



# *Case Study on the Role of Women in Rural Transport: Access of Women to Domestic Facilities*

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## *Foreword*

In rural Africa it is women who bear the greater part of the transport burden. Understanding their transport patterns is a first step in aiming to reduce their onerous task. Comprehensive village-level travel and transport surveys (VLTTs) and associated case studies have been carried out under the Rural Travel and Transport Project (RTTP) to gain insights into the travel patterns of rural people and assess the potential for, and constraints to, sustainable improvements in the level of access of rural populations in SSA to economic (particularly agricultural) and social services. The case studies focus on the role of intermediate means of transport in improving mobility and the role of transport in women's daily lives. This case study assesses the link between transport and the provision of water supply, woodlots, and grinding mills - referred to as domestic facilities.

In general, the transport efficiency of rural households can be enhanced in two ways: by increasing mobility through improvements in the rural transport system (better roads and footpaths and the use of intermediate means of transport); and by locating facilities and services closer to people to reduce the distance that they need to travel. Recognizing that in many of the poorest areas of rural Africa, domestic travel (for water, firewood and food processing needs) accounts for the major share of women's transport burden, this study explores the impact of provision of such facilities as water supply, woodlots, fuel efficient stoves and grinding mills on women. The author asserts that in order for these interventions to have a long-term positive impact on women, women have to be involved in all stages of planning, from the selection of priority interventions to planning for implementation and subsequent maintenance.

The RTTP is a component of the Sub-Saharan Africa Transport Policy Program (SSATP). The general objective of the SSATP is to help governments improve transport policies so as to enhance the efficiency of transport services, and to ensure that they are sustainable. Due to the lack of an existing policy framework for rural transport, the RTTP combines research with dissemination through country policy and strategy development, and lends support to pilot projects aiming at raising awareness of the transport needs of rural households and to devise effective ways to alleviate their transport burden. The lessons that are learned will be shared with policy makers, planners and administrators in and outside the region.

The RTTP has supported the development of country strategies (Madagascar, Ghana, Ethiopia, Uganda, Tanzania), and has produced a comparative review of rural transport policies<sup>1</sup> as well as thematic and policy papers dealing with rural road strategies<sup>2</sup> and intermediate means of transport<sup>3</sup>. The country specific work as well as the above-mentioned surveys will provide the basis to prepare guidance papers on key aspects of rural transport strategies. This will support the drive to address the transport needs of rural households and, more generally, to develop rural infrastructure services in Africa.

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1 Gaviria, Juan. 1991. Rural Transport and Agricultural Performance in SSA: 6 Country Case Studies. Washington, D.C.: The World Bank (AFTIN).

2 Riverson, John et al. 1991. Rural Roads in Sub-Saharan Africa Lessons from World Bank Experience. Washington, D.C.: The World Bank (AFTIN).

3 Riverson, John and Steve Carapetis. 1991. *Intermediate Means of Transport in Sub-Saharan Africa: Its Potential for Improving Rural Travel and Transport*. Washington, D.C. The World Bank (AFTIN).

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## *Acronyms*

AFTES	Africa Technical Department, Environmentally Sustainable Development Division
BRALUP	Bureau of Research and Land Use Planning
CIDA	Canadian International Development Agency
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IfR	Institut für Regionalwissenschaft der Universität
ILO	International Labor Organization
IMT	Intermediate Means of Transport
IRA	Institute for Resource Assessment
kpc	Kilograms per capita
Ksh	Kenyan shilling
lcd	Liters per capita per day
RTTP	Rural Travel and Transport Program
SDC	Swiss Development Cooperation
SIDA	Swedish International Development Authority
SSA	Sub-Saharan Africa
SSATP	Sub-Saharan Africa Transport Program
USAID	United States Agency for International Development
VLTTs	Village-level Travel and Transport Surveys

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## *Executive Summary*

Reducing the transport burdens of rural women, in Sub-Saharan Africa (SSA), would release time and energy for productive and socially beneficial activities. This case study investigates the magnitude of the transport burden incurred in order to obtain access to domestic facilities - collection of water and firewood, and carrying of crops to the grinding mill. The objective of the paper is to assess the impact of "non-transport interventions" to improve access to these facilities on the utilization of time and energy by rural women. "Non-transport interventions" include the installation of improved water supplies, the development of community woodlots, the promotion of more efficient wood-burning stoves, and the establishment of crop-grinding mills.

The study confirms that in SSA it is the women, assisted by their daughters, who are responsible for water and firewood collection and for travel to the grinding mill. By examining data from four household surveys in Ghana, Tanzania and Zambia, the study shows that these domestic transport activities are both time-consuming and burdensome. Water, firewood and crops for grinding are transported predominantly by women on foot, the load normally being carried on the head.

The time spent by an average household on domestic transport activities ranges from 1,150 to 1,490 hours per annum, the latter figure being close to the effective hours that a full-time employee in the industrial world would expect to work. These figures equate to a time input for an average adult female ranging from just under 1 hour to just over 2 hours 20 minutes every day. The transport effort for an average household ranges from about 46 to 82 ton-km per annum. This equates to an average adult female carrying a load of 20 kg over a distance of 2.5-6.8 km every day. In three of the four areas, domestic demands account for 47-63 percent of the time, and 89-92 percent of the human energy, dedicated to transport.

Water and firewood collection account for the major part of the domestic transport burden, although the distribution of the burden depends on the level of access to the different facilities. The larger the number of adult females per household, the smaller the amount of time and effort dedicated to domestic travel (and other household work) per woman.

The evidence suggests that, up to a walking distance of about 15 minutes or 1 km, the consumption of water per household member does not vary with level of access. However for poorer levels of access, when collection of water becomes a real problem, consumption decreases with increasing distance to the water source. Thus, the time and effort spent on water collection depends on the distance to the source and the size and composition of the household, but for longer distances there is a degree of compensation for the greater time and effort involved by reduction in the level of consumption.

Households within the same study area, but with varying levels of access to firewood and grinding mills, did not display in most cases any variation in trip frequency or level of consumption per capita. However, in Zambia, there was some evidence that the use of a grinding mill related to the level of access.

The transport burden of firewood collection depends on:

- (i) Where the firewood is collected - if it is collected from, or close to the cultivated fields, firewood collection can be combined with trips for agricultural activities.
- (ii) The agro-ecological zone which influences rainfall, tree species available and agricultural practices, and, together with population density and settlement pattern, is the main determinant of how far people have to travel to a source of firewood.

- (iii) The cooking techniques and food culture of an area. Firewood consumption for cooking does not vary significantly with household size, but firewood used to heat water is likely to be higher for a larger household.

Almost all households travel to a grinding mill. The time and effort involved is directly proportional to the distance to the mill, but depends also on household size and food culture.

It is clear from this analysis that domestic transport needs to focus seriously on the issue of women's time and effort, and that improved access could potentially free up considerable resources for other more productive and welfare-enhancing activities, and/or allow for increased utilization of a facility which is conducive to household welfare. However, it is clear from an analysis of the experience of projects concerned with "non-transport interventions" that this potential is often not realized. The evidence indicates that:

- (i) Well-designed rural water projects which provide reliable, all-year-round supply of potable water closer to home than the natural source, reduce the time and effort spent per household per day on water collection. The saving can be up to 2 hours per day, depending on the relative locations of the old and new sources and the size of the household.
- (ii) Similarly, well-designed woodlot schemes can reduce the time and effort spent on firewood collection, although this is a long-term benefit since woodlots take several years to mature and produce cooking fuel.
- (iii) The introduction of improved wood-burning stoves can reduce firewood consumption by 30 percent, with an equivalent reduction in the time and effort spent on collection.
- (iv) The provision of grinding mills closer to the home reduces the transport burden related to this activity when households are using a more distant mill. If households switch from traditional pounding to use of the mill, there is an increase in the transport task, but an overall reduction in the burden of the activity, particularly in terms of energy usage.

However, in many cases, projects have had limited impact on the transport burdens of rural women. Specific examples include:

- (i) Water supply projects where the improved source is no more accessible than the traditional source.
- (ii) Woodlot projects which focus on the production of timber for commercial use rather than domestic use.
- (iii) "Improved" stoves which are inappropriate to the local food preparation culture.

A common theme which underlies many of the projects which have had only a limited impact is the lack of involvement of women in their design and implementation. There is very strong evidence that, if such projects are to have an impact, their design must be based on an understanding of the local situation of women; must incorporate the expertise, knowledge and perceptions of women on the water and firewood collection, cooking and crop processing tasks; and must substantially involve women in their implementation. A series of measures have been defined to ensure the full and effective participation of women in all aspects of project design and implementation.

The review of project experience also highlights the need to:

- (i) Define clearly in the design of water supply projects the extent to which the aim is:

- (a) to provide better quality water; and/or
  - (b) to improve the access to water;
- (ii) Define in the design of "non-transport intervention" projects the intended effect on the time and effort spent by women on the task, including the transport component of that time and effort.
  - (iii) Develop a better understanding of the actual impact on time and effort spent on the task; and how the freed-up time and energy resources are used, leading to the more discriminating monitoring and evaluation of such interventions.

The available evidence on the reallocation of time and energy resources freed-up as a result of interventions which reduce the transport burden of rural women in SSA is complex. It suggests that, because of their many and complex responsibilities, women will devote their freed-up time and energy to social reproduction tasks, with their attendant social and welfare benefits, and to productive activities such as agriculture and income-generation. Increasing their leisure time appears to be a low priority for rural women in SSA. However, the choice as to whether to devote time and energy to productive or reproductive activities depends on a range of factors which relate to the perceived state of well-being of the household, control over income within the household, and the extent to which there are other constraints on productive activities.

# 1. Introduction

## 1.1 Background to the Case Study

In Sub-Saharan Africa (SSA), reducing the transport burden for rural women would release time and energy for productive and socially beneficial activities. This case study investigates the magnitude of the transport burden incurred in order to obtain access to domestic facilities, and the ways in which improvements in access to these facilities can alleviate this burden. It is specifically focused on the transport elements related to water and firewood collection, and to the use of grinding mills for food processing.

The case study forms part of the Rural Travel and Transport Project (RTTP) of the World Bank-financed Sub-Saharan Africa Transport Policy Program (SSATP). The SSATP is a major research program covering transport in SSA. One aspect of this research program is the RTTP, which is designed to focus on transport at the local level where it has the most direct influence on economic (particularly agricultural) and social development in the rural areas of SSA. One of the key aims of the RTTP is to recommend approaches for the improvement of rural transport services and for the adoption of intermediate means of transport to increase personal mobility and agricultural production.

This research was conducted using Village-Level Transport and Travel Surveys (VLTTs) and related case studies. The World Bank has commissioned the International Labor Organization (ILO), in collaboration with I.T. Transport, U.K., to execute the VLTTs and the related case studies under the RTTP.

## 1.2 General Objectives of the Case Study

The objective of the case studies is to investigate two key aspects of rural mobility and accessibility focusing on:

- (i) The role of intermediate means of transport (IMT) in improving mobility, and the institutional and implementation policy requirements necessary to develop the use of IMT.
- (ii) The role of transport in women's daily lives - given that a major part of the transport burden falls on women in addition to their substantial agricultural and domestic responsibilities - and the impact upon women of improvements in mobility and accessibility.

This case study investigates in detail travel patterns in SSA for access to domestic facilities, with a special focus on the transport of water, firewood and of crops to grinding mills. The main objective of the report is to assess the impact of interventions to improve access to these facilities on the utilization of time and energy by rural women.

Studies already carried out in SSA indicate that women are primarily responsible for the collection of water and firewood, and for the processing of food crops for domestic consumption. The studies also show that the transport elements of these tasks are time-consuming and involve considerable physical effort. The principal means of transport for rural women and children performing these activities is walking, with loads carried on the head.

There are two approaches which have potential to substantially reduce the transport burden (in terms of time and effort) on rural women in SSA in relation to these domestic tasks.

- (i) To utilize more efficient means of transport, and in particular intermediate means of transport (IMT) which can:
  - (a) reduce travel time per trip;
  - (b) enable a person to increase the load per trip, thus reducing the number of trips to be made; and
  - (c) transfer the load-carrying effort to a vehicle, thus reducing the human energy input.
- (ii) To develop the network of facilities in order to reduce travel distances, and hence to reduce trip time and effort. Such interventions, which are collectively known as 'non-transport interventions', include:
  - (a) installation of improved water supply systems which provide reliable, all-year-round access to potable water;
  - (b) development of community woodlots (and also the promotion of improved cooking stoves which reduce the demand for firewood); and
  - (c) establishment of crop grinding mills at village level.

Other components of the VLTTTS and related case studies examine in more detail the role of IMT. This case study focuses on non-transport interventions.

### ***1.3 Scope of Work***

The main purpose of the study is to review available documentation on projects in SSA concerned with the provision of domestic facilities in order to derive findings on their impact on the time and energy utilization of rural women.

The report has been structured to assess:

- (i) Travel patterns of rural households for access to:
  - water;
  - firewood; and
  - grinding mills.
- (ii) Impact of non-transport interventions in terms of:
  - travel patterns for the activity; and
  - reallocation of time and energy saved.
- (iii) Key considerations in project design to achieve:
  - positive impacts on reducing the transport burden of rural women; and

· productive, or socially beneficial, utilization of savings in time and effort spent by women on the activity.

## **1.4 Study Methodology**

This case study has been carried out through desk research reviewing the available documentation on access of women to domestic facilities.

The first part of the report is based primarily on four surveys on transport and travel patterns carried out by GTZ, ILO, and World Bank in conjunction with I.T. Transport in Ghana, Tanzania (Makete and Tanga), and Zambia. The advantage of using these four surveys is that the study methodology was very similar in each case, allowing for a close comparison of findings and for the derivation of general conclusions on transport demands and patterns for the SSA-region. Complementary findings from other surveys are included as well.

The remaining parts of the report draw upon the findings of studies and project documents on the impact on rural women of water supply, forestry, stove, and grinding mill programs.

## **1.5 Structure of Report**

The chapters of the report are organized as follows:

Chapter 2 analyzes the existing travel patterns of rural households in the four study areas, and quantifies the time and effort spent on transport by activity and gender. The main focus is on travel patterns relative to water and firewood collection and the use of grinding mills.

Chapter 3 studies the experiences from projects concerned with the provision of domestic and subsistence facilities on the utilization of time and effort by rural women. It involves a review of available documentation on water supply, woodlot, cooking stove, and grinding mill projects.

Chapter 4 focuses on ways to stimulate rural women's participation in programs to alleviate their domestic burden.

Conclusions on the three subjects examined are drawn at the end of the relevant chapters.

## 2. *Travel Patterns for Access to Domestic and Subsistence Facilities*

Four surveys on transport demand have been chosen to serve as a sample of rural travel patterns in SSA:

Ghana covering Volta, Ashanti and Northern regions.<sup>1</sup>

Makete district in the Iringa region of Tanzania.<sup>1</sup>

Tanga region of Tanzania, covering Muheza and Handeni districts.<sup>2</sup>

Zambia Kasama district of Northern province.<sup>3</sup>

Although there were some differences in the survey details and the data compilation, the survey methodology was essentially the same for the four studies, allowing for close comparison of the results.

The selection of survey villages in all study areas was made so as to obtain a representative cross-section in terms of population, access to facilities and distance from the villages to local centers and to the main roads.

### 2.1 *Characteristics of Survey Areas*

Table 2.1 summarizes the characteristics of the survey sample in each survey. In Ghana, the survey was carried out in three different regions, each representing a separate study area. The three study areas covered the three main environmental and terrain conditions in Ghana - the coastal zone in the South, the forest zone, and the northern savannah zone. Three villages, in the Volta region, three villages in the Ashanti region, and two villages in the Nanumba district of the Northern region were surveyed. A total of 51 households were interviewed.

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<sup>1</sup> Barwell, Ian and Christina Malmberg Calvo. 1989. *The Transport Demands of Rural Households in Makete: Findings from a Village-level Travel Survey*. Geneva: ILO.

<sup>2</sup> Barwell, Ian and Ian Leggett. 1986. *Study on Promotion of Rural Transport in Tanga Region*. Two volumes: Main report and Annexes. Eschborn, Germany: GTZ.

<sup>3</sup> Airey, Anthony and Ian Barwell. 1991. *Village-level Transport and Travel Surveys and Related Case Studies. Report on Interim Analysis of First Village-level Survey in Zambia*. Geneva: ILO.

**Table 2.1: Survey Sample Characteristics by Survey Area.**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>	<b>Total</b>
Type of survey area	country	district	region	province	-
Type and number of study areas	3 regions	4 local centers	2 districts	1 district	-
Number of villages surveyed	8	19	6	4	37
Number of households interviewed	51	431	118	169	769

Makete district is located in south-western Tanzania in mountainous and undulating terrain. On its western side, it is bordered by a steep escarpment dropping down to Lake Nyasa. The climate is temperate with high rainfall. It is an agricultural area which can be characterized as quite inaccessible and poor. The survey was carried out in 19 villages in four different study areas of the district. A total of 431 households were interviewed.

Tanga region is situated along the coast in north-eastern Tanzania. It is a heterogeneous region with variations in physiography, climate, agriculture, and population, all of which influence transport patterns. The survey was carried out in two study areas in Muheza and Handeni districts. Muheza encompasses flat and mountainous terrain and receives high annual rainfall, while Handeni is relatively flat and dry. One hundred and eighteen households were interviewed in 6 villages.

The survey in Zambia was carried out in the Northern province, in the north-eastern part of Kasama district, in the watershed of the Chambeshi river. The Tazara railway runs through the district and services the area. One hundred and sixty-nine households were interviewed in four different villages. The settlements in the villages are scattered and spread out over large areas.

The surveys adopt different area approaches - Ghana is an amalgam of three different regions, Makete is an intensive study limited to one district, Tanga is a survey of a region represented by two districts, and Zambia is a study of a district in the Northern province - and the survey samples vary in size, from 51 households interviewed in Ghana to 431 in Makete. The decision was made therefore not to accumulate the data to produce weighted averages in the analysis, but rather to compare the results of the surveys.

There are significant variations in household size in the four survey areas influencing travel patterns. Table 2.2 shows that the average household size in Ghana was 11.4, twice the size in Tanga (5.7), and more than double the number of people per household in Makete (5.0) and Zambia (4.6). Large households make more trips, spend more total time on travel and carry higher total loads than smaller households. Direct comparisons between total figures therefore become less meaningful. However the proportion of time dedicated to the various transport activities, the division of the transport burden within the household, and the benefit from travel and transport efficiency, can be gainfully compared and analyzed.

Finally, it should be noted that the data presented and the comparisons made should not be considered as providing precise data on travel patterns either in the specific surveys or regarding SSA as a region, but rather as indicating the significance and general characteristics of different transport activities.

**Table 2.2: Demographic Characteristics of Average Survey Household by Survey Area**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>
Average household size	11.4	5.0	5.7	4.6
Average no. adults per household	6.5	2.5	2.7	2.5
Average no. adult women per household	3.1	1.3	1.4	1.2

## 2.2 Overview of Household Travel and Transport Patterns

### *Travel Patterns*

In order to assess the relative transport burden for access to domestic facilities, travel patterns in the study areas have been separated into three main categories:

- (i) Domestic travel: This travel category is associated with the daily reproduction needs of the rural household. The three main domestic travel purposes are to collect water and firewood, and to process food at a grinding mill. All these activities are frequent and involve significant load carrying.
- (ii) Agricultural travel: This category is associated with the productive (cash and subsistence) activities of the rural household. It includes travel for crop cultivation (clearing, preparing, planting, weeding, crop protecting), and movement for the supply of farm inputs, crop harvesting, and crop marketing. Travel for agricultural production is conditioned by the existing farming systems and varies with the agricultural calendar. The main load-carrying task stems from crop harvesting.
- (iii) Travel for access to services and social purposes: the main service facilities used are for health purposes and for the purchase of household items at shops and public markets. Social travel includes attendance at village and church meetings, and visits to relatives and friends inside and outside the village. The four surveys differ somewhat in data collection on travel for social purposes. However, this does not significantly influence the results.

Table 2.3 presents a summary of travel characteristics of the average household in each survey area. It details:

- (i) The number of trips per household per annum by travel category - trips for domestic purposes are carried out regularly throughout the year with some variation for dry and wet seasons, while agricultural travel is concentrated at certain periods of peak activity.
- (ii) Time spent per household per annum by travel category - the data includes only the travel element of the activities, e.g. in the case of grinding (domestic travel) only the time it takes to travel to and from the mill has been included. Time spent queuing, grinding or in social conversation at the mill has been excluded.

- (iii) The effort devoted to transport per annum by travel category - the load-carrying effort is calculated in tonne-km. (One tonne-km is the effort involved in moving a 1 tonne load over a distance of 1 km. Thus, the movement of a 20 kg load over a 3 km distance 900 times in a year corresponds to an effort of 54 tonne-km.) For trips made on foot, which include almost all domestic travel, distance is derived from trip time data assuming a walking pace of 5 km per hour. The speed is clearly influenced by the age and general condition of the person as well as the condition of the road or footpath, the terrain, and the weight of the load. An average speed of 5 km per hour is considered reasonable and has been applied.

The data in the table underestimates, to a certain extent, the total number of trips, and the total time and effort that rural households dedicate to transport, as some of the surveys exclude travel for school, church, building materials, etc. Further, the load-carrying effort has not been included in the travel for access to the services and social purposes category as it is relatively small compared to the other categories. The surveys were designed to focus on key transport purposes so as to permit an assessment of the general transport patterns of rural households.

The figures in the table should be treated with a degree of caution. Since the figures are based on averages for each study area, they conceal significant variations in the transport burden for households and villages with different levels of access within the areas. Again, the main purpose of the table is not to serve as a precise quantitative analysis of household transport activities, but rather to illustrate the relative magnitude of household resources in terms of time and energy that are devoted to domestic transport.

The survey results suggest that:

- (i) Domestic travel accounts for the highest frequency of trips in all of the areas. Trips for domestic purposes range from 59 percent of all trips in Ghana to 77 percent in Zambia. Daily, in Ghana an average 6.8 trips are for domestic purposes. In Makete, Tanga, and Zambia, on average, 3 to 3.9 trips per day are for domestic purposes. This difference in the number of trips is a reflection of the larger household size in Ghana.

*Table 2.3: Summary of Household Travel Characteristics (for average household in each survey area)*

	<b>Ghana</b>	<b>Makete (Tanzania)</b>	<b>Tanga (Tanzania)</b>	<b>Zambia</b>
No. of household/villages surveyed	51/8	431/19	118/6	169/4
1. Trips per household by activity (no. p				
1.1 Domestic travel <sup>b</sup>	2,487 (59%)	1,121 (63%)	1,103	1,447 (77%)
1.2 Agricultural travel <sup>c</sup>	1,604 (38%)	415 (23%)	NC <sup>h</sup>	208 (11%)
1.3 Travel for access to services and social	153 (4%)	237 (13%)	NC <sup>h</sup>	220 (12%)
1.4 Total household trips	4,244 (100%)	1,773 (100%)	NC <sup>h</sup>	1,875 (100%)
2. Time per Household by activity (hrs p				
2.1 Domestic travel	1,490 (31%)	1,155 (47%)	1,338 (67%)	1,120 (63%)
2.2 Agricultural travel	2,884 (60%)	866 (35%)	663 <sup>f</sup> (33%)	330 (19%)
2.3 Travel for access to services and social	432 <sup>e</sup> (9%)	454 (18%)	NC <sup>h</sup>	318 (18%)
2.4 Total household time spent on tra	4,806 (100%)	2,475 (100%)	2,001	1,768 (100%)
3. Effort per household by activ (tonne-km per annum)				
3.1 Domestic travel	82 (38%)	76.7 (89%)	76.9 (89%)	45.6 (92%)
3.2 Agricultural travel	134 (62%)	9.8 (11%)	7.7 <sup>g</sup> (11%)	3.9 (8%)
3.3 Total household effort spent of tra	216 (100%)	86.5 (100%)	84.6 (100%)	49.5 (100%)

- a. Only the travel components of the activities have been considered, not the time at the water source, in the field or at the market.
- b. Domestic travel activities - water, firewood, grinding mill.
- c. Agricultural travel activities - crop cultivation, movement of farm inputs, crop harvesting, crop marketing.
- d. Travel for access to services for social purposes - health, market, social trips (inside and outside village).
- e. Excludes social travel.
- f. Only travel for crop production and harvest.
- g. Only transport of harvest from field to home.
- h. Not recorded category.

- (ii) Domestic travel is also the most time-consuming category in three of the four survey areas. It ranges from 31 percent in Ghana to 63 percent in Zambia. (Tanga has been excluded from this comparison as it did not measure "Travel for Access to Services and Social Purposes.") In Ghana, 60 percent of all travel time is for agricultural purposes while agricultural travel only accounts for 19 percent of the total time dedicated to travel in Zambia;
- (iii) The total time spent per day on travel per household varied greatly with household size, relative access to social and economic facilities, and agricultural seasons. In Ghana, the typical household had 11.4 members and spent 13.2 hours on transport daily. In Zambia, where the households had on average 4.6 members, travel accounted for 4.8 hours, in Makete 6.6 hours and in Tanga 5.5 hours.
- (iv) Domestic travel accounts for an overwhelming proportion of the effort dedicated to transport in three of the four study areas. Approximately 90 percent of all energy spent on load carrying in Makete, Tanga and Zambia involves the movement of water, firewood or food for grinding. In Ghana, on the other hand, domestic travel "only" accounts for 38 percent.

### ***Responsibility within the Household***

In many countries in SSA there is a traditional division of responsibilities within the households with regard to transport. Men are responsible primarily for trips requiring travel outside the village and with the exception of marketing, travel which does not include the movement of a load. In fact, all the surveys indicate that the transport task is performed by a woman in most cases when a load is to be moved. The transport tasks in and around the village related to domestic and subsistence activities fall mainly on women, and to a certain extent, on children. During periods of peak agricultural activities, children frequently increase their participation in domestic transport activities. This enables women to spend more time on agricultural activities.

Small boys and girls both assist in the various transport activities. However, it is predominantly the older girls who assist their mothers in the domestic transport chores. Older boys are reluctant to fetch water or go to the grinding mill as these are considered women's tasks. Moreover, headloading, which is the predominant means of transport, is perceived to be women's work.

Table 2.4 shows how the responsibility for travel is shared between household members.

- (i) Measured in time, women account for about 65 percent of all transport activities of the rural household.
- (ii) Measured in effort, women's role in rural transport is even greater, accounting for 66-84 percent of all energy expended on transport.
- (iii) The responsibility for domestic travel activities in all four study areas falls largely on women. The participation rate of women for domestic carrying purposes ranges from 96 percent in Zambia to 71 percent in Ghana.
- (iv) In Ghana, children account for a relatively higher proportion of domestic travel than in the other areas - 24 percent as compared to 3 percent in Zambia and 14 percent in Makete.

**Table 2.4: Division of Transport Responsibilities in a Typical Household (percentage)**

	Ghana			Makete			Tanga <sup>b</sup>			Zambia		
	F <sup>a</sup>	M <sup>a</sup>	O <sup>a</sup>	F	M	O	F	M	O	F	M	O
1. Domestic transport												
1.1 Time	70	6	24	80	6	14	86	13	NC	96	1	3
1.2 Effort	71	6	23	87	7	6	86	13	NC	96	1	3
2. Total transport												
2.1 Time	63	24	13	67	22	12	NC	NC	NC	66	NC	NCN
2.2 Effort	66	19	15	84	10	6	NC	NC	NC	72	NC	C

- a. The category F is female adult (women). The category M is male adult (man). The category of "other" includes all combinations of women and men, women and children, children alone, men and children or the entire family.
- b. Children were not identified as a separate entity in Tanga for all travel categories, but were sometimes coded into their respective gender. As a result the data may be over-estimating the participation rates for women and men in the Tanga study.

Thus women in all the survey areas are responsible for the majority of rural transport. Their participation rate is further increased for activities which involve load carrying, and for domestic travel, which is the largest travel category. These findings indicate that it is important to pay special attention to the role of women when dealing with rural travel in general and with domestic transport in particular.

## 2.3 Water Collection

### *Sources of Water*

The most common sources of water in all four survey areas are natural streams, springs and rivers. In Ghana two of the eight villages (25 percent) surveyed had access to a dam for domestic water, and five (62 percent) had access to boreholes (see Table 2.5) In one of the villages there were four boreholes although one was not operational due to a defective pump. Yet, in these villages, many households continued to rely on streams and rivers. This reflects the fact that each village is comprised of several scattered settlements, and that time constraints compel women to give priority to convenience rather than to water quality. In the dry season, some boreholes dry up-as a result, households have to collect water from more distant sources. Thus, different sources are relied upon in the seasons.

**Table 2.5: Percentage of Villages Using Different Water Supply Facilities in Survey Areas<sup>a</sup>**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>
Borehole	62	0	0	0
Dam	25	0	0	0
Piped water	0	10	33	0
Well	0	0	33	75
Stream/river/spring	62	100	100	100

a. Total exceed 100 percent because many villages use more than one type of water supply.

Virtually all households covered in the Makete survey fetch their water from natural streams and springs. Makete district receives high levels of precipitation and natural water sources rarely dry up. During the rainy season 1 percent of the households surveyed collect rainwater from iron sheet roofs. This partially eliminates the transport element of collection in this period because the households can reduce trip frequency. However, the vast majority of households have thatched roofs, and of the 22 percent which had an iron roof, only 2 percent had the proper rainwater collection equipment. One tenth of the villages had, in theory, had access to piped water. However, the pipes were often damaged which rendered the system ineffective. The situation is similar in the Tanga survey area where one-third of the villages have access to an unreliable piped water system. When improved water supply systems break down or dry up, people return to their traditional sources.

Access to water is a big problem in Tanga, particularly in the dry season. Shallow wells and small streams dry up and people have to travel to distant streams. In one village, more than half of the households purchase water from vendors during this period. At times, the water is delivered to the homes, commonly using a wheelbarrow. At other times, it is purchased at the source where the vendor has extracted it by digging a hole in the river bed. In this case, purchase of water does not eliminate the transport burden of water collection.

In the Zambia survey area, where access to water is relatively easy, about two-thirds of the households collect water from natural sources and one-third use wells. In the three villages that have wells, 50 percent or more of households continue to collect water from streams and rivers, reflecting the scattered settlement pattern. Thus, even if a village has an improved water facility, many households will continue to get their water from the streams and rivers if these are closer to their homes.

### ***Trip Patterns***

Table 2.6 details the characteristics of travel for water collection. Headloading is the predominant means of transport for water in all the study areas. Typically, on any trip, 16 to 20 liters of water are carried. Water is transported in clay pots, calabashes, plastic buckets, tins, or jerrycans. A plastic bucket weighs very little, but a clay pot can weigh up to 4-5 kg. During the dry season, two households in Tanga (2 percent) used bicycles to transport water from a faraway source. In Zambia, one household occasionally used a wheelbarrow to ferry water.

Trip frequency in the survey areas is by and large constant throughout the year. This suggests that the amount of water collected per household does not change with the seasons, although the water source may differ. In other words, the households are accustomed to consuming a certain amount of water, and, in the

dry season, rather than reducing their consumption, they will increase the time and effort dedicated to the task.

Although the data from Ghana only shows the average distance to water, households reported having to use different sources of water in the dry and in the wet season. Interviews with key informants in the study areas indicated that households dedicate more time and energy to water collection in the dry season than in the wet season. In Tanga, the average walking time to water is 29 minutes in the wet season and 43 minutes in the dry season. A contributing factor to the reduction of time in the wet season is that many households farm intensively at this time, and in Handeni district, often move to live on land with nearby streams.

Sixty-two percent of the villages in Ghana had boreholes, on average 1.8 working boreholes per village. Yet, as shown in Table 2.6, the average trip to the boreholes takes 15 minutes. The average one-way trip in Makete takes 22 minutes and in Tanga 33 minutes. The survey area in Zambia is situated in the watershed of a major river which is reflected in the relatively short distance to water - 5 minutes.

Transport of water is a daily activity. The frequency of trips is related to the size of household and, to a certain extent, to the distance to the water source. Households in Ghana which have 11.7 members make twice as many trips (5.9) as households in Zambia with 4.6 members (3 trips). It is noteworthy that the water consumption per household member per day is 10.4 liters in both Ghana and Zambia, although the distance to water in Ghana is a 15-minute walk, compared with 5 minutes in Zambia. In Makete, where the distance to water is a 22-minute walk, consumption is slightly lower at 10 liters per person per day. However, in Tanga, where people are, on average a 33-minute walk away from water, consumption is substantially lower at 7.9 liters per day. This situation implies that when a water source is so distant that transport poses a serious demand on household labor (in Tanga), per capita water consumption can become inversely related to the distance to the water source. In Ghana, water consumption is on the same level as in Zambia despite the greater distance (15 minutes versus 5 minutes respectively), plausibly because it is still relatively close to home, and therefore the transport task is 'manageable.' This concept of a 'critical' level of access beyond which consumption declines is supported by other literature which indicates a 'critical' distance of 1 km from the home.<sup>2</sup> The difficulty of access to water in Tanga is emphasized by the fact that many households pay for water in the dry season.

Table 2.6: Characteristics of Travel for Water Collection

		Ghana			Makete			Tanga			Zambia			
		wet	ave	dry	wet	ave	dry	wet	ave	dry	wet	ave	dry	
1.Source (% of households)	Borehole	NC <sup>b</sup>			8 <sup>a</sup>			NC						
	Dam													
	Piped													
	Well										35	34		
	Stream/River				92	92					65	66		
2.Frequency	trips/day/household	5.9			2.5			2.5	2.45	2.4	3.0	3.0	3.0	
	trips/day/household/member	.52			.50			.44			.65			
3.Trip time	One way (minutes)	15			21	22	24	29	33	43	5	5		
	Total per day (hours)	3.0			1.8			2.7			.5			
4.	Weight/trip (kilograms)	20			20			18			16			
5. Amount per day (liters)														
	5.1 Per household	118			50			44			48			
	5.2 Per household member	10.4			10.0			7.7			10.4			
6. Transport efficiency of water Collection (liters/hour)		39			28			16			96			
7. Means of transport used (% of households)														
	Walk	100			100	100		98			100	98		
	Wheelbarrow										2			
	Donkey													
	Bicycle							2						

a. Assuming that 75 percent of the households in the two villages which have piped water use the piped water source.

b. Not recorded category.

Table 2.7 presents data on the total time dedicated to water transport. The data are averages for all study areas in each survey, and they conceal large differences in the time devoted to water collection in the various villages. The difference in time spent on transport for four villages in two separate study areas of Makete district was from 565 hours per annum to 767 hours. The effort involved in transporting the water displayed a similar spread - 27.8 tonne-km to 36.7 tonne-km. Trip frequency was much less variable, showing only a 6 percent difference. Assuming that the load was constant, (which is a reasonable assumption in Makete where the vast majority of people transport water in 20 liter plastic buckets), this confirms that water consumption per person is rather constant throughout an area, and that the time and effort households spend on water transport would drop with improved access.

### ***Responsibility within the Household***

Table 2.8 summarizes the participation rates of different household members - females, children, and males. The results show that adult females, assisted by children, are largely responsible for water collection. This pattern is common to all four survey areas, i.e. women transported 67-90 percent of all water for domestic consumption. The participation rate of children is higher in Ghana, 28 percent, than in the other surveys, 8-16 percent.

Only the Makete data does show different participation rates for time and effort, recognizing that adults frequently transport heavier loads than children. In Makete, the typical load for children was estimated to be half that of an adult, that is 10 kg in the case of water. As a result, in Makete, the females' participation rate when measured in terms of time is 79 percent and in terms of effort 86 percent.

Men were rarely involved in water collection for domestic purposes. They transported water only in cases where there was no female member of the household, in the dry season in Tanga and Ghana when water was very distant, or when the man was a commercial water vendor. In these instances the load was carried on a bicycle or in a wheelbarrow.

The total input per adult female to water transport for the respective surveys is recorded in Table 2.9. The range of the averages is from 135 hours per annum (22 minutes per day) in Zambia to 565 hours (93 minutes per day) in Tanga. The load-carrying effort ranges from 4.4 tonne-km per annum (12 kilo-km per day), to 24.7 tonne-km (68 kilo-km per day) respectively. The figure of 24.7 tonne-km per day is equivalent to carrying a 20 kilo load over 3.4 km per day.

### ***Summary***

The key findings on water collection from the four survey areas are as follows:

- There is no significant variation between the wet and the dry season as regards the average number of times that water is collected daily; hence the amount of water collected is constant.
- The time dedicated to water transport is higher in the dry season in more than half of the study areas. Trip frequency is constant, but the distance to the source is longer. This is a reflection of the importance of water as most households dedicate more time and effort to water collection, rather than reducing their level of consumption.
- The average time spent per day per household ranges from 30 minutes to 3 hours depending on the size of the average household and the distance to the water source. (175-1,080 hours per annum).

**Table 2.7: Annual Transport Demand for Water**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>
1. Trips per annum (no. of round trips)				
1.1 Average for survey	2,155	908	894	1,095
1.2 Range of averages of study areas	1,708-2,065	786-1,154	730-1,204	NA <sup>a</sup>
2. Time per household (hours per annum)				
2.1 Average for survey	1,080	644	989	175
2.2 Range of averages of study area	770-1,227	565-767	593-1,368	NA
3. Effort per household (tonne-km per annum)				
3.1 Average for survey	54	31.2	43.2	5.7
3.2 Range of averages of study areas	38-64	27.8-36.7	27-62	NA

a. Not applicable - only one study area in the survey.

- Women are, with some assistance from children (mainly daughters), responsible for the transport of water.
- The typical rural woman dedicates between 22-93 minutes per day to water collection. The effort involved is equivalent to carrying a 20 kilograms load over a distance of 0.6-3.4 kilometers per day.
- Some installed permanent water supplies are unreliable. Consequently significant water supply problems can still exist in a village with such a facility.

**Table 2.8: Division of Transport Responsibility for Water Collection in a Typical Household**

	Ghana			Makete			Tanga <sup>a</sup>			Zambia		
	F	C	M	F	C	M	F	C	M	F	C	M
1. Time per annum (hours)												
1.1 Per household member category	726	302	54	510	95	39	791	168	40	158	16	2
1.2 Participation rates (%)	67	28	5	79	15	6	80	17	4	90	9	1
2. Tonne-km per annum												
2.1 Per household member category	36.29	15.12	2.70	26.87 <sup>b</sup>	2.28	2.05	34.56	6.70	1.94	5.13	.51	.06
2.2 Participation rate (%)	67	28	5	86	8	7	80	16	4	90	9	1

- a. The data collected for Tanga did not recognize children as a separate group within the household. Females accounted for 88 percent of the task and males for 12 percent. The average child participation rate for the other three survey areas is 17 percent. This rate has therefore been applied to the Tanga data.
- b. Only the survey in Makete recognized that the average load carried by children is smaller than the load carried by adults.

**Table 2.9: Input by Female Adult to Water Collection**

	Ghana	Makete	Tanga	Zambia
1. Time per female adult				
1.1 Hours per annum		236	380	135
1.2 Minutes per day		39	63	22
2. Effort per female adult <sup>a</sup>				
2.1 Tonne-km per annum		11.78	20.67	4.42
2.2 Kilo-km per day		32	55	12

- a. The figure is somewhat underestimated since it can be assumed that women carry a higher proportion of the load than children.

- Availability of an improved water source in a village does not necessarily mean improved access to water for all households. Because of the scattered nature of settlements, some households can be located kilometers away from the facility.
- Closer access through the provision of an improved water source may result in a decrease in time and effort dedicated to the task, and/or an increase in water consumption, and in all cases an increase in trip efficiency - a larger amount of water obtained per unit of time.
- The nature of the impact of an improved water supply (i.e. reduction in time and effort or increase in consumption) is likely to depend on the present level of access to water. If present access is very poor (beyond a "critical distance"), then the improved supply is likely to generate increased consumption, perhaps accompanied by a reduction in time and effort.

## 2.4 *Firewood Collection*

### *Sources of Fuel*

Firewood is the main and preferred source of fuel in all the study areas. Charcoal is also used by a small number of households in Makete and Zambia as a secondary fuel. At times, fuels such as millet or maize stalks may also be used as substitutes for firewood or charcoal. Crop residues are regarded as an inferior fuel to firewood. Charcoal is a superior, more efficient fuel but its use involves cash expenditure. The transport burden of firewood collection depends in part on the location of the source. Firewood collection on, or in the vicinity of, cultivated fields, can usually be combined with trips for agricultural purposes such as weeding or planting. This reduces a household's transport demand since the trips become "double-purpose." However, firewood collected from the bush or from elsewhere around the village generally requires a special journey.

In Ghana, firewood is obtained from fields or from forests close to the villages. In Makete, the majority of households collect firewood from places other than their farms, thus having to make special journeys. Fifteen percent of the households in Makete purchased firewood. The trees were generally bought "in the ground," that is to say, the purchasing household was responsible for their felling and transport.

In Tanga, most households get firewood from bush areas away from the fields or from nearby sisal estates. About 40 percent of the households in the survey sample collected firewood from their own cultivated fields. In the Zambia study area, firewood was obtained far away from the village—from the woodland and from chitemene fields.

### *Trip Patterns*

Table 2.10 presents data on trip patterns for firewood collection. Firewood was transported by headloading in all households interviewed except one, in Zambia, which used an ox-cart. Firewood is generally collected a few times per week and is a regular activity throughout the year although there may be some variations in trip frequency due to seasons of heavy rains, or during periods of peak agricultural activity. Households often have a store of firewood on a false floor under the roof, and some firewood for drying in the kitchen, to be used during these periods, or in the event of unforeseen circumstances.

The typical load in Ghana and Zambia is estimated to be 20 kilos, and in Makete and Tanga it is 25 kilos. According to the original data collected, households in Zambia (4.6 members) made between 6 and 7 trips per week while households in Ghana (11.7 members) go four times per week. Complementary travel diaries

in Zambia indicated that the number of trips may have been overestimated by 15 percent, which reduces the number of trips to 5.6 per week.

Firewood consumption varies with agro-ecological zones. Fuel consumption can be more than twice as high in forest areas where the firewood is relatively more easily available than in arid areas.<sup>3</sup> Experience indicates, however, that fuel consumption increases only marginally with cold weather.<sup>4</sup> Makete district, which has the coldest climate of the survey areas, and where it is reasonable to assume that firewood is also used for heating, had an average total household consumption of 11.8 kg per day, while households in Zambia consumed 16.2 kg per day. The average daily consumption of firewood per household in the survey areas ranged from 9-16.2 kg.

It is known that firewood consumption within an area increases at a decreasing rate with the size of the household. That is, per capita consumption of firewood tends to be lower the larger the rural household.<sup>5</sup> This is not surprising since firewood consumption is primarily for cooking. Although the survey areas belong to different regions of SSA, and are representative of different agro-ecological zones, the survey data confirms that larger households have lower per capita consumption of firewood. Firewood consumption was 3.5 kg per capita (kpc) in Zambia (4.6 household members), 2.4 kpc in Makete (5 household members), 1.6 kpc in Tanga (5.7 household members), and 1.0 kpc in Ghana (11.4 household members). Other factors which influence fuel consumption are the cooking stoves used, the type of kitchen utensils available, the level of food preparation, and the type of food cooked.

There are significant differences in walking distances to firewood amongst villages in a study area, between various study areas in a survey, as well as between the four different surveys. The last ranges from 38 minutes in the Tanga study areas to 98 minutes in Makete. In Makete over 50 percent of all households had to walk more than an hour to reach firewood, and 20 percent had to walk more than two hours. Within the Makete survey area the results show a slight correlation between trip frequency and access. However, in a comparison of trip frequency and access in the different survey areas, Tanga, which had the shortest distance to firewood, about 3 km, also had the lowest trip frequency, and Zambia, which had an average distance of 7.7 km, had the highest trip frequency and thus the highest household consumption of firewood.

Thus, neither household size nor distance to firewood fully explain the high level of fuel consumption in Zambia. One plausible reason may relate to the type of wood used in Zambia since tree species with low wood density or moist wood prompt higher fuel consumption.

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<sup>4</sup> Geissen, Violette. 1984. *Firewood Consumption and Related Aspects in Five Selected Villages in Lushoto District, Tanzania*. Eschborn, Germany: GTZ.

<sup>5</sup> Cline-Cole, R.A., H.A.C. Main, and J.E. Nichol. 1990. "On Fuelwood Consumption, Population Dynamics and Deforestation in Africa." *World Development Report: 1990*, 18(4). Washington, D.C.: The World Bank.

**Table 2.10: Characteristics of Travel for Firewood**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia<sup>a</sup></b>
1. Trips per day per household	.60	.47	.36	.81
1.1 Trips per day per household member	.052	.094	.062	.176
2. Trip time one-way (minutes)	43	98	38	92
2.2 Total time per day (hours) <sup>b</sup>	.86	.99	.29	2.48
3. Weight per trip (kilograms)	20	25	25	20
4. Amount per day (kilograms)				
4.1 Per household	12	11.8	9.0	16.2
4.2 Per household member	1.0	2.4	1.6	3.5
5. Transport efficiency of firewood collection (kilograms per hour)	14.0	11.9	30.7	6.5
6. Means of transport used-walk (% of households) Ox-Cart	100	100	100	99 1

- a. Travel/activity diaries of the study area indicate that trip frequency in Zambia may have been over estimated by 10 - 20 percent. Therefore, the trip frequency has been reduced by 15 percent.
- b. Total time per day takes account of the fact that when firewood was collected on fields, the time spent on transport was set to be zero since it was a dual purpose trip.

As Table 2.11 shows, Tanga which had the closest access, spent the least time and effort on firewood collection. Zambia, which had poor access to firewood, had the highest trip frequency and spent the most time and effort on the task. Where firewood was collected from, or in the vicinity of, agricultural fields the transport time has been assumed to be zero in order to avoid the double counting of household time devoted to transport. This is one contributing factor to the high transport efficiency (measured in amount per hour) in Tanga, 30.7 kg per hour. Transport efficiency was the lowest in Zambia, where firewood collection imposed a special trip, 6.5 kg per hour.

Comparing Tanga and Zambia, and keeping constant the respective level of firewood consumption in both areas, a reduction in trip distance from 98 minutes to 38 minutes in Zambia would result in a reduction of time from 905 hours per annum to 315 hours per annum. That is a reduction of 590 hours per annum or 1.6 hours per day. The effort would also be reduced considerably from 36.2 tonne-km per annum to 12.6 tonne-km.

Evidence from other studies in SSA indicate a relatively constant consumption of firewood over the year, although there may be variations in trip frequency caused mainly by seasonal fluctuations on labor demand in the agricultural calendar. One survey of Tanga region<sup>6</sup> found that women only collected fuel in the dry and cold seasons. In this area it rains for at least three months per year. Thus, if the survey figures have not been adjusted to seasonal fluctuations, there could be an overestimation or an underestimation of the level of fuel consumption, and the time and effort spent on firewood collection, depending on the time of year that data for the travel survey were collected.

<sup>6</sup> Geissen, Violette. 1984. Op. cit.

**Table 2.11: Annual Transport Demand for Firewood**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>
1. Time per household (hours per annum)	329	363	107	905
2. Effort per household (tonne-km per annum)	20	30.4	12.0	36.2

### ***Responsibility within the Household***

Female adults, with limited assistance from children, are responsible for firewood collection. In the households interviewed, women accounted for 77-93 percent of all time and all effort spent on firewood collection. (see Table 2.12). In three households in Tanga, where there were no female members, men collected firewood.

The scale of the task of firewood transport for women varies very substantially. The average time spent per annum by an adult female is 63 hours per year in Tanga, compared with 696 hours in Zambia (Table 2.13). As mentioned previously, the time dedicated to firewood transport is lower in Tanga because much of the fuel is obtained on, or close to, the cultivated fields, and thus the time is not counted. The load carrying effort per female adult is the smallest in Ghana with 5.0 tonne-km per annum. In Tanga, where households fuel consumption is the lowest, it is 6.7 tonne-km. Thus, the higher the number of females per household, the smaller the load carrying effort. In Zambia, where access is poor, the number of females per households low, and firewood consumption per household high, the load effort is 27.8 tonne-km per annum per adult female.

### ***Summary***

The key findings on firewood collection are as follows.

- Trip frequency is fairly constant throughout the year with possible exceptions for the heavy rains, or peak agricultural periods.
- Most households collect firewood two to four times per week;
- Variations in firewood consumption between areas do not appear to be closely related to average household size. The smallest household size survey area - Zambia - had the highest trip frequency and also the largest consumption of firewood per household;
- The level of firewood consumption does not appear to be closely correlated to trip distance as one of the study areas with the poorest level of access had the highest trip frequency.
- Firewood consumption does vary significantly between areas due to a combination of agro-ecological factors, type of firewood, different cooking techniques and diet, as well as cooking stoves, and cooking utensils. Thus, there is significantly more variability in demand for firewood than for water.
- The average time spent per household on firewood collection ranged from 17 minutes to 2.48 hours per day, or 107 to 905 hours per annum.

- Women are responsible for 77-93 percent of all firewood transport.
- The typical rural woman dedicates 1.2-13.4 hours per week (63-696 hours per annum) to transport of firewood with a corresponding load-carrying effort of 5-27.8 tonne-km per annum. This is equivalent to carrying a 20 kilo load over a distance of 0.7-3.8 kilometers every day.
- Closer access to firewood would significantly reduce the time and effort spent on this activity since the data indicate that there is no tendency for consumption to change significantly with level of access. Consequently trip efficiency - amount transported per hour - would increase if wood could be obtained closer to the homes or in the fields.

## 2.5 *Grinding Mills*

### *Location and Use of Grinding Mills*

Table 2.14 shows the availability of grinding mills in the survey areas. In Ghana, all villages in the sample had mills; it was also the survey area where there were villages that had more than one mill. The average number of mills in the Ghana survey was 2.9 per village, ranging from one to four working mills per village. In Makete, there were grinding mills in 40 percent of the surveyed villages. In Tanga and Zambia, only one of the villages in each survey sample had a mill - 17 percent and 25 percent of the sample respectively. According to the official number of registered grinding mills in Tanga, 50 percent of the villages have mills. This indicates that the survey villages in Tanga are less well served by grinding facilities than the rest of Tanga. However, official figures tend to over-estimate the availability of grinding facilities since some mills are likely to be out of order, or provide irregular service as a result of maintenance problems or shortage of diesel. As a result, the discrepancy between the sample villages and the rest of the area is smaller than it appears to be.

Almost all households surveyed traveled to a grinding mill or a hammer mill to process maize, cassava, wheat, millet, rice, etc. All households interviewed in Ghana and Tanga went to grind at a mill even though only 1 of the 6 villages in Tanga had a mill. The few households which did not go, in Makete and Zambia, either lacked female members or had very old household members. The alternative to going to a grinding mill is to pound the grains by hand or use a handmill. This is physically demanding, and is a time-consuming activity. Further, most households feel that the quality of the flour ground at the hammer-mill is superior. A few households in Makete had handmills, and used them occasionally, although they preferred the grinding mills.

Grinding mills can be operated by a private entrepreneur, a church, a village, or be an income-generating project. The cost of grinding frequently varies in the same area. Households tend to go to the closest grinding mill, but on occasion they are willing to walk further for reasons of cost or social/ethnic concerns. When settlements are very scattered, households from the same village may travel to different mills to grind their grain.

### *Travel Patterns*

Trips to the grinding mill are made on foot with the exception of four households in Tanga where a bicycle was used. Also, in one household in Ghana and Makete respectively, the load was carried on a donkey-the owner still walked. The typical load weighs 20 kg Most households do not grind larger amounts even when

they do not have to headload, simply because ground flour loses its taste or becomes bitter with time. For these reasons, if there is improved access, small families might consider going more frequently to grind smaller amounts.

Households tend to go to the grinding mill from two to eight times per month. As shown in Table 2.14, time distances to mills ranged from a 28-minute walk in Ghana to 1 hour and 47 minutes in Tanga. In Makete, more than 55 percent of all households are more than an hour away from the grinding mill. Households in Ghana, which are rather large, go to the grinding mill more than twice per week on average. Per capita consumption is similar for Ghana, Makete and Tanga (3.2-4.1 kg per week), but is substantially lower in Zambia (2.3 kg per week).

For Ghana, Makete and Tanga, individual households within the study area seem to have a rather constant level of per capita consumption of mill ground flour. Further, there is no evidence that the presence of a grinding mill *in the village* influences the frequency of use of the mill. However, in Zambia, milled flour consumption per person was significantly higher in villages with the closest access to a mill. Nevertheless, the effect of improved access to grinding mills would in many cases be to reduce the time and effort devoted to transport rather than to increase the consumption of milled flour.

**Table 2.12: Division of Transport Responsibility for Firewood Collection in a Typical Household**

	Ghana			Makete			Tanga <sup>a</sup>			Zambia <sup>b</sup>		
	F	C	M	F	C	M	F	C	M	F	C	M
1. Time per annum												
1.1 Per household member category (hrs)	255	46	27	281	52	29	88	12	6	842	45	18
1.2 Participation rates (%)	77	14	8	77	14	8	83	11	6	93	5	2
2. Effort per Annum (tonne-km)												
2.1 Per household member category	15.4	2.8	1.6	27	1.6	1.8	10.3	1.0	0.6	33.8	1.8	0.7
2.2 Participation rates (%)	77	14	8	89	5	6	86	8	5	93	5	2

a. The data collected for Tanga put females and children in the same category. The child participation rate assigned to Tanga is the average for the other three survey areas.

b. Number of trips per annum has been reduced in Zambia by 15 percent to reflect the evidence of over-estimation of firewood collection.

**Table 2.13: Input by Female Adult to Firewood Collection**

	Ghana	Makete	Tanga	Zambia
1. Time per female adult				
1.1 Hours per annum	82	215	63	696
1.2 Minutes per day	13	35	10	114
2. Effort per female adult				
2.1 Tonne-km per annum	5.0	21	7.4	27.8
2.2 Kilo-km per day	14	57	20	76

**Table 2.14: Characteristics of Travel to Grinding Mill**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>
Villages with mill (%)	100	40	17	25
Households using mill (%)	100	93	100	95
Frequency trips/week	2.19	.80	1.3	0.46
Trip time one-way (minutes)	28	102	107	50
Time per week (hours)	1.6	2.7	4.6	.77
Weight per trip (kg)	20	20	18	23
Amount/household/week (kg)	43.8	16	23.4	10.5
Household member/week	3.8	3.2	4.1	2.3
Transport efficiency kg/hour	27.4	5.9	5.1	13.7
Who Travels (%)				
Female	76	78	76	87
Children	23	11	8	11
Male	1	11	16	2
Means of Transport				
Walk	99	99.7	96	100
Donkey	1 <sup>a</sup>	.3 <sup>a</sup>		
Bicycle			4	

a. One household used a donkey to transport the load to the grinding mill.

For Ghana, Makete and Tanga, individual households within the study area seem to have a rather constant level of per capita consumption of mill ground flour. Further, there is no evidence that the presence of a grinding mill *in the village* influences the frequency of use of the mill. However, in Zambia, milled flour consumption per person was significantly higher in villages with the closest access to a mill. Nevertheless, the effect of improved access to grinding mills would in many cases be to reduce the time and effort devoted to transport rather than to increase the consumption of milled flour.

Transport efficiency measured in kilograms per hour is very high in Ghana (27.4 kg per hour) as the grinding mills are relatively close to the homes. Having a mill in the village does not, however, necessarily mean easy access for all households. In one study area in Makete where all villages had a grinding mill, 30 percent of households had to walk for more than half an hour to reach it. Average transport efficiency in Makete was 5.9 kg per hour, and in Tanga, which has the worst access among the survey group, 5.1 kg per hour.

Households in Tanga, spend on average, 4.6 hours per week on transport to and from the grinding mill, compared with 0.77 hours per week in Zambia. The time spent by a typical household on transport to and from the grinding mill ranges from 40 hours per annum in Zambia to 242 hours per annum in Tanga (Table 2.15).

The total effort involved in bringing crops to the mill is conditioned by the location of the mill, trip frequency, amount processed, household size, and flour consumption per household member. Bringing crops to be ground is a particularly arduous task because, unlike water and firewood collection, the load is carried in both directions. In Tanga, the household effort measured 21.7 tonne-km per annum. This is in substantial

contrast to Zambia where the effort measured 3.7 tonne-km per annum. This range of transport effort equates to carrying a load of 20 kg over a distance of 0.5-3 km every day.

**Table 2.15: Annual Demand for Transport to Grinding Mill**

	Ghana	Makete	Tanga	Zambia
Time per household (hours per annum)	81	148	242	40
Effort per household (tonne-km per annum)	8.0	15.1	21.7	3.7

### ***Responsibility within the Household***

Going to the grinding mill, just like other domestic travel activities, is women's work. (see Tables 2.14 and 2.16). In 76-87 percent of all cases, it was the woman who went to grind the grain. The typical female spent 0.38-3.54 hours per week bringing crops to be ground at a mill. This corresponds to an effort of 2-16.5 tonne-km per annum which is equivalent to carrying a load of 20 kilos over 0.3-2.3 km every day.

Children assist in the task. However trips to a mill involve the transport of a load in both directions, and in the event of it requiring travel outside the village, the effort per trip is particularly significant. Therefore, it is generally the older children who go, particularly daughters, since teenage sons may be reluctant to headload large distances as this is considered women's work. Grinding also involves the expenditure of cash which puts additional responsibility on the person who goes, and restricts participation to older children.

In circumstances where a man goes to the grinding mill even when there are females in the household, he tends to use an intermediate means of transport (IMT) if that is available, such as bicycles in Tanga and donkeys in Ghana and Makete. There is, however, no indication that the ownership of an IMT in the household results in the transfer of responsibility for the task from women to men, which is confirmed by ownership of bicycles and donkeys being higher than the male participation rate in trips to the grinding mill.

It is useful to examine the participation of children in domestic activities. In three of the four survey areas, the child participation rate is lower for going to the grinding mill (8-23 percent) and for firewood collection (10-14 percent) than for water collection (15-28 percent). As mentioned previously, trips for grinding can be long and somewhat complicated. Water, on the other hand, is fetched relatively close to the homes in the survey areas, and children of all ages go, although daughters are more involved than sons. Large quantities of water are needed on a daily basis, thus children travel together to get water. Smaller quantities of grains are processed, thus water collection is more of a "group activity" than travel to the mill. Further, the possibility of transporting a smaller amount of water is higher than for grains. To send someone to a distant grinding mill with a 5 kg load may be considered a waste of time, while small children are frequently seen ferrying water in small 5 to 10 liter containers. Thus one would expect a greater participation by children in water collection than in travel to the grinding mill.

The largest difference in child participation rates is in Tanga with 8 percent going to the grinding mill and 17 percent for water collection. The average round-trip to the grinding mill in Tanga involves more than three hours of walking with a load. Water collection in Tanga is also a relatively distant activity - on average the source is 36 minutes from home - but it is a daily activity which takes place within the village boundaries and the load is carried only on the return trip. Thus, the participation rate of children is higher.

**Table 2.16: Input by Female Adult to Transport to Grinding Mill by Survey Area**

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>
1. Time per female adult				
1.1 Hours per annum	20	91	184	31
1.2 Hours per week	0.38	1.75	3.54	0.60
1.3 Minutes per day	3	15	30	5
2. Effort per female adult				
2.1 Tonne-km per annum	2.0	9.8	16.5	2.8
2.2 Kilo-km per day	5	27	45	8

### **Summary**

The key findings on transport to grinding mills are as follows.

- Almost all households use mills, even though they may have to walk more than 2 hours to reach them. This is because the alternative of hand-pounding is very arduous and time-consuming, and flour ground at a mill is considered to taste better.
- The typical household travels on foot to the mill two to eight times per month with a load of about 20 kg. The major determinants of trip frequency are household size and food culture - and hence the demand for ground flour. The use of a larger capacity means of transport than walking would have only a limited impact on trip frequency since people will not grind grain in bulk and then store it because the taste deteriorates.
- Only in one of the four surveys does the average consumption of flour per household vary with the level of access to the mill;
- The average time spent on transport to grinding mills ranged from 40-242 hours per annum, depending on level of access and household size;
- Women were in most cases (76-87 percent) responsible for the transport of crops to the grinding mill.
- The typical female spent between 0.38-3.54 hours per week on transport for food processing at a grinding mill. The effort involved is 2-16.5 tonne-km per annum, equivalent to carrying a load of 20 kg over 0.3-2.3 km per day.
- Transport efficiency measured in kilograms per hour is highest for the area with the best access to grinding mills.
- Closer access to grinding mills would significantly reduce the transport burden of crop processing since the level of consumption does not necessarily change with the level of access. Closer grinding mills would thus increase trip efficiency (amount of processed crops per hour travelled).

## 2.6 *Conclusion*

The survey results show that travel for domestic purposes - water, firewood, food-processing at grinding mills - is the most significant category of travel in terms of frequency in all survey areas. Domestic travel activities account for 47-67 percent of all time dedicated to transport in Makete, Tanga, and Zambia survey areas, and 89-92 percent of all energy dedicated to transport in these three areas. In other words a major part of the time and effort spent on transport in these predominantly agricultural societies is dedicated to meeting subsistence and domestic needs rather than performing economic activities.

In Ghana, which is the only survey area where domestic travel accounts for a smaller percentage of total time and effort dedicated to transport, households are almost twice as large as in the other areas, access to water is relatively good (a one-way distance of 15 minutes), the distance to firewood is less than half that of the two other survey areas, and all sample villages were equipped with at least one grinding mill.

The predominant means of transport for domestic travel is walking, with loads carried on the head. In the survey areas there are a few exceptions where water is transported by bicycle or crops are taken to the mill on a donkey. In one case, firewood was transported on an ox-cart.

The trip frequency of water collection increases with household size, and, once distance becomes so large that transport is a constraint on household labor,<sup>4</sup> consumption is inversely related to the travel distance. Consequently, total household water consumption was the highest in Ghana, which had the largest number of household members, and water consumption per capita was the lowest in Tanga which had the worst access. Table 2.17 shows that in three of the four survey areas, water collection was the most time- and effort-consuming of the domestic transport activities.

The time and effort devoted to the transport of firewood ranged from 107 hours and 12 tonne-km per annum in Tanga to 905 hours and 36.2 tonne-km in Zambia. The transport burden of firewood depends on:

- (i) Where the firewood is collected. If it is collected from the cultivated fields, it is a less time-consuming activity as households do not have to make special trips - firewood collection can be combined with trips for agricultural activities.
- (ii) The agro-ecological zone which influences rainfall, tree species available and agricultural practices, and which, together with population density and settlement pattern, is the main determinant of how far people have to travel to a source of firewood.
- (iii) The cooking technique/food culture of an area, and to a certain extent, the size of the household. Firewood used for cooking does not vary considerably with household size but firewood used to heat water is likely to be higher for a larger household.

Almost all households travel to a grinding mill. The time and effort involved is directly proportional to the distance to the mill, but depends also on household size and food culture. Tanga, which has the worst access, has the highest per capita consumption. The time spent per annum on travel for grinding purposes ranged from 40 hours in Zambia to 242 hours in Tanga.

In most cases, households of varying levels of access to firewood and grinding mills within the same study area did not display any variations in trip frequency. This means that, if access to fuel and grinding mills were improved, considerable reductions could be achieved in time and effort devoted to these tasks as consumption is likely to remain relatively constant.

The responsibility for transport within households is traditionally divided along gender and age lines. Women take responsibility for shorter, high-frequency trips which involve transport of a load. Young

children participate in water collection, and older daughters in firewood collection and trips to the grinding mill. Teenage sons are reluctant to assist in activities which involve headloading since this is considered a woman's responsibility. Male participation in domestic travel activities is very rare and mainly prompted by situations where there is no female member of the household, or for a commercial purpose - the sale of water or firewood, water for cash crops or for building and construction. If men and older boys are at all involved in domestic transport, they prefer to use improved technology such as wheelbarrows, bicycles, or animal carts rather than headloading.

Although children assist in domestic travel activities, the final responsibility for ensuring that the household has adequate amounts of water, firewood and flour rests with the women. The typical adult female in the survey areas spends between 336-858 hours on domestic transport per annum, or 0.92-2.35 hours per day. The effort per adult female per day involved in the transport of domestic loads is equivalent to carrying a load of 20 kg 2.6-6.8 km every day.

The number of adult females per household was 3.1 in Ghana, and between 1.25 and 1.4 in the other three study areas. The average number of hours spent on overall transport per day for a typical female was 2.7 in Ghana, 2.5 in Zambia, and 3.4 in Makete. Research from Lesotho<sup>7</sup> indicates that the greater the number of adult females per household, the smaller the amount of time and effort dedicated to domestic travel (and other household work) per woman, and the larger the time dedicated to agriculture and social activities. The findings in the study areas confirm this as a typical woman in the Ghana study area dedicates 55 minutes to domestic travel daily (34 percent of total transport time), while in Zambia she allocates 2 hours and 21 minutes to domestic travel (94 percent of total transport time).

In one study,<sup>8</sup> 22 percent of the women cited water collection as their most enjoyable task. This may have been due to the social aspects of water collection, such as the opportunity to meet with neighbors and friends. In this study, many women noted agriculture and grinding as higher priority areas for intervention. In other places, women have cited firewood or water as their most burdensome tasks. It is advisable not to draw specific policy guidelines for an entire region on the basis of micro-level studies. However, these comments illustrate the importance of gathering sufficient base data and gaining an understanding of the most urgent needs and priorities of the local women before specific projects are initiated, in order to assure cooperation and sustainability. For example, the data presented show that access to and transport of water is a serious problem in the Tanga survey area and much less so in the Zambia survey area, while access to firewood is much more of a problem in Zambia than in Tanga.

It is clear that domestic transport needs exert serious pressure on women's time and energy, and improved access could free up considerable resources for other more productive and welfare enhancing activities, and/or allow for the increased utilization of a facility which is conducive to household welfare.

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<sup>7</sup> Feachem, Richard G. et al. 1978. *Water, Health, and Development: An Interdisciplinary Evaluation*. London: Tri-Med Books Ltd.

<sup>8</sup> Hannan Andersson, Carolyn. 1985. *Domestic Water Supply Improvements in Tanzania, Impact on Rural Women*. Dar-es-Salaam: SIDA.

**Table 2.17: Annual Domestic Transport Workload by Time and Effort**  
(for a typical survey household)

	<b>Ghana</b>	<b>Makete</b>	<b>Tanga</b>	<b>Zambia</b>
1. Time spent on transport (hours per annum per household)				
1.1 Water collection				
1.2 Firewood collection	1,080	644	989	175
1.3 Travel to grinding mill	329	363	107	905
1.4 Total domestic travel	81	148	242	40
	1,490	1,155	1,338	1,120
2. Hours per adult female per day	.92	1.89	2.22	2.35
3. Transport effort (tonne-km per annum per household)				
3.1 Water collection	54	31.2	43.2	5.7
3.2 Firewood collection	20	30.4	12.0	36.2
3.3 Travel to grinding mill	8	15.1	21.7	3.7
3.4 Total effort	82	76.7	76.9	45.6
4. Kg. km, per adult female per day	51	136	129	100

### ***3. Impact of Non-transport Interventions on Rural Women***

Data on existing patterns of women's allocation of time and energy are much more detailed than the information on the impact on women of the introduction of time- and labor-saving techniques and facilities, and the consequent reallocation of time and energy resources. In project documents, women are frequently identified as the intended beneficiaries of interventions. However, even in cases where sufficient base line data were collected before project interventions, the need to collect post-intervention data on women's travel and time distribution patterns has often been overlooked in project evaluation missions. As a result, the effects of non-transport interventions on women's time and energy use remain largely unquantified and are clearly not fully understood. This is partly because only during the last ten years has there been an explicit effort to identify and directly address women's needs and priorities in these terms.

In the subsequent sections, based on a review of project evaluation documents, related articles and existing studies, an attempt is made to assess the impact of the introduction of improved water sources, closer access to firewood, improved cooking stoves, and the provision of grinding mills on rural women.

#### ***3.1 Water Supply***

The evidence in Chapter 2 indicates that women in SSA devote a lot of time and effort to water collection. The number of hours that rural women dedicate to water collection is increasing in many areas of SSA due to low and erratic precipitation and falling water tables. Lack of water, or water of poor quality, affects family health, imposing additional burdens of child health care on women. Inadequate personal hygiene can also be related to the chronic shortage of water. Moreover, poor access to water reduces opportunities for women to raise cash and supplement diets through such activities as gardening and keeping small livestock and poultry.

Water is commonly carried on the head in containers. Over time the transport of heavy loads over large distances can result in damage to the vertebral column. A study of various carrying methods indicate that using a yoke is the least energy-consuming method of carrying water although it gives rise to more skeleton deformities than headloading.<sup>5</sup> Children who carry heavy loads also run the risk of deforming the vertebral column (scoliosis). If the load is transported on the back or the hip, the potential for bone damage to the pelvis and the back is even greater. Injuries such as twisted legs or broken ankles are also frequent due to slippery tracks and steep slopes. Further, water collection exposes women to a large number of water-related diseases, which exacerbates the nutritional and anaemic problems common to rural women.

The benefits anticipated from improved water supplies therefore have many implications for rural women:

- (i) Shorter distance to the water source means that a given amount of water can be obtained in a shorter period of time; alternatively a larger amount of water can be collected in a given time period. In other words, transport efficiency - liters per minute - increases and the effort per liter decreases.
- (ii) An increase in the quantity and improvement in the quality of the water consumed leads to improved hygiene and better health (and an indirect time saving resulting from a reduced need to care for sick persons in the household).

- (iii) Time and energy savings can be reallocated to activities which enhance the social and/or economic welfare of women and other household members. Certain income and food supplementary activities such as home gardening and the rearing of small livestock are facilitated by improved access to water.
- (iv) The involvement of women in water supply programs can improve their overall position in rural communities, and hence stimulate socio-economic development.

These potential benefits of an improved water supply can be separated into short-term and long-term benefits as described in Table 3.1.

**Table 3.1: Potential Benefits From Improved Water Supply**

<i>Short-term benefits</i>	<i>Long-term benefits</i>
Reduced burden of time and energy	Increased time/energy for activities leading to enhanced economic and social welfare
Increased quantity and improved quality of water available and consumed	Improved public health and well-being
Equitable involvement of women in all aspects of water project	Improved position of women in rural communities

*Source:* Hannan Andersson, Carolyn

### ***Access to Improved Water Sources and Trip Patterns***

While the above benefits mentioned in Table 3.1 are interrelated to a certain extent, the achievement of one benefit could take place to the detriment of another. For example, time and effort dedicated to water collection can increase, decrease or remain constant depending on the distance to the original water source as compared to the improved one.

A study from Mozambique<sup>6</sup> suggests that increases in water consumption occur when the traditional source of water which was more than 1 km away is replaced by a water source at less than 1 km from the household. A comparison of two villages - one without an improved water supply, and one with an improved source showed that water consumption increased from 3.2 liters per capita per day (lcd) to 12.3 lcd. Assuming an average household size of 7 persons per household, trip frequency increased from 1-2 trips per day to 4-5 trips per day. Thus, the installation of improved water supply could increase the transport burden on women if trip frequency increases to a greater extent than trip time is reduced.

However these findings may be exceptional. Data on amount of time saved by putting in new water supplies have been recorded in a study<sup>9</sup> from different countries in SSA and are presented in Table 3.2.

<sup>9</sup> Carr, Marilyn and Ruby Sandhu. 1987. Op. cit.

**Table 3.2: Time Saved by Use of New Water Supply**

	Minutes saved per household per day
Malawi	1
Kenya	17-86
Lesotho	60
Zaire	100
Mozambique	106
Chad <sup>a</sup>	120

Source: Carr, Marilyn and Ruby Sandhu

Time savings range from 1 minute in Malawi, where the project villages already had close access to open wells, to almost 2 hours in Mozambique, Zaire, and Chad where access to natural water sources were very poor. As stressed in the study, these time estimates have certain limitations as it is not clear:

- (i) What period of the year the figures refer to - dry or wet season or an average; and
- (ii) Whether the time savings refer to only journey time or all aspects of water collection - travel, queuing, filling, etc.

The relationship between access to a specific water source and its utilization was analyzed in the Zambia survey introduced in Chapter 2.<sup>10</sup> Seventy-five percent of the villages in the Zambia study area had wells, but in no villages were they used by more than 50 percent of the households. The trip characteristics for well users and non-well users reveal that:

- (i) Travel distance to a well, 2.7 minutes, is less than half that to a natural source (6.1 minutes);
- (ii) Well users make about 12 percent more trips to get water than non-well users which implies that their water consumption is 12 percent higher;
- (iii) Well users spend 17 minutes per day on transport of water and non-well users 35 minutes.

These results indicate that the improved water supplies reduce the time spent on water collection for the households which use them, and also increase water consumption. Thus, transport efficiency more than doubled when wells were used, from 1.34 liters per minute to 3.1 liters per minute. Access to natural water sources was relatively good in the Zambia study area, and yet the benefits from improved access to water were significant. In an area such as the Tanga region in Tanzania (Chapter 2), where the trip distance to water was more than 30 minutes, the provision of improved water supply sources closer to the households would have an even larger potential in terms of time saving, and result in an increase in water consumption per capita.

On the other hand, survey work in the Singida region of Tanzania<sup>11</sup> suggests that the most crucial factor keeping women from using an improved water source was its relative inaccessibility. Improved sources were

<sup>10</sup> Airey, Anthony and Ian Barwell. 1991. Op. cit.

<sup>11</sup> Andersson, Ingvar and Carolyn Hannan Andersson. 1984. *Development of Domestic Water Supplies in Singida Region, Tanzania. Past Experience and Future Options*. Research Report No. 71. Dar-es-Salaam: Institute for Resource Assessment (IRA).

on average more than 700 meters from the homes, which was further than the average distance to traditional sources. In a project in Tunisia,<sup>12</sup> it was found that water consumption and user patterns had not changed with the provision and/or improvement of wells because the distance to the water source was not substantially reduced. In some cases, women had to walk up to 6 km to reach the source. Thus, if women cannot access an improved water point more easily than traditional water sources, they are less inclined to use them.

Other factors in addition to distance to the water source which limit the total amount of time savings from provision of an improved water supply are:

- (i) Whether other household members continue to participate in water collection when the water source is closer to the home. A study from Kenya involving twelve villages found that the participation rates of other family members decreased.<sup>13</sup>
- (ii) Whether there is an increase in demand for the "services" women provide when the distance to water is reduced. The Mozambique study cited here<sup>14</sup> showed that water consumption for bathing of adult household members increased from 0.80 lcd to 4.75 lcd.
- (iii) The extent to which women will have to wait in line at the water source. Traditional water sources generally allow for simultaneous access by several people while lines tend to form at improved sources, depending on the type of technology used to draw water. Although there are positive energy-saving aspects for the women from using pumps to draw water from deep wells, queues tend to form because only a limited amount of water can be drawn at one time. Covered wells are hygienic and secure for children, but also give rise to long waiting times. At piped water points, there may be low pressure during the dry season, and large queues form as the water flow is reduced. Damage to improved water sources also results in excessive waiting time as women have to use the broken machinery to get the water.
- (iv) Whether the water points have designated areas for washing clothes and bathing. Trip frequency, and time and energy expenditure will be higher if women have to continue to travel to the traditional water sources to wash and bathe.
- (v) The cost of the new water supply. If there is a charge which is considered high, households may continue to use traditional sources. Various studies attempt to measure the willingness to pay for water<sup>15 16 17 18</sup>. It has been estimated that a household's willingness to pay for water is related to time (the total time spent on water collection per day), cash (the total amount paid for water collection per day), taste (perceived quality of the water from the improved source compared to the natural source), income (annual income of household),

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<sup>12</sup> Nieves, Isabel. 1985. *Time and Money: A Preliminary Evaluation of Womens' Participation in AID Domestic Water and Sanitation Projects*. Working Paper No. 105. Washington, D.C.: USAID.

<sup>13</sup> Cecelski, Elizabeth. 1987. "Energy and Rural Womens' Work: Crisis, Response, and Policy Alternatives." *International Labor Review*, 126 (1).

<sup>14</sup> Cairncross, Sandy. 1987. Op. cit.

<sup>15</sup> Whittington, Dale et al. 1990. "Estimating the Willingness to Pay for Water Services in Developing Countries: A Case Study of the Use of Contingent Valuation Surveys in Southern Haiti." *Economic Development and Cultural Change*, 38 (2).

<sup>16</sup> Van der Mandele, G.K. "Resolving Riddles of Price/Demand." *World Water*, December 1988.

<sup>17</sup> Cairncross, Sandy and Joanne Kinnear. "Water Vending in Urban Sudan." Mimeograph. Unpublished.

<sup>18</sup> Whittington, Dale et al. 1990. "Calculating the Value of Time Spent Collecting Water: Some Estimates for Ukunda, Kenya." *World Development* (18) 2.

women (number of adult females per household), and education (number of years of formal education of household members). The higher the time, cash, taste, income and education variables, the higher the willingness to pay for water. On the contrary, the more females there are per household, and the more labor available, the lower the perceived opportunity cost of water transport. In general, women are willing to pay more for water than men. This seems logical since it is their effort which will be saved. The information is, however, inconclusive and varies greatly depending on the level of development of the area, possibilities of paid employment, vicinity to markets, etc.

- (vi) The amount of time and effort women have to dedicate to participation in activities related to the planning, construction, operation, and maintenance of the improved water system, and other related activities such as complementary health and educational activities. Although women's involvement is crucial to ensure that interventions are appropriate and will be sustainable, the opportunity cost of their time must be recognized so that the extent of their contributions to the project does not outweigh the resulting time savings.

### ***Design of Water Supply Programs***

As mentioned previously, if the distance to the improved water source is as large, or larger than the distance to the natural source, the amount of water collected will not increase, and part of the potential health benefits of the water supply project will not materialize. In one village in Tanzania only 60 percent of the households used the improved source.<sup>7</sup> In Singida<sup>19</sup> there was no significant difference in health problems experienced by households who continued using the traditional source and households who used the improved source. On the contrary, in some cases, households stopped boiling the water from the improved source thinking it was cleaner, which gave rise to more frequent occurrences of water-related diseases. Further, in order to reap the full health benefits, households have to be able to use the improved source also in the dry season. This underlines the importance of:

- (i) Including an educational health component within the project; and
- (ii) Ensuring that the households can obtain water from the improved source throughout the year.

In 1983, the Tanzanian government estimated that 39 percent of the population had access to improved water supplies. However, surveys in Tanzania<sup>20</sup> indicate that out of 30 villages with improved water sources, 26 villages still mainly relied upon traditional sources. The proportion of the population which actually benefited from the improved water supply could have been as low as 5 percent. Thus, there may be large discrepancies between potential capacity and the actual service of improved schemes. Further, even though a water scheme may be functioning, there can be partial breakdowns such as broken taps or insufficient pressure which cause households to return to their traditional water sources. In fact, it was estimated that in Tanzania, the construction of new schemes was significantly smaller than the breakage of existing schemes. This suggests that the rehabilitation rather than the fresh construction of existing, but non-operational water schemes, and the improvement of traditional sources may at times be more cost-efficient.

Few water supply projects have been able to achieve their objectives of supplying rural communities with reliable, clean water close to the home all throughout the year. The main problems encountered by water supply projects have been:

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<sup>19</sup> Andersson, Ingvar and Carolyn Hannan Andersson. 1984. Op. cit.

<sup>20</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

- (i) The malfunctioning of many schemes; and
- (ii) The non-utilization of operational supplies.

These problems have largely been caused by:

- (i) *Inappropriate technology choices.* Over time, the emphasis has shifted from the construction of large-scale schemes with sophisticated technology to simpler alternatives such as gravity-fed schemes and handpumps (although these alternatives also are far from problem-free). It has been suggested that the proper choice of technology depends in part on the value that people place on the time that is dedicated to water collection. Since there is a trade-off between increased costs for the households and the benefits resulting from the reduction in time spent collecting water, the willingness (and ability) to pay for water determines, in part, the appropriate choice of technology.<sup>21</sup>
- (ii) *Neglect of operation and maintenance.* The maintenance organization has often been centralized at regional levels and the result has been long delays in repair at the village level due to the lack of spare parts locally, compounded by poor communication systems, the lack of transport, the lack of technical know-how, etc.
- (iii) *Cost constraints.* Due to limited funds, the number of supply points has not been high enough to compete with traditional sources in terms of density and location. If women are compelled by time constraints, or are not aware of the full health benefits accruing from collection from an improved, but more distant source, they will continue to fetch water from the closest point.
- (iv) *Lack of community participation.* Communities have often been told what they are expected to contribute rather than asked what they are willing and able to contribute.<sup>22</sup> Participation has frequently been limited to the supply of labor for digging trenches and wells, and symbolic involvement at the decision-making level with regard to the location of supply points, or organization for maintenance. As a result of this lack of meaningful participation, there is often a feeling among communities that it is not they themselves, but the government, who is responsible for the functioning of the water supply system. This is partially also a consequence of the programs being "high-tech" and installed by a team of experts with limited or no local involvement. The main emphasis in planning and execution has been placed on technical and economic aspects to the detriment of social and cultural factors.
- (v) *Failure to involve women.* Water projects have failed due to their rejection by women, particularly with regard to the choice of locations and sources of water, as well as the protection of the sources. The planning of water supply programs has often taken place in complete ignorance of the real needs of the women who are responsible for collecting water. Project staff mainly meet with village authorities, who in most cases are predominantly male.<sup>23</sup>

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<sup>21</sup> Whittington, Dale et al. 1990. Op. cit.

<sup>22</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

<sup>23</sup> ILO. 1988. *Women and Land: Report on the Regional African Workshop on Womens' Access to Land as a Strategy for Employment Promotion, Poverty Alleviation, and Household Food Security.* Geneva: ILO.

In order to maximize the impact of a rural water supply project on women it might be useful to include the following objectives in the planning goals.

- (i) Every household in the installation area should have access to the improved water source throughout the year. If households have to revert to traditional sources during the dry season, or due to frequent breakdowns, the positive effects of access to clean drinking water may be eliminated. "Forcing people to revert to contaminated water for only 2 percent of the time risks undoing the health benefits of drinking clean water throughout the year".<sup>24</sup> It may even be the case that if people get used to drinking clean water for long periods of the year, they lose the immunities they have acquired to water-related diseases;
- (ii) Make households aware of the close relationship between the health, hygiene, and sanitation aspects of water supply. All infectious water-related diseases will not be eliminated due to an improved water source. It is therefore necessary to provide adequate education on health and hygiene in order to reap optimal benefits from the improved water source. Further, certain customs should be considered in the planning and design of the improved water sources. For example, if households are used to boiling drinking water, it is important that they continue with this practice and are not led to believe that the water from the improved source is clean just because it may be clear. Also, if women are used to washing clothes at the water source, it is not realistic to assume that they will start doing so at home if the distance to the new source is the same, as this would inflict an additional transport burden on them. In such a case, an adequate area has to be designated for washing clothes close to the source where the waste water does not however feed back into the water source.
- (iii) The community should participate actively in all aspects of the project to ensure its sustainability. Ideally, the initiative for the project should be a request from the community itself. The community ought to be responsible for the mobilization of local support for the project, participate in the planning and construction activities, contribute financially to investment and operating costs, be responsible for operations and maintenance, and guarantee the fair distribution of water.
- (iv) Women should be involved in all stages of decision-making, planning, management, and maintenance of the water supply system. Since women are responsible for water collection, they know the preferred local water sources, the ideal distribution of supply points, and the existing usage patterns. Women already play an important role in the management of traditional sources. They are responsible for keeping the sites clean and for ensuring that children and animals do not contaminate the sources. These functions should be assigned to women also at the improved water sources. Otherwise, there is a risk that the water supply improvements can result in the reduced control of water by women. If men become the managers of the water sources, or get paid employment as attendants or maintenance staff, women could be forced into a new dependency relationship.
- (v) The water supply technology should be within the technical and financial means of the community. Ideally the community ought to be able to sustain - operate and maintain - the water system. A few villagers (also women) ought to be trained and made responsible for repair and maintenance. There are examples of water supply projects which have chosen a more capital-intensive and technologically sophisticated approach and still have been

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<sup>24</sup> Cox, Stephen and Annis Shildon. 1982. "Community Participation in Rural Water Supply." *Grassroots Development* 6 (4).

successful.<sup>25</sup> However, the large number of inoperational rural water systems is evidence of the need to increase sustainability through reliance on local maintenance and repair capacity.

### ***Summary***

The evidence indicates that many projects to provide improved water supplies have had a much more limited impact than intended. Further, many of the interventions have had very limited impact on the transport burden of rural women. In many cases the improved water source was not significantly closer for a large number of households to increase convenience and result in time savings. This raises a critical issue about the design of water supply project - to what extent is it clearly defined whether the aim is to provide better *quality* of water, or to provide a more *accessible* source of water. The evidence is that unless the new source is more accessible, utilization will be low and clearly the impact on women's transport burden will be limited.

If the improved water supply is more accessible, and if the project is well-designed, the balance of evidence is that this will reduce the transport burden on women, and may also increase water consumption, particularly if the traditional supply is distant.

Up until about 1985, the involvement of women in water supply projects was mainly limited to self-help labor in construction. The lack of involvement by women in the planning and maintenance phases is arguably a major cause of the limited impact of many projects. It can even be argued that some projects have had a negative impact on women, particularly where there has been no positive health effect and has resulted in an increased dependence on men.<sup>8</sup>

If an improved source is installed without the meaningful involvement of the local community, the chances of achieving any sustainable benefits are very slight. On the other hand, a program that involves the local community with a special emphasis on women in all aspects, including planning, operation and maintenance, stands a much higher chance of being successful. Water supply projects should also take a more integrated approach to development and include a health/sanitation education component.

### **3.2 *Firewood***

The rural energy situation affects women directly since they are the main providers of fuelwood for cooking, food processing and heating. Traditionally women collect fuelwood from common and fallow land. However, with the increasing scarcity of fuelwood in areas of population pressure, overgrazing, desertification, and decreasing access to land in areas of rapid alienation, it is more difficult for women to find fuel, and they must spend longer hours searching for it. The term population pressure implies here that the number of consuming units increases. An increase in population that results in an increase in the number of fireplaces or hearths has a greater effect on firewood consumption than an increase in population that results in larger households.<sup>9</sup>

Research indicates that the total time spent on fuel provision and use within a relatively culturally homogenous agro-ecological zone is rather constant. In other words, there may be a trade-off between the

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<sup>25</sup> Whittington, Dale et al. 1990. Op. cit.

time devoted to collecting fuel and the time dedicated to cooking and tending the fire.<sup>26</sup> A survey of three villages in Peru<sup>27</sup> showed that a total of about five hours per day was spent on these activities. The more time women devoted to fuel collection, the less time they had for cooking, and vice versa.

When women spend more time cooking, the nutritional level of the meal tends to be higher because a larger variety of food is prepared; alternatively more meals are prepared. In fuel-short areas there is some evidence, although this has been disputed, that foods which take a long time to cook, such as beans, have been substituted in the diet for foods which require shorter cooking time.<sup>28</sup> Other studies indicate that the reduced consumption of beans is caused by the increased importance of beans as a local cash crop rather than the high fuel requirements of cooking them.<sup>29</sup> In an area of Central Kenya<sup>30</sup> while women have a preference for githeri which takes 2-3 hours to cook due to the shortage of fuel, they instead prepare ugali which has a shorter cooking time, about 30 minutes. Further, as a result of fuel shortage and time constraints, the number of meals cooked per day may also be reduced from two to one.

Inadequate fuel supplies affect family health in more ways than nutrition as hot water is necessary for personal hygiene, washing clothes, cleaning cooking utensils and the house. Fuel is also needed where drinking water is boiled. The decreased availability of fuel may also negatively impact on women's ability to generate income as many of their activities such as beer-brewing, food processing and pottery are fuel-intensive.<sup>31</sup> In areas close to urban markets, the sale of fuelwood is also a source of income for women, although research indicates that women sell a much smaller proportion of the total amount of fuel they collect than men.

Fuel consumption and the type of fuel used may vary with the agricultural calendar and the availability of firewood. During agricultural peak periods, women are busier than normal. As a result, they attempt to perform other duties around the house at the same time as the food is cooking, and they consequently may not have time to properly tend the fire. They may also fail to cut the wood into the small pieces required to make it burn slower. As a result, fuel efficiency will be lower. During periods of firewood shortage, women will use crop residuals from maize, sisal, cassava, etc., dried cow dung, and other fuel substitutes. In an area of Central Kenya<sup>32</sup> 60 percent of the households interviewed relied on maize stalks for fuel about two months of the year. These fuels are less efficient than firewood.

The time and energy spent on firewood could be reduced in two ways.

- (i) By improved access to the fuelwood source; and
- (ii) By lower fuelwood consumption.

### ***Improved Access to Fuelwood Sources***

Local people rarely have access to natural forests for household use. The general policy in SSA with regards to natural forests, and at times other forest areas as well, is based upon the belief that deforestation will

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<sup>26</sup> Carr, Marilyn and Ruby Sandhu. 1987. Op. cit.

<sup>27</sup> Cecelski, Elizabeth. 1984. *The Rural Energy Crisis, Womens' Work and Family Welfare: Perspective and Approaches to Action*. WEP/10/WP. Geneva: ILO.

<sup>28</sup> Cecelski, Elizabeth. 1985. *The Rural Energy Crisis, Womens' Work and Basic Needs: Perspectives and Approaches to Action*. WEP. Geneva: ILO.

<sup>29</sup> Spence, N. 1986. *Impact of Technology on Women in Crop Processing*. Quebec, Canada: CIDA.

<sup>30</sup> Mildeberger, Elizabeth. 1986. "Women and Energy in Murang'a District, Kenya". Eschborn, Germany: GTZ.

<sup>31</sup> Cecelski, Elizabeth. 1985. Op. cit.

<sup>32</sup> Mildeberger, Elizabeth. 1986. Op. cit.

result if rural people have the right to cut or harvest trees in the natural forest. Paradoxically, this policy of prohibition to cut trees may lead to deforestation.<sup>10</sup> When rural people are uncertain about tree rights, or feel discriminated against, they may choose to cut down the trees quickly because they feel no stake in preserving them since they belong to the "forestry department" or the "government." Natural forests ought to be managed and protected for higher yields for ecological and industrial, as well as local needs. Local people, therefore, need to become involved in the preservation and management of the forests rather than simply forbidden to cut trees.

In one area of Tanga region in Tanzania, 92 percent of the women who collected fuel from their own fields or woodlots did not think that obtaining firewood was a very demanding task. On the contrary, 67 percent of the women who got their fuel from the bush or purchased firewood felt it was a big problem. In a survey in Kenya<sup>33</sup>, women felt that the most appropriate way of coming to grips with the problem of firewood shortage would be to plant trees. The main reasons why they were not more actively involved in tree planting were that land was scarce and that seedlings were not sufficiently available in the tree-planting season.

Social forestry involves local people in forestry activities and aims to increase wood production on farms and private lands. This approach has proven effective in increasing wood production outside forests, but it has had limited benefits for the rural poor in areas where there are landless peasants. When land rights and tree rights are not clearly separated, and when national implementation policies are not consistent, landless people will be reluctant to plant trees. Further, if the forestry department prohibits the harvesting of certain species, this serves as a deterrent to planting them since it may become a bureaucratic nightmare trying to obtain permission for cutting them down. On the other hand, where land rights and tree rights are firmly defined and enforced, there is evidence that poor people plant, protect, and preserve the trees.<sup>34</sup>

Specific measures have to be taken in social forestry to ensure that trees do not just become a new cash crop for large landowners, but help to alleviate women's fuel-gathering needs. A village woodlot project in Senegal that aimed at meeting household fuel needs and reducing women's workload instead grew income-generating polewood trees for the men of the village council. In other areas, social forestry projects have limited themselves to distributing seedlings on large lots.<sup>35</sup>

Women have clear preferences for specific fuels for domestic consumption. In most cases, the choice among alternative fuels is based upon on a judgement of their cost in time or money versus their convenience and other desirable characteristics. Ease of lighting and feeding the fire, speed and temperature of burning, odor and smoke are all factors considered in these choices. Thus, women have a detailed knowledge of local wood species and of other fuel sources.<sup>36</sup> Greater efforts should therefore be made to involve women regarding the choice of trees. Men tend to favor mainly income-generating trees while women prefer a mix of commercial fruit trees, pole-generating cash crop trees, and fuel and fodder species.<sup>37</sup>

In a survey of 179 tree-planting households in Kenya,<sup>38</sup> 89 percent of the women cited the main reason for planting trees to be for fuel needs. Other reasons were timber (60 percent), and to get poles for fencing (52 percent) and housing (36 percent). In a forestry project in Senegal,<sup>39</sup> men alone selected the species in some

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<sup>33</sup> Mildeberger, Elizabeth. 1986. Op. cit.

<sup>34</sup> Chambers, R. and M. Leach. 1990. Op. cit.

<sup>35</sup> Cecelski, Elizabeth. 1985. Op. cit.

<sup>36</sup> Cecelski, Elizabeth. 1985. Op. cit.

<sup>37</sup> Molnar, Augusta and Götz Schreiber. 1989. *Women and Forestry: Operational Issues*. WPS 184. Washington, D.C.: The World Bank.

<sup>38</sup> Mildeberger, Elizabeth. 1986. Op. cit.

<sup>39</sup> Molnar, Augusta and Götz Schreiber. 1989. Op. cit.

villages, and in others women and men decided together on the mix of trees. In agreement with local customs, women were responsible for the watering of the trees in all the villages. Tree survival was much higher in the villages where women participated in the selection of tree species because the women felt more motivated and worked more diligently to take care of them.

### ***Lower Fuelwood Consumption***

In most areas of rural SSA, women cook on three stones or other simple stoves. Improved cooking stoves could decrease consumption of firewood by:

- (i) Increased fuel efficiency; and
- (ii) Use of a different type of fuel.

Experience indicates that factors such as time (associated with fuel collection, cooking and fire attendance), convenience, food taste, smokelessness, heating and odor are at least as important considerations for households in choosing cooking methods and fuels as are fuel savings. Safety, portability, and the cost of the improved stove are also important factors for the rural woman. A traditional stove has no direct cost and the time and energy related to fuel collection and cooking is the opportunity cost of women's time and energy. This may not be considered by men who generally control cash expenditures.

Cooking stoves which rely on an alternative fuel source such as charcoal or bio-mass may be even more constrained by fuel supply than wood-burning stoves. Biogas plants are limited by the availability of animal dung, and divert natural fertilizer from the fields and could therefore have a negative effect on agricultural productivity; however, they are very useful where waste disposal is a problem. In many rural areas, it is often the economically more well-to-do households which use charcoal cookers. Solar cookers are expensive, fragile, and delicate to operate. Heat boxes or "hay boxes" (retained heat cookers) are cheap, but require major changes in cooking methods as the food is brought to boil on a fire and then transferred to the heat box for slow cooking. Rural women generally express a preference for the type of stove which imposes the smallest disruptions to existing user patterns and cooking techniques. Improved wood-burning stoves may require some changes in cooking habits, but they do not necessitate changes in fuels, and are therefore often the preferred choice of the women.<sup>11</sup>

Time savings from the installation of properly working improved wood-burning stoves can be achieved through:

- (i) Reduced firewood consumption which decreases trip frequency for firewood collection; and
- (ii) Reduced cooking times.

Experience from stove projects in Mali<sup>40</sup> and Kenya<sup>41</sup> can be used as an indicator of the reduction in fuel consumption from the installation of improved stoves. The improved wood-burning stoves resulted in an average of 30 percent (20-40 percent) reduction in fuel use. In the Kenyan case, only 7 percent of the households interviewed relied exclusively on purchased wood. The purchase of an improved stove in this area would require a pay-back period of between 1 to 13 months based on the annual direct expenditure on firewood.

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<sup>40</sup> Gajo, M. 1991. *Enquête sur la Consommation de Bois de Feu. Consommation de bois-energie et importance de sa reduction par les foyers améliorés au sector domestique en milieux urbain et rural au Mali.* Eschborn, Germany: GTZ.

<sup>41</sup> Mildeberger, Elizabeth. 1986. Op. cit.

Assuming that firewood consumption and the distance to firewood is equal to that of the average household in the Makete survey presented in Chapter 2, the time spent on firewood collection would be reduced by 73-145 hours per annum (1.4-2.8 hours per week) through the use of an improved woodburning stove. The corresponding reduction in energy would be 6-12.2 tonne-km per annum. Stove projects in Asia<sup>42</sup> indicate that the improved stoves also reduce cooking time by 20-30 percent. Assuming that the typical household spends at least 1 1/2 hours cooking daily, then another 2.6 hours per week would be gained. The total average annual time saving would then amount to approximately 250 hours (4.7 hours per week). It should be noted though that women perform other duties as well around the house while the food is cooking.

An example from Western Kenya illustrates a successful rural stoves project in SSA.<sup>43</sup> Designed as an income generating project for female potters, it aimed to create employment for women and young men as stove installers, and to improve the living standards of women through time saving, lower fuel costs, and improved safety in the kitchen. Stove sales were combined with training in environmental awareness and other household issues. More than 90 percent of the stove users felt that firewood consumption had decreased. The estimated time saving per household was a reduction in fuel collection time of about 1.5 hours per week; alternatively, a reduction in fuel expenditure of between 2 and 6 Ksh (US\$1 = 28 Ksh). Users also mentioned time savings in cooking. Laboratory testing of the stoves adds an additional benefit from a reduction in smoke emissions. This was not mentioned by users.

However, the project had encountered problems in marketing due to the weight of the stove liners (4-5 kg). The women's group producers preferred to sell to vehicle-borne customers in order to avoid transport and market fees. The women were also not very successful in promoting the product. Their main marketing experience came from the sale of local crops, and they felt unsure about how to market the stoves.

In the study on firewood use in Tanga region mentioned previously,<sup>44</sup> it was found that the traditional three stone stove used less fuel than the improved clay stoves also in use. Following the results of laboratory testing, the clay stoves should consume 20 percent less fuel than the three stone stoves - instead, they consumed 20 percent more. This is likely to have been caused by incorrect installation and use - lack of chimney, poor cooking pots, etc. - which lowers the efficiency of the stoves. The clay stoves also gave off a lot of smoke. Further, users commented that fuelwood consumption can be regulated more easily and quickly on a three stone stove.<sup>45</sup>

In high altitude regions, the cooking fire is likely to serve also for space heating. A totally enclosed cooking fire, while more efficient for cooking, does not efficiently heat a space. Mud-and-sand-stoves were introduced in Guatemala<sup>46</sup> without instructing the women on their proper use. When they opened the firebox of the stoves to heat the room, many of the fuel-saving benefits of the stoves were lost. In this case, even if these stoves were able to economize on fuel for cooking, they did not meet space-heating needs.

Thus, some improved stoves, under field conditions, have turned out to use as much, if not more fuel than the traditional stoves. Proper management of the cooking fire, adequate utensils, and food preparation and processing can save as much or more fuel than improved stoves. Significant improvements could be made here as part of an integrated approach to the reduction of fuel consumption.<sup>47</sup> Experience from cooking stove

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<sup>42</sup> Cecelski, Elizabeth. 1985. Op. cit.

<sup>43</sup> Ashley, Caroline, Helen Appleton and Noel Chavangi. 1992. *Project Evaluation: Rural Stoves in West Kenya*. ITDG/GATE/GTZ.

<sup>44</sup> Geissen, Violette. 1984. Op. cit.

<sup>45</sup> Ibid.

<sup>46</sup> Cecelski, Elizabeth. 1985. Op. cit.

<sup>47</sup> Cecelski, Elizabeth. 1985. Op. cit.

projects indicates that a new stove frequently proves to be only the first of further improvements in the kitchen.<sup>48</sup>

### ***Summary***

The evidence indicates that, with careful design, programs in SSA to (a) develop social forestry schemes that provide a source of cooking fuel, and (b) introduce more efficient wood-burning stoves can be effective. The evidence further indicates that both types of intervention can have a significant impact on the time and effort spent by women on transport of firewood.

- (i) As illustrated in Chapter 2, the consumption of firewood for a given size of household in a particular area is relatively constant. The development of woodlots closer to the home rather than using the traditional sources of firewood will reduce trip distance, and hence reduce the time and effort spent on firewood transport. However, this has long-term benefits since woodlots take several years, after planting, to mature and produce cooking fuel.
- (ii) The evidence suggests that improved wood-burning stoves can reduce firewood consumption, and hence transport demand, by 20-30 percent.

However, it is clear that appropriate forestry policies and project design are the critical factors in the success of these interventions. First, there is a need for forest conservation policies to be reoriented to meet local needs. Tree rights need to be clearly defined and consistently applied in order to encourage rural people to plant trees. Local people understand that trees not only meet their fuel, fodder, and food needs, but serve also as a security and contingency insurance in case of large or unforeseen expenditures. When villagers are given a stake in the trees, they will preserve them and insure their survival. A liberalization of existing rules and an assurance of tree and harvest rights would therefore serve as incentives to plant and protect trees for the simultaneous benefit of the rural people, the national economy, and the environment.<sup>12</sup>

Local energy projects and social forestry projects have to be designed so that they benefit rural women and learn from past experiences where the main beneficiaries have been men or large landholders. A World Bank working paper on women and forestry<sup>49</sup> emphasizes that the active involvement of women in forestry projects generally brings higher returns on investments, and a higher possibility of achieving long-term goals aiming at sustainability. The report includes useful design guidelines for different types of forestry projects, including community woodlots/plantations, and improved wood-burning devices.

It is generally considered difficult for women to change their cooking habits, although the examples provided here illustrate how these habits have been forced to change as a result of fuel and time constraints. However, before women change their cooking habits using a new technology (i.e. stoves), they carefully consider the total efficiency of the improved stoves, including both fuel and non-fuel factors. Evidence from stove projects suggests that improved stoves which require fewer changes in cooking habits are more likely to become accepted by rural women.<sup>50</sup>

The entire household should be involved in energy projects, although a distinction ought to be made between the problems and interests of men and women. Care has to be taken to preserve and strengthen women's rights to own or use trees within agro-forestry, fuelwood conservation and fuelwood development programs. Women are dependent on the natural environment and forests, and they are familiar with forest products and

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<sup>48</sup> Mildeberger, Elizabeth. 1986. Op. cit.

<sup>49</sup> Molnar, Augusta and Götz Schreiber. 1989. Op. cit.

<sup>50</sup> Cecelski, Elizabeth. 1985. Op. cit.

species and their uses. Village forestry and stove projects should draw upon the knowledge and information available from rural women regarding cooking needs, other fire-related activities, cooking practices, utensils, and taste preferences.

### 3.3 *Grinding Mill*

The establishment of grinding mills can either increase or decrease transport demand depending on existing food processing practices. If, prior to the existence of a mill women were pounding, shelling, dehusking and grinding at home, the time and effort dedicated to transport would increase when they take their crops to the mill. On the other hand, if women who go to grind at a distant mill are able to grind at a mill closer to their homes, the transport element of the task would decrease. Given the hard and time-consuming work related to carrying out these food-processing tasks by traditional methods at home, most women, when presented with a choice, prefer to grind at a mill even if the total time spent on the task (including queuing at the mill) would be higher than if the food were processed at home. This has led to the suggestion that women tend to give priority to energy-saving technologies over time-saving technologies.<sup>13</sup> In the case of grinding, the additional attraction of the mills is that flour ground there is generally considered to be of superior quality to flour processed at home.

Many case studies mention the time and energy savings derived from using mills. However, the focus is on the time and energy savings from the new technology, and does not separately identify the effect on transport patterns. For example, rice-husking machines were introduced in Guinea-Bissau which could pound as much rice in 20 minutes as a woman could in half a day.<sup>51</sup> Thus, the main time- and energy-saving component in areas that previously had no access to processing facilities stems from the elimination of the manual processing activity, although women now have to travel to a mill, wait in line, etc.

Sorghum mills introduced in Botswana<sup>52</sup> saved women considerable time (2-4 hours per 20 kg ground) and effort. Instead of having to pound at home, the women sent the crops with the children on their way to school. Assuming that the typical household went to grind 20 kg per week, women's time saving was between 104 and 208 hours per year. However, the load - carrying effort of the household, in this case the children, increased.

In order to estimate the impact of closer access to grinding mills on transport demand, a comparison could be made between a village with good access to a mill and a village with poor access keeping other factors equal. A comparison between the study area with best and worst access to grinding mills in the Makete survey<sup>53</sup> attempts to do this. Both study areas consist of four villages located within the same district and inhabited by the same ethnic group with identical food and cooking habits. In one of the study areas, there was one grinding mill in every village, in the other area none of the villages had mills. In the area with good access 86 percent of the households were within a one-way trip time of one hour. In the area with poor access 89 percent of the households had to travel more than an hour's distance to a mill. The average distances were 34 minutes, and 2 hours and 40 minutes respectively. Trip frequency was the same in both the areas while the average time spent per year was 3.6 times higher in the villages with no mill (63 hours and 226 hours per annum respectively). The difference is 163 hours. Applying western standards of eight-hour working days, the difference amounts to 20 eight-hour working days, or almost a full month's work.

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<sup>51</sup> American Friends Service Committee, Newsletter, 1987.

<sup>52</sup> Spence, N. 1986. Op. cit.

<sup>53</sup> Barwell, Ian and Christina Malmberg Calvo. 1989. Op. cit.

In the four surveys presented in Chapter 2, almost all households traveled to a mill even though the mill could be more than 2 hours distance one-way. Given this scenario, improved access to a mill would clearly reduce the time and energy that women dedicate to the transport of crops for food processing at grinding mills.

### **3.4 Reallocation of Time and Energy Resources**

Women tend to reallocate all freed-up resources - time and energy as well as financial resources -in such a way that it maximizes the welfare of their families. Men have more of a tendency to reallocate freed-up resources in ways that benefit themselves.<sup>14</sup>

Women have the largest proportion of the overall transport burden of rural households. In addition, they make a substantial contribution to the production of both subsistence and cash crops, and are largely responsible for the preparation of food (grinding, firewood, water, cooking) for their family, and the welfare of the children and elderly in addition to other domestic chores (cleaning, washing). They also participate in communal activities and in income generating projects. As a consequence of this demand on their time, women are both physically and psychologically overburdened. Most women sacrifice their own health for the well-being of their families.<sup>54</sup>

Available research, though scarce, suggests that most women in SSA would find "constructive use" for 2-3 hours of released time, including time to spend with their children.<sup>55</sup> Traditionally, project interventions have been justified on the basis that they will result in an increase in agricultural production, and eventually an improvement in economic welfare. However, given women's tremendous workload and generally poor state of health, the question could be asked whether it is a "benefit" for women to see their workload reduced in one area, only to have it increased in another?<sup>56</sup> It is clear that rural women in SSA are overworked and often suffer from malnutrition because of the incompatible relationship between calorie intake and physical workload. They also have no time to rest and recover from sickness and frequent childbirths. Thus, it could be argued that even if women spent the freed-up resources resting, this would have a positive effect on their health, and that would be a major improvement in itself. However, this is generally not the case, although a study from Lesotho<sup>57</sup> on reallocations of time savings resulting from improved access to water, found that women spent most of their freed- up time resting and participating in social activities.

There are very few concrete examples of increased agricultural activity resulting from time-savings in water and fuelwood collection, and improved access to grinding mills. This may be because there are other important constraints on increases in agricultural yields rather than just women's time, such as culture, size of landholding, and availability of and money for inputs (seeds, fertilizer, tools). However, one example can be found in another study carried out in Lesotho,<sup>58</sup> which shows that women who had access to more land increased their time in the fields when they spent less time on water collection.

Whether women spend more time farming also depends on whether they are able to control their own time. In some cultures, women may simply be ordered to do things, and therefore increases in agricultural productivity may be low due to a lack of motivation. Another deterrent to women using saved time for

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<sup>54</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

<sup>55</sup> World Bank. 1989. *Women in Development: Issues for Economic and Sector Analysis*. WID/WPS 269. Women in Development Division, Education and Social Policy Department. Washington, D.C.: The World Bank.

<sup>56</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

<sup>57</sup> Feachem, Richard G. et al. 1978. Op. cit.

<sup>58</sup> Cairncross, S. Undated. "Domestic Water Supply in Rural Africa." Paper presented at ESCR Conference, Birmingham.

income-earning or cash crop activities could be when men control the income of women, or when men control the income from certain crops. In one area of Cameroon,<sup>59</sup> men and women control income from different crops. Women preferred to work on their own crops even when the value of marginal output from their crops fell short of what they could produce working on their husband's crops, because the revenues from the men's crops were controlled by the men (and spent mainly on men rather than on the children and the home).

Many studies suggest that the saved time resulting from a closer water source will be reallocated to other domestic chores which require progressively more of women's time, such as fuel collection in deforestation areas. In the Singida region of Tanzania<sup>60</sup> women said that they were going to allocate their freed-up time from improved access to water towards rest (71 percent), visiting neighbors (8 percent), and spending more time with their children (3 percent). This is largely compatible with the results from village-level discussions in eastern Uganda and in Makete, Tanzania. However in practice, once the water supply was installed in Singida, most women used their extra hours to cultivate, collect firewood and wild vegetables, travel for grinding, and do housework, all of which were activities which they did not have sufficient time for previously. One woman in the area started her own business. Thus, there seems to be a discrepancy between what women ideally would like to do, and what they do in reality. Again, this is an indicator of women's tremendous work load in SSA. Any freed-up time will not be allocated to rest or social needs but to carry out the tasks which they have not been able to perform fully within their workday. Women have their set of priorities organized according to their most urgent needs: the optimal amount of water, food, firewood, shelter etc. If there is an improvement in one area, the time gained is immediately reallocated to another need.

In a survey area of Kenya,<sup>61</sup> women allocated their time savings from improved access to water to income-generating craft work. They invested their earnings from the sale of the handicrafts in a grinding mill. The grinding mill saved them more time which they used to enroll themselves in literacy classes. In other cases women have started vegetable farms, chicken- and pig-rearing projects, and involved themselves in the processing of food and drinks. In the latter cases it is likely to have been the increased availability of water, as well as the extra time, which has enabled them to start these projects.

Time savings stemming from the introduction of maize mills in Cameroon<sup>62</sup> stimulated the growth of a variety of community and individual projects. Women improved the roads so that their produce could be sold to motor vehicle-borne traders; they piped water from small streams into tanks so that there would be sufficient water in the dry season; they built community houses for their gatherings; engaged in soap making; attended literacy classes; fenced their farms; set up cooperative shops; and spent more time with their children. There may have been other factors in the community which stimulated these activities as well.

When rice husking machines were installed in Guinea-Bissau,<sup>63</sup> women initially helped their husbands with the cash crops, but eventually reallocated their freed-up time to health and nutrition classes, midwife training courses, and to learning practical income-generating skills such as handicrafts.

No case studies have been done which describe how women reallocate freed-up time and effort through the introduction of improved stoves or closer woodlots. However, a plausible outcome could be that women put

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<sup>59</sup> Jones, Christine W. 1986. "Intra-Household Bargaining in Response to the Introduction of New Crops: A Case Study from North Cameroon." Cited in Mock, J. 1986. *Understanding Africa's Rural Households and Farming Systems*. Boulder, Colorado: Westview Press. Cited in Doren J. 1990. *A Moving Issue for Women: Is Low Cost Transport an Appropriate Intervention to Alleviate Womens' Burden in Southern Africa?* Norwich, U.K.: School of Development Studies, University of East Anglia.

<sup>60</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

<sup>61</sup> UNIFEM. Kwaho Water Project File. New York: UNIFEM.

<sup>62</sup> O'Kelly, E. 1973. "Aid and Self-Help." London: Charles Knight.

<sup>63</sup> American Friends Service Committee. 1987. Op. cit.

more time into food preparation, or cook more meals since there are indicators that the total time allocated to fuel collection and food preparation is constant.<sup>64</sup>

In a more urbanized area of Ghana<sup>65</sup> the installation of improved ovens for fish smoking reduced smoking time by one third. Thus, women were able to do three smoking cycles in a day instead of one. Instead of reallocating the time saved to other activities, most women preferred to reinvest their time in the smoking activity and consequently increase their income. The women obviously had a market for their surplus. The improved smoking technology also required less tending and the women were able simultaneously to perform various activities around their homes.

### 3.5 Conclusion

It is clear that the impact made on the transport patterns of rural women by the provision of improved water supplies, easier access to firewood, fuel-efficient stoves, and closer grinding mills is potentially very high. However, the documented experience of such projects to date is rather mixed, and does not generally allow for the identification of either the total time implications of the project intervention, or the effect specifically on transport patterns. There is more information available on the anticipated impact of projects on women's time use than on the actual impact of project activities on women. This is partially because of the lack of gender segregated pre- and post-intervention data, and an insufficient breakdown of the various components of the activities -travel to and from the mill, queuing, etc. Clearly, this lack of data makes it difficult to estimate a facility's impact on the transport element of the activity.

In surveys, it can also be difficult to trace how freed-up time is reallocated following a non-transport intervention because the time saving is shared amongst all the adult women in a household, and to a minor extent amongst the children as well. The time savings may also be dispersed between many different tasks.<sup>15</sup>

Another difficulty in project appraisal is to establish a priori whether women will be able to control the use of their freed-up time. Care has to be taken so that women's dependence on men does not increase due to a project intervention. For example, there could be a risk involved in encouraging women to invest their freed-up time in income-generating activities and agriculture rather than in domestic activities. If men control the income which accrues from these activities, then the exploitation of women would increase. There is a greater possibility that women would use the time and energy saved for agriculture or other productive work if they could keep the extra income, and obtain improved access to extension services and inputs, improved technology, credit, and markets.

Studies on time-saving technologies in agriculture confirm that women reallocate freed-up resources for their domestic responsibilities, such as the collection and storage of firewood - and also to income-generating activities such as food and drink processing. This is a logical outcome when women have had to compromise on these activities in order to give priority to food production.<sup>66</sup> On the other hand, in communities where the basic food and subsistence needs are already provided for, and women have access to land and inputs, and to the income from the sale of agricultural surplus, there is a higher likelihood that agricultural production increases when time and energy resources are freed up. Time allocated to domestic

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<sup>64</sup> Carr, Marilyn and Ruby Sandhu. 1987. Op. cit.

<sup>65</sup> ILO/Government of the Netherlands. 1985 "Field Report on Post-Adoption Studies. Technologies for Rural Women." ILO/Neth/80/Eha. Geneva: ILO.

<sup>66</sup> Carr, Marilyn and Ruby Sandhu. 1987. Op. cit.

needs increases the likelihood of survival for the rural household, and therefore should be labelled as reproductive rather than unproductive.<sup>67</sup>

There are indeed many factors which can prevent anticipated time savings from being realized. However, when women are encouraged to participate actively in the planning, decision-making, and realization of project interventions, rather than having their involvement limited to the provision of unpaid labor, the likelihood of a project being sustainable and having a positive impact on women is higher. Even when women are involved at a meaningful level, it is essential that the opportunity cost of their time inputs be recognized, and that the direct time savings of the project intervention be assessed in relation to this cost. Thus, projects have to be well- planned, in conjunction with the women, in order to ensure that the project has support, that women's efforts are not wasted or ill-invested, and that the improvement will be sustained.

The analysis also suggests the need for:

- (i) Project design focusing on non-transport interventions to define the intended effect on time and effort spent by women on the task, including the transport component of that time and effort.
- (ii) The more discriminating monitoring and evaluation of such interventions, to develop a better understanding of:
  - (a) actual impact on time and effort spent on the task; and
  - (b) how the freed-up time and energy resources are used.

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<sup>67</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

## *4. Involvement of Women in Development Projects*

### *4.1 Women and Domestic and Subsistence Projects*

Women have a considerable incentive to work on community-based programs dealing with water supply, social forestry, efficient stoves, and grinding mills because of their prime responsibility for water, wood, and cooking efforts. However in the past, attention to women in these traditionally women's activities has been absent both at the levels of policy-making and practical implementation. Often, while the potentially positive benefits for women are mentioned in planning documents, there is no emphasis on involving women when it comes to project design. Women's involvement has been limited to providing free labor for construction activities, while men have been exposed to training, to new technology and ideas, to new contacts outside the villages, and have, on occasion, received paid positions.

An evaluation report of AID's experience with Women in Development, 1973 - 1985,<sup>16</sup> compared the relative success of women's-only projects, projects with women's components, and mainstream projects which aim to integrate women into their overall activities. It found that mainstream projects which include gender analysis in project design, and allow for gender-sensitive adaptations of project inputs during implementation, were more successful overall in including women in the development process and provided a higher return on the project investment than women-only projects or projects with a women's component. This was partially because women-only projects tend to be small in scope and financial resources, and often have a relatively low priority with local institutions. The most successful women's-only projects were found in mainstream institutions such as ministries of agriculture, labor, and education, or within credit banks, rather than in women's or voluntary organizations. This illustrates the increase in impact that projects can gain when they are adapted to become more responsive to gender needs.

The drawbacks of explicit women's components within larger projects proved to be that they frequently lead to tokenism and a lack of gender adaptation in the full range of project activities. Women's components also tended to deal exclusively with women's domestic roles and overlook their economic functions.

All projects in the AID survey within the water/sanitation and energy sectors were categorized as mainstream. The degree of achievement of project purposes and goals proved to be highly correlated with the match between the gender of project participants and the division of labor in the program area. Thus, project designs which evolved from baseline studies of women's actual pattern of water, fuel and food processing practices were found to be more successful than project designs which rested exclusively on technical considerations. That is, projects which analyzed and adapted to the reality of women's roles in the local situation were more likely to have a positive impact on women, achieve their purposes, and contribute to overall socio-economic development.

Working with rural women is often found to be a slow process, and the women are frequently perceived as backward and conservative. It may take time to get them involved in development activities because they are used to a subordinate position in society. It may also be difficult to communicate with them as they often do not speak the national language. At meetings, the women can be shy and afraid of expressing their opinions. One reason for this is that they have not been involved in development efforts in the past, and lack the experience and confidence needed to speak up in such situations, particularly if men are present. One way of making them understand the importance of their participation and contribution is by involving them at the

initial planning stages of a project so that they can feel that their input is meaningful, and that there is adequate consideration of their needs and priorities.<sup>68</sup>

As mentioned previously, attention to women is crucial not only for reasons of equity, but because the likelihood of project success and sustainability will be significantly enhanced, and because the return on the investment is likely to be higher than when the role of gender is overlooked. It is therefore important to allow the project to progress at a speed that is compatible with the situation of the local women.

However, male opposition has often made women's involvement in development work difficult even when there is a gender-sensitive adaptation of mainstream projects, or a specific women's component in a project. When women are appointed to serve on planning and management committees, men frequently try to exclude them by not informing them of meetings, ignoring their presence at the meetings, or simply prohibiting them from attending. People working on projects on water supply, woodlots, and grinding mills are likely to meet and discuss with village leaders. It is not unusual that there is only one "token" woman, or no woman at all amongst the leaders. In this case, a special effort has to be made to be able to consult with, and involve the women. Their knowledge about domestic needs, existing resources and facilities have to be tapped in order to ensure that interventions are appropriate and will benefit the women. In order for projects to address women's issues, women have to be allowed to participate in a meaningful way on all levels including planning, decision-making, operation and maintenance. That is, women should not be involved in projects only in their traditional roles with regard to aspects of child-care, hygiene, and nutrition, but should also be given access to training as pump attendants, site caretakers, health promoters, nursery workers, stove manufacturers and installers, mill-operators, managers, book-keepers, etc.).

A certain reluctance also may be encountered among men to let women have control over technical "innovations" which are generally considered a male domain. With the introduction of a project or a new technology, men tend to become interested in activities which belong to the realm of women's activities. When this happens, rather than seeing a transfer of responsibility from women to men and a reduction of the burden on women, men have tended to monopolize the resources and become "managers," while women become consumers. As a result, the dependency of women is increased. Women, on the other hand, have a vested interest in water supply, woodlots, grinding mills, etc. and they would contribute to the sustainability of projects in their own interest.<sup>69</sup>

Issues of ownership and control frequently arise in grinding mill projects. Mills are expensive and women's groups need credit in order to buy them. They also need to be trained in the related operation, maintenance and management aspects in order to run the mills properly. However, only if women's control over these aspects is made a specific objective will this come about. For the project to be successful, women need advice and frequent and continuous support from extension officers until they feel confident about their ability to move into, what is for them, a new area of responsibility.

In a grinding program in Southern Ghana<sup>70</sup> women were found to dislike the maintenance, repair, and bookkeeping work of the mill. They would have preferred that a man bought the mill and ran the service for them. This could be because the women were busy with so many other tasks, or that they had not received sufficient training and therefore felt less confident about the work. It should be noted how much easier it is for them to perceive a known scenario of a man selling them a service, rather than envisioning that a woman or a cooperative women's group could provide the same service.

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<sup>68</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

<sup>69</sup> Ibid.

<sup>70</sup> Carr, Marilyn and Ruby Sandhu. 1987. Op. cit.

Rural development projects have at times been criticized for perpetuating the role of rural women with regard to the division of labor. Rather than encouraging women to challenge their traditional roles, and encouraging men to participate in works traditionally assigned to women, projects could make women accept the existing unequal division of labor by making their tasks a bit easier to perform. On the other hand, given the "self-sacrificing" mentality of rural women and the enormous responsibilities they carry, it could rather be argued that their existing burdens have to be reduced, and the basic needs of their families provided for, before they will allocate scarce resources, such as time and energy, to demand change for themselves.

#### 4.2 *Ways to Reach the Rural Women*

One way of establishing contact with rural women is through existing women's groups. Village women are used to working in groups and could be reached and mobilized through these groups. Formal groups may have been started as income-generating projects, through an NGO, or as part of a national policy to have a women's group in every village to which all women automatically belong. In each case, project staff ought to estimate what percentage of the women are organized in these groups in order to understand what proportion of the women will be reached through this contact. Moreover, as all officially registered groups may not be active, it is important to assess the specific situation in each project area. In many places, women are also organized in more informal self-help groups for farming purposes or for collection of firewood.<sup>17</sup> Rural women can also be reached through this network. However, care needs to be taken to ensure that not only the most well-to-do and best organized women become involved with the project. There may also be differences between the various groups of women in a village. It is important for the project to steer clear of these conflicts and aim to include all village women. Thus, a special effort has to be made to include typical village women as well as disadvantaged women, who may not belong to any women's association.

In many rural communities, there are traditional women leaders. They can make significant contributions within projects as they are well respected in the communities and women are used to listening to their advice. Although it is generally easier for project staff to communicate with more educated women who are more used to expressing themselves, a specific effort must be made to reach the "non-elite" women of the rural community.

Whether women can receive male advice depends on the culture of the area. In many areas, there are few female extension officers or field staff who can reach the women and encourage them to participate meaningfully in projects. Given this situation it may, at times, be practical to accept less qualified female counterpart or extension officer in order to reach the audience. Another alternative is to train and "sensitize" a male extension officer to work with women.

When development programs in SSA also require women to contribute financially to the project, they are often faced with situations where women go for weeks on end without having any access to cash at all. Women perform most of the work in agriculture, but men make the decisions and control the money. Thus, women have little control over cash income in the family and can be restricted from investing even the smallest amounts in an effort-reducing device or facility. In this situation, a project could consider the provision of credit, and where required, appoint women to paid positions of authority such as pump or tap attendants, maintenance workers, health extension workers in the village, plant nursery workers, stove manufacturers, grinding mill operators, etc. In this way, the women would be able to generate their own money to pay back the loan.

### 4.3 Conclusion

Women's involvement in rural development projects is motivated not only by equity concerns, but because their participation often makes the difference between achieving or not achieving project objectives, particularly with regard to the long-term sustainability of interventions.<sup>18</sup> Various studies of the impact of non-transport interventions on women identify an adequate knowledge base of the situation of the rural women in the specific community to be key to the success of project interventions. Projects need to have a well-defined goal to improve the situation of women and their status through this intervention, and to prioritize the involvement of women. An appropriate choice of technology may also make it easier to win male acceptance of women's participation. This may involve less new and advanced technology and more emphasis on rehabilitation and improvement on existing facilities for which women are already responsible.<sup>71</sup>

Research indicates that gender-sensitive adaptation of mainstream projects, concerned with water, firewood and grinding mills, is an effective way of including and promoting women's interests in the development process as well as increasing the return on investments and sustainability. Although country and area circumstances vary, and the development of project - specific plans requires a careful look at the roles of women in each case in order to understand, respect, and build responses to their needs and preferences, certain general considerations ought to be taken into account in development programs which aim to improve the lot of rural women. Some of these considerations are listed here.

- (i) The project area should be surveyed and contact should be made with local women to clarify what their priorities are before the decision is made to start a project. It is important to try also to learn from the experience of other projects which have been active in the area.
- (ii) Consideration should be given to the opportunity cost of women's time, i.e. it is important to be careful not to overload the women with project demands, and to ascertain that the net effect of the project intervention on women's time is positive.
- (iii) Preferably, use should be made of female extension officers with good knowledge of the local situation.
- (iv) It is desirable to work through existing women's groups, although it is also important to aim to avoid too close an association with "exclusive" women's groups, and to try and reach all categories of women.
- (v) Discussions should be held with traditional women leaders and other "key informants" - nurses, teachers, religious leaders - in the community in order to learn about the community and, if the project goes ahead, to gain their support.
- (vi) Meetings should be called a few days in advance to ensure that the information not only reaches the "best connected" women, but also women who are not used to participating in gatherings.
- (vii) Meetings should be held at suitable hours for women in order to minimize disruption to their work and to avoid excessive criticism from husbands.

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<sup>71</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

- (viii) Meetings should be held in the local language. Ideally, the project counterpart or extension officer should serve as interpreter as she has a more complete understanding of what the purpose of the discussion is or the type of information that is being sought.
- (ix) The discussion should move slowly, and ensure that the women understand what is being discussed, allowing for breaks and clarifications when the women need to talk through the issues among themselves or formulate their opinions on a subject.
- (x) The aim should be to create a feeling of mutual trust and confidence in order to encourage women to express their true opinions.
- (xi) In the event of women not being able to, or being too shy to speak up, a spokeswoman can be chosen to articulate their feelings.
- (xii) Project design should be allowed to progress slowly, but with regular visits and follow-ups. There are many demands on women's time, and the agricultural calendar with its peak periods of labor demand has to be respected.
- (xiii) It is important to involve women in a functional, not token manner, in all committees and training functions of community projects and to support the women where there is male opposition or resentment of their participation.
- (xiv) The selection of participants for seminars, training, and appointments to paid positions of responsibility should aim to involve people who are truly interested in contributing to the project and willing to work hard, and to try and avoid individuals whose main interest in seminars may be merely to get a break from established routines.
- (xv) It is important to make sure that village authorities are well informed about the project activities. If the project includes only women, or has a women's component, village leaders and men should be invited to discussions on occasion in order to keep up an open dialogue and to avoid giving rise to unnecessary suspicion.
- (xvi) Consideration should be given to the possibility of using local women with experience from the project as animators when the activities extend into new areas. It is easier for women who are not familiar with the project to identify with women who are like themselves.

Experience indicates that project-specific interventions alone, such as water supply, woodlots, stoves, or grinding mills - even if successful - will, without supportive measures in other areas, only have a minor effect on the daily realities of women. This is related to the fact that the labor associated with water and firewood collection and grinding are only a part of the problems experienced by women, and they may not always be the most important problems from their perspective. Their greatest problem is rooted in their subordinate position and lack of access to power and resources. In order for rural women to participate fully in the development of their communities there have to be attitudinal and, at times, legislative changes in their societies.<sup>72</sup> However, the opportunity of women's participation in project activities will, hopefully, allow them to eventually free up resources, improve their status in society and demand further change. A first step is to reduce the enormous workload on women in order to release their potential for development.<sup>73</sup> If

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<sup>72</sup> Hannan Andersson, Carolyn. 1985. Op. cit.

<sup>73</sup> Ibid.

women are free to control over their time, they will allocate the resulting time saved for activities that contribute to the welfare of their families.

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