

# Demographic Responses to Environmental Stress in the Drought- and Famine-Prone Areas of Northern Ethiopia

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## ABSTRACT

**Research on the demographic consequences of environmental stress (drought and famine, in particular) has not been conclusive. Using primary survey data on the demographic consequences of drought and famine in the drought-prone areas of northern Ethiopia, this study argues that growing environmental stress and persisting food insecurity have stimulated changes in the demographic behaviours and attitudes of farming communities, including: an increase in acceptance rates of family planning services; changing attitudes towards early marriage and having a large number of children; actual reduction in fertility; migration (particularly of the youth) out of the communities; and the tendency by many farmers to be involved in non-farm income-generating activities and employment sectors. Copyright © 2001 John Wiley & Sons, Ltd.**

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## INTRODUCTION

The literature on substantive demography shows that the concept of 'demographic response' is the basis for Malthus' theory of population. The conceptual framework on which his essay was based is rooted in 'response theory'. His principal hypothesis was that lack of equilibrium in the relationship between population and natural resources is followed by some kind of negative response from either side. Crises including famines are responses resulting, according to Malthus, from a lack of balance between resources and population. However, the most important illustration of 'response theory' in demography is the very concept of demographic transition, which was initiated in recognition of the existence of response by populations to some forces of change (in this case, societal transformation to 'modernisation'). Kingsley Davis' (1963) theory of demographic responses to 'modernisation' revolves around this central hypothesis.

Do populations respond both to economic improvements and to stressful economic conditions? The evidence is that demographic responses exist in both circumstances. Populations respond favourably to economic development ('modernisation') as they did in the case of Europe, North America and Japan, and unfavourably to underdevelopment and economic crisis as they are doing in many developing countries today. When societies transform themselves to a higher economic level, both mortality and fertility decline, as

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shown in the demographic transition framework. But, when societies are adversely affected by natural or man-made calamities (famines, epidemics, wars, flood, etc.) which result in a higher degree of stress, populations respond through higher levels of migration, increased incidence of mortality and fluctuations in fertility.

The question at hand is: can changes in ecological stability as well as in the stability of food supply induce demographic changes? This study addresses the demographic consequences of ecological degradation and food supply instability in Ethiopia. Demographic changes in the context of this study include not only the short-term mortality and migration responses to crisis, but also the behavioural changes believed to contribute to changes in patterns of nuptiality, fertility and family planning. Analyses of local people's perceptions about the ecologies, which are presumed to be leading to changes in demographic behaviours, are at the centre of this paper's objectives. Special attention is given to the analysis of people's perceptions about the relationship between their numbers and the resource base at their disposal. Awareness and perception about the incompatibility between resources (e.g. land) and household needs indicate that the present fertility decline in the communities is indicative of the commencement of fertility transition.

## THEORETICAL PERSPECTIVES

Research on demographic responses to socio-economic changes has interested scholars of different fields, but demographers, economists, sociologists and anthropologists are in the forefront. The work of Kingsley Davis (1963) is particularly relevant for the present study. In his analysis of the demographic transition of the populations of Western Europe and Japan, Davis provided an analytical framework for the demographic responses to the social and economic changes that followed the industrialisation process in these societies. Davis asserted that the process of demographic change and response is not only continuous but also reflexive and behavioural: reflexive in the sense that a change in one component is eventually altered by the

change it has induced in other components; behavioural in the sense that the process involves human decisions in the pursuit of goals with varying means and conditions. The main objective of his essay was to lay a theoretical framework that shows how socio-economic stimulus produces demographic responses (abortion, contraception, celibacy, delayed marriages, migration, etc.). Unlike the present study, the connecting link between stimulus and response in the case of the European and Japanese populations for whom the framework was laid was not poverty but economic growth. In those societies, people started to realise that their accustomed demographic behaviour was handicapping them in their effort to take advantage of the opportunities being provided to them by the emerging growth of the economy.

As indicated earlier, studies with focus on the demographic considerations of food shortages, famine, poverty, and so on, have been major research topics for some demographers. Bongaarts and Cain (1981) suggested a model that could be used to show the demographic consequences of famine mortality. Demographic aspects of the Indian famines have been areas of special interest. Dyson, for example, has done extensive work on the demography of the famines of the Indian subcontinent, in which he focused on estimation of famine mortality, interaction between famine conditions and epidemics, age and sex composition of famine deaths, and the long-term fertility responses to famine (Dyson, 1989, 1991a, b, 1992). Reddy and his colleagues have also investigated the demographic consequences of the Indian famines, finding that occupational mobility is the most sound and direct response to stress (Reddy and Damodaram, 1978).

Changes in family structures and marriage patterns associated with drought and food crisis have also been studied using the Indian famines, in which periodic high risks of famine are found to be causes for fertility decline. The preference for having fewer but more educated children and having them married to urban or non-agricultural families has been found to be strongly related to stress induced by drought and food crisis (Caldwell *et al.*, 1986).

The link between social organisation and

ecological stability on the one hand, and demographic stress on the other has also been studied. It has been found that where social organisation and institutional factors are weak, demographic stress causes ecological instability, and vice versa (McNicoll, 1989). Lipton (1983, 1989) discussed the responses on the part of rural populations to the increasing problem of land scarcity, in terms of agricultural technology, employment and demographic behaviour, and concluded that, although at a slow pace, demographic behaviours change in such a way that the changes contribute to demographic transition. These changes include postponement of marriages, reduction in fertility, and migration for change of occupation.

In his investigative study of the demographic responses to drought and food crisis in the Sahel, Hill (1989) found some indications of fertility decline in the region. In his analysis of rural fertility levels and their proximate determinants, he concluded that the relatively modest declines in levels of fertility observed in some Sahelian societies could be attributed to changes in marriage patterns, including separation of married couples due to famine crisis. The main individual or household-level strategy for coping with drought in the Sahel is to move – a response that has major consequences for the demographic development of the community.

The present study argues that growing environmental stress and persisting food insecurity stimulates changes in the demographic characteristics of societies. More specifically, it argues that the stressful recurrence of droughts and famines have stimulated changes in the demographic attitudes and behaviours of farming communities in the northern regions of Ethiopia. The evidence used in the analysis is obtained from a survey conducted in 1994/95 to gather data on the demographic and socioeconomic conditions of farming households in the drought- and famine-prone communities of the country.

#### THE DROUGHT- AND FAMINE-PRONE AREAS: CONTEXTUAL DISCUSSION

Famines are prone to occur in the three north-eastern regions of Ethiopia (Northern Shewa,

Wollo and Tigray), which are the focus of this study (see Fig. 1). Rahmato (1994) listed major occurrences of famines in Ethiopia in the last two centuries. His listing of these famines is based on records of chroniclers, mainly those of the renowned historian Richard Pankhurst. Although by no means complete, his chronological listing of the major famine episodes in the country since 1800 shows that there were nine major famines between 1800 to 1892, and 11 others between 1913 and 1994. All occurred mainly in the northern regions. In particular, the districts covered by the present study were affected by most of the famines.

Studies related to causes of famines have always been controversial. There are those who argue that famines are basically problems of ecological degradation. This line of argument adheres to the Malthusian paradigm and strictly believes that natural resource depletions play deterministic roles. Followers of this group argue that in Ethiopia, the carrying capacity of the environment has diminished and can no longer sustain people if left to



Figure 1. Map of Ethiopia (before 1991) indicating the regions most affected by drought and famine. *Source:* based on data from Webb *et al.* (1992), Gebre-Medhin and Vahlgvist (1977); Mesfin Wolde-Mariam (1984); Relief and Rehabilitation Commission (1985).

continue under current production conditions and ecological balances (Woldemariam, 1986, 1991; Admassie, 1995). On the opposite side are those who argue that famines are essentially due to unfair food distribution. According to this perspective, people die from famine only because governments lack policies that should enable people to have access to basic food. Famine mortality, in the view of this group, is preventable if it were not for entitlement failures (Sen, 1981; Webb *et al.*, 1992).

Controversy on the causes of the 1970s and 1980s famines was heated among researchers as well as policy-makers. As a result, progress has been made in the search for improved understanding of the causes of famine and of appropriate public action required to prevent it. It is now recognised that food crisis arises not only from ecological degradation but also from a complex interaction between supply, distribution and demand factors. It has become clear that, while focus on the supply side is necessary, it is insufficient for famine prevention. Thus, traditional emphasis on production failures that ascribe prominent roles to drought, ecological degradation, war, or policy mismanagement, have recently been complemented by a shift in focus to other areas. For example, the key roles of purchasing-power collapse (closely linked to employment conditions) and market failure have gained widespread recognition. Nonetheless, drought and ecological degradation are said by many studies to be the major causes of famine (Kumar, 1990; Were, 1989; Webb *et al.*, 1992; Ezra, 1997).

In none of the famines mentioned earlier have the demographic consequences been studied critically. Even for the most recent famines, there is no agreement on the exact number of deaths. For the 1984/85 famine, for example, estimates given in various reports range from 400,000 to about 1.5 million, with the majority of the reports estimating about 1 million. Most of the latter estimates were made on the basis of the collective judgement of donor missions, relief officials and representatives of non-governmental organisations (NGOs) working in various parts of Ethiopia, including the large relief camps. The most reliable figures came from the relief centres

where records were kept, and from NGOs working closely with the Peasant Associations (PAs) and the local Relief and Rehabilitation Commission (RRC) agents. The only estimate that has applied demographic estimation methods was that of Asmerom Kidane, who put the death toll of the 1984/85 famine at about 700,000 (Kidane, 1989).

The most remarkable and immediate response to famine crisis is migration. Like anywhere else, reliable data on migration is difficult to obtain in Ethiopia. It is thus difficult to carry out analysis on trends and patterns of migration. Internal migration in Ethiopia has historically been significant, and the pattern has generally been from the northern regions towards the west and southwestern regions. This pattern has been greatly related to, among other reasons, the recurrence of droughts and famines as illustrated above. In the 1960s and 1970s, when some scattered and fragmented attempts at developing commercial farms were underway, people used to move to work on these farms for temporary seasonal employment. These are mostly the cotton and sugar plantations in the Rift Valley and the coffee plantations in the south. However, the magnitude and tempo of these movements were not known accurately. Apparently, the largest movement of people was the one which took place in 1985, in the form of resettlement schemes as a response to the 1984/85 famine.

The resettlement of people from drought-prone and ecologically degraded areas in the northern regions to the fertile lands in the west and southwestern parts of the country is considered by agricultural specialists as a necessary aspect of Ethiopia's economic and social development. The 1984 Ethiopian Highlands Reclamation Study (EHRS), a large-scale socioeconomic and agro-ecological study of rural Ethiopia, recommended that resettlement as part of a comprehensive agricultural and afforestation programme is important for Ethiopia. The World Bank also recommended such action in 1986.

The resettlement programme began in February 1976, although some small projects had been undertaken earlier. During the period 1976–79, about 48,000 families, mostly from the northern regions, were resettled in some 80 locations in the western and south-

western regions. In 1984 the resettled population totalled about 200,000. The programme reached a new stage in November 1984 when the government decided to move nearly 600,000 people, mainly from the regions of Northern Shewa, Wello and Tigray. Unpublished reports of the Relief and Rehabilitation Commission show that the government resettled 343,000 households or approximately 1,715,000 persons between 1980 and 1990 in the western and southwestern, less densely populated areas of the country (RRC, 1985).

In spite of the relocation of a large number of families from the ecologically degraded areas of the north to the west and southwest, the problem of food insecurity among the remaining populations has not yet been eased. Moreover, the resettlement of people from the high density and/or degraded areas to the less populated or uninhabited areas has not occurred since 1991. Evidently policies change with changes of governments, and that is what happened in Ethiopia. The present government, which replaced the military government in 1991, restructured the regional administrative entities along ethnic lines, and that made it difficult to adopt a policy of balanced population redistribution through resettlement programmes. Naturally, local governments with autonomous powers to manage their resources would not admit other populations to resettle in their territories.

Currently, land resources in northern Ethiopia are under increasing pressure due to two factors: population growth and land degradation. These two reasons have forced farmers to penetrate vulnerable environments in order to increase the cultivated area and compensate for low yields. In these areas, more than 90% of the land is used for agricultural purposes on a permanent basis, giving nature little room for regeneration. In many districts in Northern Shewa, Wello and Tigray, fallowing as a system of farming has completely disappeared – a clear indication that there is serious land shortage. This implies that the primary natural resource base for the social and economic lives of these regions is depleted, and needs serious attention and direct intervention to reverse the situation. Under such conditions, poverty is rampant and vicious in this part of Ethiopia. Poverty is prejudicing environmental sustain-

ability, as the poor, without alternative ways to sustain themselves, extract the remaining physical resources from the mountains, valleys, rivers and forests.

Based on earlier studies and the author's own observation, the situation in these areas can be characterised as follows:

- (1) The greatest rural economic collapse and the most devastating famines in the country during the last several decades occurred here.
- (2) The north has been preoccupied with protracted warfare that worsened the economic decline.
- (3) There are fewer roads, and the populations are more isolated, than in any other areas of agricultural Ethiopia.
- (4) The receipt of emergency food aid, which has saved countless lives but has hardly improved livelihoods, began in 1973 and is continuing to date.
- (5) There is a relatively short duration of the rainy season (June to September) compared with the more southerly parts of the country.
- (6) The area has the most rugged terrain of the country's highland massif, which is vulnerable to topsoil erosion.
- (7) There are production deficits which induce people to look to neighbouring regions of the west and south for cheaper marketed grain, or labour opportunities on farms (Holt and Lawrence, 1993; Ezra, 1997).

#### DATA AND METHODS OF ANALYSIS

The main objective of the survey was to investigate the demographic responses of farming households to persisting ecological degradation and food insecurity. It was conducted in selected drought-prone localities in Tigray, Wello and North Shewa provinces (see Fig. 2). It covered a major portion of the ecologically degraded areas in the country; 40 village communities (commonly called Peasant Associations (PA)) were included in the survey. The PA is the smallest administrative entity in rural areas, comprising about 500 households on average. The village communities selected are known for their prone-

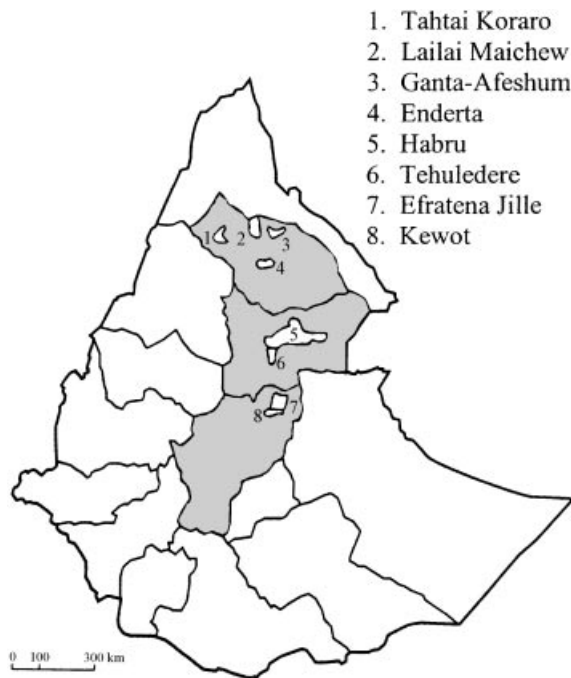


Figure 2. Location of the survey areas (*weredas*) in the former provincial administrative regions of Tigray, Wello and North Shewa.

ness to drought and famine. The distribution of the village communities by province is: 12 from North Shewa; 14 from Wello; and 14 from Tigray.

A combination of stratified sampling and simple random sampling was applied in selecting sample elements. While stratified sampling is used to select the village communities (PAs), a simple random sampling method is used to select the farm households and the ever-married women from an updated roster of households in each selected PA. Using simple random sampling, 50 households and 50 ever-married women were selected from each of the 40 village communities (PAs). Altogether, 2000 households and 2000 ever-married women were interviewed for the household and ever-married women questionnaires, respectively.

Three sets of data were gathered in this survey. The first set of data is obtained from the household questionnaire, for which the respondent is the head of household. The second is obtained from the 2000 selected ever-married women. The third is obtained from community leaders through group meet-

ings and/or discussions. The argument about demographic responses to environmental stress has been made on the basis of information obtained at all three levels. The interviews with household heads and community leaders are used to indicate changes in demographic attitudes, while data from the ever-married women are used to measure changes in actual demographic behaviours. Indicators of changes in demographic behaviours include, among others, decline in fertility; increased rates of acceptance of family planning services; migration (particularly of the youth) out of the communities; and the tendency by many farmers to be involved in non-farm income activities and employment sectors. Indicators of change in demographic attitudes include opinions about: (i) actual and desired number of children, (ii) age at first marriage, and (iii) the relationship between population and land resources in the community.

The study is intended to cover a major portion of the ecologically degraded part of the country. As mentioned earlier, Tigray, Wello and North Shewa are the three most affected provinces in the country. Selecting survey sites in each of the three provinces ensures completeness of a study that deals with environmental degradation in the country. However, the scope and extent of degradation and the natural resource endowment in each province is so different that variations in perception and awareness, as well as in survival strategies and/or response mechanisms between provinces, are widely observed.

Although the characteristics describing the situational analysis of the northeastern regions are applicable to all three provinces, the severity of each characteristic differs from province to province. For example, land shortage is a more serious problem in Wello and Tigray than in North Shewa. Average land-holding size per household is 0.51 ha in Wello, 0.87 ha in Tigray and 1.64 ha in North Shewa. And soil fertility is more of a major problem in Tigray than in Wello or North Shewa. During non-drought years, the average annual rainfall in Tigray is not more than 600 mm, while for Wello and North Shewa the averages are about 1000 mm and 1200 mm respectively. The extent of deforestation is also more severe in Tigray and Wello than in North Shewa. The

majority of rural localities in Tigray and Wello are classified by the Ministry of Agriculture as food deficit and vulnerable to food crisis. In North Shewa, the number of localities considered vulnerable to food crisis is fewer. The severity of food deficit in Wello is the most acute. For example, emergency food was needed in Wello for the entire ten years during the period 1984 to 1994. During the same period, emergency food was needed in Tigray for eight years and in North Shewa for six years (Ezra, 1997).

Social, cultural and economic factors may also be important in explaining differentials between provinces in some demographic attitudes and behaviours, including opinion about age at marriage, desired number of children, acceptance of family planning, and so on. Ethnically, Tigray is inhabited by people who identify themselves as Tigrayans. They speak the Tigrigna language which is spoken in Tigray province and in neighbouring Eritrea only. The language spoken in Wello is Amharic and the ethnic identity in the region is Amara. In North Shewa, both Amharic and Oromigna are spoken. The Oromigna speakers belong to the Oromo ethnic group. The majority of Tigrayans are Orthodox Christians, while people in Wello and North Shewa are about equally divided between Orthodox Christians and Muslims. In economic terms, the Tigrayans have suffered from shrinking agricultural production for quite a long time. This has made them outward looking in terms of supplementing their incomes from non-agricultural sources such as off-farm employment and trade. Very few farmers are involved in petty trade activities to supplement their farm incomes in North Shewa and Wello. These differentials are clearly demonstrated in the present analysis.

## RESULTS AND DISCUSSION

### Availability of Non-Agricultural Sources of Income

Generally, agricultural production has been in persistent decline. Reversing the trend does not seem to be easy, although the government believes that it will achieve food self-sufficiency, at the macro-level, in the near future.

For the drought-prone areas, however, the problem is very complex, ranging from shortage of rains over which man has no control to scarcity and depletion of resources, as discussed in the contextual section earlier. Therefore, conditions of food insecurity are likely to form part of the lives of the populations in these areas for some time to come.

Clearly, access to supplementary sources of income is becoming an absolute necessity. The fundamental economic resources (farming and livestock) are not able to support the peasant on a sustainable basis. Customarily, sources of supplementary incomes include the seasonal employment in some commercial farms (e.g. cotton plantations in Awash Valley, coffee farms in the southern regions, commercial farms in the Humera area, and other non-farm work in major urban centres). Migratory labour to these areas, which usually lasts for as long as six months, has been the main source of supplementary incomes to farming families in the investigated communities. Nowadays, these opportunities are severely hampered due to several reasons. For example, labour migration from north to south is no longer possible due to the ethnic-based regionalisation policy. Similarly, migratory labour from northern Ethiopia to major towns in Eritrea has been affected by the border war that raged between the two countries in 1998.

Creating autonomous regional states has, however, accelerated the growth of regional towns in the last ten years. Regional and zonal capital cities have grown tremendously, providing surrounding populations with some employment opportunities in the construction industry and other sectors. Although very limited in scope, labour employment opportunities also exist within the peasant communities where the wealthy farmers employ others to work on their fields.

The other source of supplementary income has been the sale of firewood and charcoal. This was a major source of additional income for many peasants in North Shewa and Wello in the 1970s and 1980s. Presently, however, these sources are not easily accessible because many woods have perished, and the few left are under the close protection of conservation agencies.

What makes the stress acute, therefore, is not

Table 1. Involvement in off-farm work for income earning during the 12 months before the survey date, northern Ethiopia, 1994/95.

Region	Number of households	Households with members involved in off-farm work	% of total households
N. Shewa	600	132	22.0
Wello	693	152	21.9
Tigray	688	407	59.2
Total	1981	691	34.9

Source: Survey data (Household Questionnaire).

only the decline in crop and livestock production but also the dwindling access to supplementary sources of income. The 2000 household heads covered in this survey were asked to declare if any of their household members had been working in any income-generating off-farm activity during the 12 months prior to the survey. This question has two main purposes: (i) it indicates the extent of vulnerability; and (ii) it indicates the desire for occupational diversification. Under ecological stress and land-resource degradation, the immediate response one expects from farming households is occupational diversification and involvement in off-farm employment activities.

Regional level results (Table 1) show significant variation between provinces. Altogether, 35% of the sample households admitted that someone in their family was involved in off-farm employment. This is not very high given the conditions of stress and the need to supplement farm outputs by other incomes. Clearly, the lack of employment opportunities is hindering people's diversification of occupation. In Tigray, however, about 60% of the households replied that some members of their families had been involved in off-farm work to supplement household income. It is well

known that people in this region go on labour migration immediately after harvesting their marginal farms.

Household heads reporting that their family members worked in off-farm employment explain that their farm output cannot sustain them for more than six months, and that they could not have survived without supplementing these outputs. Peasants in the northeastern parts of Tigray are known for having very poor and small land plots from which output, even at good harvests, cannot feed the family for more than six months. Many of those who have worked in off-farm jobs acknowledge that their earnings are far better than the output from their small and degraded farm plots. For these peasants, farming has become a marginal occupation. Indeed, agriculture in those areas has become marginal agriculture in the real sense of the term. These conditions have a marked impact on the demographic behaviours and attitudes of local people.

Those who were not involved in off-farm jobs were asked to indicate why not (Table 2). The traditional explanation for peasants' failure to diversify their occupation is that they do not have surplus labour. They use their labour for their own farms. Respondents in this survey were asked, with special emphasis,

Table 2. Reasons for not working in off-farm employment, northern Ethiopia, 1994/95 (%).

Reason for not working off-farm	Shewa <i>n</i> = 468	Wello <i>n</i> = 541	Tigray <i>n</i> = 281	Total <i>n</i> = 1290
No access to employment opportunity	76.1	79.1	46.9	71.0
No surplus labour in household	12.4	6.3	15.3	10.5
Other (health, jobs far away, wages too low, etc.)	11.5	14.6	37.7	18.5
Total	100.0	100.0	100.0	100.0

Source: Survey data (Household Questionnaire).

if they feel that farm work would be disadvantaged if someone from their household is released to work in off-farm employment. The response to the question was resoundingly 'no, labour is no problem'. The following explanation was used repeatedly: '... because our farm plots are extremely small, labour is not fully utilised. Our problem is lack of employment opportunity rather than shortage of labour that can be spared for off-farm work.' Many respondents affirmed that if off-farm employment opportunities were available, they would stop farming their marginal lands.

Thus, assessment of the major economic sources (i.e. farm output, livestock products, and other supplementary sources) shows that the communities are in a precarious situation. The conclusion is that communities in these areas are found under considerable stress of food insecurity. As indicated in the contextual discussion earlier, this predicament has characterised the communities for over three decades, and it appears that it will continue to be the case for some time to come. Communities will need to respond essentially by developing an insurance system against the effects of drought. The changes in demographic attitudes and behaviours examined in this study are presumed to be aspects of the much-needed coping mechanisms.

### Perceptions of Ecological Degradation

Studies dealing with measurement of public awareness and perception levels about ecological degradation are very rare in Ethiopia. If there are any, they are reports of some NGOs or government agencies such as the Ministry of Agriculture (MOA). The most elaborate and methodologically sound study on the subject has been the Ethiopian Highlands Reclamation Study (EHRS). As part of the EHRS study, a sociological survey was carried out in the highland areas of Ethiopia by a group of sociologists including the present author (Admassie, Abebe and Ezra, 1983) to investigate peasants' awareness levels about the problem of ecological degradation and their attitudes on the conservation measures that were widely operating at the time.

Awareness about ecological degradation can be seen at two levels—public and government-

tal. To speak of government's awareness is easier because this requires a simple inspection of policy documents. Prior to the 1970s, there was no trace of awareness by the government, let alone by the public. In fact, concern about ecological degradation started only after the tragic famines of the early 1970s and the mid-1980s. Such concerns resulted in the generation of considerable amounts of international money to alleviate both food crises and environmental problems. In particular, the disastrous drought of the mid-1980s gave rise to a particular concern for conservation, not least in the drought-prone and less productive areas. Massive amounts of WFP (World Food Program) grain, used for food-for-work (FFW) projects, created opportunities to undertake substantial conservation work. The government now considers environmental degradation as one of the country's biggest challenges and has adopted several policies to combat it. An environmental agency instituted at the level of a Ministry coordinates policies related to environmental protection and rehabilitation.

Measuring public awareness about environmental degradation is not an easy undertaking. But the severity of the problem, which has made the life of farming families extremely difficult, makes it safe to generalise that there is a high level of public awareness about degradation. There are strong indications that peasants are not only aware of the deterioration of their environment, but are also aware of the causes of this deterioration. The increase in awareness levels is a result of the sustained endurance to droughts and famines by these communities. Since the 1970s alone, the country has been hit by four major droughts: 1972/73, 1984/85, 1993/94, and 1999/2000.

One way of looking at peasants' awareness of ecological degradation is to ask them about their feeling of what the future holds for them in terms of land availability and food security. Asking the peasant about the future is not necessarily an intelligible question because he/she can mix many things together: spiritual beliefs, superstitions, hopes and desperation. However, the response to this question can be used to indicate the level of awareness about degradation. Some respondents scornfully refused to discuss the future, saying that this is an act of intrusion into the powers of God.

Table 3. Answers to questions on the relationship between household size and stress (%).

Opinion Questions	N. Shewa <i>n</i> = 600	Wello <i>n</i> = 693	Tigray <i>n</i> = 688	Total <i>n</i> = 1981
In your PA, do larger households own more land? (yes)	46.3	94.8	90.4	78.6
Do you feel that having large family size is rewarding in terms of land ownership? (yes)	45.0	65.8	75.2	62.8
Is it common to have more children in order to get more land? (yes)	34.7	17.8	19.2	23.4
Have you ever thought of having more children in order to get more land? (yes)	22.8	12.8	14.1	16.3
Do you think families with more children feel stressed due to scarcity? (yes)	99.3	99.7	97.8	99.0
Do you want your children to be relieved from the 'farming occupation'? (yes)	55.8	56.9	67.7	60.3

Source: Survey data (Household Questionnaire).

Others were equivocal and had no clear vision of what the future holds for them. But there was a third group with the capacity to perceive the future in terms of resources degradation. This group was capable of explaining its outlook of the future by considering the relationship between population and land availability.

### Opinions on the Relationship between Land Resources and Population

In principle, land allocation in rural Ethiopia is based on a very important demographic factor—the household size. The present land tenure system is advantageous to larger households. At any time of land redistribution, larger households are provided with relatively larger farm plots. Land in Ethiopia is state-owned and has to be redistributed occasionally to enable newly-formed households to have access to farmland.

Opinions on selected issues related to the variable 'household size' are presented in Table 3. Cell values represent those who

replied 'yes' to the questions. The tenure system has some degree of regional difference. In North Shewa, the frequency of land redistribution is less than in the other regions. Many households still own land that was assigned to them in 1975 when the tenure system was first introduced by the military government. Land availability is much better in North Shewa than in the other regions. The general conclusion to be drawn from Table 3 is that people do not consider large family sizes rewarding any more. Results of this study do not concur with earlier assertions by some researchers who have alleged that the tenure system in Ethiopia encourages higher fertility (Admassie, 1992). Such assertions seem to be made without due regard to changing demographic behaviour.

A simple, general question was asked on how respondents feel about the size of the population in their community in relation to available land resources (Table 4). In North Shewa, only 39% feel that population in their locality is 'too large', compared with 89% in Wello and 95% in Tigray. In North Shewa, the

Table 4. Opinions on the population size of their communities (%).

Region	Too large	Normal	Too small	Total
N. Shewa ( <i>n</i> = 600)	38.5	26.8	34.7	100.0
Wello ( <i>n</i> = 693)	88.7	10.7	0.6	100.0
Tigray ( <i>n</i> = 688)	94.9	3.8	1.3	100.0
Total ( <i>n</i> = 1981)	75.7	13.2	11.1	100.0

Source: Survey data (Household Questionnaire).

proportion of those who feel that the population is 'too large' is the same as those who feel that it is 'too small', implying that population pressure is not perceived to be a major problem. About 27% feel that population size is normal. 'Normal' in this context is taken to show no feeling about population pressure or no understanding about the possible incompatibility of population and resources. In the two other regions (Wello and Tigray), people seem to have a very different view about population size. This is a very important basis for the analysis of regional differences in changes of demographic attitudes and behaviours. The reason for the wide provincial differences in opinions about population is related to differences in landholding sizes. In North Shewa, average landholding sizes are much bigger than in Wello or Tigray. The average landholding size per household in North Shewa is more than 1.6 ha, compared with 0.5 ha in Wello and 0.8 ha in Tigray.

### **Attitudinal Changes on Timing of Marriages**

Perceptions and opinions of household heads on issues related to the influence of crisis situations on some demographic events, including marriages, were examined. It is clear that postponement of marriages is an obvious and expected outcome during periods of drought and famine. However, delaying marriage due to a crisis situation is one thing, but changing attitudes on the normal age to marry is a different thing. Given the traditional customs of marriage arrangements and the values attached to age at first marriage, this study considers change in age at first marriage as an important indicator of changes in demographic attitudes and behaviours.

Traditionally, marriages in rural areas of Ethiopia are arranged by parents and conducted during specified months of the year. The work slackness of the season and the relative availability of resources during the season are the main reasons for rural marriages to be concentrated in certain months of the year. For the peasant, the slack season is immediately after harvest, which for the northern regions of the country is essentially between December and February. January is

the central point of the peasant's slack time, when marriages and religious or ritual socialisations are carried out. More than 90% of rural marriages are conducted in the months of January and February.

There is a very strong association between the level of the harvest and the number of marriages in a given community. Marriages are very few or even nil during bad harvest seasons, while they are more common than normal when the harvest is abundant. For example, no marriages at all took place in the survey communities during the food crisis year 1984/85.

Respondents were asked if it is common to postpone marriage during periods of food shortage. Without much variation between the regions, about 85% replied that marriages are postponed if harvests are not good, even when marriages are overdue. This is culturally disheartening for those who had to arrange the marriages of their adult daughters. The age at marriage for females is very sensitive. The commonly acceptable age at marriage for females is before any sign of puberty is observed. For that reason, the relatively wealthier households arrange marriages of their daughters even during crisis periods.

When the question of marriage postponement was asked of respondents, two important demographic questions were emphasised: (i) the ideal age of marriage for males and females; and (ii) the ideal number of children families should have. From the point of view of traditional norms, early marriage of girls is a sign of economic prosperity and social prestige. Female members of wealthy households are married earlier than their counterparts in poorer households. However, the ecological stress, which has been overriding the normal life of the communities under investigation, has gradually made postponement of marriages acceptable even among the so-called wealthier households.

Table 5 demonstrates that even male household heads, who are believed to be more conservative in these matters than mothers, seem to have some attitudinal changes, and some two-thirds of all respondents mentioned age 15 or more as their preferred or ideal age of marriage for females. This represents a real change of attitude from the traditional prac-

Table 5. Ideal age at first marriage for males and females given by household heads (%).

Region	Gender	Ideal age of marriage							Total
		<12	12-14	15-17	18-20	21-23	24-26	27+	
N. Shewa	Males	-	-	8.8	71.6	6.2	10.7	2.7	100.0
	Females	1.5	35.7	56.8	5.5	0.5	-	-	100.0
Wello	Males	-	0.9	6.4	62.8	5.5	20.8	3.6	100.0
	Females	1.0	27.6	64.0	6.8	0.6	-	-	100.0
Tigray	Males	-	0.3	0.9	65.8	16.2	15.0	1.8	100.0
	Females	1.2	14.1	78.1	6.4	0.2	-	-	100.0
Total	Males	-	0.4	5.1	63.1	13.0	15.4	3.0	100.0
	Females	4.7	25.3	63.1	6.4	0.5	-	-	100.0

Source: Survey data (Household Questionnaire).

tice, which requires girls to marry before puberty. It is presumed that these changes are attributable to the stressful conditions of resource degradation. The expressed ideal ages for marriage are, in effect, confirmation of reality, because whether people like it or not, marriages in these communities are very often delayed due to shortage of resources.

The majority of respondents, 1259 (63.1%), expressed that the ideal age at first marriage for girls is between 15 and 17. Very few feel that girls must be up to 18 years and above before they get married. A group discussion with community leaders indicated that increasing the female's age at marriage to 18 or more is 'good for the health of their daughters, but it takes time for the public to accept it'. They added that whether people like it or not, many families are forced to postpone marriages of their daughters due to the stressful conditions that have been prevalent in their communities for the last three decades. It is now becoming quite acceptable to see girls marrying at age 18 and over.

### Opinions on Ideal Number of Children

Asking about the number of children along with the discussion about land scarcity and land fragmentation is not only logical, but also a legitimate measure of people's opinion about relations between population and resource degradation. In this connection, household heads, 99% of whom are males were asked about the ideal number of children a rural family should have. The ideal number of children is an important predictor variable in studies of family planning. It is a good indicator of changes in attitudes. Family planning programmes have used this variable as an indicator of demand for or readiness to accept and apply preventive measures so that it can be possible to attain the desired number of children.

The ideal number of children by region shows some differences, consistent with earlier results. The number of respondents in North Shewa who stated that their ideal number of children is less than five are much fewer than

Table 6. Husband's opinion about ideal number of children (%).

Region		Ideal number of children				Total
		1-2	3-4	5-6	7+	
N. Shewa	(n = 600)	3.9	22.9	26.5	46.7	100.0
Wello	(n = 693)	10.7	42.0	28.5	18.8	100.0
Tigray	(n = 688)	0.9	35.5	39.6	24.0	100.0
Total	(n = 1981)	4.8	28.6	32.6	34.0	100.0

Source: Survey data (Household Questionnaire).

in both Wello and Tigray (Table 6). In this region, only 161 (26.8%) stated that their preferred number of children is less than five. About half of the respondents in this region, 280 (46.7%), say that seven or more is the ideal number of children a couple should give birth to. In contrast, 365 (52.7%) respondents in Wello replied that the ideal number of children a couple should have is less than five; only 18.8% feel that seven or more is ideal.

The conclusion to be drawn from Table 6 is that local people are aware about the incompatibility between population size and the rapidly deteriorating environmental resources in their localities. In particular, people in those PAs where land is scarce (Wello and Tigray) show higher awareness levels about the imbalance between population and resources.

#### INDICATORS OF ACTUAL CHANGES IN DEMOGRAPHIC BEHAVIOUR

##### Current Fertility

Fertility parameters estimated at regional and district levels for the three northern regions, using the 1994 Census data, indicate that fertility has declined significantly in the 1990s. Estimates from the present survey data also show a similar pattern of decline. Data from the sample of ever-married women are used to measure changes in demographic behaviour of the communities investigated. As shown earlier, 2000 ever-married women

were interviewed in the survey. Of these, 13 were discarded for lack of completeness, so that the analysis is based on 1987 women, of whom 1618 were in their reproductive ages.

Fertility levels are estimated from data on children ever born and births in the last 12 months. Births in the last 12 months have been used to measure current fertility, while birth history data on children ever born is used for estimating cumulative fertility and average parities. The pattern of fertility schedule, which is determined using the age-specific total and marital fertility rates, is examined. Table 7 presents current fertility levels in the study areas. The indices are computed from the reported data on births in the 12 months prior to the survey date. The values refer to age-specific marital fertility rates and total fertility rates for the total survey population as well as for each of the three regions.

Altogether, there were 281 live births among the 1616 women in the age group 15–49 during the 12 months before the survey date. This translates to a general marital fertility rate for the ever-married women of about 174 births per 1000. Table 7 shows both the age pattern of fertility and the regional differentials in fertility levels. Among the three regions, Wello shows the lowest level and North Shewa the highest. These results are very important because they demonstrate consistency with earlier conclusions about the relationship between intensity of ecological degradation and changes in demographic attitudes.

Table 7. Marital fertility rates (MFR) and total fertility rates (TFR).

Age	Women in age group	Total		N. Shewa		Wello		Tigray	
		MFR	TFR	MFR	TFR	MFR	TFR	MFR	TFR
<15	2	-	-	-	-	-	-	-	-
15–19	115	0.157	0.054	0.171	0.036	0.150	0.070	0.147	0.059
20–24	215	0.205	0.145	0.217	0.130	0.203	0.153	0.195	0.156
25–29	306	0.219	0.200	0.233	0.204	0.211	0.203	0.214	0.195
30–34	310	0.210	0.201	0.223	0.215	0.196	0.193	0.211	0.197
35–39	294	0.170	0.165	0.194	0.189	0.144	0.141	0.173	0.169
40–44	212	0.137	0.133	0.177	0.168	0.071	0.070	0.162	0.160
45–49	164	0.049	0.047	0.064	0.061	0.018	0.018	0.066	0.064
Total	1618	1.147	0.945	1.279	1.003	0.993	0.848	1.168	1.000
MFR & TFR		5.7	4.7	6.4	5.0	5.0	4.2	5.8	5.0

Source: Survey data (Women Questionnaire).

Analysis of marital fertility indicates that women in the age group 15–19 contribute 17% of the current total fertility, and the age groups 20–24, 25–29 and 30–34, 55%. Fertility levels stay flat up to age 35 and then decline sharply. This pattern resembles the fertility schedule of societies where planned parenthood is a norm.

Overall fertility or total fertility has also been estimated. Accordingly, the total fertility rate for the whole study population is estimated to be 4.7, which is 1 less than the marital total fertility rate. The total fertility rate for Wello is 4.2 and for North Shewa and Tigray, 5.0. Total fertility in Tigray did not decline as expected. This is presumably due to the society's transition from a period of civil war to a period of peace. The civil war, which affected the region severely, ended in 1991. The peace dividend had important demographic aspects. A large number of Tigrayans who were in the rebel forces were able to go back to their normal life and establish families. Marriage and fertility rates in the region temporarily increased in the period 1992–1995. None the less, the overall direction is that there is significant fertility decline underway.

### Cumulative Fertility

Among the common problems of birth history data are the misreporting of the correct date of birth of children and inaccurate reporting of the total number of children ever born to a woman. This is known to have serious effects on all the basic fertility measures derived from such data. Being aware of this critical problem,

enumerators in this survey were trained to probe respondents and cross-check responses on children ever born for inconsistencies. The question on children ever-born was asked in two different ways. First, the respondent was asked to indicate whether or not she has ever had a live birth. If the answer is affirmative, she is further asked to tell the number of children living with her, the number of children dead, and the number of those who are living elsewhere. Finally, the number of children ever born to a woman is reached by adding these categories and by checking for consistency with the information she gave in a different set of questions that deal with her birth history by birth order. Consistency checks on these questions reveal that data on children ever born are quite reliable. Using information from the birth history data and the number of children ever-born, lifetime or cumulative fertility has been estimated (Table 8). Completed fertility is estimated by referring to the average number of children ever-born reported by women in the age group 45–49. The average completed fertility for all three regions in 1994/95 was 6.2. In Table 7, the TFR computed on the basis of births in the last 12 months is 4.7.

In theory, if fertility had remained constant and both children ever born and births in the year prior to the survey were correctly reported, then completed fertility (which is a cohort measure) and current fertility (which is a period measure) should be about equal. Any discrepancy between completed parity and current fertility should therefore be interpreted

Table 8. Number of children ever-born (CEB) and mean number ever-born.

Age of Woman	Number of children										Mean CEB
	0	1	2	3	4	5	6	7	8	9+	
15–19	84.6	12.9	2.3	0.2							0.3
20–24	46.5	17.6	20.0	13.7	2.2						1.8
25–29	22.1	9.0	11.9	23.8	19.1	7.7	5.0	1.4			3.2
30–34	8.9	5.9	6.2	11.6	17.8	23.6	13.9	6.7	3.9	1.5	4.5
35–39	6.4	4.5	5.4	8.0	9.6	13.0	21.5	13.7	9.8	8.1	5.5
40–44	6.0	2.2	3.1	5.4	11.2	13.0	15.4	13.0	17.2	13.5	6.0
45–49	6.8	2.3	4.6	4.0	6.9	14.4	16.2	11.9	12.6	20.3	6.2
Total	6.2	11.3	10.7	13.0	12.2	12.2	11.7	8.3	6.7	7.7	4.4

Source: Survey data (Women Questionnaire).

Table 9. Average number of children ever-born by region.

Age at date of survey	Total		North Shewa		Wello		Tigray	
	Women	Parity	Women	Parity	Women	Parity	Women	Parity
<15	2	–	2	–	–	–	–	–
15–19	115	0.3	41	0.3	40	0.3	34	0.3
20–24	215	1.8	69	2.2	59	1.8	87	1.6
25–29	306	3.2	103	3.6	114	2.9	89	3.1
30–34	310	4.5	94	5.1	107	3.9	109	4.5
35–39	294	5.5	93	6.3	97	4.8	104	5.4
40–44	212	6.0	68	6.8	70	4.9	74	6.2
45–49	164	6.2	47	7.2	56	5.2	61	6.3
Total	1618	4.4	599	4.8	693	3.8	695	4.5

Source: Survey data (Women Questionnaire).

as either under-reporting of current fertility or as decline in fertility. It is argued that the discrepancy shown in this survey is essentially an indicator of fertility decline.

The disadvantage of average parities is that they do not show the variation around the mean. For that reason, the percentage distribution of all women by age and number of births is shown in Table 8. It can be observed that 85% of the ever-married women in the age group 15–19 had not given birth. The average parity for this group is estimated as 0.3 children. The majority (55%) of women in ages 45–49 had six or less children, although over 20% had nine or more. However, women in the age group 30–34 show the most interesting aspect of the matrix. Only 26% of these women had six children or more, indicating a fair amount of resemblance with fertility schedules of contraceptive populations. The proportion of women who are childless at 45–49 is about 7.0%.

Average parity results by age and region,

shown in Table 9, are consistent with earlier findings on the severity of environmental degradation, particularly in Wello. Average completed fertility in Wello is 3.8 children – about 1.0 less than in North Shewa. This regional differential is attributed to the difference in the severity of resource degradation and the consequential public awareness about the growing imbalance between population and resources. Subsequent evidence on family planning attitudes and practices will support this assertion.

### Cohort Fertility

Cohort analysis using birth history data has also been used to show fertility change over time. Trends shown in the cohort analysis confirm earlier conclusions that fertility has been declining in the populations under investigation. Table 10 shows age-specific fertility rates (ASFR) for all the ever-married women by

Table 10. Cohort fertility rates of the ever-married women.

Age at survey	1990–94	1985–89	1980–84	1975–79	1970–74	1965–69	1960–64
15–19	0.054	0.115	0.117	0.099	0.093	0.076	0.089
20–24	0.251	0.275	0.273	0.254	0.226	0.218	
25–29	0.244	0.285	0.292	0.278	0.239		
30–34	0.237	0.257	0.266	0.250			
35–39	0.190	0.211	0.237				
40–44	0.126	0.143					
45–49	0.048						

Source: Survey data (Women Questionnaire).

birth cohorts, computed retrospectively at five-year intervals from the date of the survey.

The data in the table can be read in three different ways, each indicating a particular fertility situation. Reading the figures on the diagonal (from left to right) gives the fertility experience of each birth cohort. For instance, women in the age group 45–49 at the time of the survey reported that their period fertility was 0.048. The same birth cohort had an age-specific fertility rate of 0.143 when it was in age group 40–44. This, when compared with the fertility of women in the age group 40–44 at the time of survey (0.126), shows a significant decline in fertility. Similarly, the same cohort had an age-specific fertility rate of 0.089 when it was in the age group 15–19 about 30 years ago, compared with a level of 0.054 in the current 15–19 age group. Reading the table down the columns gives the fertility levels of different cohorts of women at a particular point of time, while reading it along the rows gives the fertility experience of different cohorts of women when they were in a certain age group.

### Pregnancy and Desired Number of Children

Questions about current pregnancy were also asked to women in the reproductive age span. As shown earlier, 1616 women were in the age group 15–49 at the time of the survey, while two women were below age 15. All 1618 women were asked to state their pregnancy status during the survey time. Only 137 (8.5%) women disclosed that they were pregnant, while 18 (1.1%), expressed that they would not know whether they were pregnant or not. Of those who were pregnant, 48% wanted their current pregnancy to happen, while 36% wanted it some time later. The rest (16%)

expressed that they did not desire to have any more children and indicated that their pregnancy was not wanted.

The women who reported that they were not pregnant at the time of the survey were asked to express their future intentions about pregnancy. Respondents were given six alternatives from which to select the response they thought was applicable to them. Of the 1481 women who reported that they were not pregnant at the time of the survey, 96% (1444) gave valid responses. Consistent with earlier discussion, women in Wello showed lesser preferences for additional children compared with women in North Shewa and Tigray (Table 11). Overall, however, 34% replied that they would not want to become pregnant or to have additional children. Given the traditional norms and the cultural background of these communities, this indicates a major change in demographic behaviour.

Whether the fertility reduction in the communities under investigation is fortuitous, or a short-term response to stress, or a sustainable and long-term response leading to fertility transition, is a question that merits additional evidence and analysis. Towards that end, opinions about desired number of children, and knowledge as well as practice of family planning, are treated below.

The first step to the analysis of 'desired number of children' is to find out whether or not the concept of 'number of children' is an issue among the study populations. The argument made in this study is that ecological degradation has forced the question of family size to be an issue of discussion in the daily life of households. With this in mind, women in the survey were asked if they do ever discuss with their husbands the number of children they would like to have. Of the 1618 ever-

Table 11. Non-pregnant women by preference for more children (%).

Region		Prefer more	Prefer no more	Can't get pregnant	Undecided	Don't know	God's will	Total
N. Shewa	(n = 445)	71.7	19.8	6.7	0.5	–	1.2	100.0
Wello	(n = 506)	44.7	45.5	5.7	0.4	0.8	2.9	100.0
Tigray	(n = 493)	54.6	35.1	2.2	2.2	0.8	5.1	100.0
Total	(n = 1444)	56.4	34.0	4.8	1.0	0.6	3.3	100.0

Source: Survey data (Women Questionnaire).

married women in their reproductive age span, 1568 (97%) gave a valid reply to the question. Nearly half said that the issue is discussed with their husbands. These were further asked to compare their husbands' desires with their own. The proportion saying that their husbands want more children than themselves are about the same as those who said that their husbands want the same number of children as them. The interesting aspect of this analysis is, however, the regional differences. In Wello, more than 50% said that their husbands want the same number of children as themselves, suggesting that conditions for family planning are more favourable there than in, say, North Shewa. The assumption is that, when the desired number of children by husbands and wives concur, preconditions for family planning are favourable.

All women respondents, regardless of age, were asked about the number of children they wish to have, but only 1544 women furnished valid answers that can be utilised for the analysis of fertility preferences. Many still consider that talking about number of children is an act of intrusion into God's wisdom. Table 12 indicates that a significant proportion of women (42%) stated that the number of children they desire to have is less than five, although the overall mean for the desired number of children is five. Interestingly, this average is about the same as the total marital fertility rate, estimated earlier. Opinions on 'desired number of children' also reveal regional differences, with women in Wello expressing a desire for least children. This is consistent with earlier findings of strong demographic responses in Wello.

In order to look at cohort differences, the

data presented in Table 12 were also analysed by age of women. The results show noticeable age effects on desired number of children; 54.6% of women in the age group 15–19 and 48.6% of women in the age group 20–24 indicated that they want to have 3 to 4 children. Among women aged 40 and over, the proportion who said 3 to 4 children is enough is less than 20%. In the 1990 National Family and Fertility survey, the average number of desired children by women in the age group 15–19 who have no children was 4.5 (Central Statistical Authority, 1993). The corresponding number for the present survey is 3.5.

### Family Planning: Knowledge and Practice

The 1990 National Family and Fertility Survey is the only source of information at the national level on issues of family planning. Using this survey, it was estimated that 62.7% of all women of ages 15–49 had knowledge about contraception (93.6% and 57.1% of urban and rural women respectively). In terms of practice, only 4.8% were reported as current users of contraception (2.6% in rural and 24.5% in urban areas).

In this study, knowledge and practice of family planning services is employed as one of the indicators of demographic responses to ecological degradation and food insecurity. Data on knowledge, attitude, practice and intention of future use of contraceptive methods were collected in the ever-married women's survey for this purpose (Table 13). Overall, 78% of the ever-married women of ages 15–49 admitted that they have knowledge about contraception. The point of interest at this juncture is the regional differential. Con-

Table 12. Women's opinion on desired number of children (%).

Region		Desired number of children					Total	Mean
		1-2	3-4	5-6	7-8	9+		
N. Shewa	(n = 376)	4.1	19.6	31.4	25.8	10.1	100.0	6.3
Wello	(n = 635)	17.5	37.1	33.2	9.3	2.9	100.0	4.3
Tigray	(n = 533)	6.4	32.1	49.8	6.8	4.8	100.0	4.9
Total	(n = 1544)	8.8	33.4	36.8	12.3	7.5	100.0	5.0

Source: Survey data (Women Questionnaire).

Table 13. Knowledge and practice of contraception.

Region	All women	Women who had ever heard of a method		Women who had ever used a method		
		Number	%	Number	% of all women	% of those who know
N. Shewa	517	318	64.4	48	9.3	15.1
Wello	543	483	89.0	126	23.2	26.1
Tigray	558	458	82.1	22	3.9	4.8
Total	1618	1259	77.8	196	12.1	15.6

Source: Survey data (Women Questionnaire).

sistent with earlier findings, women in Wello show higher rates of knowledge and practice of family planning.

Women who were not pregnant and who were in their reproductive age span were also asked if they intended to use contraceptive methods in the future. Results are presented in Table 14. Over 35% of those who were not pregnant at the time of the survey and who were at risk because they are in their reproductive ages indicated that they intended to use contraceptives in the future. This suggests that the demand for family planning services is increasing and also signals a precondition for the commencement of fertility transition. About 40% of those who indicated that they intended to use contraceptive methods in the future came from Wello.

Another important indicator of regional differential is the consent and approval of husbands to contraceptive use. Women, including those who were divorced or widowed at the time of the survey, were asked to inform whether their husbands approved or disapproved of the use of contraceptive methods. In all, 26% of the interviewed women revealed that their husbands were in favour of contraceptive use. However, a very

distinctive gap is observed between husbands in Wello and those in North Shewa or Tigray. More husbands in Wello (45%) showed positive attitudes towards contraceptive use compared with their counterparts in North Shewa (13%) and Tigray (18%).

#### Mobility as a Response to Ecological Stress

Migration is often emphasised as the most direct and immediate demographic response to economic crisis. Traditionally, the term 'refugees' has been used to refer to people who flee their place of origin for fear of political, racial or religious persecutions, or who leave their homes due to war and civil strife. Jacobson (1988), however, used the term to refer to the new and growing class of movers due to environmental problems, introducing the concept of 'environmental refugees'. Ethiopia is a classic case, with such environmental refugees originating mainly from the three northern regions covered in this study. The country's resettlement programme discussed earlier was mainly designed to deal with environmentally affected communities in these regions.

This study has examined people's percep-

Table 14. Future intentions of contraceptive use (%).

Region	Will use	Will not use	Undecided	Will use if husband approves	Total
N. Shewa ( <i>n</i> = 469)	24.7	53.6	12.1	9.6	100.0
Wello ( <i>n</i> = 417)	49.4	44.8	4.0	1.7	100.0
Tigray ( <i>n</i> = 536)	34.4	48.1	14.8	2.7	100.0
Total ( <i>n</i> = 1422)	35.6	51.0	9.6	3.9	100.0

Source: Survey data (Women Questionnaire).

tion about causes of mobility, particularly through a question aimed at determining whether or not migration was an important response to ecological degradation and food crisis. The survey households have, indeed, confirmed that movement of people out of their villages, in search of food, was one of the survival mechanisms adopted in the 1980s during the height of the crisis years.

In the sample, 674 (34%) households indicated that some of their family members left home to live elsewhere during the study reference period. Altogether, 1062 individuals from the 2000 households were reported as having moved to other places. Table 15 presents the perceived causes of migration elicited by respondents. While most of the reasons are not directly associated with stress, movements due to factors related to stress from drought and ecological degradation account for a significant 23% of reasons. Leaving the village due to lack of adequate land, leaving one's family to work as a livestock shepherd for wealthier households, and moving to urban areas to take up menial jobs such as maid-servants or joining the army are reasons related to environmental stress.

Both 'left to work as livestock shepherd for wealthier households' and 'left to take up job in urban sector' represent relatively higher proportions in Tigray, and 'left home due to marriage' a lower proportion, than in North Shewa and Wello. This is presumably the effect of the civil war in Tigray, which severely affected the normal life of the region's population until it ended in 1991. For example, there were relatively few marriages in rural Tigray because the involvement of youth in the armed

conflict was very high. Similarly, children leaving their parental home to work as live-stock shepherds for other households shows that poverty is severe in the region.

The survey data also show that for 21% of the sample households, migration to the temporary feeding camps or other areas was used as a means of survival during the food crisis years. The households that admitted having moved to feeding camps or other areas during the 1984/85 famine were primarily from Wello and Tigray. This proportion is extremely high even in comparison with the environmental refugees which Jacobson estimated for some Sahelian countries for the mid-1980s.

## CONCLUSION

These regions of Ethiopia clearly exhibit disharmony between the natural resource base and the population to be sustained. Land is the fundamental resource base of the rural people. This resource is suffering from different forms of degradation (erosion, over-cultivation, fragmentation, etc.). Today, land scarcity is the most serious problem in the rural communities of northern Ethiopia. This survey found that average landholding size per capita for all regions combined is 0.17 ha, while for Wello, where land is reported to be particularly scarce, the per capita holding is estimated at 0.10 ha. Under current production technology, this is considered to be insufficient to provide sustainable livelihoods.

This study explores the impact of ecological degradation and food insecurity on the demographic behaviour of communities. Specifically, it attempts to measure the demographic

Table 15. Reasons for moving to other areas (%).

Reason for moving	Total ( <i>n</i> = 1062)	N. Shewa ( <i>n</i> = 373)	Wello ( <i>n</i> = 349)	Tigray ( <i>n</i> = 340)
Left the household due to marriage	68.1	78.6	68.2	(56.5)
Left the household because of divorce	7.4	7.0	10.3	5.0
Went to other areas for school	1.7	1.6	2.3	0.9
Left to work as livestock shepherd for others	6.0	2.1	2.9	14.1
Left to take up job in urban sector	8.8	3.8	7.5	15.6
Left due to lack of land (destination unknown)	7.9	7.0	8.9	7.9
Total	100.0	100.0	100.0	100.0

Source: Survey data (Household Questionnaire).

changes that have taken place in the period 1984–1994 and interpret them in the context of demographic transition theory. It hypothesises that stress and anxiety caused by land fragmentation, landlessness, drought and food insecurity have forced people to change their demographic attitudes and behaviours.

The main focus has been to assess the level of public awareness and perception about the problem of ecological degradation. The assessment shows that on the part of the government, concern about degradation problems seems to be higher than ever before. Among other things, the establishment of the Ministry of Environment and Natural Resources Protection in 1993 indicates the government's realisation of the problem. Similarly the public awareness and perception about ecological degradation is higher than many people imagine. People have started to understand the relationship between demand and supply of resources. Many peasants see population size in their localities as a crucial problem. The perceived incompatibility between population and land resources is manifested by, among other things, changes in attitude about the ideal number of children in a family. People in those PAs where land is scarce (Wello and Tigray) have shown a desire for a reduced number of children.

Per capita production is decreasing, and large family sizes are no longer perceived to be advantageous in agricultural production. Labour is underutilised as it is now in excess of the available land and livestock resources. Two clear illustrations of local people's changing attitude on large household sizes as well as the desire and readiness for diversification of occupation are the common expressions: 'labour is in excess' and 'employment in off-farm work is better than farming the degraded marginal lands'.

Assessment of demographic responses is not confined to short-term mortality or migration impacts. Attention in this study is given more to analysis of people's perceptions about the relationship between land resources at their disposal and their numbers, which is believed to be an important indicator of whether or not responses are sustainable. The study argues that awareness of the incompatibility of resources (e.g. land) with household needs

indicates that the present fertility decline is not reversible. Attitudinal changes, such as those that relate to desired number of children and use of contraception, are used to support the argument. The proportion of women who have ever used contraception is 12%, compared with the national rate for the early 1990s of less than 5%. Within the surveyed communities, the response in terms of accepting family planning services is higher in areas where there is more degradation.

The important general conclusion from this analysis is that people at the grass roots level are aware of the different aspects of ecological degradation. This is because their survival is directly affected (food production declines, land shortages, fuel-wood shortages, etc.). However, responses to ecological degradation in terms of combating degradation, intensifying agriculture, and changing demographic behaviour need to be motivated and activated by external interventions. Under conditions of dire poverty, external assistance becomes indispensable. There is no doubt that in an area where household incomes are extremely low, lack of credit facilities and incentives can suppress initiatives to produce more and to undertake conservation and land improvement activities on small farms. Hence, Ethiopia needs sound policy intervention in the areas of population distribution, environmental rehabilitation and rural poverty alleviation.

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