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Participation of Women in Water Supply and Sanitation

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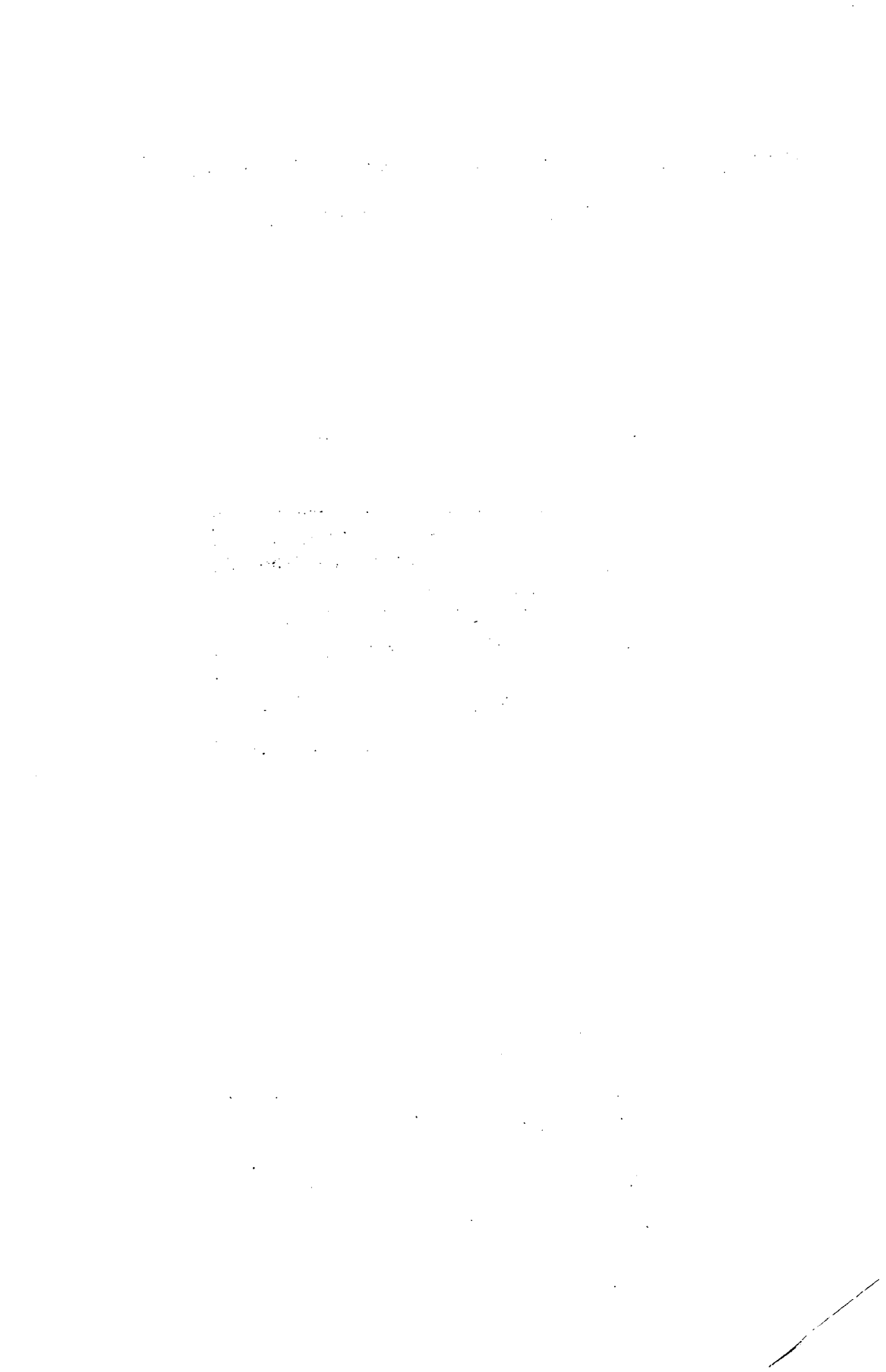
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Participation of Women in Water Supply and Sanitation



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roles and realities

Christine van Wijk-Sijbesma

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Abstract

A comprehensive review of 775 documents has indicated many aspects of traditional involvement of women in water supply and sanitation, which have implications for projects and programmes designed to improve these provisions. Their traditional involvement demonstrates that women have a potential role in such projects which will benefit both the project and the women themselves and which will contribute to wider development. Comparison of their actual participation with these potential roles shows the contributions made by women to planning and design, construction, maintenance and management of improved water supply and sanitation and to health education, and denotes areas for further development and research.

Keywords

Women's involvement, water supply, sanitation, planning, management, maintenance, evaluation, health education, social aspects, literature review.

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Foreword

The year 1985 marks the mid-point of the International Drinking Water Supply and Sanitation Decade (IDWSSD, 1981-1990). It is also the final year of the United Nations Decade for Women (1976-1985). The coincidence of the objectives of the two decades was expressed in the resolution of the conference on the United Nations Decade for Women in Copenhagen in 1980. It called on "member states and United Nations agencies . . . to promote full participation of women in planning, implementation and application of technology for water supply and sanitation". This call was supported by the resolution passed by the United Nations General Assembly when the IDWSSD was proclaimed, urging United Nations systems organizations "to take fully into account the needs and concerns of women" in relation to the Decade. Thus the timing is opportune for the publication of this literature review and annotated bibliography. Its aim is to provide practical understanding of the issues involved in increasing effective participation of women in community water supply and sanitation programmes.

The drawbacks of implementing programmes without the involvement of users, especially women, have now become clear. Many water and sanitation schemes have fallen into disrepair. A number of countries have been obliged to give precedence to rehabilitation of existing systems over investment in new facilities. Community participation, whereby partnership is established between government agencies and local communities in planning, implementation and maintenance of water supply and sanitation facilities, has been identified as a key factor in the success of projects and programmes. Planners and technicians are seeking ways to bring communities into all stages of the project cycle. In 1979, the International Reference Centre for Community Water Supply and Sanitation (IRC) published the "Annotated Bibliography and Literature Review on Community Participation in Water Supply and Sanitation Projects" prepared by Christine van Wijk Sijbesma. This provides a very useful overview of the issues involved in community participation. Nevertheless, the role of women is frequently overlooked by technical staff. This is primarily due to cultural restraints on both their formal participation in community affairs and on their contact with outsiders. Special measures are required to ensure their full involvement in the participatory approach.

The United Nations Steering Committee for Co-operative Action on the IDWSSD established an Interagency Task Force on Women and the Decade. The United Nations Development Programme, in turn, established the interregional project, Promotion and Support for Women's Participation in the IDWSSD (Project INT/83/003). A preliminary literature search of readily available information revealed that little systematic analysis existed of experience

involving women in water supply and sanitation. Thus, jointly with IRC and building on their information network, INT/83/003 embarked on a comprehensive review of all available literature and a bibliography of sources of information, including people who have spent much time dealing with these issues in field projects but who have not necessarily published formal reports. The analysis aims to provide all those involved in planning and implementing water supply and sanitation programmes with a comprehensive review of experience with the involvement of women, and an understanding of the benefits accruing from and ways to secure their involvement.

Sarah L. Timpson
Project Manager
UNDP Project INT/83/003

Preface

With growing realization of the contribution of women to water and sanitation projects, there is an increasing need to compile and analyse information available on their involvement. Over 800 documents have been reviewed with the specific purpose of identifying the contribution of women to short and long term objectives of water supply and sanitation projects and how their involvement can be used optimally to benefit projects and the women themselves. Many of these documents were received through an extensive mail survey to project staff and women research workers, and others were available at IRC and at the UNDP Project INT/83/003. In addition, visits were made to several major international organizations involved in water supply, sanitation and women-in-development activities.

This literature review has been written specifically for planners and managers of water supply and sanitation projects and programmes. It also contains much information of interest to research workers and international and national women's organizations and donor agencies concerned with water and sanitation, related broader development and women's development. For implementation, reference is made to two guidelines on involving women in water supply and sanitation projects published by UNDP and the World Bank in which much of the information from the review has been processed.

In the compilation and analysis of the material, emphasis has been placed on the use of primary sources. Only where this was not possible, secondary sources have been used, with a reference to either one in the list of literature used. Because the study of women's involvement in water supply and sanitation is very new, it was decided not to limit the material to the relatively few specific studies, but to use a broader approach in which quantity compensated to some extent for observations less supported by theory or methodology. The fact that women have been singled out for special reference in this analysis does not mean that some observations, for example regarding local knowledge and work related health risks, cannot also be made of men. Previous studies carried out by IRC on community participation have demonstrated the need for participation by all sections of the community. However, they have also indicated that the special tasks and position of women and their hidden roles warrant separate study on their involvement.

A serious drawback to the literature review of the roles of women in water supply and sanitation has been the use of neutral terms, such as villagers, leaders and committees in many publications and reports, without indication of whether men, women or both were involved. To increase present knowledge and to make the invisible involvement of women visible, it is essential that reports state

whether men, women or both are involved in the various activities and organizations described.

The first chapter gives an overview of the main aspects of the participation of women in water supply and sanitation. In Chapter 2 the traditional involvement of women is considered, especially their involvement in maintenance and management of traditional water supplies and in local learning systems. This chapter will be of particular interest to researchers and field staff concerned with participation of women in development. It may also be of interest to planners and project managers, because these traditional practices form the basis for the potential contribution of women to adequate functioning and use of improved water supply and sanitation facilities. The potential roles of women in water supply and sanitation improvements are set out in Chapter 3. In Chapters 4 to 6, the potential contributions and benefits of their involvement in planning, construction, maintenance of facilities, and in health education are compared with experience in the field. Similarly, the theory and practice with regard to the contribution of women and women's organizations to wider socio-economic development and to wider coverage are compared in Chapters 7 and 8.

The selected and annotated bibliography contains a selection of mainly primary sources which illustrate the forms and benefits of women's involvement or the loss of these benefits when women have not been involved. Reference numbers of the abstracts in the text are preceded by the letter A and are listed in the bibliography separately from the other references. The material in the annotated bibliography was chosen to represent different geographical areas and the cultural variation which determine the position and role of women, rural and urban areas, small projects and large-scale programmes, water supply and sanitation, forms and areas of women's involvement, and the effect which their participation, or the lack of it, has had on projects, wider programme goals, and the women themselves.

The keywords used in the subject index are based on the Intermediate Thesaurus on Community Water Supply and Sanitation for Developing Countries, as developed in the programme on exchange and transfer of information.

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This literature study has been carried out by IRC as part of the UNDP interregional project Promotion and Support for Women's Participation in the International Drinking Water Supply and Sanitation Decade (INT/83/003) with financial support from a grant from the Government of Norway.

The preparation of this book has benefited greatly from the support of many people. Two earlier bibliographies on the participation of women in water supply and sanitation prepared by Ellen Kendall and Alice Smith for WASH provided a good starting point. The preliminary bibliography and outline of the review circulated in the initial phase elicited valuable comments, information, and additional material. The first draft was reviewed by a small group of engineers, social scientists and women-in-development specialists.

Mary Elmendorf, Paula Donnelly Roark, and Heli Perrett provided useful criticism and information based on their long association with water supply, sanitation and the involvement of women. They also made thoughtful suggestions for the structure of the book, as did Gunnar Schultzberg of WHO, and Ronald Parlato of the World Bank. Anne White of the University of Colorado, Boulder, USA, contributed valuable comments on water use and management. Alastair White commented on aspects of community participation in general and reviewed the manuscript in detail. John Pickford of the University of Technology, Loughborough, England, and Sandy Cairncross of the London School of Hygiene and Tropical Medicine reviewed the document from the point of view of its value as a reference book for project management and training and gave additional information from their experience in the field. Valuable comments based on their personal experience were also received from Kristian Laubjerg and John Chilton. Mario Santacruz Chavez of the Instituto Nacional de Salud, Colombia, looked at the value of the document for engineering programme staff in Latin America; and Dr S.S. Sundaresan of the University of Madras did the same for the Indian subcontinent and made suggestions to improve the reference function of the book for engineers. Carol MacCormack and Mette Jørstad read the draft against the background of the participation of women in water and health projects, and Rekha Dayal did the same with particular reference to India. The continued stimulation and support of Sally Timpson of UNDP and Jan Teun Visscher of IRC are gratefully acknowledged.

1. Participation of Women in Water Supply and Sanitation: an Overview

The review of the literature has indicated many aspects of the traditional involvement of women in water supply and sanitation which have implications for projects and programmes designed to improve these provisions. Their traditional involvement demonstrates that women have a potential role to play in such projects, which will benefit both the project and the women themselves and which will contribute to wider development. These potential roles have been compared with their actual participation in subsequent project stages, planning, construction, maintenance, and evaluation, in various cultures and with various types of technologies. The compilation and analysis of information from widely scattered sources allows those involved in projects and training to benefit from the experience of others and to build on this experience to develop a more systematic approach to the active involvement of women in all project stages and at all levels. Feedback will clarify, provide support for and adjust present ideas about the methods and benefits of the participation of women as an accepted feature of all water supply and sanitation programmes.

1.1 WHY INVOLVE WOMEN

As already stated, the participation of women in water supply and sanitation projects can have several benefits. It can contribute to the achievement of specific project objectives of functioning and use of facilities and also to the attainment of wider development goals. Further, their participation can also be of both direct and indirect benefit to the women themselves.

Traditional roles

The potential contribution of women to these objectives emerges logically from their traditional participation in water supply and sanitation. As domestic managers, women decide where to collect water for various purposes and in various seasons, how much water to collect and how to use it. In their choice of water sources, they make reasoned decisions based on their own criteria of access, time, effort, water quantity, quality, and reliability. In addition, much of the informal learning about water and sanitation takes place through interpersonal contacts between women. Thus, their opinions and needs have important consequences for the acceptance, use and readiness to maintain new water supplies and for the ultimate health impact of the project.

While several studies show that traditionally women have a role in maintenance and management of community water supplies, more recent studies indicate that this role may be more comprehensive than realized previously. Their involvement has included communal efforts and user agreements, arrangements by particular women or women's groups for the upkeep of shared facilities, and the exertion of influence on male community leaders and owners of source sites. Further in-depth studies and reporting of information obtained from women in the planning and evaluation of new projects will increase insight into this traditional role. It may also disclose the difference made to maintenance of new facilities when projects are based on existing management traditions and source ratings by women.

In sanitation, demand for privacy of women is a determining factor in latrine acceptance by men and women alike, especially in densely settled communities. Women also maintain latrines or supervise maintenance by children, provide handwashing facilities, take care of excreta disposal and hygiene of young children, and assist and educate them in correct latrine use. Factors influencing latrine acceptance and use which have emerged from a review of a large number of publications are the desire to avoid visibility, cost, acceptable arrangements for sharing, status, location, appropriateness for children, and ease of operation and maintenance.

Economic benefits

The introduction of improved water supply and sanitation may have welfare benefits, particularly when time and energy spent by women on water collection and waste disposal is reduced. The review of the literature indicated that these benefits differ considerably between and within households, depending on environmental conditions, the age and position of women in the household, and socio-economic class.

Potential economic benefits from the time saved in fetching water are closely related to the extent of women's involvement in domestic, economic, and community development work. In many rural areas, women are actively involved in agriculture, particularly food crop production and processing, and in animal care. In poorer households often they contribute substantially to the household income by working for others. Conflicting demands on time and energy, especially at peak periods of agricultural work have sometimes led to neglect of household tasks, such as cooking and child care, or agricultural tasks, such as weeding, which in turn may lead to reduced harvest. Time and energy gains from reduction in water collection may also be used for community development and educational activities. In some areas, when time permits, women make the largest contribution to community self-help projects. Lack of time is often a major constraint to their participation in non-formal education.

Traditionally, women are also the main users of water and waste for the household economy, for example in vegetable gardening, animal husbandry, brewing, processing organic waste for fuel and compost, and plastering walls and floors. These activities have consequences for the level of nutrition, income and hygiene of the family. There are strong indications in the literature, although not always supported by quantitative data, that the income of women is spent on basic family needs, such as food, clothing and household utensils, and also on improvements to and payments for domestic water supply and household hygiene. These patterns make women valuable partners in the expansion of productive use of water, time gains, and processed waste, as part of water supply and sanitation projects.

Health benefits

Water and sanitation related diseases are responsible for most of the morbidity and mortality in developing countries. The use of more water of improved quality and safe methods of excreta disposal, adequate personal hygiene, and food hygiene by all members of the community can lead to significant reduction in these diseases. These measures can also decrease considerably the economic cost of these diseases and their treatment for individual households and for governments, and reduce the human suffering associated with them. Women play a key role in this process because traditionally, they manage domestic water use and household hygiene, educate and care for young children, provide health care in their household and often also in their community, and make decisions on use, and to some extent maintenance, of water supply and sanitation facilities.

Project benefits

Their traditional roles are the obvious rationale for involvement of women in the introduction of improvements to water supply and sanitation and in concurrent arrangements for operation, maintenance and health education. The literature reviewed indicated that many cases of rejection and problems in the functioning and use can be explained, either partly or fully, by insufficient attention to the traditional roles and positions of women, and that the women have had sound reasons for non-use of facilities.

On the other hand, there are many accounts of specific contributions of women resulting in direct benefits to the projects and communities. As prime beneficiaries, they have promoted the interest and willingness of men to contribute to improving water supplies and installation of latrines. Other projects have benefited from their knowledge of local socio-cultural and environmental circumstances, including the identification of reliable water sources of acceptable quality and accessibility; reduction in construction cost by having shorter

pipeline tracks, thus enabling more communities to be served with the material available; adaptation of the design of equipment for improved operation and use; and socially acceptable arrangements for sharing facilities.

Although awareness is increasing that participation in rural water supply and sanitation is more than merely the contribution of voluntary labour, the notion of self-help construction being equivalent to community involvement still persists. The main value of this type of participation is that, when well-organized, it has sometimes led to considerable savings in capital cost, particularly in gravity schemes. In areas with communal facilities, these cost savings have reverted to the agency or led to the provision of an extra tap or facility for the users. In areas with house connections, contributions in kind have reduced the connection cost so that at the time of installation more households could participate in the project. However, increased coverage has not necessarily resulted in access to all, and this form of participation in itself does not guarantee that facilities will be maintained. This depends more on joint agreement between agency and community, both men and women, that a particular improvement is wanted; is within the capability of the community to maintain, with additional institutional support and training where necessary; and that the design and location of facilities meet the needs of the users.

An important issue emerging from the literature review is that the traditional skills and knowledge of women can benefit water supply and sanitation projects. The value of their knowledge to local planning has already been discussed. Women have also made well-reasoned selections of community workers, such as members of local committees and candidates for training in health education and maintenance. Often, the women selected are older women heads of household because of their greater freedom of movement. Other reasons for preferring these women as community workers may be their greater need for and interest in part-time work which can be integrated with their household tasks, and their greater job motivation. Other more subtle criteria may also play a role. The main point is that when asked to select suitable community workers, women can make use of inside knowledge not necessarily available to the agency.

1.2 HOW TO INVOLVE WOMEN

Most accounts of the involvement of women concern isolated projects. There is a need to integrate the involvement of women in a systems approach to water supply and sanitation, including regular monitoring and feedback on both the process and the effect of their involvement in relation to the type of technology and the socio-economic and cultural circumstances.

Planning

For projects which have adopted a community participation approach, a common strategy in local planning is to inform all users, including minority and disadvantaged groups, about the project; to consult them about their needs, preferences and expectations; to discuss options and to reach an agreement on all major issues such as community maintenance and finance. Many reports and studies from the field show that, in spite of their traditional roles, women face problems in participating in this planning process. This also affects their participation in follow-up arrangements for health education, maintenance and management. These problems originate partly from the position of women in different socio-economic classes, age and stages in the life cycle, and in different cultures. In some cultures, integration of women in local socio-political structures is possible, and sometimes occurs. However, these structures do not always represent poorer women. In other cultures, men and women have separate and complementary tasks and responsibilities, which may have or have had equal status. Often women in these communities have traditional organizations and networks which could be involved in the planning process. In secluded societies, women are confined to the house and the immediate environment and contacts with other women are informal and usually limited to the family. Lack of involvement may also stem from the fact that external projects take water supply, sanitation and health out of the women's sphere into the male public decision-making domain. This occurs because the projects are carried out by male staff who communicate with male community leaders, and may also explain why much traditional maintenance done by women has remained hidden. Both community leaders and women themselves have ascribed to men only decisions and work actually done by women. Very often the true role of women has not emerged until traditional maintenance and decision-making processes have been discussed, for example, in a meeting of local women with a woman field-worker.

From the literature review, several strategies have emerged which have been used to involve women more actively in local planning. They have been integrated directly in general community participation structures by practical measures, such as facilitation of attendance at meetings and training activities, and by the development of positive attitudes of men to their involvement in accordance with women's customary tasks. Various measures reported in the literature which have contributed to this type of involvement are summarized in this review. Elsewhere, especially in areas where women and men have segregated but complementary and equivalent spheres of influence, women have been consulted at separate meetings or at places where they gather for daily activities, and eventually join in other project activities. An alternative to an integrated approach is the involvement or development of separate women's organizations, either formal or informal, as for example in health education and site maintenance of communal

water collection points. Finally, women have been reached individually at home, for example in community surveys in project planning or evaluation, and in health education, using both women workers and trained community women.

It is not clear whether in more segregated societies, preference should be given to integration or separate organization of women. In the literature, there are a number of examples of women and women's committees being excluded from planning and management decision-making by local leaders and project staff, and also examples of women's representatives and organizations contributing substantially to the continued functioning of community water supplies and to improvement of environmental hygiene. There is evidence that the women themselves know best which is the most appropriate approach in their society. Contributing factors to the success of either approach seem to be that the women are aware of their common interests, have united, and have received the support of the project. However, from the practical point of view of the agencies, each approach may have different implications. The process and effect of alternative approaches is an area for further study including aspects, such as inputs, costs, appropriate design and maintenance, changes in household and community level hygiene and training of women for group development, situation analysis and problem solving. Irrespective of whether such studies are carried out, agencies should ascertain whether their approach leads to involvement of women in the project in a way which the women themselves consider to be meaningful.

An issue for special consideration in agency planning is the integration or linkage to income generating activities for women. This is related to expenditure patterns of income controlled by women, as mentioned previously. The income generated would not only benefit women and their families, but also contribute to the attainment of project benefits, such as total community coverage, cost recovery, continued functioning and improvement of public health.

In comparison with rural areas, very little information is available on the involvement of women in water supply and sanitation in low-income urban areas, in spite of rapidly increasing urbanization. Experiments with women's groups initiating or managing their own systems show that there is potential for greater involvement of women in these areas, especially if the systems cater for both domestic and income-generating use, such as vegetable gardening, compost making, and laundries.

Health education

Many locally specific risks of transmission of water and sanitation related diseases, based on behaviour which continues after the introduction of improved facilities, make health education support programmes necessary. Where such a programme is added to a project, frequently it is the only part of the project in which women are involved. In many instances, local women have been involved

in these programmes as individual receivers of health information in their homes and meeting places. Sometimes, programmes have been limited to the transfer of general health information, without attention to the accessibility of the information, the attitudes and practices of women, and the factors underlying these practices. In other cases, information programmes are based on careful inventory of the local situation, practical knowledge, beliefs and behaviour of women. Even the rather conventional knowledge, attitudes and practices (KAP) studies which, with standardized questions, do not make it easy to gain insight into the practical knowledge of women, have revealed some sound practices and basic knowledge on which participatory health programmes can be based. Their practical knowledge of community practices, conditions and beliefs requires that women be involved, not as passive beneficiaries of general and academic health education programmes, but as active co-planners, implementers and evaluators of local action programmes.

Women have participated more actively in health education as community health workers, members of community committees and women's organizations. However, some of these organizations focus mainly on development of skills or only involve wealthier women. Further evaluation and reporting is required on the membership of these women's groups and their effect on changes in hygiene behaviour and conditions in the household and community. Projects should also report whether such changes were achieved by a didactic approach, or methods of joint analysis, planning, implementation and evaluation.

There are reports in the literature of poorer women in particular expressing a need for health education that is more adapted to the economic conditions of their families. In response to their needs, some programmes have provided implements or have helped women to make these with local materials, other programmes have included activities to generate income and to reduce expenditure. It is possible that the inclusion of economic components in health education programmes is in the long term more cost-effective than more conventional health education for the total elimination of local risks of transmission of water and sanitation related diseases. This is not yet clear, because this type of health education programme with women is comparatively new.

There are also indications that men should be involved in local health education as husbands and fathers, and also because of traditional divisions of labour between men and women. Opposition from husbands to the participation of their wives in education programmes has been overcome by involving the men in some way in these activities. Traditional divisions of labour and authority have sometimes prevented women from achieving necessary improvements, such as roofing of latrines and kitchen improvements which are male responsibilities. In both cases, the women have drawn the attention of the agency to these problems or have suggested culturally appropriate solutions. More evaluation is required

to assess the effectiveness of health education programmes involving men and also of school health education in relation to domestic improvements.

Construction

In Latin America, Africa and in parts of Asia, women have participated actively in the construction of facilities, especially piped water supplies. This has taken the form of voluntary labour especially in areas where women are traditionally involved in agricultural field-work. Elsewhere, they have motivated and supported men to do unskilled voluntary construction work, or have fed and lodged construction workers, and have raised community funds for the project.

The interest and successful training of women in some areas in cement construction work, such as latrine slabs and rain-water collection tanks, may possibly be explained in terms of a connection with traditional skills in plastering, their responsibilities for domestic water supply and sanitation, and women workers being more acceptable to preserve household privacy. Water supply and sanitation projects, and also food-for-work projects may benefit from the interest of women in sanitation improvements, both as domestic managers and project workers. Such interests exist particularly in areas where husbands disapprove of work being carried out in their homes in their absence, where the need for privacy creates a demand for better sanitation facilities, and where women work in modern or traditional construction.

Maintenance

Where women have been involved in maintenance, their role has been closely related to their traditional management tasks. They have been involved especially in the preservation of site hygiene and the control of source use. In some cases, arrangements have been made spontaneously, thus preserving their original tasks as users and informal managers. In other cases, special tasks have been formulated in consultation with the agency. These have varied from appointment of a nearby woman to look after the water point, to a site committee, user roster, or a team of a male and a female caretaker with the woman responsible for hygiene and the man for technical matters. Experience indicates that factors relevant in site upkeep are that maintenance is not imposed but agreed upon jointly; that the women know what to do and why; and that there is two-way communication with higher level maintenance so that users are informed when, for example, storage tanks are cleaned, and know whom to contact about problems. It has also become clear that to increase the welfare, health and economic benefits of the system, women as the main users and managers, should be involved in decision-making on water use at the tap or well.

Women have been involved in more technical maintenance and repair tasks,

especially in areas of high male migration, and in specific women's projects. Although there are several positive accounts of their commitment and performance, no methodologically sound quantitative evaluation has been carried out which compares the performance of men and women caretakers under similar technical, social and environmental conditions.

Administration

In local administration, women seem to be particularly active in financial matters, including fund raising, fee collection, fund keeping and supervision of the local board. This may not only show their willingness to put effort into a good water supply and indicate the most recurrent problem and problem-solving approach, but also reflect their dependability in fund keeping. Other factors which facilitate fund collection by women may be the link with their roles in managing the domestic budget and in making social visits. At present, there are too few reports in the literature on which conclusions and implications for programme development and training can be based. This is obviously an area for further information and investigation.

Evaluation

Originally, the emphasis in evaluation of the benefits of water supply and sanitation projects was on separate impact studies on public health and socio-economic development. While the large number of health impact studies in totality indicates that projects have important benefits, they also show that demonstration of these benefits depends on the soundness of the methodology of the studies. Factors for consideration include whether improved water supplies and sanitation facilities are better than existing facilities, function appropriately, and are used adequately by all, men, women and children. Therefore, the focus has moved from ultimate impact studies to intermediate studies which investigate the functioning of systems and the behaviour of the people in the community as part of ongoing water supply and sanitation programmes. This means not only involving women as knowledgeable informants in a survey, but also investigating the degree to which they were actively involved in the preceding process, and also whether greater involvement is indicated and feasible.

A similar shift may also be necessary with socio-economic impact studies, as the literature review indicated that these benefits are locally specific. As with health impact studies, there are also indications that these benefits do not occur automatically in all cases, but depend on the way projects are carried out and on the associated support programmes. For an impact on public health, usually a supplementary health education programme is necessary. For greater socio-economic impact, support programmes may be the integration or link with

developmental use of time gains, for example for non-formal education, and of surplus water and processed excreta and organic waste, for example for vegetable gardening and tree nurseries. Cost-effectiveness studies can demonstrate the value of these additional inputs, and also disclose benefits to the financing of operation and maintenance. Further, information on such developmental use of project benefits would be valuable for policy development on project allocation, and promotion and subsidization of composting latrines in some areas.

Compared with the many studies on women's traditional roles showing the potential benefits of time and energy gains, increased welfare and socio-economic development, there are very few studies which have measured the multiple benefits of community water supply and sanitation projects in quantitative as well as qualitative terms. More studies are needed in order to demonstrate more clearly that water supply and sanitation projects can improve the situation of women, their families and their communities in a multitude of ways, and to indicate which type of communities and which participation processes will bring about the most benefit.

A matter of special concern in evaluation are the issues to be addressed to ensure that improvements in water supply and sanitation do not lead to deterioration of the position of some or all women in the communities concerned. Most of these problems can be prevented by more careful planning and better dialogue with the women themselves. A special issue for study and experiment in this respect, which has already been taken up by some water agencies, is the development of an equitable system of water rates for systems with unmetered yard or house connections.

1.3 IMPLICATIONS FOR NATIONAL PROGRAMMES

The review of the literature indicated a number of steps which can be taken at national level to enhance the involvement of women in water supply and sanitation. These are mainly in human resources development and training, the development and testing of field procedures for involvement of women as part of the general community participation process, and the coordination and cooperation with other departments and organizations which can contribute to the achievement of the long-term objectives and targets of programmes.

Project staff - tasks, selection and training

Stimulation of the participation of local women in all phases and activities of water supply and sanitation projects has in particular implications for information exchange and training. It implies that throughout the project, project staff communicate as partners with all groups in the community, including women. In this process, the project provides the basic information which they

have, and the community contributes their local knowledge and expresses their needs, in order to attain joint agreement. This requires that field staff have the attitudes and communication skills necessary for this dialogue, and that the project builds in sufficient, although not necessarily excessive, time for two-way communication.

It also implies that for meaningful consultation with local women in areas where culture requires their segregation or seclusion, either field staff will need to be women, or local women intermediaries may be involved. Also, water supply and sanitation projects can often work more closely with women field-workers in other departments and programmes, such as community development and preventive health. Successful involvement of women project workers often depends on whether those selected fit in with the local culture, and whether training and working conditions are adapted to their situation.

Strategies suggested to involve women in ongoing and new water supply and sanitation programmes include integration of women in general community participation procedures; refocusing to water supply and sanitation of existing participatory activities of women; inauguration of separate organizations for women's participation linked to those of men; strengthening existing forms of women's involvement, or combinations of these. In all cases, programmes can benefit by using a "learning-by-doing" approach whereby field staff are invited to discuss experiences periodically, and intermediate evaluations are carried out to adapt ongoing programmes. Integration of the findings of this process in field manuals and training for community participation and education will help to ensure that knowledge thus developed is invested and used by organizations rather than individual workers. Reporting on meetings and evaluations and exchange of manuals will facilitate the sharing of knowledge between agencies and countries. In addition, there is a need to update existing manuals for field-work and training in community participation and education for water supply and sanitation. At present, many of these do not pay specific attention to the involvement of women in the various phases of local projects.

A weak element in many water supply and sanitation programmes is the training for community members, who voluntarily or for small compensation from the community, carry out local maintenance and management. This is probably due to the relatively recent change from centralized, agency-managed systems to more decentralized participatory approaches and also to the limited number of evaluations on functioning of local facilities. Also, in recruitment and training of higher level staff, technical agencies involved in community water supply and sanitation programmes still often emphasize technical skills, and pay less attention to management and socio-organizational aspects. The adaptation of training courses for programme managers and engineers and the introduction of training courses for community workers provide good opportunities to

introduce the involvement of women as one of the factors from which both projects and communities can benefit.

Small-scale village initiatives

The participation of women is not only important for ongoing and new water supply and sanitation projects, but can also contribute to the achievement of the target of improved water and sanitation for all. Programmes and organizations for women at the national level have the particular potential to assist women to make their own improvements to water supply and sanitation. These programmes and organizations may supplement higher level projects by assisting women to make additional improvements, such as household transport for general use of improved water sources and better household hygiene. They have an even greater potential to assist communities and scattered households not served by larger scale projects. The literature gives many examples of interesting approaches in this area. However, there is a need for more evaluation of the scope and impact of some of the most popular outreach programmes, such as appropriate technology centres, and to define their roles in the national strategy, including arrangements for coordination and cooperation with ongoing technical programmes in water and sanitation.

Conclusion

The involvement of women in all project stages and at all levels, by building on their roles in domestic water supply and sanitation, can be a contributing factor to the achievement of short and long term benefits of water supply and sanitation improvements. In the subsequent chapters, these traditional roles, their implications for new projects, and the experiences and effects of women's involvement as realized in practice are reviewed in detail.

2. Traditional Involvement of Women in Water Supply and Sanitation

2.1 DECISION-MAKING AND DOMESTIC MANAGEMENT

In developing countries, women are the main collectors of water. They not only do the work, but also decide which water sources to use for various purposes, how much water to use, and how to transport, store, and draw the water. Social studies show that women make careful decisions about water use patterns. In their classic study, White et al. (724) observed:

“Nowhere did we find widespread casual or indifferent evaluations of water sources. Most users had evaluative judgments and most were interested in ways of improving their supplies. If they appeared to act contrary to the judgment of an expert it was for reasons convincing to them. The gap between the two judgments does not seem to rise from lack of motivation to gain healthful supplies; it comes from differences in information and its assessment” (724: p. 239).

In the selection of water sources, three types of criteria seem to be important, economic, perceived water quality, and social relationships. Because of their workload, women tend to prefer water sources which are reliable and from which collection requires the least time and energy. Many studies indicate that economic criteria are given the greatest weight, for example, in regions and cultures in East Africa (370, 426, 673, 674, 724), Papua New Guinea (239), and West and Central Africa (121, 462, 540). However, this is not necessarily so for all water uses. In villages in Ethiopia (373), Nigeria (22), India (58, 405), Bangladesh (640), Thailand (254), Indonesia (643), Sri Lanka (366, 141; A18), Nepal (71), and Mexico (737), women have been reported to select certain sources for drinking water, and other sources for washing, bathing, and watering cattle.

Differentiation in water uses is increased when women have a choice of several sources at competitive distances, as for example in communities in wet highlands.

“Three quarters of the Ethiopian women in a sample from five highland villages took water for bathing and washing from a source other than the one used for cattle consumption, laundry or bathing, while 40% were doing so in the dry season. In the five lowland villages only 2% of the households used a separate source for drinking water in the dry season” (373: p. 37).

Efforts made by women in communities in Egypt (A1), Yemen (A3), India (487), Sri Lanka (A18), Kenya (397), Sudan (25), Ethiopia (373), Guinea Bissau (556),

and Colombia (A30) to clarify drinking water by filtration, straining, or treatment with alum, salt or clay, also indicate concern about water quality.

There are strong indications in the literature that in selecting sources for drinking water, women choose the nearest source of acceptable quality. A study in a representative sample of villages in two regions in southern Tanzania showed that in the dry zones, 11% of women walked to the second nearest source because they considered the water to be of better quality (673). Women in south-west Bourkina Faso were prepared to go further for better quality drinking water in the dry season than in the wet season when planting and weeding were given priority (A31). In a village in north-west Tanzania, women accepted an extra distance of 30 to 50% with an upper limit of about 200 metres (33). A study in Botswana gives the acceptable extra distance as 25%, but no upper limit is mentioned (384).

Reports on selection criteria for water sources in communities in Nigeria (22), Guinea Bissau (556), Mozambique (316), and Papua New Guinea (239) show that local concepts of water quality are based mainly on sensory perceptions, such as clearness, colour, taste, and temperature. The cleansing effect of continuously flowing or upcharging water has also been found to be an important selection criterion. Other criteria are associated with magical-religious concepts, including fears of sorcery and poisoning (239, 556; A18).

The preferred domestic water source of the Raiapu Enga clan in a valley in the western highlands of Papua New Guinea was a permanent river, which had a large flow of clean, cold water, and the source of which was within the clan's territory so that other clans could not poison the water. However, only those living in a marginal area between this river and another slightly less acceptable river were prepared to walk the extra distance to the preferred water. A third much smaller permanent stream was almost totally rejected because of its perceived quality, even by those living nearby (239).

The logical reasoning of women with regard to source quality is illustrated by the example of a village in Tanzania.

In discussion about possible contamination of the river water, their main source for domestic use, the women pointed out that drinking water was always collected early in the morning, before polluting activities, such as bathing and washing clothes, took place. They had not considered the effect of the activities of women in villages upstream who were unknown to them. Through discussions, the group concluded that these women would do the same as they, and therefore their water in the morning would not be as clean as they had thought and that they needed an improved source after all (676).

Although selection according to sensory perceptions may well mean that women choose sources of poor bacteriological quality, their rating of sources can also be

quite correct. In studies in Lesotho (240), Tanzania (673) and Papua New Guinea (239), ratings of water sources by women were found to be in close agreement with the water quality as shown by bacteriological tests. In another study in Tanzania (674), women's perceptions and scientific measurements were matched on the two extremes of the water quality scale.

The complexity of water use patterns is illustrated by investigations in two Fula villages in Guinea Bissau. In both villages the women had a choice of several permanent water sources. In-depth study of their decision-making patterns revealed, that in general, both groups applied the same criteria of good colour, taste and flow for drinking water; a short distance for kitchen water; a steady flow and opportunities for meeting for washing water; and privacy for bathing. However, the relative weight given to these criteria differed according to local circumstances.

In the first village, two-thirds of the women gave high priority to good drinking water. They drew this water from a large pond to which they walked a distance of up to 880 metres. Water from a nearer well was used only for clothes washing and kitchen purposes. The remaining women collected water from an open well for all purposes, even though they considered this water not to be as clean as that from the pond. In this choice, however, they by-passed another closer source, because of the high iron content in the water. In the second village, the greatest effort was made for clothes washing in a river-fed pond. Women were prepared to walk 800 metres further than the nearest alternative water source. They also preferred to use this water for drinking, but were not so readily prepared to make the extra effort for this purpose.

The complexity of water use patterns in these Fula villages, in which most women also filter drinking water, and drainage arrangements and regulations on use are found, is in sharp contrast to the Balanta communities in the same region. Women in these communities use the nearest family well for all purposes, including cattle watering, and conditions are very unhygienic (556).

The even greater complexity of the natural and social environment in Bangladesh is reflected in a village study undertaken by the Cholera Research Laboratory (97). Not only type of use but also seasonal variations in availability of water and socio-economic position of the users were found to influence greatly the selection of water sources by wealthy, intermediate and poor households. In more egalitarian communities, conflicts as a factor in source selection are also present but are of less importance (673, 724).

Throughout the year, villagers in Panipur, Bangladesh, have several sources to choose from in their direct environment. This allows women in all socio-cultural and economic categories to choose drinking water from the source of the best perceived quality, especially in terms of odour and taste. For all other uses, nearness of source is the most important criterion. However, in the drier season preceding and

following the monsoon, there is less choice and then "the poorer families tend to choose sources which are of worse quality but which are closer and at which quarrels are less likely". During the monsoon, water sources become merged, and "... it is now the richer groups who are prepared to go greater distances to avoid quarrels". The same is also the case for non-drinking water uses "... in all cases the rich are prepared to go further to get water of higher quality" (97: p. 179).

The same careful and deliberate behaviour based on age-long experience and social learning is also apparent in women's domestic management of water and waste. This is particularly evident in hardship areas, such as in parts of Somalia (A31), Sudan (27), Guatemala (100), and Tamil Nadu, India (141). In Mahweil province, Yemen, women preserve the cleanest and freshest water (preferably from a spring) for drinking, personal washing, cooking, and washing drinking glasses, food, and flour grinding stones. Grey water is saved for washing and rinsing clothes and for watering plants. Water used for washing food is given to poultry and cattle, and water used for clothes washing is reused to clean floors and wash dishes (A3). Reuse of waste and waste water is also reported in studies in Central America and the Caribbean (68, 100), Bangladesh (3), Thailand (303), Tanzania (383), and Egypt (630).

Women also take care of refuse disposal and are usually responsible for cleaning latrines and training children in their use (34, 348, 399), and collect water for personal cleaning in places where this hygiene custom exists (363).

2.2 LOCAL LEARNING SYSTEMS

In every community, there are learning systems by which local knowledge is adapted to new information and transmitted through dialogue and participation. Most often women are the controllers and purveyors in local learning systems related to water, health and sanitation (587). In Mahaweli, Sri Lanka, for example, "decisions concerning health, sanitation and nutrition were more often made by women than any other type of decision surveyed" (345: p. 194).

Family members (29%) and fellow villagers (36%) were the main sources of health information mentioned by women in three villages in Dhaka district, Bangladesh (401). Informal contacts were also major channels for dissemination of health information to women in rural communities in Guatemala (168), Tanzania (682), and the Philippines (684). In traditional primary health care, women's networks and local midwives play an important role. In communities in Upper Egypt (470) and Java, Indonesia (317), they were found to be more effective in responding to women's needs than formal health care systems. Investigation of the health knowledge of midwives in East Java showed that they had better knowledge of food hygiene, sanitation and insect and rodent control than male heads of household. The latter scored only slightly better on water supply knowledge and considerably better in housing (30). This is not surprising

since most of the issues discussed were the responsibility and expertise of women rather than men.

Informal women's groups provide good opportunity for communication. Water sources where women bathe and wash clothes and utensils often are much frequented meeting places (167, 345, 556, 630). In a rural community in Taiwan, there were five district neighbourhood groups, and these were linked in an overall network of village women (756).

"These were the women who were likely to be found washing clothes together, minding one another's babies, or simply chatting together. Each group included women of all ages, ranging from the youngest bride to an aged grandmother . . . Each women usually had at its core a handful of middle-aged women who had long been resident in Peihotien. They were, informally, its leaders, the women to whom younger women turned for advice and help" (756: p 43).

2.3 SOCIO-ECONOMIC ASPECTS

Because unpaid work by women is not included in the Gross National Product (GNP), the value of their labour to the national economy is vastly underestimated. Only six out of 70 developing countries include water collection by women in their GNP (84). Collection of water and recycling of waste would be considered to be economic activities of high labour cost if they were to be replaced by paid labour (444). The time required also limits women's involvement in other productive activities (578). Recognition of their economic work, of which the now classic study of Boserup (89) is an exponent, has led to an increasing number of time-budget studies on the patterns and hours of work of women and men. Women spend more time working and less on other activities than men, as indicated in time-budget studies carried out in rural communities where women actively participate in agriculture and other income-generating activities, for example, in India (129), Bangladesh (238), Tanzania (381, 632, 673), Bourkina Faso (445), Indonesia (722), Nigeria (51), Nepal (7), the Philippines (248), Kenya (763), Ivory Coast (618), and Malawi (76, 158).

"Compared to men, women work more on expenditure-saving work and women also spend less time in personal care and mid-work rest. Women also have less recreation of a formal kind than is the case with their husbands" (238: p. 44).

Water collection

In the total package of daily activities, water collection may well be one of the most time-consuming domestic chores. This is apparent from community-level studies in Africa (5, 22, 24, 70, 124, 373, 445, 540, 632, 652, 749, 750), Asia (65, 142, 269, 300) and Latin America (100, 304, 453), which report that women have to spend a substantial part of their working day collecting water for their families.

The heavy work involved may consume much of their energy intake. Women have been reported to carry as much as 18 to 25 kilograms weight of water on their heads or hips in a single journey (269, 334, 540). In Alemi, Uganda, women have carried 40.8 kg of water in one container (724). Carrying a weight of 3.5 kg (253) is as energy consuming as the heaviest agricultural work done by women (552), although the total time spent in agricultural work tends to be longer. The average proportion of daily energy intake spent on water collection reported in this study in East Africa varied from about 12% in humid areas to 27% or more in dry or mountainous areas (724). Carrying a load up hill was found to be the most energy consuming task of a group of women studied in rural Guatemala (645). These are demands in addition to energy and nutritional requirements for other purposes, such as breast-feeding (35%) (339).

In general, collecting and carrying water is the exclusive task of women. Apart from the small number of single men who must collect water for their own households, men collect water mainly for business enterprise, for example, small restaurants and bars, or to sell (27, 34, 343, 381, 397; A25). They only help women to collect water when sources are far away or hard to reach, and then usually they have some type of transport, such as carts, donkeys, wheelbarrows, or bicycles (174, 222, 262, 400, 420, 486, 594, 674) (See Fig. 1).

Although the work is arduous, it provides women with an opportunity to meet and exchange information. Studies on women's work in segregated cultures, for example in Egypt (469); India (A13), Bangladesh (3) and Pakistan (20), and in areas where women are actively involved in agricultural work, for example, in Liberia (121), Ghana (524), Malawi (158) and Ivory Coast (618) report that women have less leisure and opportunities to meet outside the house than men, who may meet solely for the purpose of communication. Women tend to combine meeting and communication with their work, for instance at laundry places (231).

From the age of about six years, girls begin to help with the daily task of fetching water (491, 522, 722). In societies in which women are occupied within the household and with economic activities, such as trading and agriculture, or in which they are not permitted to be seen in public, young girls may contribute quite substantially to water collection (413, 415, 491, 722). Boys may be involved when they have no other productive tasks (381, 722). However, in general they assist less, possibly because attendance at school is considered to be more important for them than for girls, who may be kept home as soon as they reach an age when they can help their mothers. Few time-budget studies were found which included data on the relative contribution of boys and girls to water collection. Studies in rural communities in Bourkina Faso and Indonesia show that girls between the ages of 11 and 17 years work on average five to eight hours per day. In Bourkina Faso, this included two to three hours hauling water and grinding grain. On the other hand, boys of the same age work at most three to five hours per day (722; A22). In a similar study in Malaysia, girls irrespective of



Fig. 1. Division of labour in water collection: men collect water with means of transport for business purposes, women collect water on foot (WHO photo by A.S. Kotchar).

age and ethnic group, were found to work longer hours on domestic and economic tasks than boys (685). The relationship between women's work and education is illustrated by a study in eight communities in different socio-economic areas in Nepal.

In all eight communities, both boys and girls between the ages of five and nine years participated in the labour force and household activities. In five communities, girls participated to a greater extent in the labour force than boys, and in seven villages girls also spent longer hours on subsistence activities and conventional domestic work. In all but one community boys spent more time on education, varying from twice to 16 times as long. In the age group 10 to 14 years, labour participation increased considerably, with girls again participating more in subsistence and domestic labour, and in five villages participating also more in paid labour. Differences in time for education continued but were less extreme, probably because the work done by boys in this age group had also increased (6).

Socio-economic impacts

The time and effort spent by women in water collection can affect socio-economic and health conditions in many ways. High demands reduce the time and energy available for the many other direct and indirect economic tasks of women. Long journeys carrying heavy loads of water are more detrimental in areas and periods of food shortage. In many cultures, custom demands that women eat what

remains after the men in the household have been served (66, 134, 143, 147, 248, 304, 426, 459, 638, 773; A40). This may result in greater energy deficiencies in women (136, 286). Even their use of water is restricted in areas and times of water shortage (A3). Often their food intake is lower during the planting season when they have to work in the fields and household stocks of food are lowest (99, 585, 726). Many studies have also reported that because of heavy workload or conflicting economic demands, women have had to reduce time spent in food preparation, boiling water, and child care, including breast-feeding (76, 129, 248, 417, 458, 499, 522, 537, 561, 585, 616, 639, 676).

In Laguna, the Philippines, a household survey was carried out in 34 rural communities. In order to work, the women had to reduce the time devoted to child care by more than three hours a week. Older siblings substituted for their mothers so that the total time spent in child care remained the same, but the nutritional status of these children was found to be significantly lower (A29).

In the above case, it was recommended that the time spent in paid work be reduced or adapted. However, an improved water supply in these villages may have made a considerable difference, because water collection took on average two hours and 20 minutes per week. Reduction in time spent in water collection would allow these mothers to continue with essential income-generating tasks, and to spend more time in child care.

Other studies have reported that domestic demands at peak periods were the major constraint to agricultural production output, for example, in Tanzania (381, 429), Zambia and the Gambia (591). One of the peak periods for women's labour, the planting season, has been found to coincide with peaks in the incidence of diarrhoeal diseases (130). This is probably related to increased contamination of surface water and unprotected wells as a result of surface drainage of human excreta, and in general, to greater survival of germs when temperature and humidity are high. Other factors, such as less time to boil unsafe water, to collect water of better quality from more distant traditional sources, and to observe food and household hygiene, may also contribute to the incidence of these diseases.

Infants in particular are at risk when their mothers face conflicting economic and domestic demands and poor nutritional status themselves (499, 129). Breast-feeding may be replaced by bottle or spoon feeding by older siblings. In villages in Thailand (537), Senegal (111), the Gambia (726), Bangladesh (81) and the Philippines (301), peaks in infant diarrhoea have been reported to occur in the rainy season. In the Gambia and Bangladesh, high incidence of diarrhoea was found to be significantly related to the use of contaminated water and food in infant feeding.

Economic use of domestic water is another women's issue. In many societies,

women are involved in animal care (3, 142) and also keep a few animals themselves to market and to supplement the family diet (199, 294, 298, 420, 447, 486, 492, 651, 722; A4). The animal protein provided is essential not only for the growth and development of small children and adolescents but also for adults, because the protein in staple crops is usually of lower quality. Cash income is earned from vegetable gardens, and also the produce provides a source of cheap and essential food supplements for their families (3, 345, 427, 492, 586, 617, 639, 656). However, it is not always clear whether women have gardens in the rainy season only, or whether they also collect extra water for these plots. In African countries, home brewing of beer can be of considerable economic importance in both rural and urban areas (240, 294, 585, 586; A14), and is one of the few ways in which women heads of household have been able to earn a living for themselves and their children (38, 458, 495, 586, 642).

Other seasonal economic activities related to water collection include soaking seeds before planting to improve germination (1); preparation of food and drink for hired labourers or neighbours working on family farms, for example in farming communities in Colombia (626) and Bangladesh (3); and preparation of food and drink for social gatherings, for example in Bourkina Faso (A16) and Melanesia (294).

The main socio-economic aspects of women's traditional roles in water collection and use in low-income urban areas are effort and cash expenditure. Even when free public taps are available, they are usually so few and not well distributed that distances and waiting time are considerable. Because often the supply is intermittent, women have to organize a "watch and warning system" to get their pots filled, sometimes even at night (131).

Particular hardships are endured by women pavement dwellers, who do not even have the privacy of a shed in which to bathe in the water collected.

To bathe in the city of Bombay, India, men use taps at railway stations, work places, shops and public hydrants. They line up to wet their bodies, then apply soap and line up again to rinse it off. Bathing of women in public places is often interpreted as an advertisement for immoral behaviour and causes problems for them and also between families (573).

The work of water collection is increased by the demands of modern town life, since working members of a household and schoolchildren have to be well-dressed in clean clothes, in an environment that is dusty in the dry season and muddy in the wet season (A27).

In settlements in peripheral areas or in isolated sections of cities, public taps are less likely to be provided, especially if settlements have not been legalized. Therefore, considerable time and effort are spent in collection of water from traditional sources or taps outside the area, at great risk of the water being

contaminated (479, 582; A27). Another option is to buy water from vendors, often at an exorbitant price in comparison with that paid by more affluent households with private connections. In addition, the latter receive water of controlled quality, while water sold by vendors may come from a poor quality source or be contaminated during transport.

In Lima, Peru, households with house connections use 152 litre/capita/day (1/c/d) at a cost of 35 *soles* per month. Households supplied by vendors use only 23 l/c/d, yet their monthly expenditure is 105 *soles*. They pay three times as much for about 1/7th the amount of water (11).

High price differences between water acquired from vendors and from house connections have also been reported in towns in Mauretania (683), Colombia (744), Yemen (185), East Africa (724), Nigeria (228), and Central America (221, 228, 721). The main advantage of vendor systems is that small quantities of water can be purchased conveniently on a day-by-day basis. Even though the price may seem small, it is usually much higher than that paid by wealthier households with house connections. However, no payment is made when no water is purchased, for example in the rainy season. Further, the system generates income for vendor households.

Differentiation between women. Even though hauling domestic water is a universal task of women, there are differences between women which affect the impact of water supply improvement on them. Marital status and stage in the life cycle, and socio-economic class are perhaps the main differences.

Cultural factors, such as seclusion, household composition, and division of labour influence water collection work within the family. As already mentioned, girls become involved in this activity at an early age, depending on the workload and mobility of their mothers. In polygamous households, the more strenuous tasks tend to be delegated to younger women (89; A15). This is also the case in extended families, where the heaviest workload falls to the daughter-in-law (3, 230, 420, 486, 655, 686). But with time, these women will also have daughters and daughters-in-law, and become the honoured matron known as "she who gets her water fetched in her old age" (402). Single women are in the most difficult position, especially older women and women heads of household who have no help from older children or relatives.

Differences between wealthy, intermediate and poor households permeate all aspects of life and affect the type and amount of domestic work done by women, including water collection and amounts and purposes of water use. Poor women have to spend as much time as possible on income-generating work (331, 424, 626, 651). This, together with the fact that they or their children have to fetch all their water themselves and have less utensils to clean, explains why poor women in

rural Java, Indonesia, spent less time on household tasks than wealthier women. Many of the wealthier women also have their own wells (424). In Laguna, the Philippines, ownership of private water supplies was found to be significantly higher in wealthy households. These women spent only eight minutes per day collecting water, as compared with 30 minutes by other women. In several upland villages, the water supply was so far away that many could bathe only once or twice a week (561).

The presence of cheap land labour allows middle class women to stay at home. However, often they have been found to work longer hours in their households, because they have more utensils and clothes to wash, animals to tend and land labourers for whom food and drink is prepared as part of their wages. Therefore, private water facilities are installed as soon as possible or servants are employed to transport water, to plaster floors, and to carry out other water related tasks which are considered to be tedious and less prestigious (343, 424, 534, 604, 613, 626, 655).

A study in two communities in Tamil Nadu, India, found that poor women worked most of the day at paid labour outside their houses, and thus had less time for water collection and hygiene.

“In the *harijan* area, the streets are littered with children’s faeces. One reason for this is, perhaps, that all the *harijan* women work long hours away from their houses and have much less time for their children than the other village women” (141: p. 23).

Usually, poor rural women can only obtain paid work for short periods of the year, that is in peak periods of agricultural labour (424, 580, 626, 655). Women in middle class households may have better economic opportunities, also for the economic use of water. In Cajamarca, Peru, and in southern Colombia, for example, women from wealthier households spent more time on economic activities, in animal care (187) and catering for farm labourers who were partly paid in meals (626). Time-budget studies in villages in rural districts of Dodoma, Tanzania (381), and New Delhi, India (142), also found that women in wealthier households worked more hours on income-generating activities related to water and sanitation. Under such circumstances, these women will benefit most from the economic use of time savings and increased availability of domestic water.

Waste disposal

The work involved in waste disposal varies with the local environment and culture. In densely populated areas without latrines or waste disposal places within the household, women are most affected by the lack of privacy demanded for excreta disposal. They may have to walk considerable distances to a suitable

site, or use other methods, such as “pot-storage” for composting (630) or “wrapping and throwing” (571; A36). To avoid being seen, women have to visit defaecation grounds in the dark at increased risk to their safety, especially in urban areas (446). In secluded cultures, women have even trained themselves not to have bowel movements during the day, and not to eat in the middles of the day for that purpose (A36). Yet early morning visits to sites reserved for women for excreta disposal may also have the social function of meeting and exchange of information (356, 607).

South and South-east Asia and China have long traditions of reuse of human and animal waste. In Java, Indonesia, most villages have public and/or private fish ponds for excreta and refuse disposal, and in some villages, human and animal waste is also used as fertilizer (643). Human waste is scavenged by pigs and poultry in parts of India, Nepal (594), and the Philippines (510). In Latin America and Africa, such use of excreta, which involves transport of fresh excreta is not practised, but the planting of fruit-trees in old latrine pits and selective excreta disposal in fields to increase soil fertility have been reported (453, 510, 596, 605).

A task common to many women in dry areas in the Middle East, Africa, and in southern Asia is the processing of animal dung for household fuel or to sell (142, 492, 617; A1, A2). In India, traditionally poor women who have no cattle of their own are permitted to collect dung from the cattle of wealthy landowners (96). Cow dung is also used for plastering walls and floors to keep them smooth and clean. This is usually a task of women and may vary in frequency from once or a few times a year (174) to once a week (617) or once a day (58).

A more specialized economic role in waste disposal is played by women who collect or sort waste as either a formal or informal occupation. In urban areas in some countries, many people find employment in traditional types of sanitation systems.

The number of night-soil collectors employed in some parts of India by municipalities alone is estimated to be between 500,000 and 650,000 (611). Although no specific figures could be found on the number of women employed, they are well-represented (138, 139, 611, 663, 664). In addition, they work as private sweepers in wealthy households because the high castes prefer their womenfolk not to come into contact with sweepers (139). This work is done either in addition to a job with the municipality, or under the ancient patron-client relationship in which the women are paid mostly in food and cast-off clothing (456, 686).

Women formally employed in waste disposal and collection are protected by the labour regulations of the sanitation union and central government. Sometimes, as in the cities of Varanasi and Karachi, they have obtained secure and relatively well-paid jobs and work as respected and equal partners with their husbands (175, 176). However, their strong economic and social position is dependent on

adherence to the labour laws. Evaluation of this system in nine other towns in India showed that this adherence is the exception rather than the rule (611, 686).

Labour-intensive excreta and refuse collection systems are very common in fast growing cities. Cases are also reported in cities in Afghanistan (228), Egypt (305), Colombia (228), Mexico (A32). Exploitation occurs and is increased by middlemen who sell cleaning rights to individual households. Nevertheless, these systems, in which women and children often play an important economic role, provide a living for many poor households who have no alternative.

2.4 PUBLIC MANAGEMENT OF WATER SOURCES

In the preceding sections, the important economic and household management roles of women in water collection and waste disposal have been discussed. Much less attention has been given to their traditional roles in public management of water and sanitation. However, the review of literature indicates that women in various cultures and regions are involved in informal management of traditional water sources. Sometimes, this is limited to group regulations and social control of use, upkeep and hygiene, as in communities in various parts of West and East Africa (33, 121, 250, 397, 724), Indonesia (643) and Papua New Guinea (239).

Restrictions on watering cattle at traditional sources for drinking water and on washing clothes downstream were found in at least six East African tribes. However, these restrictions do not necessarily apply to upstream use beyond the range of vision, and the men do not always keep their cattle out, since their only interest is that the cattle get good water (724).

Elsewhere, maintenance of water sources and village hygiene are the responsibility of specific women or women's organizations, for example, in Samoa where traditional women societies were responsible for the maintenance of domestic water sources and sanitation (A33). In Sri Lanka, maintenance of shared neighbourhood wells is carried out by the women and children in the household of the owner.

The cleaning of the well is a major task. All water is scooped out and the walls are rinsed and rubbed with a stone or coconut husk. Mud is taken out with a bucket or a coconut shell, holes are plastered, and the edge is cleared of vegetation. Flowers and a religious chant complete the work (A18).

Effective traditional maintenance appears to be based on personal responsibilities associated with ownership of the land on which the well is located, as in Sri Lanka, or on joint activities and decision-making by women to improve their water supply, as observed among the Lango in Uganda (724) and in south-west Bourkina Faso (A31).

“Where there is sharing of sources, there is usually some feeling of responsibility for keeping the facilities clean and in working order. The Gogo [who live in Central Tanzania, on an arid plateau with muddy ponds and riverbed wells] do not improve the sources much, and so there is no strong organization for this purpose. One woman may, however, use the hole dug in a dry streambed by some one else. The same pond may be used for drinking, washing, bathing and watering cattle. Among the Lando [who live in Uganda, by a swampy river with water holes dug along its course], there is a strong feeling of responsibility. A group of women together will dig and clean the small hole which constitutes a well and keep it clean. They will not prevent other women from using the well, but they may make remarks about their laziness in failing to build their own or to maintain the common one” (724: p. 240).

Differences in traditional management and maintenance of water sources may occur within a relatively small geographic area. A study of water use in Kibwezi Division, a dry area in central Kenya, showed a great variety in user practices. Some ponds were used indiscriminately and simultaneously by people and livestock. At other ponds, cattle watering and domestic water collection took place at opposite ends. At yet other ponds, small mud enclosures had been constructed, through which clean water filtered into a small reservoir beyond, but unfortunately no details are provided on who was responsible for these improvements (514). Similarly, no information is given on improvements to natural springs used by women in a highland community in Guatemala (100). However, it is likely that women were involved since they have been reported to make similar improvements elsewhere in East Africa (677, 724) and in Bourkina Faso (A31).

Yet another form of traditional maintenance is the responsibility of male community leaders or water supply owners for the upkeep of domestic water sources (86, 360, 397, 415, 438). However, it is not always clear whether women take informal action to ensure that these management duties are fulfilled. In Ghana and Bourkina Faso, wells are dug by men but “it is the women who decide when to build a new permanent water supply” (353) and who contribute to the maintenance (86). Further experience from Bourkina Faso provides evidence to support the double function of women in maintenance and mobilization of male authorities.

The need for a new water supply is discussed firstly in a women’s meeting. Thereafter, the recognized women leaders approach the chief and elders to organize a meeting. Presentation at the meeting varies between villages, either the women representatives present the information, or they remain silent while their husbands and brothers present their case. Their request is always heard but sometimes the leaders are slow to organize a meeting. Then the women ask the council to review the progress made. This is an implicit reprimand and always works. The women also decide on source maintenance. They either do the work themselves, or when outside economic or work resources are needed, put the problem to the council (A31).

Invisibility of traditional management

It is likely that the traditional involvement of women in public management of water sources, and to a lesser extent in village hygiene, are more widespread than at present realized. This assumption is based on several arguments and also experience. Firstly, the informal nature of much traditional maintenance and management means that it is not always obvious to male technicians involved in introducing new facilities. They are further constrained by the socio-cultural gap and restrictions on communication between men and women, and are not expected to give time and attention to existing facilities and structures. When, if at all, male staff discuss issues with women, the women are expected to receive them as guests with food and drink and not to discuss content issues (477). Secondly, women's studies have concentrated mainly on the domestic and economic tasks of women and their exclusion from the formal public sphere and have not emphasized their traditional involvement in management. Thirdly, the attitudes of the women and local leaders themselves contribute to the lack of awareness of their involvement. In the examples cited from Sri Lanka and south-west Bourkina Faso, the women made the decisions and carried out the work, but in both cases, the men and women referred only to the involvement of the men.

In Sri Lanka, credit is given to the men who are supposed to do this work because they are ritually cleaner than women, who menstruate and bear children. In reality, the men only assist when wells are very deep, difficult to clean, or ritually very important. Otherwise, they claim that they have no time and that only women use the wells (A18).

The greater role of the women did not emerge until participant observations were carried out by a woman anthropologist in Sri Lanka (A18), and the process of management was discussed in a separate women's meeting during project planning in Bourkina Faso (A31).

"Questions concerning actual water management decisions were disappointingly vague from both groups (women and village leaders). Questions asked were variations of "who has the responsibility for choosing a new water source?" or "who decides and carries out maintenance?". All responses were general in nature, "the village, the chief, the council", and did not clarify or indicate how decisions concerning use and management were actually made and carried out. On the other hand, the complex interdependencies and prioritization that were evident in the discussion of use criteria (with the women) seemed to indicate the existence of an acknowledged decision-making group. Therefore, within the women's meeting the question were once again rephrased using the interrogative "how" rather than "who". This differentiation allowed the women to state "how" the tasks and responsibilities were actually performed and managed rather than "who" had the ultimate political or cultural leadership" (A31: p. 58-59).

Because practices of this type are often very subtle, they may easily be overlooked, thus forsaking opportunities to integrate local and external maintenance systems in better operation and maintenance (103).

3. Potential Roles of Women in Water Supply and Sanitation Projects

3.1. PROGRAMME OBJECTIVES

Their traditional tasks in water supply and waste disposal for family well-being, economic resources and health, make women the main potential contributors to and beneficiaries of water and sanitation projects. Elmendorf and Isely (1981) (A9) have identified four essential roles of women in water and sanitation projects: acceptors, users, managers, and change agents. They have considered the implications of these roles for project design, implementation, and evaluation. As the main acceptors of new facilities, women should be involved in the local planning stage. As users and promoters of changes in behaviour, they should be the main recipients of health education programmes accompanying water and sanitation projects. As traditional managers of water and waste in their households and in the community, they can play a valuable role in maintenance and management of improved water supplies and community health education to reduce environmental health risks. The involvement of women as community and domestic managers in new projects has implications for human resources development. In many cultures, women are more effective and are sometimes required as trainers and as trainers of trainers. In evaluation, the roles of women as users of facilities and promoters of behavioural change must be taken into account. Involving women in evaluation helps communities and agencies to determine effects of projects and to identify and to rectify specific local problems. This also helps to improve design and implementation procedures for other communities.

The type and extent of the involvement of women depends largely on the objectives of water supply and sanitation projects. These may range from narrow short-term objectives to serve a certain area or to install a certain number of water supply facilities or latrines per year to broader long-term objectives of water and sanitation in the socio-economic development of the communities served, as set out in Table 1.

Table 1 Interdependency of project objectives and the potential contribution of and benefits to women and the community

Project objectives	Potential contribution	Potential benefits
1. Maximum coverage at minimum cost	<p>Voluntary contributions to construction work</p> <p>Motivation of community contributions</p> <p>Local knowledge for appropriate design</p> <p>Support for self-reliant improvement of traditional water supply and sanitation</p>	<p>More households can be served</p> <p>Avoidance of design mistakes</p>
2. Continued functioning of facilities	<p>Local knowledge for appropriate design</p> <p>Participation in maintenance and management</p>	<p>Avoidance of design mistakes</p> <p>More control over service</p> <p>Better functioning of facilities</p> <p>Recognition of traditional roles in modern functions</p>
3. Public health impact	<p>General acceptance of facilities</p> <p>Exclusive and safe use of facilities</p> <p>More time and water for hygiene, child care, and food production</p> <p>Elimination of local transmission routes of water and sanitation related disease</p>	<p>Better health for users and their families</p> <p>Improved public health</p> <p>Reduction in health costs</p>
4. Socio-economic development	<p>Economic use of time and energy gains</p> <p>Economic use of water, including grey water</p> <p>Economic use of waste (compost, biogas)</p>	<p>Income generation</p> <p>Food production</p> <p>Increased time for women's organizations, household tasks, child care, education</p> <p>Enhancement of the status of women</p>
5. Equitable distribution of contributions and benefits	<p>Local knowledge of needs and capacities</p>	<p>Access for all</p> <p>Contributions according to capacity</p> <p>Employment of poor women</p>

3.2 LARGE-SCALE, LOW-COST CONSTRUCTION

Because of the large number of unserved communities, many water and sanitation programmes have placed emphasis on construction. Politically, the target has been to serve as many people as possible within the budget and according to national design criteria. In many areas, this objective has limited community participation to voluntary labour for digging trenches to reduce the construction cost to the agency (735). Voluntary labour has also been used to reduce connection charges to individual households, for example, in many piped water supply projects with yard connections in Latin America (204) and in latrine projects.

Within this concept of community participation, women as future users and beneficiaries, at most can be involved as motivators of adoption and self-help, and in some cultures as direct contributors to voluntary labour. Yet in spite of this emphasis on construction, many communities cannot be served. This number is likely to be greater than originally estimated because of the increasing necessity to improve maintenance of established systems. To achieve total coverage, governments and agencies will also have to consider programmes to help unserved communities and households make simple improvements to their own water supply and sanitation conditions (719). A study in a village in northern Tanzania has shown that such solutions can be quite cost-effective.

Women and children in this village carried in total more than 32,000 gallons of water per year a distance of almost a mile, at a labour opportunity cost of 25 cents per gallon. Acquisition of an oxcart to carry a 40-gallon drum would reduce this cost to 10 cents per gallon, covering capital and operation costs, and result in a slightly greater quantity of water available for domestic use (444).

As the need for and experience with domestic water supply and sanitation concern women especially, women and their organizations can play a major role in these programmes. In West Africa, for instance, it has been advocated that leaders of traditional women's groups be selected and trained in appropriate technology (182) to fit their needs, resources, and capabilities (183).

The mid-term review by WHO shows that many countries have readjusted their targets for the International Drinking Water Supply and Sanitation Decade (736). Planners in these countries may well consider using the large potential of women's organizations and programmes in national water supply and sanitation programmes. With adequate practical support, national women's organizations, which may encompass 5,000 or more voluntary women's groups, as for example in Kenya, would be able to mobilize community action effectively (169). Interest in the participation of women and women's organizations to achieve total coverage is likely to increase especially in low-income urban areas. Urban

populations are growing at a faster rate than rural populations, and in some areas rural growth may approach zero within 25 years. Population growth will be concentrated in the urban areas, and 45 cities instead of 16 cities as at present will have a population of five million or more. Half of this population is expected to be living in slums and shanty towns (205).

In rural areas, coverage may also be increased by linking domestic and agricultural water supplies. It has been estimated that 95% of irrigation systems are also used in practice for domestic purposes (772). Studies in India (14, 536, 541), Thailand (47, 670), Republic of Korea (15), Nepal (425), Viet Nam (772), Botswana (250), and El Salvador (772) confirm this type of use of economic water supply projects. Although several technical and organizational issues remain to be solved, irrigation technologies and management can be adapted to existing practices and needs of women. Seepage of water from unlined canals, for example, has raised the water-table and hand pumps have been installed along the water source to draw safe water for drinking in schemes in southern Asia (14, 345, 537) and in Africa (528). In Sri Lanka, the Gal Oya project issues domestic water for three days out of ten when canals are normally dry. In a scheme in the Philippines, a small diameter pipe system was added to the irrigation network to provide easy access to a limited amount of extra water for domestic use (14, 772).

Combining agricultural and domestic water supplies poses special demands for design, management and maintenance for adequate quantity, quality, reliability, and proximity of the water (261). Women can contribute to the adaptation of irrigation systems for household use through information on the number and type of domestic uses for more appropriate design (772), and by participating in design consultations (164), management and maintenance (164, 261).

3.3 CONTINUED FUNCTIONING OF FACILITIES

Although planners and policy makers may rate those areas in which facilities have been constructed as being served, it is increasingly clear that many facilities do not function for long periods or have broken down completely. This not only means a loss of investment, but also hampers the attainment of health and other developmental benefits. It has been stated that "Breakdowns that force people to use contaminated water for only two per cent of the time risk undoing the health benefits of drinking clean water during the rest of the year" (177: p. 455). As even a short period in which a new water point does not function will force many women to return to traditional water sources, the acceptance of a 20% down factor considered to be reasonable in engineering projects (312) can put an entire community in jeopardy. Thus for continued functioning, limitation of breakdowns and quick repair are essential. Women can contribute in several ways. As users and managers of traditional water sources they may have knowledge and experience useful for project design. For example, they know the

location, reliability and quality criteria applied to traditional water sources in their communities, and therefore should be consulted in geohydrological surveys (422).

Their personal interest in good and reliable facilities can also motivate villagers to follow closely all local construction work, for example by contractors (746; A18), provided they are involved in the project and know which aspects to pay attention to. Referring to the practice of local workmen and supervisors to take their cut of construction materials which has led to broken floors and taps in community blocks in inner-city slums in Colombo, Sri Lanka, local management committees have demanded more control over construction. They commented that “even the women can tell that the cement mixer is putting in five cement to eight sand instead of five to three” (969: p. 135). In fact, women were considered to be the most suitable to check quality of construction because they are home during the day, and can make arrangements to supervise the work (696).

As main users, major interest group, and traditional managers of domestic water and sometimes water supplies, women can also contribute greatly to the maintenance of improved facilities. Their potential to safeguard facilities against vandalism and unintended or mischievous damage by children has been noted (757). Training of women in local maintenance tasks should be given more serious consideration by agencies and also by communities (312, 336, 341, 354, 369, 598; A9, A14, A15). Reasons advanced include the direct concern and personal interest of women in their water supply; their regular visits to distribution points; the compatibility of preventive maintenance and user education with the traditional tasks of women; easier communication between women caretakers and women users; their greater sensitivity to social pressure from other women to do a good job; the importance of health aspects; the lower career orientation and labour mobility of women; and recognition that training in modern technology is for their age-long contribution to the household’s water supply and sanitation.

Whether the work is suitable for local women depends on the actual tasks, the type of technology, and the availability of low-cost spare parts. A review of the daily and monthly tasks of hand-pump caretakers (396, 422, 538, 675) and scheme attendants (421) did not reveal any tasks that could not be done or organized by women. The main problems reported with local hand-pump maintenance in Bangladesh and Guinea Bissau were that bolts were not fastened and bearings not oiled (262, 557). New light-weight pumps, including those that allow internal parts to be replaced through the top of the pump head, also facilitate maintenance by women (633; A20) (see Fig. 2). In Sri Lanka, local women are not only being trained in maintenance, but also through a network of cottage industries they will be involved in the manufacture and installation of pumps and production of spare parts (633). A study in four villages in this country revealed that a considerable proportion of the women interviewed has used screwdrivers and

spanners (287). For many men trained as caretakers in Upper Region, Ghana, lack of experience in technical tasks is no different from that of women (A15). Further, the physical strength of rural women accustomed to heavy work in agriculture and food processing should not be underestimated. With the correct tools and training, they should be able to do all regular maintenance tasks, and can obtain assistance from others for the occasional heavier task.



Fig.2. Participation of women in local maintenance: a woman caretaker using a wrangle to repair one of the many no. 6 hand pumps in Bangladesh (IRC photo by Akil Khan).

Their direct interest in a reliable water supply and better hygiene and greater potential for direct communication with other users are also reasons to involve women in community management (A9). In hand pump and simple piped schemes, this means involving and training women as members of village water or health committees responsible for regular supervision and support of local caretakers and local administration (293, 297, 422, 677). In more complex systems, such as diesel-pumped supplies run by agency-employed staff,

responsibilities and authority need to be divided carefully between the agency and the community on the basis of the capacities and interests of both parties (677). As users, women are most affected by poor operation and inconvenient times of supply (79, 98, 370; A1). Their greater participation in local management may well result in better performance of operators in such cases.

The question has also been raised whether women, and the community as a whole, should be more directly involved in the choice of technology if continued functioning is to depend largely on local maintenance. Improvement of existing sources or increasing the number of hand-dug wells may be a better solution for some villages than the introduction of hand-pump wells or boreholes with motorized pumps, the maintenance of which cannot be guaranteed (33, 35; A31). This implies that the community should be given all the information necessary to make an informed decision. In a community which uses less than 10 litres of water per person per day, information about the type of health improvements to be expected from increasing the quantity of water per person per day to more than 20 litres may well be crucial in a decision to select a lower level of technology, which provides a more reliable supply of slightly less quality (A31). Studies in Guinea Bissau and Sierra Leone, for example, show that while not completely free from contamination of E-coli, protected wells are a considerable improvement on traditional sources (767; A49). "Any system that would offer an incremental improvement would need to be displayed and be perceived as offering either better quality, greater quantity or more convenience" (A8: p. 12). Failure to pay attention to these user perceptions was considered to be the main reason for lack of village maintenance of hand-pump wells in Thailand (A8). Another important consequence to be considered is the maintenance cost of the various options. This concerns women especially because household contributions reduce the household budget of which often women are the managers or co-managers (602, 739).

3.4 ADEQUATE USE OF FACILITIES FOR IMPROVED HEALTH

A major objective of water and sanitation projects is improved public health. According to WHO, 80% of all disease in developing countries is related to unsafe drinking water and inadequate hygiene (336). The incidence of these diseases is reduced when everyone, men, women and children, drinks only safe water, uses sufficient safe water for good personal and household hygiene, uses only safe excreta disposal methods in a hygienic way, and observes good food hygiene. The involvement of women in local planning, maintenance and management is only one factor related to satisfactory functioning and general and adequate use of water and sanitation facilities. Many changes in hygiene practice are required before a public health impact can be achieved. As mothers and domestic managers, women are the key actors in bringing about these changes in individual households (A9). At community level also, they can have considerable influence

on planning and implementing local health education programmes, because traditionally they play an important role in local learning systems as participants and as leaders (A31).

The health of the women and their families will also benefit from reduction in time and energy spent on water collection. As already discussed, women need to expend less energy from their often low food intake on the heavy task of transporting water, so that they have more energy for themselves, for foetal development and breast-feeding, and more time and vigour for tasks essential to family health, including household hygiene, child care, production and processing of food crops, cooking and income generation (220, 339). Water collection is not only energy consuming, but may also have detrimental physical consequences. Carrying heavy water pots, for instance, is mentioned as a primary cause of pelvic distortion, which in turn may lead to death in child-birth (710). In villages in dry areas in Thailand, water collection is one of the seasonal stresses reflected in data on miscarriages (537). The risk is high of falling on slippery paths and steep slopes, while carrying food, water, and a baby. Half of the cases of broken backs treated in a rehabilitation clinic in Bangladesh resulted from falls while carrying heavy loads (119).

Aspects of their living and working environment which present specific health risks to women and preventive action which may be taken are summarized in Table 2. Children are also a high risk group. Those who have not been able to build up resistance to infectious diseases, are particularly vulnerable to diarrhoeal diseases and worm infestations, as apparent from higher incidence of faecal-oral diseases in children (32, 180, 210, 390, 572, 640). It has been estimated that every year, 4.6 million children under the age of five years die from diarrhoeal diseases alone (731). For those who recover, the vicious circle with malnutrition may continue. Mildly malnourished children can become seriously malnourished as a result of diarrhoea, thus making them more vulnerable to more frequent and more severe attacks (32). To prevent such diseases, mothers are the most effective health workers through their practices of child care, education, maintenance of a hygienic environment and first-aid (oral rehydration) in cases of diarrhoea in children (592).

3.5 STIMULATION OF SOCIO-ECONOMIC DEVELOPMENT

The Interagency Task Force on Women and Water of the Steering Committee for the International Drinking Water Supply and Sanitation Decade has stressed the importance of integrating water and sanitation projects with wider socio-economic development.

“The strategy for women’s participation needs to consider water supply and sanitation as an integral part of the entire development process along with other socio-economic sectors. Improved water supply and sanitation facilities can have

many direct benefits, such as reduction of the drudgery of water collection, improvement in health, nutrition and food supply. Moreover, there are indirect benefits in the form of improved potential for economic and social development such as rise in productivity, incomes and improved standard of living" (336: p. 4).

Review of the literature on traditional roles in water supply and sanitation has shown that women will be the main users of benefits of time and energy gains from improved facilities, whether for child care, cooking and household hygiene, for participation in local education and community development activities, as individuals and as members of women's groups, or for agricultural and income-generating activities. A cross-cultural study in Nepal, for instance, found that women contribute 50% of the total household income, men 44%, and children 6% (7). Rural women in developing countries produce 50% of the food (211). In sub-Saharan Africa, South and South-east Asia, their contribution is between 70 and 80% (231). Studies on the traditional roles of women show that in seasons and lifetimes of competing economic and domestic demands, reduction in the pressure on women's time can make an essential difference. Such potential benefits are also mentioned by the women themselves. In a project in Ethiopia, the women planned to use time gains for economic purposes, but their husbands expected that time gains would be used for work in the household (373). Another potential use of time gains is on community projects. A time-budget study in rural communities in Bourkina Faso showed that all community projects were undertaken by women. On average, they spent almost half an hour per day on these activities (445). For all of Africa, the estimated contribution of women to self-help projects is 70% (689).

However, who benefits and in what way will also depend on the water collection patterns. Reduction in the time spent may mean, for example, that women no longer require assistance from their children. This can have the beneficial effect of permitting regular attendance at school (577, 713) and also increase the quantity of water used and thus health. Per capita use in Mwisi, Uganda, where in half of the households children collected water because their mothers were busy in the fields, was lower than in any other community using un piped water (724).

Assisting women to prevent water and sanitation related diseases not only increases well-being but also reduces health costs to the family and the national economy. It is estimated that in Thailand alone, 100,000 tons of rice are lost annually because of the high incidence of ascariasis. (337). In India, 73 million working days are lost annually to water and sanitation related diseases (336). For individual households, a high incidence of disease may mean investing as much as 30% of their income on health care, as found in a preliminary study in Thatta, Pakistan (637).

Table 2. Water and sanitation related diseases associated with women's work and the contribution of women to disease prevention.

Activity	Disease or accident	Environmental factors in disease and disease transmission
Clothes washing Drawing water from ponds and rivers	Schistosomiasis (bilharzia)	Infestation by schistosomes resulting from prolonged standing in infested water
	Onchocerciasis (river blindness)	Simulium fly breeding in fast flowing water
	Trypanosomiasis (sleeping sickness)	Tsetse fly in vegetation on river banks
	Dracunculiasis (Guinea worm)	Infested water users release larvae from leg ulcers when standing in water, others are infested from drinking the water
	Back and head pain, injuries from falls, miscarriages	Lifting, carrying heavy loads on steep and slippery paths
Domestic work	Faecal-oral diseases	Wiping babies' bottoms, washing soiled garments, cleaning latrines, preparing food
	Skin and eye diseases	Small quantities of water collected for bathing and washing clothes
	Chagas' disease	Vectors live in cracks in house walls and animal shelters
	Filariasis	Vectors breed in latrines and sullage water
	Yellow fever, Dengue fever	Vectors breed in old tins, domestic water storage containers, etc.
Agricultural and other work	Snake bite	Night visits to defaecation areas and latrines
	Schistosomiasis	Transplanting rice in flooded fields
	Faecal-oral diseases	Collecting night-soil; working in fields fertilized with night-soil and visits to traditional defaecation areas
	Hookworm	
	Zoonoses	Working with animals

Based on MacCormack (436)

* In all cases, women can participate in problem analysis and identification.

Contribution of women to disease prevention*	Reference
Participating in design and management of washing and bathing facilities at safe water sources	29, 125 234, 438
Collecting water early in the morning and late at night only, 48-hour sedimentation	676; A5
Avoiding crowded places and prolonged contact with infected water	
Educating children about bathing and swimming risks	
Removing topsoil from domestic ponds in the dry season	
Participating in design and management of washing and bathing facilities at safe water sources	
Adapting washing and bathing practices to avoid use of high-risk sources	490, 589, 725; A4, A5
Women-to-women health education and peer influence for general use of washing facilities	
Filtering drinking water through folded fine textures cloth	490
Participating in design and use of lifting and transport devices	118, 119, 537
Improving handwashing, latrine hygiene, food hygiene, hygiene of children	112, 688; A5
Participating in latrine design and location	
Using more water	724
Using transport facilities to collect more water	5
Carrying out housing improvements and maintenance	200, 471
Participating in improving drainage design, and upkeep of water facilities, latrines, and bathing areas	92, 241; A5
Safe water storage and disposal or reuse of sullage water	
Participating in latrine design and location	588
Supporting snail collection and habitat destruction campaigns	725, 775
Motivating installation and use of latrines	
Promoting social norms on avoidance of contact with stools, ablution and foot washing; burying excreta in fields	259, 383, 386
	729

As already stated, traditionally women are the main economic users of water and waste. These activities have important consequences for the nutrition, income, and health of the family, especially when water and sanitation projects enable women to make more active use of their economic potential and interests. Improving water supply and waste disposal and involving women in all project activities also implies recognition of their domestic and economic roles. It enhances their status, increases their skills and capacities for developmental activities in their households and communities, and can stimulate organization for joint problem solving (127, 500, 587; A15).

Equitable distribution of benefits and contributions

No one will deny that safe drinking water and adequate excreta disposal are basic human needs that should be available in every city, village, and household (710). Women's associations can play a valuable role in achieving these basic needs for all by identifying women's needs and enriching national resources, and at the community level, forming focal points for local improvement (336). Women representatives and groups can also have an important role in agency projects on water supply and sanitation. Their personal experiences of difficulties in water collection and sometimes waste disposal suggest that women would be interested particularly in the practical benefits of these projects. On the other hand, male leaders are often involved in village factionalism, which has a negative effect on community participation and project progress (542, 748). In some cases, it is almost inevitable that heads of household of the local elite try to gain advantages, sometimes more as a symbol of their power than the actual benefit involved (A18). Therefore, it may be assumed that the involvement of women in local planning and decision-making will have a positive effect on the equitable distribution of burdens and benefits (127), provided that women from all groups are involved and not only the elite (297).

4. Realities of Project Participation: Women as Planners and Users

4.1 PROJECT ACCEPTANCE AND THE NEEDS OF WOMEN

Many cases of rejection of improved water and sanitation facilities and also of the responsibilities attached to their introduction have been recorded. Such reactions cannot be attributed merely to lack of interest, cultural barriers or inherent conservatism of poor rural people. On the contrary, their decisions are often based on a rational comparison of cost and benefits of the old and new options. Their rationalism is different from and more comprehensive than that of the “experts” (274). Cases of incomplete adoption or rejection of facilities become understandable when viewed in the light of decision-making, work and position of women.

Reduction of time and energy

In view of the traditional roles of women, it is not surprising that many continue to use certain traditional water sources for drinking and other purposes, which are nearer or at which the waiting time is less (33, 54, 60, 79, 180, 213, 383, 397, 440, 715; A15). Inadequate access is often the result of one-sided decisions by project staff, contractors, or higher level authorities. In Togo (311), Tanzania (33, 48), and Malawi (473), political pressure has led to reduction in the number of hand pumps per village and the extension of piped water supplies to serve a larger number of villages resulting in substandard service for the users. Ease of access for technical teams, expectations of better community maintenance and similar practical concerns have induced projects to install water points at public institutions, such as schools and along main roads, thus limiting access to the nearest households only (48, 126, 141, 344, 397, 418, 514, 727; A18, A43). Small hamlets outside main settlements and cultivation villages have been bypassed (302, 344, 505, 677). The former affects in particular poorer households which in stratified societies are often on the outskirts of the community (344, 415; A18).

When new facilities are not used by all, the argument is put forward that women should be “educated”. To date, it is not certain whether additional education in projects that are adapted to user needs, leads to total adoption of new facilities. Investigations on traditional patterns of use (see Chapter 2) and on women’s health knowledge (see Chapter 6) highlight the fallacy of viewing villagers as empty vessels to be filled with knowledge by the expert (387). Women make reasoned choices and have some basic, although not necessarily complete,

understanding of the relationship between water, sanitation and health. It is possible that by building on their knowledge that all women will come to accept new facilities, such as hand-pump wells, even if extra walking distance or waiting time is required. However, the few evaluations are inconclusive (557, 676).

Pour-flush latrines, composting latrines and biogas plants may also mean more transport work for women. General acceptance and proper use of these facilities depend on support of family members (13) and economic benefits to be gained from their use (A32). Transport work is one reason for rejection or inadequate use (363, 753) and the breaking of water seals (A36). Yet as a status symbol, they have become quite popular in Honduras (553) and Colombia (A30), possibly also because many women have yard connections, which make water collection easy.

Socio-cultural appropriateness of facilities

Sharing of facilities and user responsibilities is one of the main issues in socio-cultural appropriateness. Experience in Nigeria (319), Guinea Bissau (557), Kenya (620), Zambia (479), Guatemala, (100), and Indonesia (624, 678) suggest that failure or success in sharing of communal taps, hand pumps and sanitary blocks is largely determined by the degree of consensus on who may use the facilities, under what conditions, what should be done if neighbouring users are without facilities, and how to control unauthorized use.

Frequently, women from minority groups do not have access to public taps or hand pumps, either because they live in neighbourhoods which are not served, or because they are not permitted to use communal facilities. This has been reported in communities in India (189, 542), Bangladesh (155), Sri Lanka (344; A18), Sudan (717), and Egypt (630). The location of public hand pumps, boreholes and taps has been affected by influential people, as shown in studies in Sri Lanka (344; A18), Kenya (706), Ethiopia (528), Central African Republic (400), Nigeria (A43), and Peru (299), and also monopolization of use has occurred as for example, in Uttar Pradesh, India (195), and Bangladesh (323).

A survey of 15 villages in two regions of Tanzania showed that women in more affluent households had a significantly shorter distance to walk to the free public standpipes than those from other households. In India, the National Planning Commission investigated the effectiveness of the National Programme of Minimum Needs and the Accelerated Rural Water Supply Programme in 99 villages in 17 states. It found that 80% of the water points were public, but that only 16% of the taps and hand pumps were located in poor areas which made up one-third of all localities in villages (325).

Cultural constraints to the sharing of household latrines by men and women or fathers and daughters have been reported in areas of the Republic of Korea (12), Bangladesh (A36), Ethiopia (380), Tanzania (399, 677), Malawi (482), Swaziland

(282) and Honduras (217). Lack of privacy of users, especially women, has also been a constraint to the acceptance of latrines. This has been shown to be increased when the user is visible to others, for example, when latrine doors are open at the bottom for ventilation (588; A21), and water must be carried for flushing and personal hygiene (A21, 36). Lack of privacy has also reduced the use of bathing facilities at public taps (477; A41). Privacy as a factor in the location of facilities is another consideration.

In an East African country, the public health inspector ordered every household in his area to build a latrine, or to pay a heavy fine. For ease of inspection, all latrines had to be built along the road. As a result total coverage was achieved but latrines were not used because people disliked being seen entering or leaving by passers-by (62).

Especially in cultures prescribing seclusion of women, it is impossible for them to use facilities located in public places. This included taps and hand-pump wells (13, 262, 267, 630), communal latrines, (571) and also manure pits (206).

Functional appropriateness of facilities

As housewives and mothers, women are most affected by the functional constraints of new facilities. They have rejected safe sources for drinking water and food preparation because of problems with taste, colour, and cooking time (381, 558, 640; A8). Water for washing clothes should give a good lather and not stain the clothes. Therefore, softer but unsafe surface water is often preferred to groundwater (97, 769). Children may drink indiscriminately from this water even when it is stored separately (95, 630).

Ease of operation of facilities is also important for general use. In the past, some types of facilities, for example, foot and hand pumps, have caused difficulties for certain categories of users, such as children, pregnant women and the old, and also for certain uses, such as bathing (95, 155). As a result, users have resorted to unsafe but easier to use water sources (75, 372, 410, 557, 769). Automatically closing taps are often fixed open with the aid of local materials with the result that water wastage continues (256). Also, mothers have often rejected latrines for their children, not only because of a lack of understanding of the harmfulness of children's excreta, but also because of the risk of collapse, presence of snakes, or great distance from the house, while children often fear falling in or the darkness of the hole (10, 399, 408; A10, A21). Some designs are too wide for young children to squat over (141).

A report of experience with ventilated improved pit (VIP) latrines in Bangladesh illustrates how various technical, socio-cultural and functional demands of new facilities can come into conflict, when users are not sufficiently

informed about the working of the technology and assisted to design an outhouse to meet the widely diverging and opposing requirements of low cost and suitability for men, women, and children.

The vent pipe of VIP latrines should be in the open air so that odours from the pit can be drawn off. Yet they were sometimes completely surrounded by a solid outhouse. This meant that the pipe did not function as designed and children were afraid to use the dark smelly place. On the other hand, women appreciated the privacy offered by these latrines. Outhouses built of open material, such as jute sticks, with an ill-fitting curtain for a door are used less by women but are more easily afforded by the poor and more readily accessible and less frightening for children (267).

Upkeep of facilities is also important. Flooding of water points because of poor design and/or maintenance arrangements has prevented women using them (554), or caused women and children to take contaminated water from the pool beside the tap (475). Similarly, latrines can become sources of infection, and are not used regularly when difficult to keep clean because of the construction material used, for example, very rough concrete (83, 242), the design (432), or overuse and lack of maintenance (252). Since women and children usually clean latrines (282, 399; A12), they are most affected by these deficiencies.

Division of labour and authority

While women are responsible for water collection and waste disposal and obtain domestic and occasionally also economic benefits from improved facilities, men usually contribute finance and labour. Local men have less appreciation of the benefits to their wives than is sometimes assumed by project planners and designers. They have been reluctant to contribute, for example, to a communal biogas project (12) and to rural water supplies.

Several case reports from the Indian subcontinent state that men have objected to reduction in water collection time and effort for their wives and children, because this is their traditional role (274, 457, 520). It was feared that less work would make them idle and provide opportunities for undesirable behaviour. In villages in Guinea Bissau and Tanzania, on the other hand, men have welcomed a closer water supply not because it has reduced the workload for their wives, but because they could see what their wives were doing, and thus keep them under control (559, 745).

The involvement of women in financial decision-making increases with their economic role or recognition of their domestic role. Patterns that can be distinguished are:

- husbands control and decide all financial issues, domestic and economic labour of their wives is not appreciated sufficiently to be reflected in

decision-making, for example, in most of North Africa, the Middle East and southern Asia (129, 269, 307, 536, 602, 739);

- wives have separate income-generating activities but profits are small (“pin money”) and often in kind in order to retain some control over it, for example, in parts of East Africa (381, 447; A2) and Morocco (420);
- traditionally, wives and husbands have separate economic activities, each spending his or her own income; wives usually have lower cash incomes because cash crops are grown by men, and women spend a greater proportion on basic necessities for the family, for example, in West Africa (70, 86, 135, 289, 447), Mexico (489) and Kenya (295, 763);
- male labour migration has led to greater responsibilities for and contributions to the household economy by women, for example, in the Punjab (492) and Lesotho (281);
- women regulate household expenditure in at least eight countries in South-east Asia (739, 692); in Andean communities the wife is considered to be an equal and complementary half of the marriage team, participating economically and in decision-making (417). The important contribution of women to the household income in low-income households in India (602), Bangladesh (427), Nepal (7), and the Philippines (581) is consistent with their influence on the domestic allocation of funds.

These patterns are only general and several patterns may exist side by side depending on the economic system, as in Peru where the role of women in decision-making varied with size of landholdings, cash crops or subsistence crops, and the presence of cooperatives (708).

4.2 PARTICIPATION IN PROJECT INITIATION AND LOCAL PLANNING

The many cases of project rejection by or related to women are counterbalanced by the equally large number of cases in which participation of women in local planning has helped both women and projects. A checklist of planning issues related to the special needs and knowledge of women, as has emerged from the literature survey, is presented in Table 3.

Differences in needs and interests

For acceptance, use, and support of local maintenance of public and household facilities, the interests of the community should be identified. Depending on local conditions, it is possible that:

- both men and women have strong felt needs for domestic facilities (165, 373, 642, 673);

- women have a high felt need for domestic facilities, but the men are not interested in expenditure for this purpose (156, 214, 225, 275, 665, 705; A7, A27), or are only interested because they expect to benefit economically for irrigation, watering cattle, etc. (13, 389, 615, 620, 670);
- women have a felt need for facilities for both domestic and economic use (118, 504; A4);
- women have a higher priority for other domestic facilities which are more time and labour saving, for example a grain mill (108, 517, 590, 677; A14);
- both men and women have higher priorities, for example, to overcome a food shortage (401; A42) but women consider water and sanitation to be important problems (401);
- neither men nor women have a high felt need for water and sanitation facilities, for example, because there is no convenience problem and knowledge of health risks is either absent or not applied to local circumstances. Projects are carried out because they are allocated from above, or initiated by influential individuals for professional or political reasons (113).

Review of the literature confirms the motivational role of women as discussed in Chapter 3. Experience in rural villages in El Salvador (504), and Uttar Pradesh, India (563, 728) has shown that non-involvement of women in need identification reduces the likelihood that water and sanitation are mentioned as community needs. Household surveys in Chan Kom, Mexico (440), Bangladesh (401), New Delhi (A7) and West Bengal, India (A24) have brought to light the interest of women in improving household water supply and sanitation. After a household survey and meetings with both men and women, often the initiative to purchase latrines has come from women, as in a community campaign in Ainthapali, a rural village in Orissa, India (363). In Kenya, members of a Masai women's group managed to collect funds from the sale of traditional beadwork, and to attract financial support from urban women's organizations and also technical assistance. Thereupon their husbands gave a large donation to the project (257). Other accounts of women initiators or motivators are given in water supply projects in Panama (A23), Kenya (434), and Japan (460), and latrine projects in Paraguay (201), India (137, 363, 728), and Botswana (64).

In communities in which local authorities are responsible for water and sanitation, women have petitioned successfully for improvements in water supply (133, 498, 600, 648; A11) and waste removal (359), and for sanitation blocks (136). The women were able to undertake this action because local health projects had made them aware of the health risks, the technical options, and the functions of the local administration, and had helped them to unite in a women's group for joint action. Such a need was expressed evocatively in a discussion with women in Chiuchin, Peru.

Table 3. Participation of women in project planning at the community level

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1. Do women and men have a felt need for the project? What are their respective priorities and expectations?
 2. Is the community willing and able to participate fully in the project, including social-economically weaker groups, such as women heads of household?
 3. What forms of control have women over continued and adequate functioning of the project facilities?
 4. Is the design acceptable for all categories of women with regard to:
 - water quality (colour, taste, odour, etc.), quantity, and reliability
 - access to water points, latrines
 - ease of use and upkeep
 - aesthetic and cultural acceptability?
 5. Are additional public facilities required by women for:
 - washing
 - bathing
 - watering of small livestock?
 If so, who is to be responsible for:
 - design
 - construction
 - maintenance
 - management?
 6. Are conflicts likely to occur over use of facilities between and within groups and households?
 7. How can women make economic use of water, waste and time and energy gains resulting from the new facilities:
 - dry season gardens
 - tree nurseries
 - composting
 - education
 - women's groups?
 Do they have a need for support? Who will benefit from additional economic activities?
-

“We need a plaza, drainage and electricity. I think it would be best if we could create a committee of women with someone to advise us. It hurts me that my town is backward, that there isn't any progress. Soon we will need progress so that there is some advancement for the children, so there isn't so much unemployment. Everyone goes to Lima. It isn't possible that we will leave behind our land that is so beautiful” (91: p. 128).

The women went on to name other women with whom they would cooperate and to state the issues they would deal with to improve their life style, such as a regular supply of water in the town so that they would no longer have to fetch water from

the river (91). Later these women united and in one season made enough money to pay for the plumbing for a public toilet (A6).

Because of their lack of formal influence, women have sometimes taken more drastic steps to make their opinions known, for example, a demonstration at a ministry (308) or local office.

In a village in Tamil Nadu, India, a large number of women went to the local council offices and broke their earthen water pots on the floor to demonstrate their frustration about the poor drinking water supply. As a result, funds were made available within weeks and a pump for drinking water installed (173). Women in another Indian village dug several drainage pits in the main village street overnight to demonstrate their need. Thereupon the village drainage system was improved (45).

Urban areas. In these areas, interest in improvements to water supplies and sanitation is usually high because of water shortage or flooding, unsanitary conditions and problems of privacy and safety for women (446, 472, 571; A27, A32). Whether this is a community need depends on the history and the demography of the particular slums. In the present review, all cases of women's participation were found in long-established city slums with settled and homogeneous populations of families and in urban squatter areas.

Generally, in old city slums no action is taken, in spite of high interest, if there is no outside mobilization (611, 697). Once a project has been initiated and women have been involved, for example through home visits and organization, they have participated actively in motivation and planning (55; A7).

The Baldia slum in Karachi, Pakistan, is a conglomerate of 39 neighbourhoods each having its own ethnic identity. A social worker from the university made house-to-house visits to inform the women about a new type of soak-pit household latrine and to help arrange for construction (free if households provided their own superstructure and labour). Once initial mistrust had been overcome, the local women went from door-to-door to canvass for latrines, allowed their daughters to be employed in social surveys and organized street cleaning. The result was 80% latrine coverage in their community (599).

Elsewhere, women's interest in improved water supply and sanitation has been mobilized as a result of organization and confidence building as part of an income-generating project.

Most slums in Madras, India, were originally rural villages which have been engulfed by the urbanization process. Women in these areas contribute half of the household income through petty trade and businesses. The establishment of women's loan groups by a women's organization has had both economic benefits (2,800 new jobs, average 50% increase in earnings) and social effects. Once united, the women promoted the construction of public toilets for women in markets and

other work places, and also better housing and latrine construction in the slums (144).

In urban squatter areas, which often have more heterogenous populations and are still developing a sense of community, domestic water supply and later sanitation, often become rallying points. Obtaining a water supply not only solves a problem, but also contributes to legalization or at least to official recognition of the settlement (246, 576, 579; A27, A32), which is an essential step towards community self-improvement. To obtain and support these basic services, communities have exerted pressure on urban authorities, with women presumably involved as motivators, individually (A27), in informal groups (570), as members of mixed resident associations, or in separate women's organizations parallel to residents associations formed by male heads of household, as for example, in Honduras (221), Brazil and Costa Rica (700). In West Africa, women have also formed associations for business or cultural purposes, or are members of mixed societies which contribute to urban development (414, 472). It is not clear whether such groups are also involved in urban improvements in water supply and sanitation but they have been active in improvements in their home areas (31, 319). Women have also reacted spontaneously in times of crisis, by holding protest marches against acute shortage (480).

Factors contributing to the initiation and participation of women in urban water supply and sanitation projects have been their awareness of the risk to family health of poor environmental sanitation (94; A12, A32); opportunities for recreation for children and beautification of their environment (18); and common economic interests in an adequate water supply, for example, for beer making (495; A27) or clothes washing (12).

Capacity to contribute

While important, a universally high interest and priority need does not guarantee that everyone will be able to participate in water and sanitation projects. In several projects, households headed by women have been excluded from the use of facilities, not only because they were unable to make the required financial contribution but also because they had no adult men to assist in construction (282, 391, 677). In some projects, special arrangements have been made for such cases. These could also be incorporated in larger scale water supply and sanitation programmes.

In the urban slum latrine improvement project in Karachi, Pakistan, the youth group installing the latrines gave free labour to widows and destitute families (55). In a Brazilian community the public health service arranged for digging the pit, supplying the slab and building the enclosure for those women heads of household who were willing to make small monthly payments for the latrine (512). Another

approach was followed in an urban housing project in Panama where women were trained to carry out their own masonry, carpentry and plumbing work (271).

Offering a greater range of low-cost options and finance arrangements adapted to individual household circumstances will also benefit poor families. Latrine ownership is often associated with the relatively high socio-economic status of the owners (52, 79, 146, 682, 684). Piped water projects may offer only one level of service, for example yard connections, which the poor cannot afford (149; A8).

As already shown, in many areas, women are the managers and co-managers of the household budget, and therefore should also be involved in planning household facilities. In some societies, where women have independent cash incomes, agencies have approached them directly for finance, for example in Nigeria (319). However, this may reinforce the inequality which has replaced earlier equality between sexes in these societies. In the past, men and women had separate but equitable sources of income, for example subsistence crops, and similarly an equitable division of responsibilities. Generally, men were obligated to provide housing, some clothing, supplementary food when necessary, and to meet a variety of expenses, such as taxes and school fees. Women provided most of the household food, household utensils, clothes and medicines for themselves and their children, school fees and books (194, 763). Nowadays the men grow the more profitable cash crops using modern implements. Adhering to the traditional division of responsibilities, they can spend the larger proportion of their incomes for personal use, as has been reported in studies in South Asia (536), Cameroon (400), Zambia (176, 442), Zimbabwe (152) and Mexico (489). Meanwhile, the women continue to grow food crops or to practice traditional crafts, such as soap making, without the aid of modern tools and equipment. Their smaller profit is not spent on luxuries but on the basic necessities they have always provided for the household (70, 89, 116, 122, 194). Another demand on their meagre earnings would be an undue burden, unless their income-earning potential were to be increased, for example in integrated projects on the economic use of water.

Control of local operation and maintenance

In most communities, some responsibility for functioning and maintenance of public facilities rests with the community itself. Sometimes, women have opportunities to exert their influence on functioning as users, either indirectly, through annual meetings (738, 744; A45) and accepted channels of complaint to the water agency (213, 574), or directly, through membership of management boards or water committees. Their involvement is acknowledged when incorporated in the planning process with the whole village (431, 677), in separate consultation or interviews with women (A31, A40), or in field-testing and evaluations (531; A32).

Reports on accountability to the community of agency field staff, such as operators, are less usual. One account comes from an action research project for a national community participation component of the rural water supply programme in Tanzania.

The villages concerned were very much in favour of the idea of shared control because often the pump supply did not work because of the absence of the operator. The villages provided and paid for a second operator who was trained by the water department. Both operators were made accountable to the local water committee and had to arrange their work so that one would always be present. Arrangements were also made to improve the diesel supply. This system of shared local accountability and management led immediately to improved functioning and is part of the proposed community participation framework for the national programme (672).

The development of a system for shared accountability at community level has also been proposed for the national rural water supply programme in Bangladesh (401).

Choice of technology in relationship to local maintenance capability is more common in latrine programmes (242, 401, 432, 768) than in rural water supply programmes. In the hand-pump programme in southern Guinea Bissau, users are given a choice of two new protected wells with pulley, upgrading existing wells, or one new hand-pump well (558). A rope and bucket system is recommended where pump repair or breakdown is likely to be a major problem (A44).

Appropriateness of local designs

Field experience indicates that women can make valuable contributions to local project design. Their opinions on water quality were found to be important in selecting sources for gravity water supplies in Malawi and Tanzania (421; A40). In the Philippines, women assisted in selecting reliable sources for a gravity supply. Yet in Tanzania, failure to consult local women resulted in the construction of shallow wells with hand pumps that dry up, while traditional wells in another part of the village never dry up (577). Surveyors in a well project in Bourkina Faso found that in contrast to the women, the local councils of chief and elders had no specific information about the traditional water sources and their year-round reliability (A31). Locations for hand-pump wells have been changed because women have objected to the steepness of slope (422) or taste of the water (556).

In Guinea Bissau, the acceptable salt content of well water for one ethnic group was found to be less than 200 mg/l. One solution found was to site wells for drinking water in the valleys between the villages, where the salt content of the water was lower, provided the women agreed to the extra effort required to fetch the water. The

other solution was early discussion about shared use of good wells for drinking water with all households. Without discussions, users of brackish water would return to their traditional sources for drinking, instead of sharing a pump in a neighbouring section (556, 557).

In selection of service level and siting of facilities, the needs and practical experience of women as housewives, mothers and neighbours also play a role. In a community in the Philippines, women pointed out that the tap site selected would force children to cross a busy road (571). In Mexico, house connections were rejected by women in favour of patio taps, because leakage would be less of a problem (376). When the plan for sharing rain-water collection tanks in western Java, Indonesia, was submitted to the households concerned, they changed the division of user groups and based it on social criteria (624). Similar experience has been reported on the sharing of group connections of piped water supplies in rural communities in Guatemala (100).

Although more information is required on their actual roles, it is plausible that women have contributed to the appropriate design and siting of children's latrines developed with local participation in communities in Sri Lanka (A10), Uganda (408), and India (526; A7). In other places, women have decided to retain traditional latrines for young children because the new type was unsuitable for their use (217, 741). In an Eskimo community in Canada, the women decided on a composting latrine instead of the pit latrines proposed by the men. This occurred after one of their number had participated in a demonstration visit to another community (A28). Rural women in Mexico (440) and Honduras (221) have also expressed interest in composting latrines after the concept had been explained to them.

Women have been involved in the aesthetic and cultural acceptance of new facilities. For example, they influenced the design and colour of household latrines in communities in Mexico and Colombia (217), and in Botswana (432), and the design of communal toilet facilities in a low-income urban neighbourhood in Nepal, where the originally designed closed cabins were not in accordance with traditional communication habits (607).

Water use at the collection point

Provisions for clothes washing and bathing may be required at public water points if women prefer to wash clothes, utensils, and children at the source (121, 174, 262, 370, 682). In areas in Tanzania (296, 677) and in Ghana (A15) it has been reported that men bathe at home using water collected by their wives, while women and children bathe at the water source to reduce the heavy work of water collection. However, water agencies do not always take such needs into account, because they are not within the scope of the project, or because such practices are

considered to result in unhygienic conditions and contamination of the source. Prohibiting clothes washing and bathing at the source is often not the solution; either the ban is not effective or it leads to more transport work or less water being collected by women who live some distance away (33). Involving women in the design, construction and management of communal facilities, together with thorough discussion of the implications for their upkeep and proper use, is likely to be more effective. In Guatemala (100, 439), Indonesia (667), Ghana (A15), Saint Lucia (125), India (A7) and Iran (193), for example, communities have united to construct and manage shared household or group facilities adapted to the local culture both with and without the assistance of technical agencies. The role of women in this process has varied from passive beneficiaries (193) to active designers and managers, for example, in villages in Tanzania (A40), Bangladesh (401) and Zimbabwe (A41). Involvement in design and management appears to be more important than self-help alone. In Malawi, dissatisfaction with the height of washing blocks and the dirty surroundings were found to be the main reasons for non-use of laundry facilities built with community labour in the first phase of a hand-pump programme (430). The results of this internal evaluation have since been fed back into the programme (151).

Women are also likely to be aware of possible conflicts at water points with other potential users, such as cattle owners and people from adjoining areas competing for the same water sources (54, 70, 174; A16). Their experience and direct concern make them important partners in discussions to overcome these problems.

Development use of water, waste and time gains

Women in Ethiopia (373) and Pakistan (52) have expressed interest in economic use of water and time gains. To date, in only a few projects, for example in Malawi (422), Guinea Bissau (A44), Ethiopia (A37) and Tanzania (677), opportunities for further local development have been part of local planning.

4.3. SOCIO-ECONOMIC STUDIES IN THE PREPARATORY PHASE

As a means to better project planning, socio-economic studies have been carried out, in particular in the preparatory phase of large and long-term projects (22, 52, 64, 79, 370, 371, 673, 768; A21, A44) and to try out new technologies in new areas (A16). In most countries of Latin America and in Guinea Bissau, separate community studies are carried out before a local project is designed (113, 546, 738; A44). These studies serve to identify the interest, willingness and capacity of community members to participate in a standardized type of water or sanitation project.

Another type of socio-economic study for better project design is evaluation of completed projects. These evaluations have provided project agencies with very useful information, not only about the patterns of use and reasons for non-use by various groups, but also ways to improve project procedures, including those for community participation and involvement of women (310, 673, 677; A44).

Thus, an evaluation of water supplies in two regions of Tanzania has revealed two main reasons for low use of water points. The first was poor functioning because of the absence of local caretakers or lack of spare parts, tools and training for simple repairs. In one region 49% of reported breakdowns were due to broken pipes or taps. The second reason was the poor distribution of public standpipes in communities. Thus in the new project, sites were selected by men and women representatives after thorough briefing on selection criteria. Similarly, arrangements for maintenance training and acquisition of spare parts were integrated into programme planning (673).

Obviously, both men and women must be contacted in such studies. Experience in Bourkina Faso (A31), Peru (A45), and New Delhi, India, (A7) suggests that women are more knowledgeable than men about patterns of functioning and use. Unfortunately, women are not always recognized as a separate user category. In evaluations in Ghana, Nigeria, Tanzania, India, Thailand and Indonesia only heads of household and authorities were interviewed, even about women's issues, such as water needs (202), water transport and use (23, 509, 563), functioning of laundry provisions (357), and preference for a foot or hand pump (198). Failure to involve women in initial testing of new technologies, such as hand pumps and water carts, has resulted in reduced effectiveness and use (117, 118, 372, 557, 621). Evaluation with men and women users of an experimental hand pump and platform design yielded useful data and suggestions (401), and contradicted the original expectations of ease of operation for children and women (266). In analysis and reporting, a distinction between the sexes is not always made (22, 397). Because of the difference in point of view between men and women, Simpson-Hebert (A38) has stressed the relevance of women interviewing women, and if necessary, separately from men so they can express themselves more freely. In many instances, male heads of household answer questions on topics about which they know very little, such as infant diarrhoea, water sources, and water uses. Even when the woman is present she does not contradict her husband (35, 345). Although experience shows that male promoters can sometimes be used to interview women (670, 744; A45) female promoters may be preferred (40) and be necessary, especially in societies requiring the seclusion of women (52, 350), or in which women have separate responsibilities and working places (A44). A dialogue approach and group interviews with women help respondents to speak more freely than in formal interviews (34, 432, 474, 669).

Women have also been involved more actively in socio-economic studies. In some cases, the field staff collecting the information report the findings of their study to the community in a general assembly. In this way, the community is kept informed, and can supplement information if necessary. This process is also part of collective conscientization of environmental problems and joint planning of improvements. (558, 677). In other cases, community members, who may include women, have been trained to assess community needs and resources and to carry out socio-economic surveys for water supply projects (50, 113, 218, 365, 567, 599). An experiment in five communities in the Philippines found that training of community members to carry out their own socio-economic studies led to considerable reduction in costs, and these studies were as reliable as those carried out by agency staff. However, it also showed that sophisticated studies with many questions and complicated processing of data and insufficient feedback and action planning reduces the learning and motivation of participatory surveys (179). These problems were avoided in an evaluation survey in Olancho, Honduras, which involved local women health promoters in planning, implementation, analysis, reporting and discussion of results and follow-up. As one woman said: "We did not want an evaluation that we could not understand and that would not have helped us to understand our problem - like just answering questionnaires" (244: p. 64).

4.4. CONSULTATION OF WOMEN IN LOCAL PLANNING

Apart from their involvement in socio-economic studies, women have also been involved in local planning through information, consultation and decision-making in community assemblies, local representative bodies, such as councils and development committees, and special subcommittees.

In large standardized programmes in Latin America and Malawi, community participation in the local planning phase includes the organization of general assemblies, which are open to all members of the community including women. Emphasis is mainly on information, motivation and community organization. The participants are informed about the type of design, level of service, labour required, and cash contributions. They also form or elect local committees to manage community contributions and give consent to the project (100, 273, 605, 744; A45). In some projects, assemblies are also involved in choice of technology (706; A44).

In other cases, information, organization and decision-making are limited to an official institution representing the community, such as the local council (716; A1), village chief and elders (283; A15), political and traditional leaders, or a water committee is formed by the local leaders (110, 272, 747).

For effective involvement in local planning and decision-making, both of the above approaches have limitations. An assembly of future users may be

appropriate in small and homogenous communities where this is a customary form of decision-making (737; A31), but is more difficult in large and differentiated communities. Involving local leaders only does not necessarily ensure that the points of view and knowledge of all user categories are represented, and it increases the risk of political conflicts (240, 718). Therefore, a small group, committee or subcommittee is often set up for more detailed planning discussions (290, 422, 673, 677). Ideally, such groups should “include representatives of each of the social groups in the community (for example, both sexes and various age groups as well as any social divisions); persons with relevant knowledge, whether modern or indigenous (for example a school teacher, a plumber or mechanic, a well digger); and a preponderance of active young people” (718: p. 40).

Experience with the involvement of women

In many cases, procedures are such that, in practice, women can make less use than men of these mechanisms for information and consultation, in spite of their roles as future users, primary caretakers, protectors of family health and educators of the new generation (see Fig. 3). In the attendance of meetings, women are hampered by lack of free time. Their limited access to information on village affairs means that they are also less well informed about projects or project meetings (628; A13). In segregated and secluded societies, it is often difficult or impossible for them to attend predominantly male meetings, especially in male meeting places (80, 492, 628; A13). Men heads of household represent the family and it is assumed that the women are informed and influenced by their husbands (91, 276, 318, 492).

Even where women are able to attend meetings, often they do not speak the national language (35, 74, 708, 745) and feel restricted because of their lack of education and because of cultural barriers (628, 708). Customary seating arrangements also limit their access to information.

“The scene is a small village in Upper Region [Ghana]. The community education staff of the Water Utilization Project have agreed to visit the village and make a public presentation on water protection. They arrive, are greeted by the chief and wait in his compound conversing with him, while the villagers are summoned for the meeting by the elders. The meeting takes place at the chief’s meeting place. Community education staff must, by tradition, address the chief and elders. Men occupy the most prominent seats closest to the visitors. The women, however, sit in the rear of the meeting place, some unable to hear or see accurately. The message is heard and seen clearly by the men, but a percentage of women do not receive the full message. Yet it is the women who are the primary water users in the compound and at the pumpsite” (341: p. 259).



Fig. 3. Community decision-making on water supply and sanitation improvements: often women who collect and manage water are not involved in this process (WHO photo by D. Henrioud).

At public meetings, often the accepted role of a woman is to listen to the men talk; she is not expected to express herself (666, 708, 745). Women are also less familiar with the public sphere. They have little experience in public debates and even women councillors have been found to express themselves less freely or frequently than men (745). Men travel more widely on business and attend political and religious meetings, while women's mobility is restricted largely to visits to relatives, the dispensary, market, or flour mill (78, 297, 427, 708).

However, even without expressing themselves directly, their attendance at meetings gives them access to project information as the first minor step to project involvement (297; A7).

Similarly, meetings of local councils and development committees are restricted mainly to men. Although few data are available (502), most community representatives in local government tend to be men. A study of 18 communities in Tanzania has shown that the average number of women councillors is two out of 25 members. (745). In two provinces in Colombia, representation of women on approximately 3,500 community development committees is 8% and 17% respectively. (606). The absence of women in decision-making organizations is also reported in northern Ghana (135), Kenya (434), Thailand (628), Republic of Korea (93) and Guatemala (165). In Egypt, all local councils are required to have

one female member, but the communication gap between men and women councillors and the community is very great (A1). According to Indian law, at least one woman must be elected to each local council. A study in three villages in Madhya Pradesh, India reported: "Often these women did not know they were elected" (656). In Malawi and Sri Lanka, minimum representation of women on local development councils has been obtained through the functional representation of all chairpersons of local organizations, including women's party branches, traditional women's organizations, and mothers' clubs. Local women are involved automatically through their clubs and organizations (243, 362). Although this increases the chance of having several experienced women representatives, poor households are not always included, either because they have no organizations, or because their organizations are not recognized (367). Also, representation at the community level does not necessarily give these women a say in water projects.

In the Harispattuwa water development programme in Sri Lanka, all decisions, including the selection of villages for inclusion in the project and of well sites, were made by an all-male water project committee at district level (A18).

The absence of women at local meetings and on governing bodies means that information and decision-making is a men's affair, even on issues of which women have special knowledge and interest. This would be of less importance if they were consulted by the men. This has happened occasionally, for example in a water project in Guatemala, where the local male leader has established a farmers' association with six appointed subcommissions, including one on home making. These were all consulted on the water project (100). However, discussion between men and women of what is considered to be men's business is the exception rather than the rule (194, 296, 318, 345, 745).

In two villages in Andhra Pradesh, India, the women united in a women's organization did not know that a water project was being implemented in their communities, even though the council and Village Development Committee (both all male) were fully informed (743). In Majengo village, Tanzania, the women said that either they had not been informed in advance about the inconvenient location of the new wells, or that the council had not listened to their objections (745).

The election or appointment of women to special water committees for local participation in water and sanitation projects would be more logical. However when optional, election of women is still unusual, especially where there are cultural barriers to their involvement in public life (272, 299, 479, 747; A15).

In northern Cameroon, representation of women on water committees varied from zero to 20% (110). In northern Ghana, a patrilineal Moslim society, three out of seven villages studied had special water committees, but only one committee had a

woman member. Most chiefs and elders interviewed did not consider the involvement of women to be appropriate (A15). Interviews with male leaders in Nyanza Province, Kenya, were more positive. Almost half objected to ownership control by women, but the other half said that women should control or have a say in new water facilities (397).

4.5 FACILITATION OF PARTICIPATION

Although the literature contains many accounts of women being excluded from local planning, it also suggests several mechanisms to enhance their participation in this phase. These are the promotion of meeting attendance, stimulation of two-way communication, selection and training of women representatives, and formation and strengthening of parallel women's organizations.

Promotion of meeting attendance

Awareness of village leaders of the value of women's involvement in water supply and sanitation and support of their participation are primary conditions (3, 93, 297, 299; A11, A17). Meetings must be held at suitable times and places for women (77, 80, 88) and women should be informed and encouraged to attend through both men's and women's channels, for example, village authorities (297) and women's organizations (474). A second, separate meeting with local women for more detailed discussion of planning issues related to their responsibilities and knowledge has been found to be very effective (A7, A31). Special efforts must be made to involve poor women, who are often not represented in women's organizations (53, 59; A13). Neighbourhood delegations or meetings may help in this regard, because often poor and wealthy households are located in different parts of the community (141, 258; A7, A13, A18). Small neighbourhood meetings also facilitate women's participation (A7).

Increase of two-way communication

As already shown, project information may not reach women attending local meetings unless the local language is used and seating arrangements are adapted so that they can participate on equal terms with men. Feedback from women and also men can be improved by the attitude of the discussion leaders and also by prior discussion with the women. A break in meeting proceedings for women to discuss issues and use of a spokesman or spokeswoman to voice their opinion can also assist (434, 745; A31, A40).

Local, educated women, such as midwives, nurses and teachers, may be suitable intermediaries provided they discuss the issues with the women concerned. Their professional status makes their involvement more acceptable to male leadership

in societies requiring the seclusion of women (360, 361). In Latin America, schoolteachers have often played an important role in rural water projects as local promoters and spokeswomen (299, 670). The same role can be played by representatives of local women's organizations, such as women's clubs and women's wings of political parties (297, 318, 480, 520, 666). The use of small-scale models, photographs and drawings of the proposed facilities has also stimulated women to participate in decision-making and to provide valuable feedback (400, 440; A28).

Selection and training of women representatives

The women selected should represent the interest of various socio-economic groups in the community and have sufficient time and mobility to carry out the work (3, 297, 427, 434; A1). Their position must be respected by both men and women (434; A1) and they should have the support of their relatives (226, 318, 458). Often single women are selected because of their greater freedom of movement (3, 745; A40). A strong personality (745; A40) and experience with organizational work (110, 745) are also advantages. As socio-cultural patterns vary considerably, the local women themselves often make the best reasoned choice of their representatives (3; A40). Their participation is more readily accepted if responsibilities are divided along existing lines, for example, if women on water committees are responsible for health aspects (93, 153, 230, 272, 297, 434, 628, 634).

Two women on a committee can give one another mutual support (297). Attendance of the first meetings by an extension worker, who may need to be a woman, may also help (382, 646; A40). However in many cases, women representatives will need special training, particularly in leadership skills, confidence building and communication with those they represent (279; A35, A40). Similarly, training must be given to the men to prevent them from feeling passed by (279, 296, 341, 591).

Parallel organizations of women

A second option to enhance the involvement of women, especially in areas where matters of concern to men and women are divided, is parallel organizations. This can sometimes be achieved through existing women's organizations (297, 480). In parts of Melanesia and West Africa, for example, women's organizations have a long tradition and considerable status in women's issues, such as health, cleaning and village beautification (232; A33), and financing of women's activities (savings and loan associations, 86; A39).

In Tonga, local women boycotted a sanitation project when they were excluded wilfully from the discussion of the community survey results and the planning of a village action programme by the men's committee. Involvement by the agency of both the women's health committee and the men's water and agricultural committees in a neighbouring community led to a successful piped water supply and sanitation project, with total latrine coverage and satisfactory maintenance. Their example stimulated 18 villages to join the project (232).

In other cases, women's organizations or committees have been established with the aid of women field-workers and the support of local men (52, 323, 350, 560; A7). Another method used effectively in segregated but non-secluded societies is to contact women at their places of work especially if they do not have the time to meet elsewhere (A44). These approaches may not be appropriate in areas where women live in seclusion and social contacts are confined to the family. In such cases, agency intermediaries or development workers have made home visits and organized meetings in the homes of leading local women (55, 599).

4.6 FUNCTIONING AND EFFECTS OF SYSTEMATIC INVOLVEMENT

To date, most accounts of the involvement of women in local planning concern isolated cases and projects. The first procedures and guidelines on community participation including more systematic involvement of women have been prepared for hand pump and piped water supply programmes in Malawi (422), Tanzania (677; A40), and Guinea Bissau (A44). However, more information is required on the functioning and effects of this involvement, and on the contributing factors. Limited evidence to date indicates that it is not sufficient to stipulate women's presence, agency staff and local leaders need to support their active participation and contribution.

In four projects in eastern Africa, one in the Republic of Korea and one in Pakistan, the agency specified that some community representatives should be women. Experience showed that local men did not always inform the women about meetings (677; A40), and that women only met when asked to do so by the men (52). In an integrated programme, the priorities of women for water, sanitation and other improvements in infrastructure were heeded little (93). Agencies themselves have complained about the lack of interest of women participants (587, 745), without paying attention to the problems posed when meetings were held in a central project office (745).

On the other hand, where women members have been fully accepted, mixed committees have met regularly also on their own (677). Personal contact between women and women committee members indicates that women members are functioning as intermediaries (428; A7, A15).

A periodic review of experience in these more systematic programmes assists in adapting procedures and manuals to ensure that knowledge gained from

“learning by doing” is not tied up in individuals, but is integrated in organizations and becomes available for interagency exchange. One method, which has been used to improve community participation in general, is periodic meetings of field-workers to review their experience and problems, and to draw general implications for the programme, either informally (610), or on the basis of systematic notes made during field-work (583). In another programme, an evaluation of the procedure for women’s involvement by an external social scientist resulted in several adaptations (310). “The new, modified working method really proved to be a considerable improvement and the well construction programme gained much more support from the population” (A44: p. 53).

5. Realities of Project Participation: Women as Project Workers

5.1 CONSTRUCTION OF FACILITIES

Community contribution to construction consists mainly of unskilled labour for site clearing, digging, and transport. Women have been involved as voluntary labourers and motivators of voluntary labour, and as construction workers paid in food-for-work or cash. Sometimes contributions to construction are made in cash or kind.

Voluntary contributions

In many countries, voluntary contribution or self-help is advocated to reduce construction costs for project agencies. Well-organized self-help has led to considerable savings especially in piped systems. In Latin America, cost reductions to agencies in the range of 3% to 40% have been reported (177, 467, 608), the highest being for construction of gravity systems which are labour intensive. In Africa and Asia, community contributions to construction has ranged from 14% to 44% of the total cost (240, 434, 452, 473, 727; A11). From these savings, the extra input required for organization and supervision needs to be deducted. Because the cost of these inputs is seldom monitored, little information is available. However, evaluations in Cameroon (477) and Zambia (56) have estimated the average cost to be one-third of the value of the community contribution.

In community systems with yard or house connections, voluntary labour has made it possible for more households to be served. Because of reduction in construction cost, households make lower monthly repayments for the connection loan (467, 744). In areas where capital investments are the responsibility of the government, lower construction cost enables more communities to be served within a given programme budget. Smaller cost savings have been used to provide better services for women, such as extra standpipes and community centres (56, 677, 766).

Women have contributed considerably to these savings, both directly and indirectly. In regions where they do most of the agricultural work, they have also provided most of the self-help in water projects, for example, in Lesotho (464, 766,), Kenya (263, 434, 514, 641), Ethiopia (290), Cameroon (110), Zambia (478), and Papua New Guinea (283). Even in the Upper Region of Ghana and in

Mauritania, both of which have a strong Mōslim influence, women have contributed unskilled labour to water projects (341, 683).

Apart from cost savings, well-organized self-help can aid the development of technical and management skills in the community. These skills can be built on in turn to set up local maintenance and administrative systems. However, in spite of their active participation in physical work, participation of women in local management has been minimal, as reported for projects in Papua New Guinea (39), Ghana (341), Cameroon (110), Kenya (263, 634), and Zambia (479).

A study in Kenya of 311 self-help projects found that 41% of contributors were women, and that they contributed most of the labour (5,000 hours in two water projects alone). In contrast, only 6-7% of the leaders were women (434).

Socio-political circumstances in some countries have stimulated greater involvement of women. In Lesotho, women not only do most of the digging, but also predominate on water committees because many of the men work as migrant labourers in South Africa (464, 766). In Ethiopia, the national women's association has assisted women to become involved in more than just digging (290). In Dodoto region, for example, 100 women have been trained in management and technical skills, and have gained practical experience in these tasks during the construction of a gravity supply scheme for 48 villages (755).

In societies where women are confined to the house and compound, less is known about their participation in construction work. There are indications that they have participated in this type of work when their need for facilities has been high, and the work has been carried out in private surroundings, as for example the construction of household water-seal latrines (162, 599).

In Baldia, a low-income urban area in Karachi, Pakistan, "almost half of the work of constructing soakpits has in fact been undertaken (or at least overseen) by women. In some cases they did the digging" (162: p. 16).

Training in cement work can build on women's traditional tasks and skills in plastering, and may well explain their interest and involvement in this type of work. Poor women in India have expressed interest in training in latrine construction (428). In Mozambique and Tonga, latrine slabs are made and sold by women's cooperatives (109, 338). In Thailand (365) and Botswana (64) projects have also trained local men and women to construct latrine slabs.

In the construction of public facilities in the more segregated societies, women have undertaken either individually or through women's clubs, mainly motivational and support tasks, such as the organization of bazaars and lotteries to raise funds and the supply of food and drink to male workers (4, 434, 439; A11).

Experience has shown that women can be the driving force behind successful self-help in construction (263, 646; A11, A44). This role can be stimulated by the

water agency (590). However, voluntary labour by itself does not lead to a sense of ownership and responsibility and capacity for maintenance (240, 430, 452).

Women construction workers

In areas where economic conditions are so difficult that people are unable to provide voluntary labour, frequently infrastructural works are designed to provide food-for-work. In some countries, women have constituted a high proportion of the labour force in such projects: 80% to 85% in infrastructural projects in Lesotho and Ethiopia (313, 507); 20% to 30% in the Republic of Korea (416); and in Bangladesh, 34% of the wheat distributed in 1979/1980 went to women workers (428). An evaluation in Bangladesh showed that most of the women participating in such projects belonged to landless households, two-thirds being heads of household (145). These findings have led to a limited number (6% in 1980/1981) of separate projects for women, with rates of work adapted to their physical capacity. However further adaptations, such as child care provisions, first-aid boxes and training in skills that will help them to find more permanent work, are also needed (428, 507, 565). The women in a food-for-work project in Bangladesh expressed interest in training in reforestation, vegetable gardening, livestock and sanitation projects as a means of generating income. Absence of latrines and water at the work site were their greatest felt problems (428).

In addition, structural changes have been recommended, such as a more realistic national price policy for local food crops to stimulate production and to reduce the need for food aid, long-term agricultural development inputs and local acquisition of food where possible (229, 323). The latter would be of particular interest to women as major producers of food crops. These interests were affected negatively by the drop in prices when a food-for-work project was carried out at a time when local production of food crops by women was also high (116).

Women also work as paid construction workers, particularly in Asian countries. The 1971 census in India, for instance, gives a total of 200,000 women registered labourers, that is 9% of the total construction labour force (327). In reality, their participation is higher because many women work gangs are registered in the name of the male leader (196). In India also poor women in particular work as unskilled construction labourers.

Of the women employed on infrastructural works in Maharashtra, India, 80% were landless or marginal farmers; 18% were heads of household; and 40% were the family breadwinners. These women also said they were in need of drinking water, child care provisions, and medical aid at the work site, and also steadier employment (332).

To date, labour unions, departments of women's welfare, and others have shown little interest in female construction workers (332, 428). Many mechanisms operate to prevent these women from using their work as an entry point to further advancement of their families instead of for bare survival. These mechanisms include the lowering of wages by bringing in migrant labourers from drought-prone areas; permanently binding families through loans for basic necessities which they cannot pay off, and wage payment systems which increase women's dependence on contractors, money leaders, shopkeepers and male heads of household (332, 483). Preliminary indications are that these problems are more serious in systems built by contractors than in those constructed under direct management of water departments (195, 743).

5.2. OPERATION, MAINTENANCE AND LOCAL MANAGEMENT

Women, as primary users and beneficiaries, can contribute greatly to adequate use and satisfactory functioning of water and sanitation facilities. Various forms of their involvement in local maintenance and management are set out in Table 4.

Table 4. Forms of participation of women in local management and maintenance

Site management

- as individual users
- as members of user organizations

Caretaking

- as members of male-female teams with culturally appropriate division of tasks
- as caretakers doing both technical and non-technical tasks

Local administration

- as members of local management committees
- in parallel management committees for men and women

Self-sufficient systems

- services operated, managed and maintained by women
-

Site management

Participation for adequate operation of new facilities begins in the planning phase. Damage and vandalism may be the delayed result of lack of involvement in design and testing for easy and adequate use (A41), and lack of consensus on use and control of use by various user categories, such as women, children, cattlemen, vendors and neighbouring settlements (740). In some cases, traditional norms and social control on the use of communal sources and the sense of

communal ownership of new facilities are strong enough to guarantee proper use and maintenance of the site. Often, the manner of use is a form of management as it protects the durability or quality of the source. In rural communities in Botswana "no-one fetching water from a well or *hafir* surrounded by a thorn fence would think of leaving without replacing the thorn bush which serves as a gate" (250). It is likely that such rural patterns are stronger in places where the water culture is high and when users have been closely involved in the establishment of the new water supply. However, no conclusive evidence could be found in the literature on this issue.

In other cases, satisfactory site maintenance has been achieved through the organization of women users. Sometimes, this is a spontaneous initiative of the women themselves, presumably based on traditional arrangements. For example, in a village in Zimbabwe, the women themselves organized the use and upkeep of the communal water point comprising bathing and washing facilities (A41). In an urban slum in Zambia, the women's branch of the political party organized the women on an ad hoc basis to improve the drainage of public taps (480). In other cases, water, health or community development staff have made arrangements with the users concerned. In Malawi, tap committees composed mainly of women have been established (410). Women have also been encouraged to use the pipeline routes as paths and to report leakages to the village caretaker (273). Committees have also been formed to supervise use of protected wells (473). In Samoa, members of the women subcommittees used to sit in the open walled watch-house near the village bathing and drinking sources to weave their mats and at the same time to ensure proper use of these facilities (A33). In Tanzania, women have chosen a site attendant from a nearby household, or established rosters for site upkeep and preventive maintenance (677; A40).

Experience reported in the literature indicates that for site maintenance to be effective the community should be involved in project planning and later in making detailed arrangements for upkeep and maintenance. Evaluations of two hand-pump projects in Malawi show that well committees formed to maintain site hygiene neglected their work in many cases. This has been attributed to a low feeling of community responsibility, despite the fact the people had participated in well digging and in the construction of the apron, drainage channel and washing slab (430). Another factor was found to be the absence of an agreement on the duties and rights of the village committees (A25). Therefore, more attention is now being paid to community involvement, including the women, in local planning of well projects and in site management, and supervision of these arrangements by mixed village committees. One outcome of the discussions on the duties of management committees was that villages do not question whether women should be involved, but whether men should be involved. Another outcome was the good site hygiene perceived during field-work in the area, for

which the women members of the village committee are especially responsible (431).

When women are involved in maintenance arrangements they should be consulted as a group rather than as individuals to find a joint solution.

To prevent damage to the hand pump and to prevent water wastage in a rural community in Peru, the local council appointed a nearby woman as overseer. The imposition of this task did not work. Both she and a second housewife were ineffective, claiming they were too busy with domestic tasks. The pump was then padlocked, with a third housewife holding the key. This resulted in much intravillage conflict and finally to the breakage and removal of the pump (716).

Although women's groups have been quite effective in carrying out tasks assigned to them, greater benefit would be derived by projects and users, if these groups were also involved in management decisions. This refers particularly to the organization of the work and the use of water at the source.

In a project comprising primary health care, water and sanitation in 60 villages in Danfa, Ghana, village health committees planned and implemented the local project together with the project staff. For village refuse collection, separate women's groups were formed. Although they carried out the allotted tasks in a satisfactory manner, the work was disrupted during the agricultural season when women are particularly busy in the fields (769). In Malawi, a tendency has been found in some areas to impose rules on tap committees instead of involving its members in management decisions. General rules have been established by the water department, but local headmen have added their own rules, such as tap water should not be used for purposes other than drinking and cooking. This has led in some places to 60% underuse and continued use of traditional water sources for washing and bathing, thus perpetuating the risk of schistosomiasis. At other taps, collection of water for brick making, house plastering, vegetable gardening and other productive purposes has been permitted (A25).

Improved two-way communication would also increase women's involvement in preventive maintenance. If women are expected to contribute to maintenance by reporting problems, they need to be kept informed by local operators or management committees on matters of relevance.

When the taps in Zomba, Malawi, gave no water, over 80% of the users interviewed stated that they had not taken any action because they thought that project staff were cleaning the water storage tanks. Only a few reported that they had contacted their committee or that they had followed the pipes to detect leakages (A25).

Basically, this is a matter of recognition of the contribution of women to preventive maintenance and optimum water use as part of the total water supply and sanitation system. Their participation is achieved more easily at the lowest community or neighbourhood level than at higher levels (480; A7, A18, A39). One

condition for better two-way communication and more influence in management decisions regarding women's issues would be a change in attitude of higher level committees. Another option would be to involve women at higher levels, with the specific task of communicating with site organizations and users in general. Steps in this direction are now being taken in Tanzania and Malawi. In Samoa, on the other hand, the Ministry of Health failed to recognize the importance of the women's groups.

The introduction of salaried men health workers and the delegation of overall responsibility for sanitation to the mayor was resented by these groups who had successfully managed the upkeep of village water sources and general community hygiene. The women lost their incentive, sense of responsibility, and prestige that contributed to effective communication with their fellow women. The result was deterioration in village sanitation at a higher cost to the government (A33).

It would have been interesting to have observed the effect had the women been given training and some financial support for their work.

Trained caretakers

In some maintenance systems, trained community workers do all preventive maintenance and simple repairs. Until recently, women have seldom been trained as local caretakers. As this work can usually be done by either men or women, this can be attributed mainly to socio-cultural objections from authorities and project workers. The following reasons have been put forward for their lack of involvement:

Women do not want to do unpaid work [do men?]; they are shy and illiterate; they are often away at the market; they are tied to the house and cannot report or go about the village; they are afraid to go out at night to repair a pump [is that necessary?] (110; A15, A18).

Based on existing divisions of labour and responsibilities, projects in Guinea Bissau (A44) and Togo (311) have decided to train village teams consisting of one man and one or two women as voluntary caretakers. The men are responsible for technical tasks, such as lubrication and fastening nuts and bolts, and the women for site hygiene and user education. In other cases, women have been trained to do all preventive maintenance and sometimes simple repairs. Factors contributing to this choice include high male migration and mobility (281, 481, 619), and linkage with a women's project or organization (277, 451, 633, 659).

Lesotho has many female caretakers because many adult males work in South Africa (156, 281). In Sudan, as male caretakers were found to be away frequently on their distant farms, the project changed to training women who farm in the

villages (619). In Bangladesh, female hand pump caretakers have been trained as part of vegetable gardening and health projects (3, 451). In Kenya, women running a vegetable garden project sent a number of their members for training in the operation and preventive maintenance of a diesel pump to save the cost of a hired attendant and also to be more independent (562).

Training of women caretakers as part of ongoing government programmes has commenced in several countries, including Malawi (A20), Mali (694), Sierra Leone (670), Tanzania (395, 677; A40), Kenya (484), and Ethiopia (635, 755). In Bangladesh, after evaluation of the system, it was recommended that for each hand pump, a woman and her husband or a group of women users (at least two) be trained as caretakers (401).

Information about the performance of women as caretakers is limited to a few studies. In Guinea Bissau, evaluation in 25 villages found that the system of village caretaker teams as such was functioning well. Most village pumps were well lubricated, sites were clean and arrangements had been made for proper use, for example, for cattle and washing (557). However, no quantitative long-term evaluation has been carried out since. In Togo, mixed teams were found to function well when supervised by a village health committee composed of both men and women, but training of local artisans for repair services and better supply of spare parts were found to be necessary (311). An evaluation of male volunteer caretakers in Shinyanga, Tanzania, on the other hand, showed that three-quarters of them were no longer carrying out their tasks (197). Experience with village caretakers in Tamil Nadu, India, indicates that interest declines when it is no longer a novelty for young men to work as volunteer caretakers, and that they have had problems in communicating with women users. Where women have volunteered to be caretakers, these problems have not occurred (277). Initial experience also indicates that independent women, such as schoolteachers and women heads of household, are the most suitable candidates for training (277; A40).

Most accounts of the successful performance of women in technical maintenance, including diesel pump operators in Botswana (17), caretakers in Bolivia (659), source monitors in Angola (217) and well disinfectors in Villarica, Colombia (588), are anecdotal rather than factual (219). The first quantitative evaluation of men and women as individual caretakers was carried out in Bangladesh in two separate hand-pump programmes (451). This study seems to confirm the equal technical capacity of men and women and to indicate that better hygiene is maintained by women.

In total, a sample of 324 hand pumps maintained by men and 148 maintained by women were visited. Of these, 68 or 21% and 27 or 18% respectively had been out of order for more than six months. According to the caretakers who could still be traced, most problems had occurred underground. Aside from these pumps, 12 out

of 256 or 4.7% pumps maintained by men, and 4 out of 121 or 3.3% maintained by women, were not functioning. However, the reported frequency of breakdowns during the preceding two years was significantly lower for women. Reported duration of breakdown was also lower but not significantly. More women than men (11% more) cleaned the platform regularly and of those who did this every day, twice as many were women. The views of male caretakers themselves coincided with the findings of the study. Almost three-quarters thought that women would be as effective as men at pump maintenance.

However, these findings should be viewed with caution because they are based on recall of experience over a period of two years and not on monitoring. Also, more than 80% of hand pumps were located either on the land or in the house of the caretakers. A possible distorting factor is also the age of the pumps, which was not taken into account in the analysis.

Interviews with women caretakers in Bangladesh revealed that contrary to common belief, this work was being done by the women themselves. Only 8% received direct help from their husbands or sons. The task most often done by men was the purchase of the spare parts for their wives (419). On the other hand, cases have also been reported of men being trained for part-time operation and maintenance, yet others have actually done the work (401). They included women to whom their husbands had passed on their responsibilities because these tasks fitted in with their routine household activities (403; A18).

Local administration

The longest and most extensive experience of the participation of women in local management committees for water and sanitation is probably in Central and Latin America. As far as known, water and health departments in these countries have not analyzed the composition and management performance of local administrative committees established within their projects. A comparative evaluation in Mexico, of 94 community water supply projects with community participation and 43 without, concluded that on average the proportion of functioning systems was higher in those with participation, being 71% as opposed to 51% without participation. However at the time of this evaluation, the participation of women as a factor contributing to the satisfactory functioning of these systems was not recognized. As a result, the study did not take into account the participation of women in the project when the sample was designed, and only analysed their involvement in self-help labour (61).

Qualitative data on the involvement of women in management indicate that they make special efforts to solve local problems (A40), including fee collection and fund raising for repairs (A23, A32, A33).

In Panama, "each of the 26 communities visited had at least one woman on the water subcommittee of the Community Health Committee. Evaluation showed that women had important roles in maintaining the water systems. In several communities that were having problems collecting water fees, women emerged as local leaders and successfully managed the collection process" (A23: p. 8).

Women members of a board or committee often hold the position of treasurer (8, 272, 467, 606, 634).

In two departments in Colombia, 43 out of 374 administrative committees have a woman member. Of these, 42 hold the position of treasurer and one is president (606).

This raises the question whether women are chosen because they are less likely to abscond with funds (647). Other factors may be dislike of male collectors visiting houses during the day when husbands are absent, and the association with patterns of social visits and management of household budgets by women.

Usually, women are elected to local management committees by the users but sometimes formal barriers impede their election. Women have been excluded from decision-making and managing functions when only heads of household have been permitted to be members of user associations, as for example in the national rural water supply programme in the Philippines (548). Individual membership of user cooperatives have given women more guarantee of a voice in collective decisions. As one woman in a Mexican user association stated, "sometimes I think one way and my husband thinks differently. But both votes count" (A32: p. 16). Because board members are usually chosen from association members, excellent woman candidates who are not heads of household may be excluded.

This is not to suggest that women do not have indirect influence. As discussed in Chapter 2, both men and women have ascribed formal management tasks to men, even when decisions are informally guided or made by women. This may explain why women in a Mexican community, united in their dissatisfaction with the functioning of their water supply system, established a separate "Gran Commission" to oversee the work of the association's directorate (A32). In Honduras, the women who had initiated and established a water project in a low-income urban neighbourhood, asked the men to form the majority on the local development board, while they themselves continued to run the sectorial committees on drinking water, sanitation, and education (221). In an irrigation project in Indonesia, the women mediated in conflicts and collected rates, but were not represented officially on the local management committee (164). On the other hand, in Guatemala, women joined the water board after participating in an evaluation of their water supply (531). In a village in Thailand, the two women

on the village development committee were advised on health and sanitation by the public health committee which consisted of one female village health worker and ten female and four male health volunteers (742).

Separate women's committees for management have been established in societies in which they live in seclusion. Experience with these committees differs. In some villages in Pakistan, they have been reported to have met only on the initiative of the men's committees or women's committees were not formed because distance between households made it difficult for the women to obtain permission and time to meet (52). On the other hand, women's committees in rural development in the Gezira irrigation scheme in Sudan were said to work well, and often better than those of men. Therefore, it was considered preferable in a similar scheme, that both water and health committees be composed of women (717). Separate women's organizations in an environmental sanitation project in New Delhi, India, organized health education meetings on child care and sanitation. Each organization also elected a representative as member of the executive committees of the neighbourhood councils managing community development projects. The councils were especially effective in improving water supply and sanitation conditions (A7). Several improvements made, such as different types of platforms and concrete drains with one side higher than the other to prevent children defaecating in them, seem to suggest that the involvement of women in health education and decision-making may have had some effect.

Thus, experience indicates that, depending on cultural circumstances, integration of women and involvement of separate women's organizations can contribute to better local administration. As with their participation in local planning, the essential factor appears to be awareness of their common interests and a sufficiently strong organization. This has occurred either spontaneously as a result of common experience and probably also initiatives of women leaders, or as a result of agency inputs.

Services operated and maintained by women

In a number of cases, women's organizations are fully responsible for management and financing of community water supply and sanitation. In some cases, this may mean that voluntary groups take on tasks that are officially the responsibility of government organizations.

For example, in a community in Tamil Nadu, India, a nursery schoolteacher has also been made the pump caretaker, and a women's group pays for the repairs. The voluntary agency that implemented the project has a cadre of women workers trained as pump caretakers based in about 40 villages. The agency also has a mechanic in permanent employment to whom the women report more serious problems (277).

Elsewhere, participation has been a joint venture or business undertaking. In urban areas in particular, water and sanitation agencies have sought innovative ways to operate cost-recovery services in low-income areas. One method is for the agency to provide the main service and a community organization to take care of the local distribution or collection system, for example, the water kiosks run by women's organizations in Kenya and Honduras.

These organizations purchase water in bulk from the water agency and resell it at a low price to local women. The advantages of this system are not only better financial return to the agency with less administration and wastage, but also a contribution to social justice. In Kenya, women are no longer dependent on private entrepreneurs who own water kiosks and dictate the selling rates (634). In Villa de los Laureles, a squatter settlement in the capital of Honduras, the employment opportunity is divided among those most in need. "The women organized to have every three months another female head of household assigned as water manager to control the tap and collect the 10 cents (of a *lempira*) fee for 10 liter water. With this fee, the government's water charge is paid as well as the salary of the water manager" (221: p. 20).

The women in Villa de los Laureles have also developed their own system of operation. In the morning, water is sold at the tap in the lower part of the *barrio* and in the afternoon water is sold in the higher part (221). This was done apparently to cope with problems of low water pressure, because of the steep slopes of the squatter settlement and the excess demand in the city as a whole.

The social justice of kiosk holders selling water should be considered in the light of the particular circumstances. In some cases, the system may be satisfactory from the point of view of the agency, but in reality for the people it may be a "tax upon cleanliness" (620: p. 40). This is not only because the wages of the kiosk operators increase the price to the users, but also because women still have to carry the water. This implies that smaller quantities of water are used and the risk of contamination is higher (723). In such cases shared group connections and a women's organization to collect the water rate may be just as cost-effective to the agency and more beneficial to the women. In Villa de los Laureles, such a solution seems to have been technically impossible. Also, a fixed price for the water has eliminated the considerable variation in the price consumers had to pay vendors. The price ranged from 5 to 10 cents per 10 litres in the wet season to 35 to 50 cents in the dry season (221).

Small, simple and locally-contained systems have even been handed over completely to a women's association. For example, the urban waste recycling plants which produce compost for locally owned vegetable gardens and to sell to generate funds are run by a women's cooperative in a low-income urban neighbourhood in Mexico. These women have also trained women in another community on the operation of these plants (A32). The cooperative has chosen

a woman head of household to be caretaker. Again this may reflect their awareness of the socio-economic needs and greater independence and job motivation of such women.

Although the dedication and personal interest of women are advantages, they are not all that is required for good local management. Water committees and boards of user cooperatives may have many tasks, such as supervision and organization of operation, maintenance and repair, finance, accounts and record keeping, hygiene improvement and health education, and communication with the users. Therefore, special training for local committees is necessary (299; A8, A11, A45). Women representatives, who have had less opportunity for education have been aware of the need for training, and have even taken the initiative to broaden their knowledge by attending technical training as observers, in order to be able to recognize satisfactory repairs by village caretakers and mechanics (A20).

In this context, the lack of expertise within the technical agencies themselves is a problem. Many engineers in charge of small water and sanitation systems are trained in technical aspects, and to a lesser extent, or not at all, in management and socio-organizational aspects (114, 735; A45). Some water supply programmes, for example in Colombia (171) and in Tonga (245), have developed special management training for members of local management committees. In Chile, the water agency has involved social workers to give on-the-job training (A19). Reports on these courses and their impact should state the degree and effect of participation by women so that more information can be gleaned about their participation in local management.

5.3. HIGHER LEVEL SUPPORT

Involvement of women at the community level, which has been emphasized throughout this book, requires the support of both men and women at higher levels, from field staff to programme planners and policy makers.

Agency field-workers

In communities in which women live in seclusion, communication between women in two important phases in a project, planning and training, requires the mediation of women field-workers (3, 20, 37, 80; A1). For water and sanitation projects carried out in the confines of the house, this also means training women technicians. In Pakistan, 52 female and 136 male field-workers have been trained in the construction of latrines, biogas plants, soakpits and rain-water collection tanks (161, 350). As early as 1957 in Orissa, India, women technicians were trained for a latrine project (364). These experiences confirm the interest and participation mentioned previously of women and women's groups in cement

work. However, when women staff have gained the confidence of the women and their husbands, and have succeeded in organizing women's groups or teams, men staff have been used for specific tasks for which no women staff were available (3, 82).

In other cultures, women staff are still an advantage because of easier and more effective communication and cooperation with other women (174, 297, 646, 670; A40, A44). Men field-workers have also been able to involve women, provided they had a favourable attitude, were aware of the roles and position of women, had been trained for this task, (A35), and were skilled communicators (140, 346, 382, 584).

No clear pattern emerged from the literature review regarding selection criteria for trainees. Training young, unmarried girls as field-workers has the advantages that they have a higher level of education and are more mobile, but usually older women have more authority (297).

In Savar, Bangladesh, young, unmarried women are generally accepted and in the face of local taboos ride bicycles to bring primary health care services to more distant villages. On the other hand, in Samoa (A33) and the Dominican Republic (285) older, less educated, but more experienced women staff were more successful than young women having more formal training but lower credibility and greater social distance.

To combine maturity with mobility, young married women have been employed in Guinea Bissau. In accordance with African custom, they carry their babies on their backs while working (A44). This has also facilitated communication with other mothers on nutrition and hygiene (558). Other projects have employed women heads of household (widows) who combine maturity and mobility with high motivation for the job (178, 476).

The combination of "expert" knowledge and a "non-expert" approach is most effective in communication with local communities (A7, A14, A44). Participants in a women's programme in Maswa district in Tanzania, expressed this very well when they said of a community development worker from the area, who had followed several courses in Tanzania and Zambia, that "had she gone off for a special course she would have returned as an "expert" from the outside and would not be acceptable" (306: p. 98). In contrast, men and women promoters in the hand-pump programme in Guinea Bissau mentioned above were considered by the villagers to be arrogant. Reasons may have been "the manner in which meetings were conducted, with the promoters acting as teachers or instructors", and that "they sometimes did not fully understand the information they were presenting; this led them to avoid difficult questions by taking an imposing style of discussion which left little opportunity for the people to put their problems forward" (A44: p. 49).

One characteristic of effective training of women for village and project work is adaptation to their circumstances. Problems of travel have been overcome by organizing group travel for women in Bangladesh (3); using teams of two women and one man in Pakistan (350); decentralizing training courses to village level in Tanzania (395); and providing child care facilities at training centres in Nigeria and Guinea Bissau (A43, A44). In Guinea Bissau, women are also employed as much as possible in their own areas (A44). Failure to do so was the main reason for the turnover of women workers in projects in Nepal (72), Senegal (A39), and Bourkina Faso (458). Women may also need extra training to gain self-confidence in working with village authorities (see Fig. 4).

"A special problem was the training of the male and female promoters jointly. The men were accustomed to taking the leading role and responsibility. In Guinea Bissau it is not common that a woman is in charge, and most village committees directed themselves exclusively to the male promoter, and not to the woman in the promotional team. As a result the male promoters were taking up their tasks more easily and the female promoters made little progress. Once the female promoters, after many discussions, became more secure in taking up their tasks the male and female promoters became equally effective" (A44: p. 105).



Fig. 4. Woman field-worker in community motivation: while women promoters in Guinea Bissau were effective in working with women, they needed special training to communicate with village authorities.

Programme development and policy making

To integrate women into water and sanitation programmes, small-scale experiments and action research as part of an ongoing programme have been very valuable (55, 430; A7, A40, A44). For continued application, procedures need to be set out in field manuals which are adapted to field experience and are accepted at programme planning and policy levels (677; A40). There is also a need to adapt manuals and guidelines for community participation. Many manuals as yet do not mention women as a separate category in the community, or do not take into account their particular roles and circumstances (41, 150, 546, 597, 738; A8). Similarly, new insights need to be integrated into training guidelines, such as those prepared for WHO (720).

Much less is known about the involvement of women at policy level. The most common forms of their involvement in policy making under various economic and political systems have been assessed by Ooko-Ambaka (523). As far as known, activities in water supply and sanitation have been limited to separate women's projects, for example, the Dodota Water Project for Women of the Revolutionary Ethiopian Women's Organization (755), and to support and training for women's self-improvements (see Chapter 8). Further, women's departments, women's bureaus and/or national voluntary agencies are not involved actively in national action committees (NACs) for the International Drinking Water Supply and Sanitation Decade. As far as known, only the national women's organization in Kenya and the Women's Bureau in Sri Lanka are associated with the NAC in their respective countries. In several other countries, women from social and technical departments are represented on the NAC (730), but it is not clear whether their involvement is designed to have an effect on the planning and implementation of the technical programmes.

Involvement of women in national planning in water and sanitation programmes is only effective when based on a clear conceptualization of their roles in ongoing and new projects for the mutual benefit of the programmes and the women themselves (543). An interesting example of women's involvement in national planning is the introduction of a special 'women-in-development' chapter in the sixth Five Year Plan of India (326).

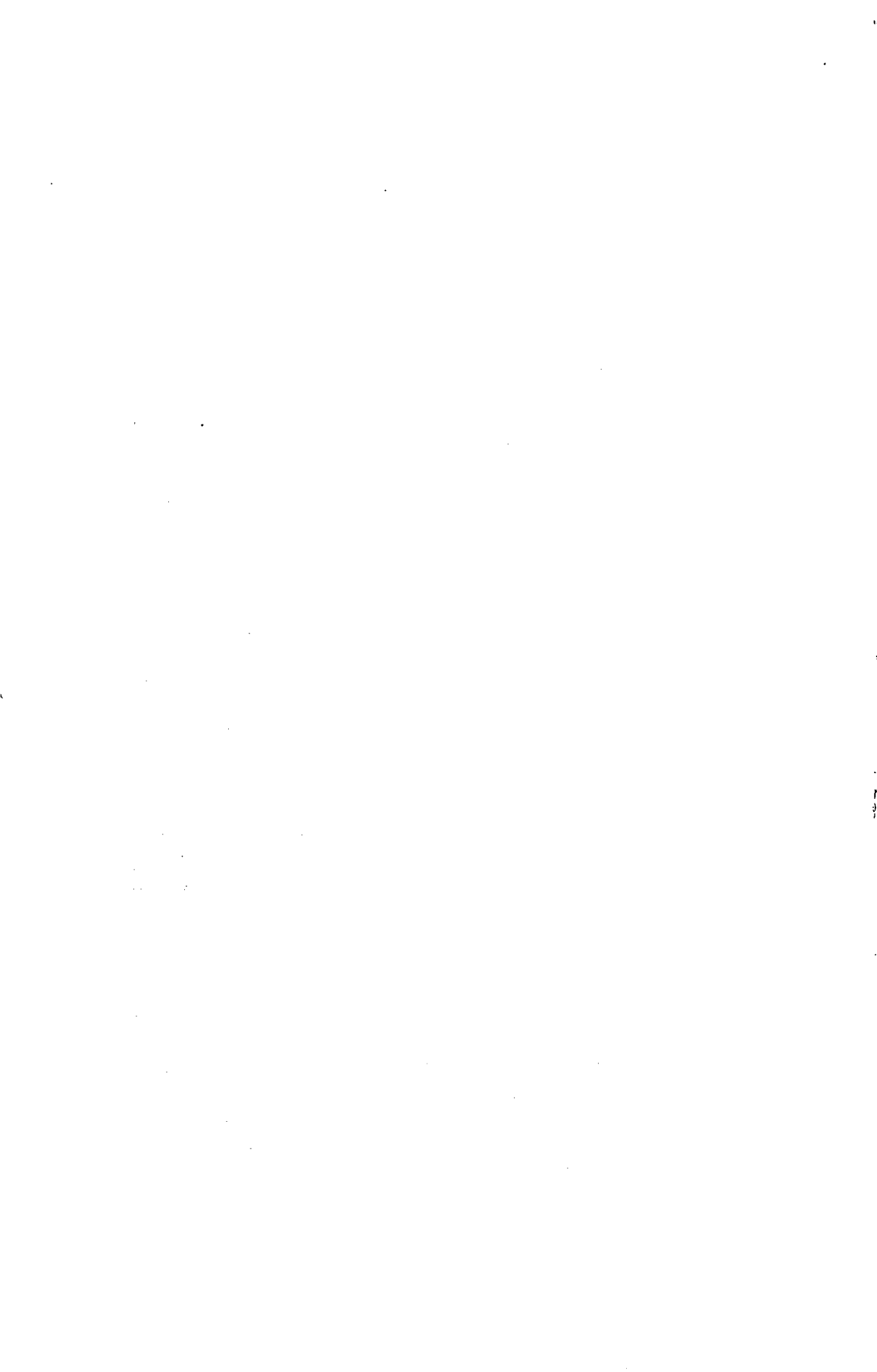
The chapter was the result of a symposium on women's needs and expectations organized by the Indian network of women politicians, scientists and voluntary organizations, when it was found that women's issues were not included in the draft. *Although reference to the water and sanitation sector is limited to training women in primary health care and more employment in public work schemes, many practical suggestions have been made to improve existing programmes based on the present conditions of women and girls.*

In most international and donor agencies, women-in-development departments, women advisors, or advisory groups have been established. They have contributed to the integration of women in water supply and sanitation through general policy papers and recommendations (16, 335, 336), guidelines (237, 513) and checklists (488), studies, training seminars, inventory and support of women's organizations and projects and review and circulation of material (334, 419, 530, 531, 622, 623, 734, 759, 760). Other support activities include the publication of earlier bibliographies (377, 644) and a report reviewing and analysing the literature (A9); and guidelines for projects and programmes desiring to involve women in water supply and sanitation (544, 545).

A review of project documents has shown that frequently project have quantitative, short-term objectives, and that long-term objectives are qualitative, so that they are not taken into account in project inputs and evaluations (355). Therefore, it has been recommended that long-term objectives be redefined as more measurable, medium-term objectives. These include the use by all of improved water supply and sanitation facilities throughout the year, and improvement of hygiene practices (501). It is also recommended that evaluations include the functioning and use of facilities (733). This implies not only interviewing women as users but also analysing their role as project participants (419).

Evaluation of a series of rural development projects has also shown that participation of women-in-development specialists in project identification and preparation is not effective unless they are integrated in the overall team (116, 500, 636). Continued cooperation during implementation has ensured that the proposed participation has been achieved (116). Further, socio-economic studies on women have not always led to their involvement in subsequent projects. Although some studies, for example, those in Guinea Bissau (556), Tanzania (673) and Ethiopia (79, 560), have led to more participatory water projects, numerous examples exist of projects which have not involved women, or only to a very limited extent, in implementation (80, 105, 116, 591; A2). Therefore, a "total approach" integrating both men and women in the whole project process has been recommended (336, 513).

Guidelines and checklists have been found to have little effect on the actual involvement of women, unless used in combination with other strategies and aids. These include careful planning encompassing preliminary studies and the involvement of women in all stages of a project and at all organizational levels in the donor agencies and also national organizations (758). Training of staff and consultants in women-in-development issues is also being carried out by international and donor agencies (508, 622, 752), but the impact has yet to be assessed.



6. Realities of Project Participation: Women and Local Hygiene Improvements

6.1. PATTERNS OF WATER USE AND HYGIENE

Technical water and sanitation projects may assume that women automatically improve domestic and personal hygiene when improved facilities have been installed. However, experience has shown that this is not always the case. This may be due to lack of health discussions to help women apply and increase their practical understanding of the relationship between water, sanitation and family health, and to find practical solutions for the safe collection and storage of more water, safe and sufficient clothes washing and bathing, and other ways to improve family health.

Transport, storage and drawing of drinking water

Cross-cultural observations show that the risk of contamination of safe drinking water often persists after the introduction of an improved water supply system. At the source, dirty water is sometimes used for priming the hand pump in communities in Nepal, (262) and India (574). Vessels, such as open pots, basins, and buckets, instead of the narrow-necked water jars as used in Ethiopia and many other places, increase the likelihood of drinking water being contaminated by dirty hands during transport. In many cases, along with good habits harmful practices have been observed, such as no separate storage of drinking water (262, 384); open storage vessels for drinking water (27, 265, 384, 601, 628; A14); collection and storage without regular cleaning of vessels (141, 240, 265, 674; A1); and use of communal cups to draw drinking water or hands touching the water (54, 68, 265, 282, 383, 440, 514, 628; A3, A14).

E-coli tests of drinking water at the source and in collection and storage vessels have confirmed contamination as a result of such practices (174, 188, 212, 215, 240, 509, 572, 660, 673). Helminthic ova have also been found in stored drinking water (378). Investigation has revealed that contamination is greater in earthen pots than in brass and copper pots owned by wealthier households in South Asia even when the water is touched by hands (190). Earthen pots are not only less effective but unlike copper pots cannot be scoured too often with sand because this closes the pores that help to keep the water cool by evaporation (141). In addition and as stated previously, a substantial number of households continue to use unprotected and probably contaminated sources for drinking water. Such practices reduce the beneficial effect of improved drinking water supplies on the

incidence of diarrhoeal disease (Table 5). Therefore, in an action research project in ten villages in Memari, West Bengal, India, local women volunteers have been trained to promote and to carry out chlorination of all drinking water in household storage vessels, and to assist in testing its impact on infant diarrhoea and worm infestations (329). Elsewhere, emphasis is on improvement of behaviour through health discussion.

Table 5. Prevention of transmission of water and sanitation related diseases

Disease	Safe water	Safe excreta disposal	Personal and domestic hygiene	Safe handling of food	Safe waste water disposal and drainage
Diarrhoea	++	++	++	++	-
Worm infestations					
roundworm	+	++	+	++	+
whipworm	+	++	+	++	+
pinworm	+	++	++	+	-
hookworm	+	++	+	-	-
guinea worm	++	-	+	-	-
schistosomiasis	+	++	-	-	+
Skin and eye infections, and louse-borne infections	-	-	++	-	-
Mosquito and fly-borne infections					
malaria	-	-	-	-	+
yellow fever/dengue	-	-	-	-	+
filariasis	-	++	-	-	++
sleeping sickness	-	-	-	-	-
river blindness	-	-	-	-	-

Adapted from WHO (732).

++ = high

+ = medium

- = low or negligible

Increased water use for personal and domestic hygiene

As indicated in Table 5, adequate quantities of water for personal and domestic hygiene contribute to the prevention of transmission of many diseases. However, it is not clear whether improved water supplies also lead to use of more water. This has been studied in particular in Sub-Saharan Africa. Some studies (108, 290, 383, 397, 399, 674, 721, 727) have indicated that more water is used when public taps or hand pumps have been installed, but fewer trips are made or less water is used the further the distance from the improved source (174, 290, 399, 673, 674, 727; A25). Other studies (98, 240, 682, 687, 724; A15) reported no or very small increases in the amounts of water for domestic use after the introduction of new public water supply facilities, and found no connection between increased use of water and reduced distance or collection time (98, 240, 724).

These apparent contradictions are explained partly by methodological problems in collecting information on water use. Oral reports of how much water is brought into the household may not always be reliable, as water use varies considerably from day to day. Also, small quantities collected by children tend to be forgotten (381). In addition, water used directly at the source, for example for clothes washing (724), is not always included. Other studies based on measurements or observation are more reliable, but may reflect special circumstances. Factors reported to increase the amount of water collected include the seasonal use of rain-water (724), high socio-economic status of the households (674), and expected interruption to supply (108). In addition, continued use of traditional sources for special purposes, such as clothes washing, may also affect the amount of water used from new systems.

Thus, where there are no house or yard connections, it is difficult to generalize whether an improved supply leads to the use of more water for personal and domestic hygiene. Frugal habits and the lack of assistance or means to transport and store water may also explain why some women do not use more water when the supply is improved. Anne White stated in a study on water use patterns: "There is no entirely satisfactory explanation of why one woman will struggle home with 40 kilograms of water on her head, while another is content with much less" (721: p. 108).

In the literature reviewed, little mention was found of the effect of transport facilities on water use. A household survey in Kibwezi, a dry area in Kenya, indicated that 2 to 5 litres more water was used per person per day when bicycles, donkeys or wheelbarrows were used for collection. The study also reported that of those using transport, 59% were men and 41% were women. However, in the total sample of 1,067 water collectors, the number of women with transport was relatively small. Three-quarters of the collectors were women, of whom 90% carried all water on foot; while for the men the proportion was 43% (5). It is not clear whether higher water use is more general when transport is used. Also, it is

not clear whether men, who have helped when improved water sources were further away (203) will also assist when they understand the value of increased amounts of safe water to family health, if sources are closer (12). Further, it is not clear whether in such cases, women can and will use transport more than they do at present. Apart from questions of affordability, and of environmental limitations to their use (400), there are also accounts of transport in the household being used only for men's work (118, 400), and of problems in ease of operation, for example, where from childhood women have developed muscles for carrying instead of for pushing (119).

Excreta disposal and food handling

The importance of safe disposal of excreta in reducing the incidence of water and sanitation related diseases is also apparent from Table 5. However, general acceptance of safe excreta disposal methods is difficult to achieve because of the lower priority given to sanitation at both national and community level (735). Further, acceptance of latrines does not necessarily mean general and correct use. As already discussed, non-use by children is widespread, because of practical problems, and also cross-cultural beliefs in the harmlessness of their excreta. The latter has been reported in regions as diverse as North and Central Africa (54, 630), southern Africa (108, 282, 432), central and southern Asia (344, 563, 640; A10), and Central America (217). Latrines are also used less often by men (366, 563, 631) and at night (399, 631; A21), this being related to distance from the house (A21).

In some areas, safe excreta disposal is as necessary in cultivation settlements as at home (366, 677). Handwashing after latrine use is not universal and often only water is used (10, 282, 344; A42). Also, practices reported may be ideal rather than real, as indicated by a comparison of reported behaviour with the presence of water for handwashing in or near latrines (383, 682). Handwashing with soap is especially effective in preventing faecal-oral transmission of disease in children under five years of age.

In a controlled experiment in Bangladesh, soap and earthenware pitches to store water were supplied to a group of households with a confirmed case of shigellosis. Health workers educated families on the need for handwashing, and monitored hygiene practices. Spread of infection was significantly lower (10.1%) in the study households than in the control group (32.4%). The greatest difference (over 40%) was found in the group of children under five years of age, probably because mothers feed them, thus unconsciously spreading infection if they have not washed their hands beforehand (688).

Handwashing with water only made no difference. Unfortunately, the study did not investigate the alternatives used by women when soap is not available or too

expensive, such as ash and dried plants. Other risks observed in excreta disposal are soiled latrines, no covers, and cleaning material left lying about (108, 366, 383, 682). Thus, latrines can become a source of infection rather than the barrier intended.

Risks reported in food handling include unhygienic kitchen conditions and practices (54, 384). Handwashing before meals seems to be more common than before food preparation and after latrine use, but also often only water is used (10, 282, 366, 383). Mothers who prepare the household food and care for the children may unknowingly become a link in the faecal-oral chain of disease transmission. A study on *tortillas* prepared by 56 housewives in a Guatemalan village indicated a high level of faecal contamination from the use of contaminated water and probably also from the hands of the women themselves (112).

Waste water disposal

Domestic water supplies and water-borne, on-site waste disposal can also create breeding places for mosquitoes and other disease-transmitting vectors. The mosquito vector of yellow fever in an urban area in Cuba bred in the containers used to store domestic water (92). In India, the population at risk from filariasis has increased from about 20 million to over 125 million in 15 years as a result of improved water supplies without adequate drainage (680). Similar developments have been reported in Egypt (241). Risks of malaria and hookworm also increase, especially in arid areas (411). In a study in three villages in Madhya Pradesh, India, these risks were also referred to by the women themselves.

“While farm women were grateful for the drinking water supply, they also noted poor drainage in the village lanes. They claimed that the muddy streets were responsible for illness” (656: p. 24).

As shown previously, women in both rural and urban areas have traditional practices of water conservation and reuse that can be built on to reduce health risks. This can be done not only with yard taps but also with public facilities. For example, banana groves or coconut palms have been planted to absorb excess water (141). Elsewhere, women use waste water for dry season vegetable gardens (see Chapter 7).

6.2. PARTICIPATION IN HEALTH

When expected behavioural changes and health impacts do not occur, health education is used to promote the desired use of water and sanitation facilities. Generally, women are the main target group for these programmes (201, 296, 340,

341, 353, 670, 761; A9). Too often, this is the only aspect of water and sanitation programmes in which they are directly involved (105, 149, 177, 265, 454; A2, A42). Limiting their participation to health education increases the chance that necessary changes to the project design through their involvement in the planning phase are not made.

“Health education has often become the scapegoat for all kinds of programme failures. It is easy to blame people (and workers) for programme failures. Planners and administrators would like to change people’s behaviour to fit programme requirements, technology and procedures. Health education can become a tool of compulsion” (387: p. 8).

Further, constraints to the participation of women are not always taken into account in health education programmes.

Time to learn

The first condition for impact is that health education programmes reach those for whom they are intended (733). Frequently, women have mentioned lack of time and opportunity to attend meetings, especially when held at inconvenient times or places.

In Jamaica, government health staff only worked during the day when the women were busy with their own work. In the evening, when they could attend meetings more easily, the health staff had gone home (593).

Distance and lack of time to attend health education meetings were also reported for programmes in Benin and Zaire (400), Guinea Bissau (A44), Bourkina Faso (A4), Senegal (351), Nigeria (9), India (87), Sri Lanka (288), Republic of Korea (149) and Malaysia (146). An evaluation study in the Upper Region of Ghana found that only 16.7% of those reached by a health education programme on water use and hygiene were women (A15), even though their involvement as managers and participants was one of the original recommendations in the development of the project (293).

In cultures that demand the seclusion of women, access to health education is even more difficult. Meetings at health centres are not appropriate because apart from time and sometimes transport, this requires entering the public sphere (49, 360, 427, 470). The same cultural restrictions apply when village health workers are men, as experienced for example in Afghanistan (423).

Several programmes have succeeded in reaching women better at their meeting places. The choice of site will depend on local socio-cultural circumstances. In Nigeria, where women do most of the marketing, a health education programme was transferred temporarily from the health centre to a stall in the weekly market

(8). In a Guatemalan community, women gathered for several hours at the local *pila* or communal washing place. After listing their health problems, a series of tape recordings was prepared using several techniques for knowledge transfer and behaviour change. The tape recorders were operated by a local girl (167, 168).

Elements used in the tape were dramatization (the happenings in a local family), authoritative statements from respected local health staff, reinforcement (reminders of earlier messages), localization (interviews) and entertainment (music, stories). The design of the contents and the hours of operation were adapted to suit the variable times of visits to the laundry places (167). An evaluation showed that women appreciated in particular the health information. Scores on a health knowledge scale varied from 92% for daily listeners to 35% for those who never listened, as compared with 27% for a control group who did not receive the tapes. Measurement of behavioural impacts was limited to the reported application of a recipe for a new nutritious dish. Of the 70% of women who remembered the recipe, 58% had tried it at the time of the second survey (168).

Elsewhere, water collection places have been found to be suitable for small group discussions on water use and sanitation. In a Tanzanian project, group discussions were organized at water collection sites and informal gatherings using locally made discussion posters. In addition, members of the village water committees made home visits to discuss how sanitation could be improved (677). In Moslim communities, health discussions have been organized at family gatherings and informal meetings in women's homes (38, 55, 361, 427).

Women's participation in health education and other health related development activities has also been facilitated by provision of child-care facilities. In a rural community in Sri Lanka, the public health inspector and community health volunteers failed to raise interest in follow-up to a community self-survey on health problems until the felt needs of the mothers (which included a day care centre) were addressed (288). In Viet Nam, the provision of crèches has enabled women not only to take part in economic work outside their households, but also to participate in small group discussions on hygiene and family planning, and to support rural health centres. Their participation has been essential for the health movement as a whole, and where they have not been mobilized, results have been poor (443).

Several evaluation studies have demonstrated the effectiveness of active participation of women's groups in discussions on health conditions and behaviour. Programmes which use one-way information transfer (lectures, films) directed to individuals have been found to be less effective in achieving behavioural change (516, 661, 677, 728; A40).

A study in an urban fringe area in Durban, South Africa, showed that discussion with local friendship groups reached more women and led to greater improvements

in environmental hygiene than the usual programme of films, exhibitions and leadership involvement (661).

The advantage of a discussion approach is that it allows the concerted use of several mechanisms for behaviour change (242, 718). These include the development of practical understanding of disease transmission routes; joint planning and implementation of specific local changes based on local knowledge of conditions and behaviour patterns; identification of ways to facilitate these changes, for example, making utensils from local materials (A40); public commitment and group pressure to achieve the changes identified; and appeal to status group symbolism (599) and authoritative assurances (167; A3).

Radio, and in some cases television, reach women at home during their work and therefore have been advocated for health education, especially for women in remote rural areas and in more secluded cultures (222, 407, 469, 628).

A health education experiment in six rural communities in Ecuador showed that women were reached more effectively by radio broadcasts and men by film and slide shows and demonstrations (650). In three villages in Dhaka district, Bangladesh, women mentioned radio as the second source of health information (47%), after personal contacts with relatives and friends (65%). Information from medical staff was mentioned by only 9% (401).

Conditions for effective use of radio's are that women have access to functioning radios (222), and that the broadcasting hours, vocabulary and programme content are adapted to their habits, life style, knowledge and beliefs, as for example in oral rehydration campaigns in Honduras and the Gambia (249). In a case in India, on the other hand, it was found that women did not have practical access to broadcasts because their husbands took the radios with them all day (228). In Yemen, women did not listen to women-oriented health education programmes because of inappropriate scheduling of broadcasts, unfamiliar vocabulary and inapplicability of information (314).

Radio broadcasts are particularly appropriate for increasing women's awareness and providing information. However as shown in the examples above, changes in local behaviour and conditions are brought about more effectively through discussion and demonstrations with friends, neighbours, relatives and by trained community motivators. This is why the programmes in Honduras and the Gambia have involved local health workers and women volunteers (175) and why programmes include the formation and active involvement of radio listening groups (186). Successful self-improvements through participatory radio and television programmes have been reported in a sanitation and housing programme in urban squatter settlements in Sante Fé, Argentina; in an experimental programme for community action in two villages in Ecuador (525); and through radio listening group campaigns on preventive health in Tanzania

(292) and Botswana (222). However, data on women's participation were only found for the radio listening campaign on environmental health in Tanzania; 49% of participants were women (292).

Building on local knowledge and resources

A serious constraint to participation voiced by women is the lack of direct relevance of many health education programmes. Poor women in projects in India (332), Bangladesh (428), Nepal (7), and the Philippines (493) felt that time spent away from their families should contribute primarily to the family income. Both men and women in a survey in three villages in Dhaka district, Bangladesh, gave shortage of food as their main concern (401). Some health education programmes advocate unrealistic changes, such as handwashing with soap when soap is not available or too expensive (296, 383). Occasionally, health education programmes have been adapted to the circumstances and needs of women. For example, in Kerala, India, the Health Department changed its approach after evaluation meetings with women and began production activities until the women themselves expressed interest in health education (654). Similarly, attention to the practical needs of women (income generation, ancillary equipment, such as basins and locally made water filters) as part of or preceding health education programmes has been reported in projects in Indonesia (102), India (45, 191), Pakistan (637), Cuba (701), and Guatemala (A42). It is not yet clear how widespread these attitudes are, and whether the appeal and effectiveness of health education programmes is increased when more attention is paid to inherent and related income generating and expenditure reducing aspects.

The literature study indicates that programmes consisting only of lectures on what people must or must not do, or programmes presenting only abstract and general knowledge of causes and prevention of water and sanitation related diseases, are rarely effective (108, 222, 383, 394, 432, 454, 493, 527, 628, 709; A14). Other programmes adopt a more participatory approach based on joint identification and understanding of local risks contributing to the transmission of water and sanitation related diseases and their elimination by local means, as for example described in various field manuals and guidelines (37, 374, 437, 677; A5, A40).

There is a great deal of evidence that in all cultures, women, through their daily experience and observation, have acquired basic and practical knowledge of environmental hygiene on which participatory programmes can build. Reference has already been made to their traditional practices of source selection, in which they make reasoned choices and often distinguish water quality according to use and to the characteristics of the source.

An exception in this respect is tap water, which frequently is considered to be

safe when it looks clean, even if it comes directly from a river without treatment (282, 370, 674; A1). Projects should not keep users in ignorance of such issues, but need to discuss them as part of local decision-making on the choice of technology and scheme design. This also applies to the issue of continued intake protection. Users themselves have sometimes found excellent local solutions to this problem, such as planting a grove of trees around the intake to force cattle to drink further downstream (744).

In East and West Africa, discussions with women have revealed that the filtering action of river-bed wells and the slow recharge of dug wells are recognized as being beneficial to water quality (677, 724; A31). Perceptions of contamination of water sources by cattle, dogs, washing and bathing and also the safety of a closed water supply have been reported in studies in Sri Lanka (344, 366; A18), Swaziland (282), Botswana (384), India (563) and Liberia (121). Awareness of the harmfulness of adult excreta has been reported in studies in rural communities in Nigeria (10), India (563), and Sri Lanka (287) and Nicaragua (588).

Some basic knowledge of various water and sanitation related diseases by at least a reasonable number of those interviewed is also widely reported, for example in household surveys in communities in India (264, 563, 609), Indonesia (30), Kenya (397), Tanzania (399, 682), Ghana (687), Nigeria (10, 22), Sudan (601), Egypt (216, 630), and Colombia (A30). It is likely that the amount of knowledge women have, and the gaps and misunderstandings which exist, would become more apparent in in-depth discussions than in the more common knowledge, attitudes and practices (KAP) surveys. The latter approach is only useful if beliefs, attitudes and behaviour are not categorized as "right" or "wrong" to be corrected by didactic teaching, but instead lead to educational programmes that reflect recognition of and respect for the local community and their framework of perception. This knowledge is often mixed with conflicting beliefs on the causes, seriousness and prevention of these diseases and is not always applied to the actual situation (10, 216, 282, 344). However, it could provide the basis for general health education programmes and especially for local health discussions and community action (see Fig. 5).

Women health promoters

Many communities have trained village health workers, who often are women. Experience shows that mature women especially are stable and effective communicators and motivators of health improvements (44, 45, 49, 102, 359, 515, 521). Technical projects can benefit greatly from close cooperation with these women (744).

Where there are no village health workers, local women have been trained for educational and motivational tasks, for example, in Nigeria (21; A43) and



Fig. 5. Women's group discussions on health education: women have useful knowledge of local conditions, practices and resources on which joint programmes for local improvements can be based (UNESCO photo by Madelaine Caillard).

Pakistan (350). There are indications that the communities and the women themselves would like some curative tasks to be added (82). To reach families more effectively, several Asian countries, including Viet Nam (443, 503), Thailand (398, 628) and Japan (460), have also trained selected individuals, often women, from small groups of households in environmental sanitation, to assist community health workers to promote improved hygiene.

In Ulengule village, Tanzania, women were asked to select the women they considered to be most suitable for training as environmental health educators. Evaluation showed that they had chosen those who were already opinion leaders in health and domestic care. Criteria used were so subtle that the project could not have made the same choice. These women were very effective motivators of environmental changes in areas which are the responsibility of women (A40). It is interesting to compare these experiences with those with piped water supply

projects in two communities in Guatemala. The health communicators (men and women) selected by the (male) water committee made little or no impact. This is probably because: "The young women were probably selected by the committee for their knowledge of Spanish, and not for a role in the community's informal health network" (100: p. 68).

In addition to being involved in health dialogues in their homes and meeting places, women are also participating increasingly in the organizational approach to health education. As members of village health or water committees, women are trained and involved in the planning and implementation of hygiene improvement programmes in their communities. This may include the identification of local health hazards by simple community surveys, for example in Malawi (437, 511), Togo (50, 311), Burma (454), Thailand (365), Sri Lanka (243), and Indonesia (567).

Women's organizations

Traditional women's organizations, for example in Melanesia (232; A33), and newly created women's groups, for example in the Republic of Korea (2, 379; A17) and the Philippines (A11), have been very effective in developing peer group support for environmental change. However, husbands in both secluded and non-secluded societies have sometimes opposed the participation of their wives in women's educational programmes (73, 160, 285, 601; A2, A13). Such opposition has generally been overcome by obtaining support from male leaders (469, 637, 646) and by involving husbands in some of the activities, for example in projects in Damfa, Ghana (603), and in Maswa, Tanzania.

"Local research in the Maswa District has revealed a very interesting fact. If women alone attend the course, they return to their homes with new ideas and methods only to meet opposition and resistance from their traditionally-minded husbands. So husbands are encouraged to attend the five-day course, or at least come occasionally during the day to see what their wives are learning. One pamphlet on Benefits of Clinics has been prepared especially for fathers to read" (306: p. 99).

Elsewhere, women have found their own culturally appropriate solutions to this problem. Mother's clubs in the Republic of Korea and the Philippines, for instance, have made the most negative elders official advisors to their clubs (379), prepared a ceremonial dinner for their husbands at which the purposes of the programme were explained (A17), or have had proud husbands accompany their wives to a formal graduation ceremony at the end of their course (A11).

In working with women's groups and organizations, two basic approaches have been distinguished; those that aim at the development of skills, and those that aim at development of analytical capacities and group building (653). In the first type of programme, women are trained in skills and competencies by which

they can improve individually their lives and those of their families. Training offered usually includes child care, hygiene, and nutrition (306, 328, 466; A11), but may also include technical skills based on local resources, such as the construction of household water filters (A22) and latrines (159, 498, 653). The second type of programme encourages women to assess local problems, to generate ideas for solutions, and to work out their own action plans using local resources as much as possible. In the process, the women work as a group rather than as individuals. As a result, problems more fundamental than hygiene and sanitation may emerge for group action (160, 359, 654).

The lack of objective evaluative studies on the impact of local women's groups on hygiene improvements makes it difficult to ascertain which approach is most effective under certain circumstances (653). More information is also required on the categories of women reached through such programmes. An analysis in northern India showed, for example, that the more conventional women's clubs were attended mainly by women from wealthier and higher status families.

"They teach many details of nutrition and food preparation, household hygiene, including how to make soap, baby care, sewing classes, and promote the cultivation of kitchen gardens. It is ironic that the women who dominate such meetings are, as a class, the least likely to undertake many such chores by themselves. The lower classes of working women and labourers who must regularly do all such chores themselves, are not reached by the clubs" (A13: p. 413).

Women's programmes in Ivory Coast (409) and elsewhere in West Africa (116), Botswana (392), Kenya (235), Republic of Korea (379), and Indonesia (59, 639) have also reached mainly women of higher status who have the time and interest to learn prestigious domestic skills. Therefore in several countries, courses have been set up to make leaders of women's organizations aware of these discrepancies and to train them to adapt their approaches and to initiate projects and programmes which include poorer women (see Chapter 8).

Linking health education with technical projects

One way to ensure that health education is integrated into water projects is for technical projects to organize concurrent health education programmes. This approach is used in Latin America in particular (113, 555, 597, 738).

Attempts to integrate health education into the technical water supply programme in Paraguay were unsuccessful between 1973 and 1980. In 1980, the government began to implement a new policy on community participation and health education in rural water supply and sanitation. Methods used include discussions in local schools, mothers' clubs and community workshops. For this purpose, the sanitarians work closely with local schoolteachers, who are mainly women (670).

However, an impact evaluation will be necessary to determine whether such a short-term and general health education programme is sufficient to reach all households and to achieve the permanent changes in hygiene behaviour necessary for a public health impact. It is possible that closer cooperation with local health workers and training of local women is needed to continue local health education and action programmes after the completion of technical projects (437, 677, 744), and depending on local needs, linkage with economic activities (310, 401).

The absence of clear policies, guidelines and orientation of middle-level officials on intersectorial cooperation between departments with technical and socio-educational tasks complicates integration of health education in water and sanitation programmes. In India, health education programmes have been integrated into some water projects, because this was part of the design agreed with the donor (264). However, this has not led to the integration of health education in other water and sanitation projects carried out by the same department (743). Such experience highlights the need to incorporate policy making and programme development in all evaluation studies and pilot projects, with special emphasis on the reasons and methods for the involvement of women.

Support from husbands and children

Frequently, cultural divisions of labour and responsibilities do not permit women to make decisions or carry out improvements in all aspects of hygiene.

In West and East Africa, latrine construction and kitchen improvements are often carried out by women. But essential tasks, such as pit digging, or roofing which is important to prevent non-use and collapse of clay slabs in the rainy season, and other building activities are men's tasks, as also pointed out by the women themselves (64, 676; A22, A40).

Therefore, in the development of local health education programmes with the community, separate issues for men and women may need to be identified. This will also prevent hygiene education programmes on women's issues reaching mainly men, as found in rural communities in Ghana (A15), Bangladesh (310) and Tanzania (35). Further, and as shown earlier, involvement of men will help abate opposition from husbands. Finally, health education activities with fathers will counteract impressions created by some programmes in health education and mother and child care that responsibilities and work for and enjoyment of children rest with their mothers only (489, 565, 591; A2).

The involvement of children of school age in health education is often stressed because they are the generation of the future. Generally, girls assist their mothers in household work, and older sisters and sometimes brothers take care of their younger siblings (468). In the mid-term evaluation of the International Drinking

Water Supply and Sanitation Decade, the existence of school health education programmes is considered to indicate that health education has been included in water supply and sanitation programmes. Of the 86 countries participating in the evaluation, 29 reported that primary schoolchildren receive health education. Estimates of coverage varied from 5% in five countries to 100% in ten countries (736).

However, little is known of the methods and effects of health education programmes in schools and other youth organizations. Some programmes are limited to teaching academic information about the causes, transmission and prevention of water and sanitation related diseases and carrying out medical inspections, as reported in studies in Sri Lanka (344) and India (264). Other programmes, for example in Paraguay (113), actively involve children in improvements in their schools and communities. Educational materials for these activities has been developed (1, 330, 549, 550, 569, 764, 765). In some cases, educational programmes have succeeded in mobilizing children to improve hygiene in their homes and communities (42). In other cases, little or no effect has been achieved.

In an isolated and poor area of Tanzania, young girls have been frustrated by school health education, because their parents and later their husbands have not accepted what they had learned at school and would not support their attempts to introduce new practices at home (349).

Improvement in hygiene and understanding and elimination of disease transmission risks are also required in schools because the risk of disease transmission is increased when many children are gathered in one place.

A programme on an island in Micronesia to promote better handwashing habits in schoolchildren increased the spread of trachoma because handkerchiefs and towels became channels of disease transmission. In another case, the well water became contaminated because in order to wash their hands the children picked up the bucket and rope immediately after defaecation (608).

This is another reason for not limiting participatory health education programmes to individual mothers but to include joint identification of all local risks and the planning and implementation of comprehensive action programmes. Construction of more latrines at schools and arrangements for better maintenance has been a frequent element of such programmes in a pilot programme in Tanzania (677).

Finally, a complicating factor in improving family hygiene through school health education is that many girls do not go to school, or leave school at an early age. The reasons for this are that parents do not consider that girls need to be educated, their mothers need their help at home, or education violates norms of

seclusion (67, 420, 492, 655). Therefore, in some urban and rural projects, home schools and special educational programmes for women and girls have provided valuable opportunities for them to continue their education within the boundaries of their culture (46, 49, 55; A7). In a urban project in Karachi, this has even stimulated some women to become involved as motivators of hygiene improvements in adjacent neighbourhoods (55).

7. Realities of Project Participation: Development Benefits

The immediate benefits of improved functioning and use of water supply and sanitation facilities to both women and the project from women's involvement in design and local planning, maintenance, management and health education have already been considered in chapters 4 to 6. In addition, projects also have long-term benefits for public health and for the socio-economic development of families and communities. Achievement of these benefits depends largely on active participation by and support to local women.

7.1 HEALTH IMPACTS

Many studies have been carried out to determine the impact of improved water supply and/or sanitation on public health. Because of methodological problems, results have been interpreted in two ways. In a review of approximately 200 health impact studies and five other summary reviews, Mc Junkin concluded that, as a whole and in spite of their deficiencies, "a significant body of evidence supports the positive linkage between sanitary water supply and excreta disposal and long-term improvements in health status. This linkage is supported by long-term empirical observations in both the developed and less developed countries" (441: p. 94). He also concluded that results were inconclusive or negative mostly in situations where poverty and underdevelopment dominate. This suggests that the success of a project depends on the way it is implemented. Comprehensive and participatory programmes are most likely needed in these areas to assist people to find affordable and appropriate solutions to the whole complex of disease transmission risks in their environment.

Blum and Feacham (85), on the other hand, make a plea for more health impact studies which take into account various methodological pitfalls. However like Mc Junkin, they are aware of the high cost of studies for the sole purpose of impact measurement. Therefore, they recommend that these studies be carried out as part of ongoing water supply or sanitation programmes.

Evaluation should also focus on behavioural processes because health impacts depend on the patterns of use by adults, and especially in cases of diarrhoea control, by children (85). The next logical step is to ask why these behavioural patterns occur, and whether they can be improved by greater involvement of the community in general and women in particular in the design, planning and management of water supply and sanitation improvements, and also in community health education programmes (419).

7.2 SOCIO-ECONOMIC BENEFITS

In addition to improvement of public health, water supply and sanitation projects may also have a number of socio-economic benefits, associated with the work and position of women. These include reduction in time and energy expended by women on water collection, and in some cases sanitation, productive use of increased availability of water, time, and processed waste, and enhancement of their status and self-reliance.

Time and energy savings

The literature reviewed in Chapters 2 and 3 shows that reductions in time and effort may be valuable benefits accruing from improvement to water supply and in some cases, sanitation. However, few studies have measured these impacts; this has been noted for Central and Latin America, and the Caribbean (529), but applies also to other world regions. In the present review, more studies were found on the potential benefits than on the actual impact of water supply and sanitation projects. Impact studies would be useful for planners, and to stimulate investment in water supply and sanitation (333). As with health studies, there is a need to move from large-scale socio-economic studies as carried out in the 1970s (713) to behavioural studies of water collection and use of water and time gain in project communities. This information is easier to collect and the validity of study design is less of a problem, especially when the study is planned as part of the total project. Methodological issues should also be addressed (224).

Studies carried out to date indicate that the scope of time and energy savings depend largely on criteria for project allocation, the quality of the service, and water collection patterns within the households. Large reductions in time and effort in water collection have not occurred in communities with reliable and accessible traditional water sources. These reductions have been substantial in areas of limited supply or long distances to traditional sources (100, 108, 240, 299, 416, 712; A23).

In East Zomba, Malawi, the average time saving was only 1.15 minutes per household per day, because the villages had many accessible and reliable open wells (A25). In a scheme in Mozambique, on the other hand, time savings were on average 106 minutes per day (108).

Sufficient discharge, adequate number of outlets and reliable functioning and operation of facilities determine the degree of time gains. Poor service cancels out potential reductions in collection time because of the long waiting time at taps, as reported in Ethiopia (98), Kenya (727), Tanzania (60), and Zimbabwe (172).

Finally, time savings also depend on changes in collection patterns and the

division of labour within households. In one Indian community, the introduction of a piped water supply with house connections has not reduced the heavy burden of water collection for women servants, because all water for purposes other than drinking is still fetched from the free traditional wells further away (613). However in another Indian community, the poor women benefited most from improved availability and access to drinking water, because they had no means of transport and storage facilities for the water collected previously from more distant sources (655). In projects in Kenya (727), Guatemala (100), and Mexico (43), the women reported that men and children no longer assisted in collecting drinking water when trips were shorter and less taxing. With a closer water supply, women have also reported more frequent trips. Thus in their view, the total amount of time spent on water collection had not been reduced (141, 727). However, they did not consider the loss of assistance from their children especially, as being negative. They valued the reduced demand on their children's time (727) and their increased school attendance (43). Similar benefits have been mentioned by villagers in Botswana (174). Also, more frequent trips may result in more water being collected, which contributes to better hygiene and ultimately to improved health.

Economic use of water, waste and time gains

Data from studies on women's time budgets indicate that time saved from shorter water collection trips is used productively. Studies in Lesotho (240), Mozambique (108), and Bourkina Faso (A22) indicate that time and energy reductions benefit firstly household activities, such as cleaning and cooking (108; A22), and time spent with the children (108). Frequently, the women themselves also mentioned these as being important benefits (174, 299, 410, 670, 744; A15, A23). In addition, time savings are used for activities in women's organizations and community development, but mostly only qualitative data are available on these aspects (518, 727; A3). The only quantitative data found stem from a study in central Kenya.

Random household samples from two rural areas similar in socio-economic and cultural conditions except for water supply were compared. Unfortunately, no baseline data were collected. The average time gain for the functioning part of the scheme was 35 minutes per person per day, benefiting on average three women in each household. Membership of women's organizations was almost twice as high in the area with a water supply as in that without. In addition, participant observations suggested that hygiene was better in households with access to tap water. Further, the average income from daily milk sales of progressive farmers with a yard connection was almost three times that of farmers in the control areas (343). Although the study does not give data, women may well be actively involved in dairying.

There is a considerable amount of qualitative information to indicate that, where possible, women use savings in time and increased access to water not only for domestic purposes but also for other economic uses. In projects in Thailand (A8), the Republic of Korea (149), the Philippines (A11), Zambia (56), Botswana (174), Honduras (221), Peru (299), and Panama (A23), women reported using time gains and water from yard connections to grow vegetables and flowers to market, to tend small livestock, and for homecrafts. In Guruvarampalayam, Tamil Nadu, India, women used time savings to collect fuelwood, which has become increasingly scarce (141).

In Lesotho (240) and Tanzania (A40), time-budget studies were carried out which compared women's time use, but without data on the situation beforehand in communities with and without an improved water supply. The results of these studies do not confirm the findings mentioned above on the use of time gains for income-generating activities. In both cases, women used the limited time gains for domestic work and child care. However, the studies also indicated that women already gave priority to agricultural labour in the peak season and reduced household activities for that purpose. Thus, time savings from reduced water collection were spent on household and social activities. One reason may be that they have little incentive to increase their agricultural production. In Lesotho, time savings were greatest in the lowlands, where shortage of land is greatest and there is easy access to cheap vegetables imported from South Africa. In addition, women have difficulty in obtaining capital for the acquisition of seeds and fertilizer (240).

Price policies and agricultural boards that give farmers very little return for extra effort are further constraints to use of time gains for food crop production. "Price controls, typically designed to favor urban dwellers, have become increasingly popular as urban populations have grown and inflation has become more apparent . . . The sad story of farmer price control in Africa in the last decade reflects more the tendency to try to set fixed prices or prices that are governed by short-term political considerations than it does any inherent mistake in the policy objective" (163: p. 194).

Other reports show that socio-economic benefits also reflect circumstances within communities and households. In a community in Botswana, brewing of beer increased after the water shortage had been overcome with a piped water supply. This provided a source of income for women heads of household especially (174). Floor plastering also increased in dry area communities (174; A15). In a village in Haryana, India, wealthier households in particular benefited economically from an improved water supply, because women in these households used time gains from reduced water collection for agricultural work and weaving (656). Although water from piped domestic systems for profit-making activities was unauthorized in rural Panama, many of the 26 communities visited reported such water use, mainly associated with women's

work. This occasionally gave rise to water shortage, because the system had not been designed for such uses.

“During the dry season, the piped water systems provided essential water for small livestock and for vegetable gardens. In the milk district of Chiriqui province, piped water from the mountains permitted high standards of cleanliness in daily operations” (A23: p. 9).

Women’s garden groups are of relevance where there is opportunity for the economic use of surplus and drainage water from communal water points. Some groups have special communal water supplies in their gardens: the women in Casamance, Senegal, use wells and hand pumps (120, 351; A39), a group in Botswana fill their watering cans from a gravity filled reservoir (207); and groups in Lesotho use mostly dams and springs (104).

The use of surplus water from public facilities for domestic purposes is less common. In a rural community in Zimbabwe, women who have always gardened near traditional water collection points, established vegetable plots at the end of the drainage channel for the water and laundry facility, as part of their own site management system (A41). A women’s group on the outskirts of Nairobi established a tree nursery near a public standpost (634). Laundry services run or planned by women’s groups are another form of economic use of domestic water supplies, especially in urban areas (221, 623, 751; A12).

In other projects, such as hand pump projects in Buba Tombali, Guinea Bissau (A44), Niger (309), Upper Region, Ghana (A15), and Livulezi, Malawi (422), gardening at the water source was part of the original project design. In Singida, Tanzania, school children in six villages have raised tree seedlings for fruit, timber and fuelwood by their school hand pumps. The seedlings have been transplanted in their home compounds during the rainy season (157). In low-income urban areas, vegetable gardening projects have also been established to increase economic benefits from surplus water.

In San Miguelito, Panama City, over 100 community leaders, of whom more than half were women, were trained in low-cost vegetable gardening and nutrition to improve home gardens watered from yard connections and public standpipes. In Chawama, Lusaka, Zambia, where 25 households share one tap, a similar project emerged as a result of pressure from inhabitants of low-income areas to make waste city land available for food production in addition to their small home gardens. Earlier crops had been destroyed as they were said to provide breeding places for mosquitoes. After a successful start, the project was abandoned because of problems of interagency cooperation. In another neighbourhood, Jack Extension, no such problems occurred and in 1980 the project had expanded to include a fruit-tree nursery (698).

However, there are indications that projects do not attach sufficient importance to the integration or linkage of economic uses to domestic water supplies. In Ghana, no increase in dry season gardening has been reported and was not found at the wells visited, probably because of insufficient promotion and support (A15). In Guinea Bissau, women promoters participate in the physical and organizational work of establishing garden plots, and also sell vegetable seeds (A44). However, this component has remained weak, presumably because project objectives and division of tasks were insufficiently defined (388). In Malawi, results have been disappointing mainly because of lack of active support from the Ministry of Agriculture. Where there is an active agricultural extension worker, as for example in Dowa West, results have been more positive (151). A similar observation is reported from Botswana (174).

Factors which emerged from the literature reviewed as being relevant for the functioning of women's gardening groups (104, 207; A32, A39) include: availability of water and land; feeling of solidarity based on traditional cooperation and/or newly emerging circumstances, such as a group of women heads of household; high priority given to food production and good marketing facilities; previous experience with gardening; flexible organization with the group setting its own rules; a low financial threshold; and in most cases, some basic technical assistance or extension services.

As mentioned earlier, little attention has been paid to systematic analysis of the output and value of the economic use by women of increased quantity, reliability and accessibility of domestic water and of processed waste. Analysis and strengthening of this project component where necessary are required because there are strong indications that women spend proceeds directly on family welfare. Studies and informal discussions have shown that the income controlled by women is spent on basic household needs, such as food, clothes, fuel, health care, housing and utensils. This is the case where women traditionally have had their own incomes and responsibilities, as in areas of Nigeria (9, 89, 106), Mali (771), Senegal (199; A39), Ghana (101, 122), Kenya (73, 295) and Thailand (602), and also where women have started to earn incomes as paid workers, such as in India (14, 332, 393, 536), Bangladesh (347, 428, 602), and Guatemala (223).

Income-generation components in projects are also important for the water and sanitation agency themselves. This has been shown in projects in Thailand (A8) and Mexico (A32), where women have used income from vegetable gardens and handicrafts to pay the water costs, or to manage the system. The ad hoc contributions raised by women as part of local management activities discussed previously may also be provided largely by women.

Enhancement of status and self-reliance

Recognition of women's tasks and organization and training for new tasks are not only essential to achieve maximum benefit from improved facilities, but also do much to improve the status of women (see Fig. 6). This has been observed universally and is the more noticeable where women are culturally secluded or segregated and not organized (46, 299, 469, 634; A7).

"Organization was a new idea to slum women, and the formation of *mahila samitis* [women's organizations] and the program of activities brought them closer together. Many of the men eventually became reconciled to the participating of women inside or outside the project areas, and the women developed feelings of self reliance. Women became more conscious of their children's health, and, as they themselves requested the health programs they more readily accepted them. Attitudes of older women changed to some extent particularly in allowing their daughters and daughters-in-law to leave their houses to participate in various self-help programs run by the *mahila samitis*" (A7: p. 272).



Fig. 6. Training of village sanitation volunteers in Orissa, India: by involving women, the project recognizes and builds on their responsibilities for household sanitation, need for improvements and access to and influence on other women, thus combining direct project benefits with enhancement of the status of women (UNICEF photo).

Representatives of these women's organizations were for the first time invited to civic functions and were members of citizen development councils (representing 250-400 families) and neighbourhood councils (1,500-4,000 families). Two-thirds of them attended meetings occasionally and one-fifth regularly (A7).

Increased self-reliance is particularly apparent in the health education projects reviewed previously, which used the approach of group development and joint analysis and problem solving. Other instances have emerged from economic use of water and waste by women, such as a garden group in Senegal which went on to establish a maternity centre and dispensary (646). A women's cooperative managing a neighbourhood waste and waste water recycling plant also established a children's playground, and the joint purchase of food wholesale (A32). Benefits of increased self-reliance have also been reported by projects being carried out as part of larger water supply and sanitation programmes (36, 634, 744). Although primarily these projects have functional objectives (operation, maintenance, use, financial viability), they have also become a community organization and learning process by involving users in planning and implementation. This is in contrast to other programmes which emphasize only the collection of community funds and the mobilization of voluntary labour (28).

7.3 DISTRIBUTION OF BENEFITS AND PREVENTION OF NEGATIVE IMPACTS

In the review of the literature, many instances were found of benefits which could have been increased and negative impacts which could have been avoided with more involvement of women. These issues are summarized in the checklist presented in Table 6.

Access to services

Exclusion of poor groups from access to services and thus to better health and other benefits is reported frequently. While whole families are concerned, this affects women more directly. Therefore, ways to prevent or overcome such problems have been reviewed. These include the formulation of explicit agency objectives, the adaption of designs through staff awareness, direct consultation with the poor, increasing the social awareness or overruling of local elites, and organization of the poor.

Explicit agency objectives. Access of the poor to basic services as a separate project objective has sometimes made a considerable difference to the design implementation of projects.

In Andhra Pradesh, India, engineers have been instructed to identify all *harijan* sections (castless groups of the very poor) within a community and to design at least

Table 6. Reduced benefits to and negative impacts on women of domestic water supply and sanitation projects

1. Certain categories of women are excluded from access:
 - poor
 - minority groups
 - women heads of household
 2. Greater benefits and development spin-offs have accrued to women from wealthier households, thus widening the gap between rich and poor.
 3. Workload of women is increased by:
 - voluntary labour for construction
 - loss of assistance in water collection
 4. Poor women and/or their husbands have lost employment or resources in:
 - water collection
 - waste collection and reuse
 5. Women have no control over income from economic use of time and energy gains or increased availability of water and waste for economic purposes:
 - agriculture
 - horticulture
 - dairy cattle
 6. Special needs of women are not met:
 - laundry and bathing facilities
 - service operating hours
 - privacy
 - alternatives for meetings and social learning
 7. The involvement of women has been relegated to:
 - health education
 - special projects
 8. Improved facilities have led to reduction of:
 - traditional spheres of influence
 - organizational skills
 - social status
-

one tap in each area. In Uttar Pradesh, India, no such design criterion exists, with the result that public taps have been designed which have to be shared by at least about 800 people, and have been located in the community centre and not in the poor neighbourhoods where the users live (195).

Increased awareness of agency staff. Training of agency staff has also contributed to breaking down barriers to access of poor women to facilities.

An integrated rural development project, comprising land reform, improved agriculture and infrastructure, was planned by the Ministry of Planning and

Economic Politics in Tonosi, Panama. Because only households headed by men were considered to be a complete social unit, those headed by women were excluded from the project. Participation of project staff in a women-in-development seminar made them aware of the special roles and conditions of women in rural development. As a result, selection criteria were amended, and women were included in local planning and obtained access to all services provided originally only to households headed by men (358).

Involving the poor in consultation and local planning. Ideally, local planning committees should represent the various groups in the community, including poor households, but this is not always the case. In one situation this problem was overcome by a member of the project staff visiting informally the poorer sections. He was informed that they were concerned that they would not benefit from the project.

In particular, it was feared that the standposts would be located in favour of the privileged. These ideas were reinforced because the poor were not represented on the local development committee. As a result the project ensured that these sections were also represented on the committee. Joint development of a set of criteria for location of public standposts prevented facilities being located in favour of one group, and also promoted community participation (367).

The same effect has been reported from the joint application of siting criteria by committees composed of established leaders and women elected in a general women's meeting (A40). However, in a Brazilian community, local leaders and landowners refused to make joint decisions with share-croppers and housewives in a representative community council, and the project decided to work only with the established leaders (512).

Increasing the social awareness of local elites. When working with the local elite, project agencies have sometimes been able to raise their awareness and socio-political conscience (44; A43).

In a non-government agency project in Jamkhed, India, the local leaders were taken on a walk around the village. Starting with the wealthier groups (plenty of food and good water, waste disposal, etc.) the group moved slowly towards the poorer parts of the community. The comments of the agency worker on the perceived situation forced the local leaders to acknowledge the situation in the poor sections and even to comment upon it themselves. The time was then ripe to sit down and discuss possible improvements (44, 45).

Health education related to improved conditions for all has also contributed to extending facilities to unserved parts in the community (A42). In other cases, agencies have used arguments based on modern or traditional technology to overrule the selection of sites, as has happened in projects in India (45), Ethiopia

(528), and Kenya (706). This prevented the exclusion of some groups of women from facilities intended for all.

Organization of the poor. Sometimes the only way to ensure equal access to services is to mobilize the poor themselves to express their rights (133, 506, 746, 754). Through non-formal education, non-government agencies in particular have assisted groups of the poor, including women's groups, to gain access to the basic services to which national policies give them a right (144, 173, 359, 600). While some government agencies have cooperated with them to achieve this end, others unfortunately have preferred to maintain tight bureaucratic control (746).

Balancing burdens and benefits

Another issue in access to facilities is the cost to women's work and the household budget. Frequently, community contributions to construction of public facilities are collected as voluntary donations in cash and kind at fund raising meetings, and as voluntary labour. In Kenya, this has been one mechanism by which women have started water supply projects to redress the disproportionate allocation of services between regions (434, 533). The traditional prestige system of communities has ensured that contributions are made according to means and status (434). Where egalitarian systems for self-help no longer function, it is the task of the water agency to introduce a new system of well organized and equitable self-help, to avoid tensions and later problems and participation in water supply projects, as noted in communities in Peru (284), Cameroon (477), and Sri Lanka (367).

An issue requiring attention in areas where both men and women customarily participate in agricultural labour is whether men, as fellow beneficiaries, should contribute equally to the physical work. Without due consideration of this issue, increased involvement of women in local planning committees may mean that women especially are mobilized for voluntary labour, as in a project in Mbeya region, Tanzania (A40).

One system used in particular with piped water supplies with yard or house connections is that the total community contribution, as determined with the aid of a socio-economic study, is divided by the number of participating households. Thus, each household contributes the same amount of work and cash (738, 744). Agencies have sometimes been aware that this burden is greater for poor households, such as those headed by women. Attempts have been made at a fairer distribution of community costs in Colombia (227, 467).

"Each future user of the aqueduct was requested to contribute a number of workdays to the project; this contribution corresponded to either 55, 35 or 25 workdays, the quota depending on each individual's financial situation. In order to fulfil his assignment, each villager had either to provide manpower himself or

members of his family or to pay an amount equivalent to the value of such workdays in Colombian pesos. The work system adopted is known as *convite*, where the men perform the material work directly related to the project and the women prepare their food and refreshments" (467: p. 125).

In Cameroon, an alternative system for the calculation of household contributions has also been proposed (477). Free water supply or a flat rate of contribution for all households can be particularly inequitable when water is also used for economic purposes, such as small-scale irrigation and cattle raising. This is particularly so with unmetered yard and house connections, which no longer necessitate the carrying of water.

In an Indonesian community, landholding families served by a piped water supply were found to use almost twice as much water as households who had little or no land, yet all paid the same flat rate. However, an exception was made for the poorest 19 households; who were exempted from rate payments (747).

Similar effects of flat rates have been noted in Thailand (A8) and for cattle-owning households in Kenya (706). Where economic use is possible, it has been recommended that those benefiting pay a proportionally higher contribution for the operation of the scheme (672).

Yet another system in use in Bangladesh is that a group of at least ten families applies for a public tubewell with hand pump, and pays a fixed proportion of the construction cost. Although this system at least in theory provides free access to poor women, wealthier households benefit disproportionately. These families pay a subsidized price for a public tubewell near their house. A private tubewell in their compound would cost about ten times as much (352).

Relatively greater adoption of subsidized facilities by wealthier households stems partly from their better knowledge and experience of bureaucracy. Therefore, an Indian non-government organization makes all subsidy and loan arrangements for interested households part of its package in introducing water-seal latrines in urban areas (707).

Evaluation in one city showed that there was no over-representation of wealthier households. Of the adopters, 85% were low-income households and the proportion of disadvantaged social groups (tribals, *harijans*) matched that of the town population as a whole. Only poor households in rented houses were greatly under-represented (564).

Loss of employment and resources

Issues concerning loss of employment and resources and control over economic use of increased amounts of time, water and processed waste are closely related to the traditional roles of women discussed in Chapter 2. The seriousness of the loss of employment depends on local circumstances. In some cases, oxcart and

lorry owners from wealthier families have lost a means of making exorbitant profits from water vending (60, 514). Elsewhere, new facilities have meant loss of income for poor rural families, because landless women or their husbands have lost a steady job (343, 348, 449, 456). Even the removal of exploitive systems is a loss of income for workers, who often have no alternative employment. Occasionally, they have been integrated into the new system, as for example, the male and female sweepers and night-soil collectors in China (612), or have been offered training and employment at comparable income levels. Training has been integrated into the Indian programme for the conversion of bucket latrines in the largest cities, but it is not clear whether women sweepers also participate and whether employment will be available for all after training (679).

Deterioration and loss of free resources has occurred because maintenance of traditional water sources was abandoned after installation of government wells (505) or private house connections (57, 415). Also, the establishment of private or public owned biogas systems has meant the loss of free fuel for poor women, who traditionally have had the right to collect and process cow dung for fuel and to generate income (96, 485).

Increase in workload and control of benefits

While short-term voluntary labour by women in construction of water facilities may lead to permanent reduction in the work of water collection, time gains have also led to increased workloads without control over ensuing benefits. This is the case when time gains are used to tend cash crops owned and marketed by husbands (477, 657). Wealthier men with more land and more than one wife may benefit most from economic use of these gains (108, 382).

Improved water supply has also contributed to livestock production (343, 706). Although women may do much or all of the daily work in dairy farming, they do not necessarily share the profits from their labour (278, 342, 459).

In milk cooperatives in Rajasthan, India, the women do all the work. However, the men own the animals and are members of the cooperative bodies. An attempt by women to obtain a higher milk price was thwarted by the cooperative's board. Higher prices would have directly benefited the women, but higher profits and dividends from low prices go to the shareholders, who are all men from wealthier households (342). In Andhra Pradesh, India, the men abandoned paid agricultural labour when the income from milk started to come in, but the women continued to do both agricultural labour and their work in dairying. Their husbands are the members of the milk cooperatives (euphemistically called "mixed cooperatives"). Gains, that is cash from sales or milk for home consumption, go mainly to the men in the households (459). A few women's cooperatives have now been established.

Similar cases of women working but not sharing in training, improved water supplies and/or material benefits of their water related work have been reported

for a poultry project in Bourkina Faso (315), a vegetable gardening project in Zaire (698) and in nomadic areas (26; A16). In resettlement areas, the need for a good water supply has often been overlooked, or given low priority (34, 400, 536; A4). The extra energy expended on water collection in the dry season (150 days) by 60 women in a resettled village in the onchocerciasis control programme in West Africa has been estimated to be one tonne of sorghum, at a value of 300 work-days (A4).

Relegation of women and neglect of traditional roles

Although women's involvement is gaining recognition, there are still many cases where they are not given opportunities to take part in all aspects of project work. A study in Nigeria, Bolivia, and Peru reported that women have participated less in decision-making in government projects than in more traditional self-help projects (450). New water projects have not built on the traditional roles of women in the care for their domestic water sources (18; A15). Work, which was done remarkably well by voluntary women's groups in Western Samoa, became a paid job when it had become a male responsibility (A33). Similarly, women paid staff have been replaced by local women volunteers supervised by paid men staff (697).

In an urban slum development project in Hyderabad, India, initially women made up 45% of the paid project staff. In 1981, their involvement was reduced to 23%, most being replaced by paid men. At the same time, women were essential to the project, because almost three-quarters of the households were Muslim. This resulted in an increase in the number of voluntary workers, 93% of which were women (697).

In urban projects in Latin America, on the other hand, local women have been involved as intermediaries in programmes for sanitation, preventive health, basic education, and nutrition (94) and have been employed increasingly by the departments concerned.

In 1984 in Lima, Peru, 96% of community promoters and monitors were women, and many held leadership positions. In Ecuador, all programmes used women workers who were selected by their community, trained, and employed by the departments concerned. They were advised by user committees (697).

Finally, involvement of women in health education should not result in them being isolated from the main project for water and sanitation improvement, as has been reported in several cases (247, 255, 565, 671). It may well be necessary to work separately with women in areas where they are not integrated in local development activities. However, these projects would serve their purpose better if specific areas and linkages with the water and sanitation projects were developed at the same time (500).

8. Realities of Project Participation: Water and Sanitation for All

The literature reviewed contained many examples that confirm the potential of women's programmes and organizations to assist those not served by larger scale programmes to make their own water supply and sanitation improvements. These programmes include women's programmes in community development services, primary health care, appropriate technology, and cooperation between national and international women's organizations and local women's groups.

8.1 WOMEN'S PROGRAMMES

In the 1970s, many rural development projects and services introduced separate women's programmes. However, frequently these programmes have been limited to hygiene, nutrition, and other home improvements, without attention to other important tasks of women, such as agriculture, food processing and water collection (9, 80, 105, 246, 406, 458). In some cases, integrated programmes have been readjusted to focus on domestic aspects only (105; A2). Increased awareness resulting from women's studies and more participatory approaches are gradually changing this situation.

Sociological surveys have been used to develop programmes appreciated by women (159), but usually informal methods are preferred to determine jointly what women need and where improvements are possible (3, 128, 160, 463, 506; A35). Simple drawings of the various steps in water collection and use, and ways to improve each step by local means (source protection, lifting devices, water transport, storage and water drawing) have helped women to identify priorities and potential solutions (400). This job analysis technique, which has been used in western countries to improve labour outputs in industry (320) and domestic work (268), also deserves attention in development projects (321).

The Integrated Family Life Education project, which was implemented in ten to twelve rural and urban fringe communities in Ethiopia during the period 1973 to 1980, illustrates how involving women in project planning and solving problems identified by them has led to improvements in health in Lumamie, a rural community in the project.

"A group (35-50) of women in Lumamie decided that reducing the number of infant deaths in their community was their major concern. Through discussions with project planners, group leaders and various extension agents they realized that the community's water supply was unsafe and affected the health of their infants. With considerable effort, they mobilized the human and material resources necessary to

protect the water supply. Soon thereafter, the women lobbied for clinic services so that their infants could be examined regularly and inoculated. They learned about nutrition and initiated small income-generating activities. Within a three to four year period, there was a significant decrease in the number of infant deaths in Lumamie. Slowly, the women began to seek assistance in planning their families. Despite intermittent political turbulence in the province, the women's group in Lumamie worked together for seven years to identify and solve problems of importance in their daily lives" (385: p. 24).

The training of women promoters for participatory village studies and action programmes has often resulted in environmental improvements.

In the Central African Republic, 43 men and women community development workers in three *préfectures* have organized well protection and the installation of pulleys and covers. Activities include the production of simple educational aids, for example flipcharts, brochures, and puppets, and appropriate technology training. The introduction of donkey carts is being considered (400).

In Cameroon, the Community Development Department has a separate women's programme, which includes nutrition and child care, home management and improvement, handicrafts, and agriculture. In addition, the programme has introduced appropriate technology to reduce the time and effort required in food processing, for example palm-oil presses and cassava graters (494). Training has also included appropriate technology for drinking water.

The 50 promoters have received mobyettes (a light motorcycle) from UNICEF and some cement. They have organized cleaning and repair work of spring catchments and also general community development in line with the priorities of the ministry (255).

These activities started originally with a revolving fund to provide village women with grain mills. To pay back the loans, the women have formed milling societies to which members paid a small monthly fee. In total, 200 societies with about 18,000 members were formed which also became active in other self-reliant development activities.

The social gatherings around the mills and the time gains from central milling stimulated the women to start adult education groups on soap making, child care and nutrition. To house the group in the rainy season, the women started to make bricks and obtained help from their husbands to build their own centres. These were also used for mobile clinics. Other spin-offs included vegetable gardens and reforestation plots and water storage tanks with a laundry site and showers, financed also by their revolving fund (517).

Niger, Zaire, Benin and Ivory Coast are also carrying out women's programmes which incorporate village technologies for water supply and sanitation (324, 400).

In Niger, 22 women's development centres were established in 1975 to serve almost 400 villages. In Benin, the women's centre in Bohicon provides a four-year course for women extension workers, including one year of field-work. Training includes water lifting and storage, housing improvements and disease vector control. In Zaire, two training centres for women extension workers have been established, the Centre de Formation des Animatrices in Upper Zaire and the Centre d'Animation Sociale Rurale.

For the Centre d'Animation Sociale Rural, women extension workers are selected by the communities themselves. After training in health and simple water technology, they are employed by the agency in their areas of origin (400).

In addition to training women in village-level technologies, orientation of male colleagues may be necessary.

"When a woman social worker in Kenya wanted to introduce firewood and water carrying by idle family cattle she was ridiculed by her male colleagues for wanting to introduce new techniques for performing traditional chores" (318: p. 120).

Therefore, a programme in Udaipur, India, started with joint discussions by men and women workers on attitudes and expectations concerning women and the implications of working with women for community development (74).

Cooperation with technical agencies

A constraint to the implementation of village technology projects reported in the literature is the lack of cooperation and coordination with engineering agencies (463, 646). In Cameroon, men and women community development workers work on separate programmes. While the women work on community self-improvements, the extension work in connection with piped water supplies is carried out by men promoters only, and not in cooperation with the women's programme (255). In a women's programme in Mali, more reliable wells were identified as a priority need. This resulted in a project for hand-pump wells, but it is not clear whether the women were involved in other aspects of the project (627). In Guinea, sanitary brigades are attached to women's promotion centres in each region, with women workers concentrating on home economics, nutrition and traditional women's crafts (400). In integrated training courses for women leaders in Kenya, the technical officers offered advice only, while the home economics sessions included demonstrations and learning-by-doing (73). In Niger, women extension workers found cooperation with village men in water projects less of a problem than cooperation with technical services (69, 70).

“Several times the community development service made proposals for communal action to OFEDES [the water supply department] but without success” (70).

Their assistance has been less of a problem in integrated rural development projects, such as the BARIDEP project in Ghana: “The Ghana Water and Sewerage Corporation was informed about the problem and it kindly agreed to dispatch one water engineer to examine the problem facing the rural communities” (770: p. 48). Based on his recommendation of shallow boreholes or hand-dug wells for most villages which had requested a water supply, the corporation made an expert in well siting available to advise the villages on siting, digging and protection (770).

8.2 PRIMARY HEALTH CARE

In many countries, village health workers, many of them women, also play an important role in environmental health improvements. In the People’s Republic of China, India, Papua New Guinea, Ethiopia, and the Philippines, they have organized latrine campaigns and water supply improvements (115, 132, 699, 775). In Botswana, family welfare educators are trained to construct water carts, water filters and latrines and to promote them through popular theatre at health centres (181). In Kaani, Kenya, a village assembly initiated by a woman health worker decided on a village self-improvement programme which included the construction of rain-water collection tanks, spring protection, and latrines (178). In Thailand, rain-water collection tanks and water-seal latrines are part of the national primary health care programme for safe drinking water and sanitation. Health workers provide master moulds and train villagers selected by the community to make concrete slabs for water-seal latrines. Both men and women are trained, including village headmen and teachers. Health workers have now requested that half of the trainees be women. They will work alongside men in learning to mix concrete, pour latrine bowls and cast rain-water jars. Workers are paid a reasonable compensation by their community development committees (365).

8.3 APPROPRIATE TECHNOLOGY PROGRAMMES

Self-improvements in water and sanitation may also be stimulated by the development and diffusion of appropriate technology, such as locally made rain-water collection tanks, water transport facilities, and household water filters. Many bibliographies and manuals on appropriate technology have been prepared, which include self-improvements for water supply, sanitation and hygiene (233, 291, 412, 435, 455, 519). However, it is not always clear whether they reach women and women’s organizations in rural and urban fringe areas. Village

technology centres have been established in Kenya (435), Swaziland (123), Ghana (183) and Papua New Guinea (539) and also in India and Latin America. However, centres located in large cities are difficult for rural women to attend or to obtain information and technical assistance (535, 662). Evaluation of the Development Technology Centre in Bandung, Indonesia, showed that most of the target groups had never heard of their three field stations for village technology, in spite of intensive promotion in the mass media. Direct contacts were found to be the most effective extension method (192).

Some programmes have made special efforts to reach their target groups. In Indonesia, the Ministry for Women Affairs has published a handbook on appropriate technology for village women (461). Copies have been distributed to the wives of village headmen, who usually chair the meetings of local women's organizations. In other countries, courses have been organized to train women in labour-saving technologies.

In northern Swaziland, women can attend a course on income generation and appropriate technology at a special training centre. A crèche has been provided to facilitate their attendance. A revolving fund provides loans to acquire equipment and raw materials. Advice is available on marketing, design, equipment and production. Three other centres are planned in the other regions of the country (123). In Lesotho, the Women's Bureau, with technical assistance from other departments, has organized courses in ten districts and trained 400 women in simple water and sanitation technologies and other means to save labour and increase household productivity (464). Similar courses are also planned at provincial and local level in Papua New Guinea (649). The Technology Forum for Appropriate Development of the University of Zimbabwe supported 52 introductory courses for small groups of up to 35 women in the north-eastern part of the country. This resulted in the construction of over 17,000 ventilated improved pit latrines. To finance the acquisition of the latrine slab, ventpipe, and other components, often the women have organized brick-making projects (368).

An interesting strategy to diffuse knowledge of appropriate technology for women's self-improvements has been followed in Senegal. A travelling exhibition of village technologies was organized by the Ministry of Rural Development and Water Supply to tour all rural communities. During its one-week stay in each village, a seminar was organized to introduce the various technologies to the women (400). A similar travelling exhibition focusing on environmental sanitation was organized in Ghana as early as 1948. After villagers had been escorted around the various exhibits, women were selected to receive intensive training at rural training centres.

"Whilst total results did not add up to the expectations of the organizers, there can be no doubt that considerable improvement was achieved in cleaning up villages and improving environmental hygiene. The travelling exhibition itself was manufactured locally and, whilst some of the exhibits might have been deemed

crude, there was no doubt of the interest that they stirred in the villagers of Transvolta" (566: p. 47).

8.4 COOPERATION OF WOMEN'S ORGANIZATIONS

Several cases are reported in the literature of local women's groups starting income-generating projects to improve family living conditions, including water supply and housing.

A well-known case is the women's groups in central Kenya who have worked as paid labourers in the peak agricultural season. The income generated has been given to each member in turn for a corrugated iron roof, gutters and a rain-water collection tank (73, 257, 535). In western Kenya, some income from a women's goat project also went to rain-water collection tanks (634).

In Polynesia and eastern Kenya, women's groups have sought training in masonry work (see Fig. 7). They have constructed rain-water collection tanks (276, 280) and built water-seal latrines for their own use and to generate income (404, 465). They have also trained other women's groups in these construction techniques. In a South Korean community, a women's club initiated by the wife of the assistant headmaster started to sell compost and to raise funds in several other ways. The proceedings were used to make kitchen improvements and to protect local wells. Their example was followed by women in 11 other villages (A17).

In other cases, professional women have acted as intermediaries to mobilize local women to initiate and manage local projects.

"Women in a Karachi squatter area responded to the efforts of a concerned woman architect-planner to get them to undertake the improvement of their own community. Despite male community worker statements that only men did that sort of thing, the inspired women harnessed the efforts of their out-of-school adolescent boys to carry rock fill from a nearby hill, and dredge the stagnant canals in the neighbourhood. The women were right there directing the work all the way" (571: p. 88).

Cooperation is increasing between local women's groups and national women's organizations in developing and western countries. The latter often work through international programmes, such as the UNESCO Co-action Programme and the Voluntary Fund for the United Nations Decade for Women (695, 703, 704), and of necessity, provide support rather than participate in joint field-work. National women's organizations have more opportunity for cooperation with women's groups in the field in such a way that both parties increase their understanding of the factors which hinder escape from poverty and help to break down these constraints through joint efforts and solidarity.



Fig. 7. Technical cooperation between women's organizations: a trainer from a women's group in Tonga training members of a similar group in Fiji to mix cement for a rain-water collection tank (photo by Peta Joice, by courtesy of Diane Goodwillie, YWCA, Fiji).

Two cases of cooperation between development-oriented national women's organizations and local women's groups in water supply and sanitation have been reported in Honduras. In the first, a mass media campaign on environmental sanitation stimulated the Union of Honduras Women to cooperate with a village group in a latrine construction project (584). Extension of the project to other communities is planned (221). In the second, the Federación de Asociaciones Femeninas de Honduras assists women's groups from poor *barrios* threatened with eviction from the land. They also provide support for *barrio* improvements, including water supply and sanitation in cooperation with the Office for Squatter Settlements of the metropolitan authorities (221).

Another women's organization in Honduras, the National Federation of Peasant Women (FEHMUC) (702) and the Ghana Home Science Association (603) also cooperate with rural women's groups in water supply and hygiene improvements. Local FEHMUC groups in two regions select one of their members for training in primary health care. However, although their activities are carried out independently of the Ministry of Health, their promoters cooperate with the ministry in latrine projects. Urban-based women's organizations are not always aware of the difference between charitable support

and cooperation for self-reliant development, or they foster women's development on the basis of their own way of life (247, 658). Therefore, training programmes for women leaders have been developed or proposed in Thailand (107) and Indonesia (666).

Integration with national programmes

An interesting case of cooperation between women's organizations going beyond local projects and training programmes is the Kenyan Women and Health Organization (KWAHO) with a national programme on women and water. Inspired by the activities of traditional women's groups in the country, 33 voluntary organizations of urban women and UNICEF set up a joint project to support water improvements. These may be proposed by any of the 5,000 registered local women's groups in rural and low-income urban areas (257, 691). In spite of its potential, the project has not yet been able to develop a supplementary programme for households not being served by the various engineering programmes. Evaluation of selected projects has shown that mostly financial support had been provided, including to large-scale government water projects (634). However, support to these projects does not seem to have led to the development of more general procedures for women's involvement in programmes of the Ministry of Water Development. Other gaps in the KWAHO programme seem to be lack of a clear overall policy and programme for self-action, including technical assistance from the Water Department where necessary, the systematic diffusion of information about the programme to the women's groups eligible for support, the establishment of clear selection criteria for project allocation, and good monitoring procedures.

The only account identified in the literature of a combined effort for total coverage based on national policy decisions concerns a programme in Paraguay, where the engineering programme for rural water supply and sanitation is coordinated with and supplemented by a programme for community self-improvements.

At the conference on the role of American volunteers in the National Service of Environmental Sanitation (SENASA), held in Paraguay in 1982, it was decided to station Peace Corps volunteers in areas not being served by SENASA. Their tasks are to assist communities to make self-improvements using local materials and craftsmen, and to help them to set up local enterprises to construct latrine slabs, well covers and hand pumps. They cooperate with local teachers, who are often women, to organize the community. The names of local craftsmen and community motivators are reported to SENASA so that, when the government programme is expanded to new areas, their skills can be used (670).

Elsewhere, for example in India and Sri Lanka, initiatives have been taken to

improve coordination and cooperation between government programmes and non-government organizations in water supply and sanitation.

The many women's programmes and organizations are rich resources for community self-improvements in water and sanitation. Their efforts deserve to be incorporated and supported in national programmes and by donor agencies, aiming at the establishment and use of water supply and sanitation improvements for all.

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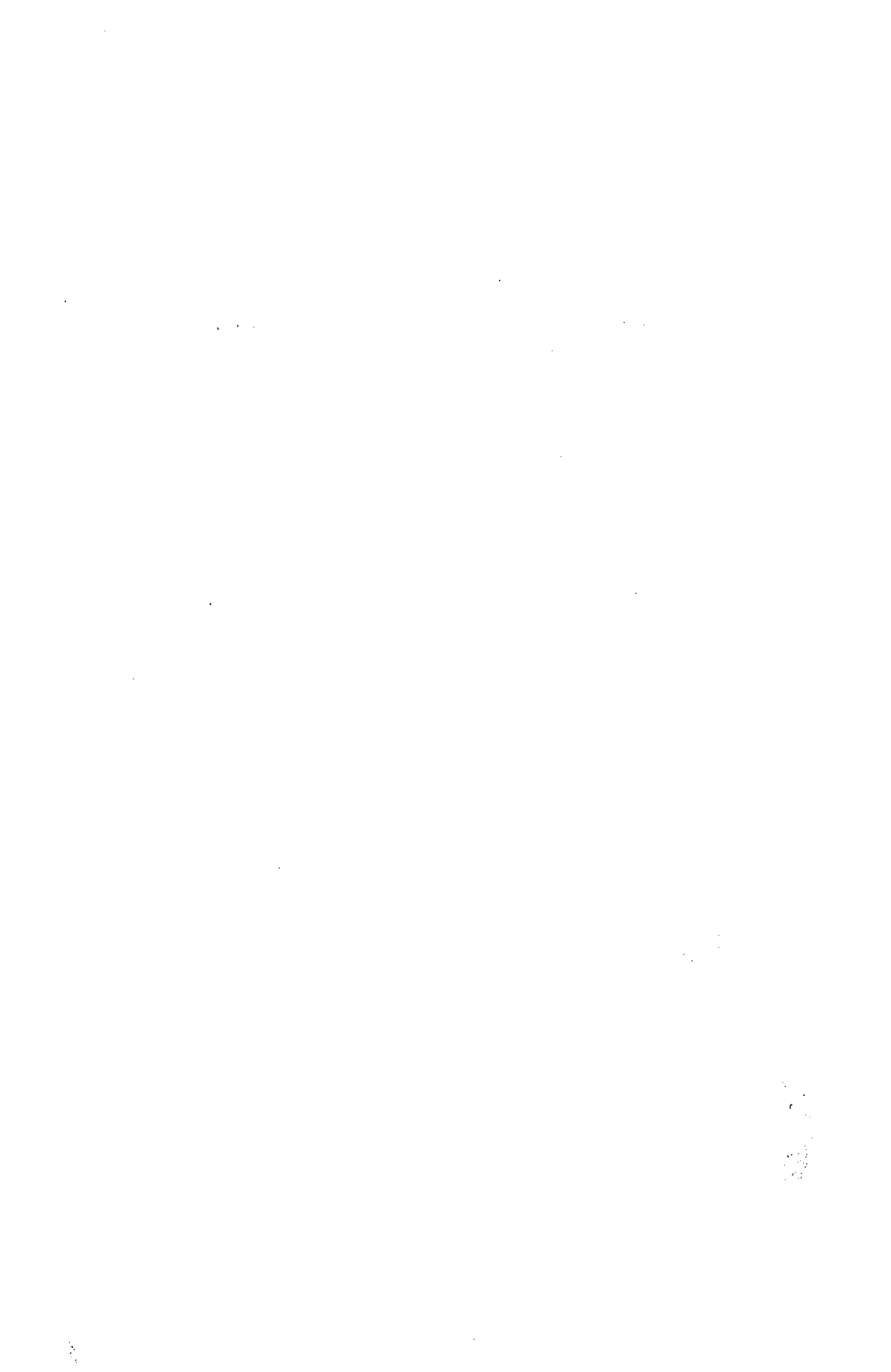
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774. Youssef, Nadia (1983). Issues in programming for women's economic activities. background paper presented at the joint UNICEF/ILO workshop on income generating activities for women, 24-27 October 1983. Geneva, Switzerland, ILO.
775. Zang, Bihua. (1984). No more snails in the land of rice. in Sumi Krishna Chauhan (ed.), *Who puts the water in the taps*. London, UK, Earthcan, 17-25.



**Selected and Annotated Bibliography
on the
Participation of Women in Water Supply
and Sanitation**

Introduction

In the selection of the material for annotation, emphasis was placed on primary sources, not only because this is the original material, but also in recognition of those working in the field, who in spite of their heavy workload have found time and opportunity to report on their experience. The criteria used for selection include geographic area; sector (water, sanitation and integrated projects); rural and urban areas; small-scale projects and large-scale programmes; and the form and effect of the involvement of women, or lack of involvement, in the various project stages and levels (community and community-support level).

Background reading

The following publications will assist in introducing basic technical and social issues in water supply, sanitation and education of relevance to the participation of women. The publications on water supply and sanitation all illustrate the need to look at the choice of technology, design, implementation and maintenance from the point of view of the user, which in many respects means involving women. The book on education and training introduces the type of learning that involves women as controllers and purveyors of knowledge, a role which they already have in traditional learning systems.

Bourne, Peter (ed.) (1984). *Water and sanitation: economic and sociological perspectives*. New York, USA, Academic Press.

Feachem, Richard, and McGarry, Michael, and Mara, Duncan (eds.) (1977). *Water, waste and health in hot climates*. New York, USA.

Morley, David, and Rohde, John, and Williams, Glen (eds.) (1983). *Practising health for all*. Oxford, UK, Oxford University Press.

Pacey, Arnold (ed.) (1978). *Sanitation in developing countries*. Chichester, UK, Wiley.

Srinivasan, Lyra (1977). *Perspectives on non-formal adult learning*. New York, USA, World Education.

White, Gilbert, and Bradley, David, and White, Anne (1972). *Drawers of water: domestic water use in East Africa*. Chicago, Illinois, USA, University of Chicago Press.

Abstracts

- A1. Abdel Kader, Soha (1983). Women, water and sanitation: primary health care. Cairo, Egypt, American University, Social Research Center.

This is a report of a workshop on re-orientation of the national water supply and sanitation programme in Egypt. Women are affected by poor distribution and functioning of taps and poor performance of operators. They are careful domestic managers (traditional filtration, manure processing) but lack adequate knowledge about environmental health. Home visits and dialogues were found to be most effective in reaching women, but regular health workers lack training, equipment and incentives for anything other than the prescribed clinic work. Therefore, the use of mass media and of women's informal health networks and the training of older, local women as educators (more time and authority) were recommended. The local councils, which include at least one women, decide on how funds are to be spend. However, community participation in projects has been absent because of the patronizing attitude of government officials and the large communication gap between villagers and councillors. In one case, community involvement has helped to expand the existing supply.

- A2. Albihn, Mari, and McPhee, Sarah, and Poluha, Eva (1982). Integrating women as a means of rural development: a case study of the Swedish CADU project. Stockholm, Sweden, SIDA.

In spite of a special study, programme staff of an integrated rural development project in Ethiopia were not aware of the important role of women in agriculture in the area, and limited the women's extension programme to home economics. Classes were attended by over 80,000 women. Reasons for non-attendance were male opposition, irrelevance of courses, and lack of home visits. Although half of the women applied some of the knowledge gained, none felt able to influence the hygiene habits of the other household members. Labour-saving devices were only extended to the men. Where women participated, wells were placed satisfactorily, but lack of maintenance training led to a failure rate of 60%. Most of the water budget went to irrigation projects. Promotion of the use of manure as fertilizer was opposed by the women who processed and managed manure, because they use it for fuel, thus reducing the time spent collecting firewood. Greater involvement of women in their areas of expertise, and health education for both men and women are recommended.

- A3. Ansell, Christine (1980). Domestic water use in a subdistrict of Mahweit Province. (Applied research report, no. 2), Sana'a, Yemen, Save the Children.

Participant observations in this ongoing rural water supply project in Yemen have shown that women are careful managers of domestic water. All water is collected

by women and girls, who carry weights of up to 20 kg on their heads. Water is stored carefully, but practices of drawing water need to be improved. A distinction is made between sources of different quality for different purposes. Grey water is saved for reuse according to its perceived quality. Social status also plays a role in water management. Men and male guests have the first right to the use of the cleanest water. When sources are far away, women and children may even limit their water intake, and women may also restrict their water intake during the day because of lack of convenient and private places for urination. For children drinking too much water is considered to be harmful. Children with diarrhoea are not given extra water to drink, or no water at all, for fear of intensifying the diarrhoea. The addition of health education to all projects is recommended to strengthen positive practices and to correct negative practices. Observations indicated that time gains from water projects are used by women for social activities; but it is not clear whether these observations were carried out systematically.

- A4. Bissiliat, Jeanne (1978). The role of women in the Onchocerciasis programme area. Rome, Italy, FAO.

Women in the Volta river basin area in West Africa make substantial contributions to the income and living conditions of their households. An evaluation in three areas showed that their participation in educational and economic activities is affected adversely by the demands on time and energy of collecting water and grinding millet. Water supplies were not included in the plans for new settlements, or were located at a considerable distance from the villages for technical reasons or for fear of contamination. Where the customary practice of giving women land for their own use had not been followed, women have increased their livestock keeping activities to generate income. This has increased their water collection burden even more. A review of sex and age related incidence of river blindness showed high rates of infection in women and children in relation to type, time, and place of water related activities, such as bathing, clothes washing, and water collection.

- A5. Boot, Marieke (1984). Making the links: guidelines for hygiene education in community water supply and sanitation. (Occasional paper series), The Hague, The Netherlands, IRC.

These are guidelines for the development and implementation of a community-based, participatory health education programme to eliminate disease transmission risks remaining after the introduction of an improved water supply system. The booklet is for community hygiene promoters and their trainers or supervisors, but is also suitable for other village-based workers, planners and technical field staff, who aim to increase the development impact of water and sanitation projects. Topics covered include reasons for and methods of participatory health education, timing and organizing the programmes, identification of local risks of disease transmission, and the use of teaching aids. The author stresses the involvement of community women, who are the domestic managers and local experts on health behaviour and conditions, in programme planning and implementation. Practical ways to involve them in local health

discussion are suggested. However, no mention is made of evaluation as part of local programmes.

- A6. Bourque, Susan, and Warren, Kay (1981). Rural women and development planning in Peru. in Naomi Black and Ann Baker Cottrell (eds.), *Women and world change*. Beverly Hills, California, USA, Sage Publication, 183-197.

This paper deals with the position, needs, and development of women in rural areas in Peru, and includes a case study of a public toilet initiated by women in one of the communities studied. Sanitation was a priority identified by a women's committee representing all sections of the community. Male leaders were more interested in projects that strengthened political and commercial ties with the urbanized coast. By means of raffles and income-generating activities, the women collected the necessary funds, and in spite of male opposition, acquired a communal latrine as a first step to the desired sewerage system.

- A7. Clinard, Marshall (1966). *Slums and community development: experiments in self-help*. New York, USA, The Free Press.

As part of a more general study of urban community development, a detailed case study is presented of a project in New Delhi, India. The project was started with a sociological survey in six pilot areas, which also served to train field staff. Teams of one male and one female worker were assigned to areas covering 200 to 600 families. Men and women heads of household were interviewed separately to assess needs, to identify local leadership and opposition, and to collect some specified socio-economic data for project planning. A female head of household was defined as the mother of the children and not the mother-in-law. Because the latter are the traditional heads, they were treated courteously or interviewed for appearances only. Community organization for project involvement started with meetings at the lowest neighbourhood level (*katras*, streets or blocks of 15-100 families) which form a natural unit. This facilitated participation of the poorest sections and of women. Two meetings were held, a mixed meeting and a separate meeting of women. Each meeting discussed the functions of a community development committee (*vikas mandal*) at the next level (250-400 families) and elected a man representative to this committee, and a woman to a separate women's organization. Two or three members of the women's organization were elected to the *vikas mandal* as ex-officio members. Committees at the neighbourhood level (1500-4000 families) comprised two men representatives of each *vikas mandal* and one woman representative of each women's group. Special measures were taken to facilitate meeting attendance by women. Area-level training of male and female representatives included discussion of the role of women-in-development. In addition, separate area meetings were held to bring women representatives of local groups together for discussion of common issues and for training.

Health and environmental sanitation improvements were the second highest need expressed by the survey respondents. Projects with these objectives carried out by 31 development committees had the highest level of participation (30.5%). Activities included the installation of additional water taps, drainage gutters, repair and

improvement of latrine blocks, and bathing enclosures. Residents also designed better tap platforms, children's latrines and drains with one high side to discourage children defaecating in them. The women's organizations organized health classes and were active in stimulating sanitation improvements for which each development committee set up a subcommittee. All group activities, whether literacy classes, child care, or discussion of community hygiene, contributed to a new self-image for Indian slum women, who were actively involved in bringing about changes in their community. Although they are illiterate, tradition-bound, and burdened with young children, these women were more likely to work for social change than the men, who were more skeptical and divided by local politics.

- A8. Dworkin, Daniel, and Pillsbury, Barbara, and Thatsanathep, Thira (1980). *The potable water project in rural Thailand. (Project impact evaluation, no. 3)*, Washington DC, USA, USAID.

A multi-disciplinary team evaluated a random sample of 52 out of 212 piped water systems installed in rural communities in Thailand. The systems serve 133 villages with an estimated total population of 100,000. At each site, standardized interviews were held with the system operator, village headman, and leaders, and with an unspecified number of villagers including women. Of the systems visited, only seven were not functioning. An evaluation in 1972, revealed that 11 out of 22 systems were not functioning. The present effectiveness has been attributed largely to the continued high quality support and supervision, especially the monthly visits of agency staff. In most cases, problems appeared to be due to underestimation of the importance of community participation and management training, than to technical short-comings. Of the 35 systems for which financial data were available, 31 were operating at a profit. A contributing factor was that public taps were eliminated in favour of metered private connections. As a result, only 40% of the systems provided water for 90 - 100% of the community, through a combination of private, shared and public taps. In the remaining communities, poor households were not being served. The users appreciated in particular the reliability, quantity and accessibility of the water, and reported considerable time savings and increased water use. In ten out of 45 villages, all households had installed or were sharing locally purchased water-seal latrines, and in 31 villages about half the households had done so. Women used the increased water availability and time gains for income-raising activities (vegetables, livestock, weaving). Reported estimates of increased income because of the water system ranged from 5 to 200%. They used part of these benefits to finance house connections. Some also stated that their earnings made it no longer necessary for their husbands to seek temporary employment in the city in times of drought and rice crop failure. However in 14 communities, some or all users rejected piped water for drinking, because of the taste. Failure of village-level maintenance in an earlier hand-pump programme is ascribed to lack of awareness of project staff that improvements replace existing sources and therefore should be perceived by the users as providing better service in terms of improved quality, increased quantity, or greater convenience. The authors stress the need for more specific procedures for community involvement.

- A9. Elmendorf, Mary, and Isely, Raymond (1981). The role of women as participants and beneficiaries in water supply and sanitation programs. (Technical report, no.11), Arlington, USA, WASH.

On the basis of an extensive literature survey, the roles of women in water supply and sanitation are identified as acceptors, users, managers, and change agents. These imply that technical agencies must involve women in local planning and provide health education and training, including productive use of waste water and excreta. Women staff should be involved and local women's organizations strengthened. In most cases, local educational materials and direct two-way communication need to be used. Women are suitable candidates for training in water supply management. This implies that they should be included in training programmes and also trained as trainers. As promoters of change in behaviour, women largely determine the impact of a project on health and development, and their roles must be taken into account in evaluation.

- A10. Fernando, Vijita (1982). Cooperating with non-governmental groups: a lavatory without walls. paper presented at the UNDP/NGO Water Decade consultation meeting.

Fear of the dark interior and falling into the hole and mothers' fear of snake bites and falling into unprotected water sources, have prevented young children using outside latrines in rural communities in Sri Lanka. Made aware of this problem at a training workshop, a male village leader requested an adapted latrine design for children. Initial designs were found to be unsuitable. On the insistence of the villagers, an improved design was developed and installed near the kitchens so that mothers could train and supervise their children more easily. The project is now being extended to other villages.

- A11. Glasgow, Muriel (1983). Rural water supply project of Surigao City, the Philippines: a project initiated by women. New York, USA, UNICEF. (adapted from Abdul Awal and Mary Ann Mgalipan, Interim project report of UNICEF-assisted rural water supply project in Surigao.)

On the initiative of mothers' clubs, 53 communities in rural and urban fringe areas were provided with gravity flow water supplies. Started as classes for mothers, the clubs soon began basic service and income-generating projects. They petitioned for and contributed to government water supply services, with cash, catering for voluntary labour, and motivating labour and cash contributions from their husbands, to the value of 14% of the capital cost. Their traditional knowledge was used to select suitable water sources and the shortest routes for pipelines, thus resulting in increased cost-efficiency and more communities being served. All systems except one are functioning satisfactorily, but community management systems are needed for local maintenance, source protection, and equitable distribution of water. The projects have reduced greatly collection time and effort, and stimulated latrine construction, vegetable gardening, village beautification, and personal hygiene improvements, but no quantitative data have been given. Local

sanitation groups receive technical guidance from sanitary inspectors. Husbands and male leaders are involved actively by the clubs.

- A12. Gosling, David (1975). Housing case study in Brazil: Vila 31 de Marco, Belo Horizonte. *Architectural design*, **1**, 38-41.

Conflicts about the establishment of *favela* 31 de Marco in Belo Horizonte, Brazil, led to a feeling of solidarity and to the formation of a legally constituted "Cooperative for the provision of services to 31 de Marco". The cooperative had no executive and decisions were taken jointly by the inhabitants. Lack of water, light and sewerage were serious problems, but the 350 households gave priority to a primary school as being more fundamental to the development of both children and adults. The women and children worked on the site during the day and the men by night. A local girl who had just graduated was the voluntary teacher, until the school was recognized by the state education system. This stimulated the *favela* to set up a primary health care system. However, its pharmacy was closed by the the Public Health Department because it did not meet public health standards. The cooperative decided that the basic problem was not the pharmacy but environmental sanitation in the *favela* itself. They obtained an expansion of the city sewerage network and established their own piped water supply. Because most women were washer women, the cooperative constituted a union and established a laundromat with automatic machines. Each woman paid a small amount per load to cover electricity and maintenance costs. The medical post was reinstalled, and vocational training courses for girls and adult literary courses established. An aid fund was established to assist the poorest households and also for emergencies.

- A13. Hale, S.M. (1977). Women and rural development programmes in India: problems of information flow. *Eastern anthropologist*, **30**, 4, 407-417.

This is a report of a study in five villages in which both general projects including sanitation and women's programmes were carried out. Most development programmes have reached men only, in spite of their relevance to women also. In practice, women had no access to integrated clubs and general meetings. Poor women were doubly disadvantaged because social and practical constraints also prevented participation of their husbands. Women from leading factions and high income households dominated the women's clubs. Permission of the headman for the clubs was withheld if meetings conflicted with his desire for seclusion of the women in his own household. Factors reinforcing elite and factional participation were the houses selected for meetings and the diffusion of invitations through male relatives. Training concerned household chores (hygiene, child care, vegetable gardening) which are seldom done by elite women. The women from lower classes, who participated least in the programmes, had the highest need for development information and the greatest freedom and opportunities to communicate with both women and men.

- A14. Hannan Andersson, Carolyn (1984). Development of water supplies in Singida Region, Tanzania: the realities for village women. (Research report,

no. 63), Dar es Salaam, Tanzania, University of Dar es Salaam, Institute for Resource Assessment.

This report reviews the position and work of women in Singida Region, Tanzania, and summarizes experience with an earlier integrated development programme in which women were involved as both target group and field-workers. The main reason for the limited impact of the project was the lack of real dialogue between staff and villagers. In more recent water projects, women have not been involved except as voluntary labourers. A survey in three villages showed that only 14% used new water points because of non-functioning and distance. In spite of health education, environmental health knowledge was found to be incomplete and many unhygienic behaviour patterns were identified. Detailed recommendations are given on how to involve women in the region in planning and maintenance. More participatory health education and improvement of traditional sources together with the construction of new facilities are recommended for a greater health impact.

- A15. Harkness, Rose Mae (1983). Village women, water and development: an evaluative study of the Upper Region Water Supply Project in Bolgatanga District, Ghana. (M A thesis), Ottawa, Canada, Carleton University.

A total of 2,500 hand-pump wells are being constructed to improve health, to increase agricultural productivity, and to reduce the workload of women. Because the traditional roles of women in water (site selection, equipment, transport, use) were not recognized, men have acquired training and skills in some of these areas. Opposition to training women is based on social not technical criteria. An evaluation in seven villages showed that, in spite of a recommendation by a review team, women are rarely involved in decision-making, health education, and local management. Many do not use the pumps in the wet season. Construction of additional bathing facilities near some pumps would help to increase water use and to reduce the heavy work of collecting water. The women reported considerable time savings in the dry season, which were used for home care, food preparation, and agricultural work. The greater availability of water facilitated plastering of floors and walls, which is a dry season activity. Mothers also said that children bathed more regularly and had more leisure time to play. Dry season gardening demands more inputs, such as seeds and fertilizer.

- A16. Hemmings Gapihan, Grace (1979). Baseline study for socio-economic evaluation of Tangaye solar installation. in Irene Tinker (ed.), Women and development: final report of a workshop, 26-27 March 1979. Washington DC, USA, AAAS.

The study revealed a shortage of water in the dry season. Monopolization of the few permanent wells by herders forced the women to collect water very early in the day, walking in total 14 km. Water collection and food processing, including brewing, took 60% of their working day. In the rainy season, water was collected from rain-water pools, thus allowing more time to be spent on agricultural work and on cooking meals more frequently to replenish energy for cultivation work. In addition,

the taste of the pond water was preferred and the calcium deposits were considered to make the water healthier. The proposed solar pump will benefit the cattle owners mostly, but may leave more traditional wells for the use of women. A share-holding company for the solar pump and training of permanently settled villagers including women for maintenance have been proposed.

- A17. Ho Yoon, Ju, and Bong Hyun, Jo (1979). Cattle project, Hakding Unit, Dusan Village, Kangwan Province, Republic of Korea. in *Learning from rural women: village-level success cases of rural women's group income-raising activities*. Bangkok, Thailand, UN Economic and Social Commission for Asia and the Pacific; Rome, Italy, FAO, 1-14.

With the help of a community development worker, the locally initiated women's club began income-raising activities, including communal land-labour, a rice-saving fund, and selling compost. Initial opposition of male leaders and husbands was overcome by inviting them to a dinner and lecture on community development. To facilitate women's work, a child care centre was established. The club's income was spent on improvements to kitchens, homes and wells, and the men assisted with construction. A piped water project was completed in 1976, but the report does not mention how the women were involved. The club has cooperated with other clubs in the area, helping to extend the project to 11 more villages.

- A18. Kelles Viitanen, Anita (1983). *Water and wells: symbols of prestige, power and prosperity in a Sinhalese village*. Helsinki, Finland, Ministry for Foreign Affairs; Helsinki, Finland, Institute of Development Studies.

In this case study on traditional water sources and hand-pump wells in a rural community in Sri Lanka, women were found to use different traditional sources for different purposes. They empty, clean and repair shared open wells, even though officially this is a man's task. Siting, use and management of traditional water sources are based on practical knowledge and religious rituals. In the hand-pump project, no attention was paid to these socio-cultural aspects, and poorer sections of the community were not served. Half of the pumps were not used because of difficult access or dislike of the taste of the water. Because the women were not involved in the project, they have transferred age-old rituals and maintenance practices to the hand pumps which has reduced their efficiency. Although women were represented on the local council through their organization, they were not represented on the higher level project committee which makes all decisions. The authorities did not consider women for pump caretakers, because they considered preventive maintenance to be too technical.

- A19. Luz Alvares, M. de la, et al (1992). *Evaluación del trabajo social a nivel comunitario: una experiencia metologica*. *Revista de Trabajo Social*, 37, 40-46.

One of the main problems with community participation in water supply and sanitation programmes is the lack of training and expertise in local management.

This article evaluates the work in 21 problem communities of five female social workers seconded to the national rural water supply programme in Chile. Objectives were solving problems in acquisition of land and rights of way; increased community coverage; leadership training for more voluntary contributions to construction; formation of local management boards and training of their members in finance and administrative skills. No mention is made of community involvement in local planning and decision-making. At the end of the seven-month support programme, 80% of the problems in communities with ongoing construction programmes had been solved, and two-thirds of the problems in the post-construction villages. Five of the 13 water boards had solved all problems, the others had solved on average three out of five problems. Reference to the participation of women is limited to the use of female trainers with social science skills.

- A20. Mauluka, Linda (1983). Community participation in the construction and maintenance of rural groundwater supplies in Malawi. in Malin Falkenmark and Jan Lundqvist (eds.), *Water for all: cooperation, education, participation: report from an international seminar*. Linköping, Sweden, University of Linköping, Department of Water in Environment and Society, 162-180.

Large numbers of dispersed hand pumps, difficult access, and high costs, have impeded effective maintenance in the Malawi groundwater programme. A new low-cost design for 25,000 hand pumps is more appropriate for village-level maintenance. To enhance feelings of ownership, and proper use and maintenance, communities now participate in siting, contribute labour and materials, and form management committees at both village and well level. The programme favours women as voluntary pump caretakers because of their personal interest in a reliable water supply. Opposition has come from some village headmen, but examples set by more progressive headmen have helped. A survey showed that more than 80% of women felt that women could be trained in hand-pump maintenance. Courses are held at village level. To date 90 pump caretakers have been trained, both men and women. Male volunteers have been trained for more advanced area-level repair tasks. On their own initiative, women have attended these training sessions as observers, in order to be able to check the quality of higher level repairs.

- A21. Mbere, Nomtuse (1983). Socio-economic aspects of low-cost sanitation: the Botswana experience. paper presented at the international seminar on human waste management for low-income settlements, 17-22 January 1983, Bangkok, Thailand.

In a pilot project in four low-income urban and six rural communities in Botswana, various types of latrines have been introduced for field-testing. Motivation and health education were given by men and women health staff. The community was involved through general assemblies, meetings with leaders, and home visits. A sociological survey revealed a high felt need for private flush or improved pit latrines, a good health awareness, and several socio-cultural design criteria for

latrine use by men, women and children. These included a short distance to a water point, raised seat, lack of visibility of use from ventilation openings under doors and from carrying water for flushing and cleaning. Existing latrines were not used by men for urination for fear of filling up the pit too quickly, and by children for fear of falling into the hole or problems with fouling the seat. More than 90% of the latrines were cleaned by women. In the rural areas, households formed work teams to dig the pits. Because only 3% could afford the cost of the latrines, a 75% subsidy was given. Evaluation showed that women wanted washing facilities near the latrines for reasons of culture, convenience, and health. Households preferred their latrines to be located at some distance from the house, but if too far away, they are not used at night and in the rainy season. Compost-making procedures in double vault composting latrines installed in urban pilot areas have not been followed in spite of an intensive education campaign, thus mechanical emptying at the cost of the households is planned.

- A22. Mc Sweeney, Brenda, and Freedman, Marion (1980). Lack of time as an obstacle to women's education: the case of Upper Volta. *Comparative Educational Review*, June, 124-129.

In an evaluation of women's work using time-budget studies in one project village and one control village out of a total of twelve project villages in Bourkina Faso (formerly Upper Volta), women were found to spend twice as much time as men on economic activities. Men spend most of the remaining time on personal needs, leisure, and to a lesser extent, on community activities. For women, the most time consuming task was grain milling, followed by water collection. Time savings as a result of the introduction of wells, grain mills, and donkey carts in the project village have been used for household tasks, child care, economic activities, and rest. Attendance of adult education classes in the project village was three times higher than in the control village. School attendance of girls was not significantly different in either village, but data do not include age-specific breakdown. Half of the women in the project village had made household water filters, promoted by traditional midwives who had received special training. Reasons advanced for non-adoption of water filters were lack of knowledge, money for pots, and time. Latrine construction was not successful, mostly because the men were not involved.

- A23. Meehan, Robert, and Viveros Long, Anamaria (1982). Panama rural water. (Project impact evaluation, no. 22), Washington DC, USA, USAID.

The team visited 26 communities randomly selected from a total of 562. Two or three women were interviewed in each community. All communities had at least one woman on the water subcommittee of the community health committee. Women often initiated projects and participated in construction by carrying sand and preparing food. The total community contribution to construction cost was 20%. Women also have important roles in maintenance. In several communities with fee collection problems, women have emerged as local leaders and collected water fees. Although unauthorized, much water has been used for small livestock and vegetable gardening thus leading to shortages. The projects have led to reported reduction in time and effort in water collection and sometimes have reduced risks to the safety

of children. Time savings were reported to be used for child care, household management, income-generating activities, and rest.

- A24. Mitra, Aloka (1984). Water, sanitation and rural women, a case study on rural women in West Bengal, India. paper presented at the 10th WEDC conference on water and sanitation in Asia and the Pacific, Singapore, 28-31 August 1984. Loughborough, UK, University of Technology.

Community participation including the involvement of women, was achieved in a rural water supply project in five villages through contacts and cooperation with local administrative bodies; general meetings to which all village categories were invited; the involvement of active village workers including women in local project management; separate house visits and discussions with women by female workers; and a vocational training, health and income-generation component for women. The need expressed by women for adequate water and latrines helped to make the project a community felt need. No details have been included on subjects of community communication and consultation, and on maintenance and management arrangements after completion.

- A25. Msukwa, Louis, and Kandoole, B.F (1981). Water by the people: an evaluation of the rural water supply programme in Zomba district. Zomba, Malawi, University of Malawi, Centre of Social Research.

A household survey was carried out in two areas in Zomba, Malawi, as a pilot study for an integrated programme evaluation. In Zomba-East, where piped gravity systems have been installed with community participation in construction and maintenance, a stratified sample was drawn of six areas. In each area, six taps were selected, at the beginning, middle, and end of a line. At each tap, men and women from ten households at increasing distance from the taps were interviewed. In Zomba-South, a random sample was drawn from six areas, and ten households using protected wells, boreholes or rivers were interviewed. Five of these areas will eventually also be served by gravity systems. The survey showed that women and girls are the main water collectors, men only collect water for commercial purposes. The amount of water collected increased with decreasing distance of the household from the source. The maximum acceptable distance to a tap was about one mile. From the sampling method used, it is not clear how many households do not use the taps. Use of water for economic purposes has been prohibited by some headmen, although project staff have only discouraged water use at the tap itself. As a result, 60% of the capacity of the water supplies was not used. The ban on washing and bathing at the tap has forced women to continue using bilharzia-infested water. User committees are responsible for tap hygiene, but most of the work is done by individual women. All sites were observed to be well kept. At boreholes, where women were not involved, hygiene was poor. Higher level committees formed by male authorities have failed in two-way communication with the users. It is concluded that there is no real participation in management because of insufficient involvement in decision-making on water use, committee membership and tasks. Project impact on quantity of water and time gains was reported to be small, but more than half of the women interviewed considered tap water to be healthier.

- A26. Mustafa, Asha (1981). Women and water in western Kordofan. in Diana Baxter (ed.), *Women and the environment in the Sudan, proceedings of the workshop on women and the environment, Khartoum, Sudan, 4-7 April 1981*. Khartoum, Sudan, University of Khartoum, Institute for Environmental studies, 67-69.

This case study in a village in central Sudan showed that while the men moved with the main herds in search of water and pasture or migrated to hill agricultural schemes, the women remained as subsistence farmers. Occasionally, they migrated to urban centres where water was available. Improved water supplies with cattle watering facilities in the area have benefited mainly the men, who have increased their income from cattle sales. Cash earnings of women from dairying and goat raising have not benefited from improved water supplies, and the absence of the men has increased their workload at home.

- A27. Nelson, Nici (1980). *L'importance de l'eau pour les femmes africaines vivant dans un bidonville: le cas de Mathare Valley, Faubourg de Nairobi, Kenya*. *Revue Tiers Monde*, 21, 84, 863-869.

This case study indicates the unifying and mobilizing effect of lack of water on women in an urban squatter area in Nairobi, Kenya. The motivating factors were arduous water collection, poor hygiene conditions and strong pressures for personal cleanliness in urban areas, and the economic importance of water. Beer brewing was the main source of income for households headed by women, which constituted 60% of households. United in an informal network, the women through women party officials, succeeded in obtaining permission for an extension of the city water supply. By picking coffee and cleaning streets, they helped to finance the construction work. Local administration, including fee collection, for the public standposts is organized by the local women's branch of the national party. Profits have been used for youth activities.

- A28. Participatory Research Group (1980). *Users making choices in a fragile environment, Canada*. in Robert Mitchell (ed.), *Experiences in appropriate technology*. Ottawa, Canada, Canadian Hunger Foundation, 47-58.

Exclusion of the Indian population from a water and sewerage project, damage to a local graveyard, and threats to their livelihood because of pollution of the local lake by raw sewage, prompted the all-male council to propose an alternative water and sanitation system to serve the whole population. The involvement of a local woman in an orientation visit to a comparable project and feedback by means of photographs led to suggestions from other women for modifications in design of the hand-pump project. These concerned water use for clothes washing and cooking, and a composting latrine in addition to the pit latrines selected for trial by the male councillors. The problem of pollution of the lake by the sewerage system remains to be solved.

- A29. Popkin, Barry (1980). Time allocation of the mother and child nutrition. *Ecology of Food and Nutrition*, 9, 1-14.

A study in 34 rural communities showed that income and also nutritional value of daily food supplies were considerably higher in households in which the women had paid work outside the household. However, this led to reduction in time spent in child care of more than three hours per week. Older siblings took over the care of young children, which resulted in significantly lower nutritional status of these children. An improved water supply would reduce women's work in the villages concerned by more than two hours a week. Observations and recall data on time use showed that households with a private connection to a piped water system spent 8.4 minutes per day to collect water as opposed to 27.4 minutes per day for those without connection. The presence of a piped water supply was found to be positively but not significantly related to weight-for-age of preschool children, but not with height-for-age. However, the study did not report the number and socio-economic status of women who had access to piped water, and how this affected child care.

- A30. Posso Bejarano, Cecilia (1974). Estado de la educación sanitaria dentro del programa nacional de saneamiento básico: resultados de una investigación. Bogotá, Colombia, Instituto Nacional de Programas Especiales de Salud, División de Saneamiento Básico, Sección de Promoción.

Community participation, water use patterns and environmental health knowledge were evaluated as part of the national rural water supply programme in Colombia. The sample consisted of 40 villages in two sections of three zones, one with a high level and the other with a low level of community participation. In each community, five interviews were held with households who participated in the projects. Non-participants were not interviewed. The interviews revealed that often village planning meetings were not attended by the women because they were not informed about them. Most frequently recalled topics of the meetings were community obligations. In community education, emphasis has been on one-way information rather than two-way discussion. Traditional water sources were still used for drinking and cooking, mainly because of preference for the taste and quality perceptions. The women had some but inadequate knowledge of water related diseases. Improvements installed by households with yard connections included laundry facilities (44%), water storage reservoirs (36%), water-seal latrines (39%), bath or shower (33%), kitchen sink (20%), and hand basin (11%). Health education is recommended for inclusion in all water projects, also more direct communication between project field staff and the users, both individually and in small groups.

- A31. Roark, Paula Donnelly (1984). Women and water. in Peter Bourne (ed.), *Water and sanitation: economic and sociological perspectives*. Orlando, Florida, USA, Academic Press, 49-68.

Two case studies illustrate the roles of women as beneficiaries and active participants in rural water supply projects. As domestic managers, women in a dry area in Somalia adapted water use to its availability and accessibility. In the rainy

season, they made two trips per day, spending two hours in water collection. Water use was 15 litres per capita per day (l/c/d). Babies were bathed daily, utensils and clothes washed regularly, and two meals prepared per day. In the dry season, the women by consensus of the community and led by the water committee, gradually reduced the amounts collected to 10 l/c/d. At the end of the dry season, water was collected by camel or on foot from wells 10 km away, thus taking a further two hours. The women then reduced all washing and bathing, and cooked only one meal per day. Mothers also had less milk for breast-feeding.

Consultation on water use patterns as part of a hand-pump project in south-west Bourkina Faso revealed the roles of women in decision-making and public management. Two meetings were held which differed in style and information presented. At the first meeting, chiefs and elders pledged support for the project in long speeches. At the second meeting with women only, they discussed among themselves the issues raised and then provided collective and detailed answers on patterns of water use and source selection. In the dry season, women went slightly further to a source of a perceived better quality. Also, they dug wells next to a pond to obtain filtered water for drinking. In the wet season when agricultural work has the highest priority, the nearest source was used. The women made it clear that they would test the hand pumps for reliability, access, and quantity as conditions for continued use and maintenance. Both men and women originally ascribed maintenance responsibilities to the chief and elders. Discussions with the women on how maintenance was carried out elicited more information than questions on who was responsible. They revealed that in practice, the decision as to whether a new water source was needed was made at a women's meeting. A spokeswoman then approached the council for action, either directly or through a male relative. Decisions on maintenance were made in the same way and were carried out by the women, or were put before the council for action. In health education, women should be involved not as passive target groups but as the active controllers and purveyors of local learning on water, health, and sanitation. If communities and women are to continue to manage their own water supplies, and water and sanitation behaviour, they should be permitted to make informed decisions on local project design and health education. When made aware of the health improvements that can be achieved from increasing water use from 10 to 20 litres per person per day, a village in a dry area, for instance, may prefer a reliable open well at a short distance to a less reliable borehole with hand or diesel pump.

The author points out that it is unrealistic to expect communities to maintain improved water sources and to change long-established health behaviour, if they are not given the necessary information and freedom to make reasoned choices in the planning phase.

- A32. Schminck, Marianne. Community management of waste recycling: the SIRDO. (Seeds), New York, USA, Population Council. (forthcoming)

Two case studies are presented of the involvement of women in management of low-cost urban waste disposal and water supply. The women operate, maintain, and manage a small community plant which recycles sewage, grey water, and organic refuse. The plant is operated on a rotational basis and supervised by an elected and trained women's committee. This committee has also employed a widow and her son for daily maintenance. Compost and purified water are used for growing vegetables

and the surplus compost is marketed. Off-spins have included the construction of a children's playground and buying food wholesale. The women have given feedback for design improvements and have been involved as trainers in a second area. Here, the local women had already improved the poorly functioning water supply, by collecting funds for maintenance and arrears in water fees, and by establishing an advisory committee to improve the functioning of the local water board.

- A33. Schoeffel, Penelope (1982). Dilemmas of modernization in primary health care in Western Samoa. paper presented at the American Anthropological Society meeting on anthropology and the delivery of primary health care, Washington DC, USA, 4-7 December 1982.

In the 1930s, medical staff involved traditional women's organizations in preventive health. Subcommittees of women effectively organized refuse collection, housing and latrine inspection, and supervised the use of traditional water sources. They also organized monthly health clinics and raised funds for construction and maintenance of piped water supplies. They were guided and taught by older public health nurses of respected status who were well versed in the local culture. With the formal introduction of primary health care, responsibility for water and sanitation was taken over by male health inspectors, village mayors, and young nurses. As a result, the women volunteers lost their motivation. Health cost and problems (filariasis, malnutrition) have increased. The author recommends that the involvement of women's organizations be revived and recognized through training and appropriate reward from the authorities.

- A34. Service d'Education et de la Participation de la Femme au Développement (1980). Rapport Annuel. Ouagadougou, République de Haute Volta, Ministère des Affaires Sociales et de la Condition Feminine.

The service was established in 1978 as result of a UNESCO pilot project. It carries out a national programme of non-formal education, health and village technology in 117 villages [out of about 7,000]. In total, 68 women extension workers and one or two women volunteers in each village are involved. The programme includes the construction of wells and the introduction of donkey carts and flour mills to make time available for education and income-generating activities. Lack of involvement of women in maintenance and management of communal facilities has resulted in earlier failure. Women's committees have now been formed, and women contribute 20% of initial costs. A period of one year is too short to determine whether results are positive. Lack of technical assistance has resulted in the construction of only two permanent wells; the other 40 wells dry up in the dry season. In 1980, the service promoted the construction of 187 latrines and trained women to make their own household water filters from clay pots. The Rural Water Supply Service is not listed under the collaborating institutions of the project.

- A35. Seslar Svendsen, Dian, and Wijetilleke, Sujatha (1983). Navamaga, training activities for group building, health and income generation. Colombo, Sri

Lanka, Women's Bureau; Washington DC, USA, Overseas Education Fund.

This manual was used initially to train more than 90 men and women staff for increased involvement of women in rural development activities. In turn, each trainer trained the leaders of local women's groups in three villages. The manual emphasizes learning-by-doing; joint assessment of priority needs; project identification; resource assessment; and project planning and implementation. Much attention is also paid to exercises for leadership development, group development, and communication. Topics covered on environmental sanitation and health include survey of village health needs; prevention of water and sanitation related diseases (general); planning a village improvement project in sanitation; oral rehydration treatment; and the economic use of domestic water.

- A36. Shafiuddin, and Bachman, Sally (1983). Vietnamese latrines at Gonoshasthaya Kendra. paper presented at the international seminar on human waste management for low-income settlements, Bangkok, Thailand, 17-22 January 1983.

Existing excreta disposal facilities ("overhung latrines"), and practices (field disposal) have been adapted to the local environment and culture. Women have the greatest problems because of lack of privacy and constipation caused by training to control bowel movements during the day. Socio-cultural incentives to install water-seal latrines are privacy for women and increased status. Constraints are cost, lack of health awareness, increased demands on water collection, tabus on being seen entering a latrine or carrying water for flushing, men and women sharing latrines, and smells caused by lack of understanding about the functioning of water-seal latrines (unflushed latrines, broken water-seals). An experiment to introduce communal dry composting latrines was unsuccessful because of the inconvenience and complexity of use, and bad odours. Household latrines were more successfully operated and maintained. Re-use of the waste was no problem, but helminths were still found to be present, probably because of existing water use habits. Problems in large-scale adoption are the high cost, accessibility for the poor, and maintenance.

- A37. SIDA (1982). Plan of operation, Dodota Water Supply Project for women. Addis Ababa, Ethiopia, SIDA.

Under the auspices of the national women's organization (REWA) and as part of a regional development project, a gravity water supply to serve 56,000 people is being constructed. The work is being supervised by an engineer from the national water agency. Women, through their local level organizations have been trained for active participation in the project through courses in home economics (including hygiene, housing improvements, and child care), operation and maintenance (including pipe fittings, and workshop technologies), administration and management, and accounting. All trainees follow the home economics course and then specialize in one area. Others follow courses for income generation, including

irrigated vegetable gardening and livestock raising. A study is to be carried out to evaluate the socio-economic effects.

- A38. Simpson Hébert, Mayling (1983). *Methods for gathering socio-cultural data for water supply and sanitation projects.* (TAG Technical note, no. 1), New York, USA, UNDP; Washington DC, USA, World Bank.

This manual contains guidelines for engineers and social scientists to study water supply and sanitation conditions, behaviour, and attitudes in selected communities. Emphasis is placed on local women as the main source of information and the use of women researchers and interviewers, who are essential in patrilineal societies. In some cases, local people can be used. Direct consultation as a means for project adaption, and community participation in evaluation as a means for local learning and follow-up action, are not discussed.

- A39. Soon, Young Yoon (1983). *Women's garden groups: a self-help project in Casamane, Senegal.* New York, USA, UNICEF, Water and Environmental Sanitation Unit.

In the 1970s, women's garden groups became part of the Integrated Project of Agricultural Development. These groups are based on the traditional division of labour, organization and equal status of women in the area, and the felt needs and potentials identified by them. The groups are organized by men and women extension workers, with the men being trained as technical advisors, the women in nutrition education. The use of women from other areas as extension workers has reduced their effectiveness, because they seldom remained in their area of work. Profits of the groups are spent on basic needs and/or communal projects. Local men have begun to join the cooperatives, attracted by the income generation, and because they are needed to dig wells (traditionally women carry soil away). The government assists with the construction of permanent water supplies, but no mention is made of training women to maintain the facilities.

- A40. Tanzania, United Republic of, and DANIDA, and Institute of Resource Assessment and Centre for Development Studies (1983). *Water master plans for Iringa, Ruvuma and Mbeya regions, socio-economic studies: village participation in water and health, Vol. 13.* Dar es Salaam, Tanzania, Ministry of Water and Energy.

After a socio-economic study involving men and women researchers and respondents, an action research study was carried out in several ongoing piped water projects. Election of mixed water committees alone did not affect community involvement in local planning and construction. Female committee members were excluded from meetings. Closer cooperation of trained community development workers with the committees and the technical field staff and training and support of the women members by a woman worker led to equitable siting of taps, and effective management of voluntary labour. After training, the women were the most dedicated participants of the committees. To test the effectiveness of female versus

male scheme attendants, the women have elected three women out of seven attendants, in spite of male resistance. For health education, local women have chosen their opinion leaders in health for training as discussion group leaders. Discussions resulted in improvements in sanitation and the design and construction of a communal laundry and bathing facility. Involvement of men for men-specific environmental activities and of formal leaders was found to be necessary. Field experience has been summarized in project manuals for community participation and health education in piped water supply projects.

- A41. Toit, F.P. du (1980). A design for rural village water points in Zimbabwe. in *Water supply and drainage services in developing countries*. proceedings of the seminar on water supply and drainage services in developing countries, National Building Research Institute, CSIR.

An investigation of water supply systems showed that problems stemmed from lack of understanding of the cultural and social traditions surrounding water use rather than from poor engineering. Collection sites in rivers were important meeting places for women. To reduce water transport, washing and bathing were done at the source, and large vegetable gardens cultivated nearby. Behind their homesteads, the women had small herb gardens which they watered with domestic waste water. To reduce the increasing health risks from faecal contamination and from bilharzia, piped water supplies had been installed with public standpipes and with automatic taps. However, these facilities did not meet the social traditions regarding water use. Use of surface water continued and automatic taps were fixed to obtain continuous discharge. Therefore, a new water facility was designed which was adapted to the requirements of the women. It contained a small storage tank, a reservoir for washing water which filled automatically, and a tap and stand for filling buckets. The washing and bathing area was paved and partly covered to give shade at midday but permitted sunlight to penetrate the floor area in the morning and afternoon. The women preferred washing slabs at floor level. Location was determined by a combination of technical and user criteria, including a safe and easy route from the village, arable land nearby, and privacy at a short distance from the village. A prototype of the design remained unused and was named "Fred's Folly", until a bamboo screen was built around it. Thereupon it became very popular and was renamed "Fred's Fountain". The women made their own rules of use. They established an enclosed vegetable garden at the end of the drain and kept chickens which were fed on food residue washed from cooking utensils. The site was kept clean by an elderly woman. Monitoring of use showed a total water use of 60 l/c/d, of which more than half was used at the water point and disposed of as waste on the vegetable garden. The only problem experienced with maintenance was when an automatic tap was installed. It was damaged irreparably within two weeks and thus the design was adapted to the requirements of the women. The communal water facility has been used and maintained very carefully and has functioned without mechanical repair for seven years. The paper includes four drawings of the design and its use.

- A42. Tonon, Marilyn (1980). Concepts of community participation: a case of sanitary change in a Guatemalan village. *International Journal of Health Education*, 23, 4 (supplement), 1-16.

This is a village case study of a locally specific, participatory health education programme. This programme was planned jointly with an all-male Community Betterment Committee. The first felt need was to overcome the land and food shortage problem. After assistance in meeting the local food crisis, subteams of the committee organized household discussion meetings, in which about half of the households participated. After completion, each participant received a wash basin, soap and towel as reward. Women only participated as target group. The educational programme resulted in expansion of the piped water system to unserved areas, and in significant improvements, as compared with a control village, in excreta and waste disposal conditions, quantity of water used for hygiene, latrine use and maintenance, and food storage. However, after two and a half years of intensive support, continuity of the male-managed groups is still uncertain.

- A43. UNICEF (1984). The UNICEF-assisted Imo State rural drinking water and sanitation project: description and analysis of the project and its health impact evaluation. report submitted to the Executive Board. New York, USA, UNICEF.

Baseline data on five villages in Imo State, Nigeria, showed that most women spent more than five hours per day in water collection in the dry season, and that only 1% of the population used latrines. The prevalence of guinea worm infection and infant diarrhoea was high. The communities have been involved in the project through motivation, site selection for hand pumps, contribution of voluntary labour and materials, and training in construction skills. Local management committees have been formed with community leaders, both men and women. A separate sanitation team has been set up to train and supervise local masons to construct ventilated improved pit latrines. Adoption is slow because of the high cost. Local men and women have been trained as village health promoters. They are to be paid by their villages. Initially, training was found to be too oriented towards mothers only and the initial pump sites selected (schools, private) gave multiple problems with use. Stricter agency control and an appeal based on the effect on the health of children have been used to obtain more equitable location of wells. A plan for health impact evaluation is included.

- A44. Visscher, Jan Teun (1982). Rural water supply development: the Buba Tombali water project, 1978-1981. The Hague, The Netherlands, Ministry of Foreign Affairs, Directorate General for Development Cooperation; The Hague, The Netherlands, IRC; Bissau, Guinea Bissau, Ministry of Natural Resources.

This report describes the organization and results of the first phase of an integrated well construction project, consisting of dug wells with foot and hand pumps which were partly locally produced. To prepare its community participation component,

a socio-economic study was carried out on water use patterns and perceived problems. A detailed investigation of water use patterns was carried out in a subsample representing various types of communities. The study showed that women applied different criteria to water used for different purposes, and that considerable differences existed in perceived problems and priorities, social organization, and water culture. Experience with non-use of hand pumps in another area also showed the importance of involving the community, especially the women, in the project. A team of one male and one female promoter consulted the villagers before site survey and construction took place. After construction, visits were continued to organize local maintenance and health education and to establish vegetable gardens near the wells. The number of hand-pump wells installed depended on the size of the community. A community could opt for two wells with a rope and bucket instead of one hand-pump well. This reduced problems of accessibility and reliability of operation, but increased problems of quality, although bacteriological tests showed that bucket wells were less contaminated than traditional wells. Rehabilitation of existing wells was discontinued because they did not contribute to improvement of the situation. Recharge problems continued after deepening, quality sometimes deteriorated, and the number of wells was not increased. For maintenance, the community selected a team consisting of a man responsible for the technical tasks and a woman for upkeep of hygiene.

Evaluation of the first projects resulted in adaptation of procedures, including fewer but longer visits by the promotional team, contact with women at their places of work, and an earlier initial evaluation visit. Factors related to a lack of interest of the women in health education were lack of time, and a too theoretical and instructional approach. As a result, the promoters were considered to be arrogant. Thus health education was replaced by joint activities such as, making laundry facilities and vegetable gardens at the well, and preparing more nutritious meals. The promoters also sold soap and vegetable seed. The new approach resulted in better support for the project. However, local disease transmission risks have not been addressed systematically.

Role playing and field visits were the most effective methods in training women promoters. Extra time and effort were needed to give them sufficient confidence to participate on equal terms. The cost of the social activation work including expatriates and development work amounted to 17% of the cost per well.

- A45. Wellin, Edward (1982). Socio-cultural impact of water on far highland communities in Peru. (excerpt from AID Evaluation). Washington DC, USA, USAID.

Using women and men interviewers, a survey was carried out of local authorities and women users in 27 rural communities. The women were found to be more knowledgeable than the local water boards about the water supply. The strongest felt need for water for men was for economic purposes and for women, domestic purposes. No details have been given about the involvement of women in design, construction, and management. Emphasis on community involvement was on voluntary labour; consultation in planning was minimal. Main problems reported were leadership rivalries and inadequate service due to design mistakes, village expansion, and high fuel cost. Male operators did not operate the supplies regularly and some indicated they wanted more training for jobs outside the community.

Almost 80% of women used other water sources in addition to the taps. Problems in functioning reinforced non-payment of fees and a high turnover of water boards. The water agency was always willing to give technical support, but lacked training and expertise in community organization and management. A substudy on excreta disposal conditions and attitudes covering 27% of the household sample showed that privacy and convenience for women, and status considerations were the main reasons to install the pit latrines supplied at cost price by the Ministry of Health. Major perceived problems were cost, labour for digging, lack of space, odours, flies and resistance to accumulation of human excreta in one place. Maintenance and use of latrines were not investigated, but all school latrines were found to be badly soiled.

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