GENDER AND SUSTAINABLE ENERGY

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Contents

News from the Editors 1

Letter to ENERGIA 3

News from the Secretariat 4

Networking Around the World 5

Internet Resources 6

Meeting ENERGIA members 7
Shri Ram Naik

International Programmes: Focus on... WHO Initiative on Household Energy, Fuel Poverty and the Indoor Environment 8

Gender Differences in the Impact of Biomass Fuel on Health 10
Prepared by Yasmin von Schirnding

Gendered Sights and Health Issues in the Paradigm of Biofuel in Sri Lanka 12
Anoja Wickramasinghe

Health Implications for Women and Children of Wood Fuel Use in Cambodia 14
Dara Moeung

Solar Disinfection of Water in Latin America Benefits Women and their Families 16
Ana Choque Salas and Xiomara del Rosario Torres

Rural Electrification Benefits Women's Health, Income and Status in Tunisia 18
Sawsen Chaieb and Ahmed Ounalli

Rural Electrification in South Africa: Implications for the Health and Quality of Life of Women 20
Angela Mathee and Thea de Wet

Bulletin Board 22

Next Issue 24

A wide range of interventions such as improved stoves and cleaner fuels can reduce the impacts on health. The photograph shows a mother and her child tending a fire in the Northern Province of South Africa. (Photo: Courtesy of Angela Mathee)

News from the Editors

Gender, Energy and Health

The energy supply and use system has many implications for health through its links with the household economy, the indoor environment (e.g. indoor air pollution), women's activities, education, child safety, and other aspects including the local and global environment. Until now, the principal health issue that has been addressed in the energy sector in developing countries is indoor air pollution due to smoke from cooking using traditional biomass fuels.

WHO estimates that around three million deaths occur each year in developing countries related to indoor air pollution from domestic fuels used for cooking and heating. Combustion of traditional biomass fuels (wood, charcoal, animal dung, crop wastes) and coal exposes the rural and urban poor in developing countries to serious health hazards. Typically burned on open fires or in low efficiency stoves with inadequate ventilation, large numbers of people are exposed on a daily basis to

harmful emissions and other health risks. Indoor use of these fuels leads to levels of indoor air pollution many times higher than acceptable international ambient air quality standards.

Research suggests that this may result in a two- to five-fold increase in acute lower respiratory infections during childhood. Increased risks have also been demonstrated for chronic respiratory diseases and lung cancer, mainly in China, and particularly in women. This issue of **ENERGIA News** highlights work which is underway to address these problems, both at the international level (see for example the article on the WHO programme, as well as the information on World Bank activities, and recent initiatives by the Shell Foundation for Sustainable Development, reported in the Internet Resources and the Bulletin Board sections), and at the country level.

It has largely been taken for granted that the work on the health impacts of biomass, especially in relation to the incidence of acute respiratory infections, automatically addresses women's needs since they are the principal cooks and users of traditional fuels. However it is becoming increasingly apparent that there are gender differences in exposures and gender issues in measurement, as well as other potential gender issues in relation to indoor air pollution that may make a significant difference both in diagnosis and interventions.

Here we highlight findings, some preliminary, of work being conducted in South Africa, Kenya and India regarding the health impacts of biomass combustion. Gender differentials highlighted in these articles reveal that in parts of India there may be a greater effect on the health of boys and men, than on women and girls. This difference may be artefactual however, and several hypotheses are suggested to explain this surprising result. In rural Kenya on the other hand, recently published work in The Lancet reveals that women are more likely to be diagnosed with acute respiratory infections, and are also significantly more exposed to high levels of indoor air pollution, than men. This work represents one of the most comprehensive indoor air pollution and health studies done to date anywhere in the world. In general, however, the work on gender differentials is only beginning and clearly requires further exploration.

Indoor air pollution is not the only health issue for poor women using traditional fuels. The entire biomass fuel cycle of supply, transport, and use has serious health implications for women, as is well documented in the articles by Anoja Wickramasinghe discussing Sri Lanka, and by Dara Moeung concerning Cambodia. The Sri Lanka study, for example, found serious occupational health impacts for women associated with the woodfuel system, such as repetitive strain injuries, respiratory problems, nausea, headaches, itching eyes, and also skin irritations.

As emphasised in recent deliberations by the Commission on Sustainable Development (CSD), as well as in discussions of the ad-hoc Intergovernmental Group of Experts on Energy, the Inter-agency Task Force on Energy, and publications such as the recent World Energy Report, it is crucial to develop interventionist strategies that address this global threat to the health and wellbeing of the world's poor, the majority of whom are women. In this regard, the interview with India's Minister of Petroleum and Energy gives an insight into the importance attached to the issue of household energy in India and to the issues and strategies being developed to address the problem.

A wide range of intervention strategies can reduce the negative health impacts. These vary from improved stoves and cleaner fuels, to better ventilation and improved housing measures, to various user behaviour measures. Initial cost benefit analyses indicate that interventions to reduce indoor air pollution may result in benefits, such as reduced mortality, which significantly outweigh the associated costs.

Any energy intervention is likely to have consequences, either negative or positive, for women's health and wellbeing. Two articles in this issue illustrate the potential benefits for women of rural electrification. In South Africa, where electrification programmes in the rural areas are underway, studies show that gender plays a strong role in fuel use patterns at the household level. Despite preferences amongst women to purchase electric stoves as a priority, in practice it is more likely that lighting, entertainment and refrigeration appliances will be among the first appliances purchased following electrification. Hence, electrification has yet to dramatically reduce overall indoor air pollution levels in rural South Africa.

In Tunisia, where rural electrification is rooted in a strong national commitment to a broader programme of rural development, gender equity and the reduction of social inequities, women and girls appear to have benefited in particular from improved access to education, health services (especially concerning reproductive health), information from TV, and economic opportunities. The first benefit of rural electrification cited by households with children is that of improving homework and school performance, while at the same time reducing eye problems from the use of candles and kerosene lamps. Rural electrification has also resulted in benefits for

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◆ Professor Jyoti K. Parikh is a Senior Professor at Indira Gandhi Institute of Development Research (IGIDR). She is the National Project Coordinator for the UNDP capacity building project on the inculcation of environmental economics for sustainable development into the decision-making process. She chairs the environmental economics research committee for the World Bank project on building India's nationwide capacity for environmental management and she coordinates a large project on rural pollution and health in India. Professor Parikh can be contacted at: **IGIDR, General vaidya Marg, Goregaon (East), Mumbai, India 400065;**
Tel: +91.(0)22.840.2754, Fax: +91.(0)22.840.2026,
Email: jp@igidr.ac.in

◆ Dr Yasmin von Schirnding is based in the Department of Health and Development at WHO. She is the WHO focal point for Agenda 21 and WHO's representative on the Inter-agency Committee on Sustainable Development. She was previously responsible for the Office of Global and Integrated Environmental Health at WHO, and, prior to that, Director of Environmental Health for the City of Johannesburg. She has also held senior research positions at the Medical Research Council in South Africa. She has a special interest in strengthening the basis of intersectoral collaboration for health and environment in development policy and planning. She is the recipient of various awards, including the 20th century Achievement Award of the American Biographical Institute. Dr von Schirnding can be contacted at: **WHO, Department of Health and Development, 20 Avenue Appia, Geneva–27, Switzerland 1211;**
Tel: +41.(0)22.791.3533, Fax: +41.(0)22.791.4153,
Email: vonschirndingy@who.ch

health services and clinics, which have been able to expand their range of equipment and services, notably health education.

A choice in energy options is critical in meeting the needs of poor people, necessitating a variety of strategies and trade-offs. In addition to the direct health benefits which result from a reduction in fuelwood use, hundreds of millions of women and children miss out on opportunities for education and other productive activities due to the long hours spent collecting fuel for cooking and heating which again impacts on their health.

Gender, energy and health concerns are not limited to the energy sector, or indeed to "energy" technologies such as improved stoves and photovoltaics. Environmental, communications, and health-sector professionals have recently been promoting a very simple solar technology, which can potentially provide the huge benefit of safe drinking water, where women have a particular role and benefits. The article by the SODIS Foundation in Latin America focuses on the introduction of solar disinfection of water in Latin America, working through community development organisations.

New approaches such as this emphasise an explicit poverty focus, decentralisation and the participation of women in particular, and the integration of energy efforts with health and other development sectors. Local, community-based, approaches are critical for ensuring the sustainability of intervention measures. In particular, we need to encourage interdisciplinary work, with health, gender and energy professionals working together.

To conclude, while the indoor air pollution issue is increasingly recognised, the gender aspects are less so; and there are still a number of other health linkages, both in the traditional and modern energy sectors, that need to be better understood and addressed. A concerted, global effort is needed to address the health-energy-gender nexus in the future. ■

ENERGIA is grateful to Professor Jyoti Parikh and Dr Yasmin von Schirnding, the Guest Editors for this issue, who worked jointly with Elizabeth Cecelski of the ENERGIA Editorial Board.

Letters to *ENERGIA*

Women and Stoves: Some Thoughts

A recent issue of the leading scientific journal, ***Science****, featured a summary article[1] based on studies in rural areas of poor countries, which highlighted that, at every age, women in general work more than men; do much more household work than men; and do essentially all cooking-related work, including fuel gathering. Those working in the field of rural energy accept that the majority of fuel used by most of humanity is probably still in the form of locally gathered biomass and that the associated fuel cycle is largely operated by women. Fuel gathering is shared to some extent with men and children in many areas, but women are nearly universally responsible for essentially all cooking. We have also come to understand that the operation of the biomass fuel cycle is an important, but not the sole, reason for the "double burden," i.e., that rural women end up with significant responsibilities in the field as well as major responsibility for the home and children. We are also cognizant of the fact that the worst human impacts of these fuel cycles, particularly the health burdens of gathering and cooking, are borne directly by women, and directly and indirectly by their youngest children.*

There remains the question, however, whether just because women play the most critical role in these fuel cycles means that there needs to be a special role for women in their improvement. It is a fact, for example, that the half of the world's population that, over time, has shifted to more efficient, clean, and expensive fuels and stoves from biomass (which used to be the fuel of all households everywhere), has done so without special programmes aimed towards and run by women. Although the private-sector marketing of stoves and fuels that has been part of this shift up the household energy ladder does target women as appropriate consumers, it does so in a way no different from the way it matches products of all kinds to the appropriate population segments (market niches). In addition, by far the largest and most successful non-market dissemination effort of cooking improvements has been the Chinese Improved Biomass Stove Program, instituted in the early 1980s. By 2000, according to official statistics, it had disseminated more than 180 million improved stoves throughout the country, undoubtedly making it one of the largest household-level development projects in history. This monumental effort, was accomplished without any special focus on women or preferential participation by women.

These are powerful bits of evidence indeed, but there are arguments why they may not provide an accurate story about what is being faced today. It could be argued that both the historical changes and the Chinese programme accompanied or followed changes that were occurring in the status of women within the societies involved, along with changes in income, fuel availability, and infrastructure. Thus, there was no need to focus on women because they were already becoming enfranchised. Today, however, if we were to wait until the status of women improved sufficiently in the parts of the world where unprocessed solid fuels dominate, the process of kitchen improvement would remain slow. Hundreds of millions of women and children would be stuck with dirty inefficient fuels for many decades longer than is technically and economically necessary, or acceptable from a health standpoint.

This argument implies that, in order to accelerate the natural, but slow, movement up the household energy ladder, we need to improve the status of women quicker than would otherwise happen. This, of course, is a tall order although it is attractive since it also brings other potential benefits. Indeed, there are so many other benefits from improving the status of women that, from the perspective of someone outside the rural energy scene, it might seem like an extreme case of the tail wagging the dog to argue for improving women's status for the purpose of improving cooking practices.

Stoves as a Trojan Horse

The relationships being discussed are complex, and causality runs in more than one direction. For example, healthier women will more easily become enfranchised and vice versa. Further, while household energy programmes involving women may assist in the enfranchisement of women, the opposite is also the case. Indeed, there are examples of stove programmes that have engaged women as builders and trainers, whose major impact in the end was not in the form of more efficient and less smoky stoves, but in the increased empowerment of the women involved. According to Madhu Sarin in India, for example, it may be that stove programmes are uniquely suited to this outcome because they provide a route by which women can organise and be trained that does not directly threaten men. There may be advantages, therefore, to being below the threshold of interest.

Professor Kirk R. Smith, School of Public Health, Environmental Health Sciences Division, University of California Berkeley, 140 Warren Hall, #7360, Berkeley, CA 94720-7360; Tel: +1.(0)510.643.0793, Email: krksmith@uclink4.berkeley.edu

[1]. . "The Work Burden of Women," James Levine, Robert Weisell, Simon Chevassus, Claudio Martinez, Barbara Burlingame, & Andrew Coward, Science 294: 812, 26 Oct 2001.

News from the Secretariat

Building Women's Capabilities in the Energy Sector

Joy Clancy, Anja Panjwani-Koerhuis and Sheila Oparaocha

***ENERGIA* has been** collaborating with Winrock International, through its offices in Nairobi and Abidjan, in a programme to contribute to building women's capabilities in the energy sector in Africa. There were three components to the first phase of the programme:

1. A Women and Energy Workshop in Durban, South Africa.
2. Training courses for energy planners, and
3. Identifying needs for improving capabilities with electronic media among *ENERGIA* organisations in Africa.

Women and Energy Workshop in Durban, South Africa

A report of the workshop (held in December 2000) was published in **ENERGIA News** 4.1, page 5 and can also be found on the *ENERGIA* website.

The workshop was organised by Winrock International in collaboration with the Department of Minerals and Energy in South Africa, and with support from the United States Department of Energy. *ENERGIA*'s contribution to the workshop came in the form of advice to Winrock International on the programme and invited speakers, plus a presentation delivered by Sheila Oparaocha (*ENERGIA* Secretariat) on "*ENERGIA*'s Networking Activities in Africa". A supporting presentation given by Mr Washington Nyabeze, (the focal point of the Gender and Energy Network of Zimbabwe - GENEZ) provided practical examples of some of the issues the *ENERGIA* network endeavours to address at the national and project levels, in his presentation "Gender and Energy in Zimbabwe- Issues from Selected Cases".

A key output of the workshop was the Durban Declaration, in which African Ministers pledged to support key gender and energy issues on the continent. The declaration also included follow-up support by the US Department of Energy for leadership training of women selected by African nations; and support to capacity building, policy formulation, knowledge generation and dissemination by the World Bank in partnership with other donors in ESMAP and RPTES.

Training Courses for Energy Planners

The objectives of the training component were:

- To raise the awareness of gender in energy institutions so as to facilitate the institutionalisation of gender in those institutions.
- To raise the awareness of gender and clean energy in finance institutions so as to facilitate the institutionalisation of gender in those institutions.

This component used the Gender and Energy Training Manual prepared by the Technology and Development Group of the University of Twente (the Netherlands) to develop a curriculum to meet the clients' needs. Winrock International led the training with local resource persons and Joy Clancy (*ENERGIA* Director of Capacity Building and Regionalisation) in a supporting role.

Two training courses have been conducted:

1. South Africa Department of Minerals and Energy: This course was held from 20th to 22nd August 2001 at the Department of Minerals and Energy in Pretoria. Sixteen officials from the Department participated. David Omambia from Winrock Kenya was the key facilitator. Inputs were also made by: Will Cawood (Winrock REPSO in South Africa), Maryann Green (University of Natal), Wendy Annecke (member of *ENERGIA* Consultative Group), Tieho Theoha (MEPC, the focal point for both South Africa and Southern Africa gender and energy networks). Joy Clancy also participated in a supporting role. Topics covered included:

- Understanding gender concepts
- Gender and sustainable energy issues
- Gender tools for use in energy planning
- Genderising energy policy

2. Department of Rural Electrification, Senegal: This course was held from 25th to 28th September 2001 in Dakar, Senegal. This was a joint course between *ENERGIA*, Winrock Côte d'Ivoire and ACER. There were fifteen participants (the majority of whom were men) from a range of government and non-government organisations in Senegal. The course was opened by representatives of the Ministries of Energy, and of Women, Family and Children. Isidore Bontchué and Florent Ouapeu (Winrock Côte d'Ivoire) were the lead facilitators. Local resource persons making inputs included; Dr. Sow and Chiek Wade (from ACER) and Oumy Ndiaye (Winrock Senegal). Joy Clancy also participated in a supporting role. Topics covered included:

- The energy situation in Senegal
- Gender and energy in Senegal
- Gender-sensitive analytical and data-gathering tools

Participants were able to practice using the data-gathering tools in the villages of Ndioufère and Keur Banda (Thiés Department).

Needs Identification for Improving Electronic Media Capabilities

This task was undertaken by *ENERGIA* in collaboration with the Tanzania Traditional Energy Development and Environment Organisation (TaTEDO). Initially, *ENERGIA*'s national, sub-regional and regional focal points in Africa were identified as potentially key partners for this activity. An important reason for selecting the focal points is their potential for playing an intermediate role in making information available to the local network members. Thus, indirectly, more organisations/people will be able to profit from any eventual training.

A questionnaire was then developed by TaTEDO, which will be sent to potential partners in the next phase of this activity. The data received will be analysed, and the results and recommendations presented in a report by *ENERGIA*. Winrock East-Africa's "Email and Internet", and "World Wide Web" training syllabuses will be compared with the identified needs of the potential partners. The final step in the second phase of this activity will be to make recommendations for the customisation of the Winrock training syllabuses and course work. Phase three will encompass the actual training activities. ■

Networking Around the World

Reports on ENDA and SAGEN

Gender in Energy Meetings

Participants to the ENDA-RPTES Gender and Energy Workshop, held in June 2001 in Dakar, Senegal. From left to right: Professor Salome Misana (University of Dar es Salaam, Tanzania), Pamela Cunneyworth (ELCI, Kenya), and Stephen Gitonga (ITDG, Kenya).

Summarised by Anja Panjwani-Koerhuis

ENDA-RPTES Gender and Energy Workshop

The gender and energy workshop *'Moving towards Practical Solutions of Meeting Gender Differentiated Energy Needs within an Integrated Development Approach'* was held from 11-13 June 2001 in Dakar, Senegal and organised jointly by ENDA Tiers-Monde, Senegal and the World Bank Regional Programme for the Traditional Energy Sector (RPTES). The workshop was an opportunity for gender and development analysts and practitioners to share their field and research experience. The workshop's aim was to revisit gender and energy studies and identify ways of pushing the gender debate forward. It adopted an integrated development approach, without losing sight of the need to use energy as an indicator of development.

There was a general consensus that the fundamental problem is poverty. Although there are no ready-made solutions for reducing poverty, many participants felt that energy could serve as an entry point to alleviate some of the socioeconomic constraints that people face.

Important issues raised in the discussion included:

- 'Energy for development' which was one of the recurrent themes of the meeting. It was recognised that improved energy services could help achieve sustainable development.
- It was stressed that governments, NGOs and other stakeholders needed to cooperate. Governments should evaluate the extent to which their policies are gender sensitive, and consider gender sensitisation and training for their institutions.
- Practical steps need to be taken that do not require large resources; such as lobbying and advocacy, and further research.
- Constant exchange of information is essential and needs to be done at all levels.

The participants felt that the following recommendations could be used as a basis for poverty reduction and improving the quality of life of rural and urban women in Africa. The recommendations were structured around three issues:

1. Energy perspective

- Energy policies need to break away from centralised processes in the management, supply, and commercialisation of energy sources.
- Both short and long term solutions should be adopted to address the problem of energy accessibility.
- Some of the barriers to alleviating women's poverty, caused by the absence of affordable energy services, need to be reviewed and addressed.
- Refine the current focus, which is heavily weighted towards energy, in favour of a more integrated approach.

2. Financial Perspective

- Focus on income-producing activities to alleviate the cash flow problems that women face, and identify ways of making these more durable.
- Identify sustainable income bases for women through consultation with women's groups and training programmes.
- Adopt a participatory approach that would place women centre stage and identify activities that have entrepreneurial potential and would be attractive to the private sector.
- Adopt a hands-on market/business approach with concrete outputs and women as the main drivers.
- Develop business ideas with the assistance of the private sector and businesswomen in order to gradually progress from informal vending towards large-scale entrepreneurial activities.

3. Advocacy, training and sensitisation programmes

- Use long-term programmes to empower women.
- Advocacy can be conducted through networking activities.
- Investing in people means mobilising the necessary funds to equip them with the right tools. Training should target the needs of specific groups.
- Training should not follow a one-dimensional approach.

◆ For more information, or the full report of the meeting, please contact:
ENDA Tiers Monde, P.O. Box 3370, Dakar, Senegal;
Tel: +221.(0)8.224229 / 216027,
Fax: +221.(0)8.222695,
Email: se@enda.sn,
Website: http://www.enda.sn

SAGEN Planning Meeting

More recently, the regional Southern African Gender and Energy Network (SAGEN) held its first planning meeting from 20-21 August 2001 in Johannesburg, South Africa. The meeting was organised by the Minerals and Energy Policy Centre (MEPC). The network currently covers the following countries: Lesotho, Mozambique, Namibia, South Africa, Swaziland, and Zimbabwe. Each of the participating countries has a national network on gender and energy, and a SAGEN focal point. The regional coordinator for SAGEN is MEPC in South Africa, which also coordinates the South African national network.

SAGEN has the overall aim of strengthening the role of women in sustainable energy development through the exchange of information, training, research, advocacy, and action and to empower communities for sustainable development by providing both men and women with

sustainable energy options. The network seeks to identify interventions, encourage and, if possible, assist members and their institutions to undertake decentralised initiatives in empowering women and engendering energy.

The planning meeting was arranged primarily to plan SAGEN's contribution to the Earth Summit 2002. The objectives of the meeting were to:

- Review and evaluate the status of SAGEN and national networks;
- Identify obstacles and problems facing both SAGEN and national networks;
- Develop both short-term and long-term workplans for SAGEN;
- Based on these, allocate responsibilities to MEPC (as regional coordinator), focal points within member countries, and network members;
- Draft a communication structure for the network; and
- Identify funding strategies for implementing the proposed plan of action and project activities.

One of the outcomes of the meeting was the definition of SAGEN's vision: to contribute to poverty alleviation through increasing the empowerment of women for the sustainable use of energy resources. A short-term objective is to raise global awareness at the Earth Summit 2002. Activities, processes and commitments to achieve this aim were discussed at the meeting. As to SAGEN's long-term objectives, the meeting agreed that the network should focus on 'Gender and Energy for Sustainable Development from an African Perspective'. The following were identified as major issues:

- Lack of data on energy policies;
- Lack of access to energy resources; and
- Lack of appropriate energy technologies.

Further outcomes of the meeting included:

- The decision and strategy to expand SAGEN's geographical coverage to include Botswana, Mauritius, Seychelles, and Zambia.
- A clearer understanding of the network's structure.
- Outlining mandates, including terms of reference, for the regional coordinator and the focal points; and clarification of the relationships, roles and responsibilities of the national, Southern Africa and Africa network coordinators.
- Strategies for communication and fundraising.
- A workplan was developed, based on the objectives of the network. ■

◆ For more information, or the full report of the meeting, please contact:
Tieho Theoha, Minerals and Energy Policy Centre (MEPC), P.O. Box 395, Wits 2050, South Africa;
Tel: +27.(0)11.403.8013,
Fax: +27.(0)11.403.8023,
Email: Tieho@mepc.org.za

Internet Resources

WWW

The World Health Organisation (WHO) has published its *Guidelines for Air Quality* on its website. The primary aim of the guidelines is to protect the public from the effects of urban and indoor air pollution, and to eliminate or minimise exposure to hazardous pollutants. The guidelines can be viewed at:
http://www.who.int/peh/air/Airqualitygd.htm

The Shell Foundation's Sustainable Energy Programme held an electronic dialogue on household energy and health during July and August 2001. More information about the forum, the background document, and a report of the dialogue can be found at:
http://www.shellfoundation.org/resources/library/sep/household_energy.html

Professor Kirk R. Smith's research activities currently focus on air pollution with a particular, but not exclusive, focus on biomass fuel cycles. His website contains a number of interesting publications, and information about recent research activities, employment, news and events, and programme links. The site can be accessed at:
http://ehs.sph.berkeley.edu/krsmith/

The Household Energy, Air Pollution and Health Study reviews the impact of current Indian policies and government programmes concerning access to cleaner fuels and cooking systems on the rural poor, and the reduction of public health risks associated with indoor air pollution. Read more about the study and its background at:
http://wbln1018.worldbank.org/sar/sa.nsf/6062ad876fb8c066852567d7005d648a/a81e14fcb60e835f852569d7004e8c66?OpenDocument

The Bulletin of the World Health Organisation, 2000, 78 (9) features an article *"Indoor Air Pollution in Developing Countries: a major environmental and public health challenge"* by Nigel Bruce, Rogelio Perez-Padilla, and Rachel Albalak. The article's keywords are: indoor air pollution; adverse effects; fossil fuels – toxicity; lung diseases; smoke inhalation; injury; cataract; developing countries. To view the article, visit:
http://www.who.int/bulletin/pdf/2000/issue9/bul0711.pdf

Pollution Management in Focus, Discussion Note No. 4, August 1999, is a special note on indoor air pollution, written by Prof. Kirk Smith. It reviews the evidence on the health effects of indoor air pollution in developing countries, outlines possible solutions, and concludes that the only feasible long-term remedy is improved access to cleaner modern energy. The note can be viewed at:
http://wbln0018.worldbank.org/Networks/ESSD/icdb.nsf/D4856F112E805DF4852566C9007C27A6/EC27FD19F013AED585256801005A1865/$FILE/In+Focus+4.pdf

Indoor Air Pollution: Energy and Health for the Poor is a newsletter that forms part of a World Bank study in India entitled 'Household Energy Air Pollution and Health'. Issue No.3 of the newsletter was a special issue on women and energy. The Indoor Air Pollution newsletter can be accessed through the Internet at:
http://wbln1018.worldbank.org/sar/sa.nsf

Wood Energy News, Vol.12 No.1, special issue on energy, women and health is a newsletter of the Regional Wood Energy Development Programme (RWEDP), focusing on health problems linked to smoke-related indoor air pollution and on the health effects of carrying heavy wood loads. Possible solutions to these problems are also addressed. This special issue of Wood Energy News can be accessed through the Internet at:
http://www.rwedp.org/acrobat/wen12-1.pdf

The TERI (Tata Energy Research Institute) website includes a page on indoor air quality that contains a bibliography on the subject, the greater part of which focuses on cooking. The page further contains many links to related websites. You can visit the TERI indoor air quality page at:
http://www.teriin.org/indoor/indoor.htm

The Armidale Air Quality Group's webpage hosts a literature review on the health effects of wood smoke, both in developing and developed countries. The review can be accessed at: **http://lash.une.edu.au/~drobinso/smog_refdescr.htm**

Meeting *ENERGIA* Members

Shri Ram Naik

Union Minister for Petroleum and Natural Gas, Govt. of India

Interview by Professor Jyoti K. Parikh
Indira Gandhi Institute of Development Research, Mumbai, India

What is your response to IGIDR survey results that cooking fuels are not easily available in the rural areas, whether they are biofuels (fuelwood, dung or crop residues) or hydrocarbon fuels?

Nearly 70% of the country's population of over 1 billion resides in rural areas but, traditionally, the petroleum industry leans mainly towards urban areas. Kerosene and diesel are the only fuels presently available in rural markets. With deforestation, the availability of firewood in rural areas has come down, and it is important to ensure that kerosene and liquefied petroleum gas (LPG) reach rural markets. Now we are trying to bring them to rural areas so that rural women can get convenient and smokeless fuels.

70% of the crude oil has to be imported, and the oil import bill reached about US $2 billion in 2000-2001. The demand for petroleum products in India is growing at 6% annually, compared to world average demand growth of 1.5 - 2%. The annual availability of wet dung is estimated to be about 960 million tonnes. When dung is burnt its availability as organic manure decreases. Total availability of crop residues is around 450-500 million tonnes.

Which other rural energy uses compete for petroleum products?

While kerosene is used as a medium for cooking and lighting, diesel is widely used for transportation, agriculture (e.g. irrigation pumps, tractors, thrashers) and for diesel-power.

What are your concerns about kerosene subsidies? How can we ensure that subsidies reach the poor?

Kerosene is highly subsidised by the Government of India, and subsidies of over US $1.2 billion are given under the Public Distribution System (PDS). However, due to the substantial price differential between kerosene (PDS price Rs.7/- per litre) and diesel (market price Rs.18/- per litre), a large proportion of the kerosene meant for the poor under the PDS gets diverted for the adulteration of diesel for transportation. It is mainly the responsibility of the Civil Supplies Authorities under the State Government to check for this diversion of kerosene. In fact there is a demand from agriculturally rich states such as Haryana and Punjab to provide sufficient LPG connections for rural households, and to reduce kerosene quotas to zero for these states as the farmers face the problem of their agricultural machinery getting ruined due to the adulteration of diesel with kerosene. The Government of India has set up an anti-adulteration cell, headed by a senior IAS Officer, with Regional Offices in all the four metropolitan areas to check for adulteration. Civil society and NGOs can also play important roles in keeping vigilant over this matter and by reporting malpractices.

What steps have been taken by your ministry to increase fuel supply?

A record 12.7 million new LPG connections were released between October 1999 and December 2000. This wiped out the waiting list for LPG connections. Now they are available across the counter all over the country. During the last two years, 19.5 million new connections have been released; given the total of 57 million LPG consumers after nearly 40 years of LPG marketing, this amounts to 33% of the total in the last two years. We plan to release another 13 million LPG connections between April 2001 and March 2002.
So far the focus has been on cities and towns having a population of 20,000 and above. The new LPG connections will be marketed in smaller towns and villages having populations of about 10,000; and so LPG will reach deeper into the rural areas. Moreover, we have taken a major initiative in reviving Dealer Selection Boards (DSBs) in the country, and 59 DSBs were formed to expedite the allotment of new retail outlets, LPG and kerosene dealerships. These DSBs are to allot 2848 retail outlets, 403 kerosene dealerships, and 3597 LPG distributorships within this year. To increase the availability of LPG in rural areas, over 1200 of these LPG distributorships will cater exclusively to rural areas, and 1400 are urban/rural distributorships.

Conventional cylinders that contain 11 to 14 kg of LPG weigh about 25 to 30 kg. These are not only difficult to transport and handle by women but also require a high one-off deposit (Rs.1000/-) for the large cylinders. In addition, each refill costs Rs.250/-. Could small and certified containers be considered so that they are more easily marketed and not so difficult for poor families to purchase?

The government has, in principle, given approval for the introduction of small cylinders containing 5 kg of LPG for low-income households in semi-urban and rural areas. This will enable penetration into hilly and interior areas due to the ease of transportation. The deposit for a new connection with a 5 kg cylinder would be about Rs.500/- and a refill cylinder would cost only about Rs.100/-. Thus, relative to the large cylinders, both of these amounts are within monthly budgets. Even after the deregulation of the petroleum sector in April 2002, the government proposes to continue subsidies on LPG at 15% and on kerosene at 33% which at present amount to about Rs.100/- per LPG cylinder and about Rs.4/- per litre of kerosene. The prices of these commodities may increase in remote and far-flung areas after the APM is dismantled. Similarly, 1, 2, and 5 kg kerosene containers can be considered for rural areas. The government is also trying to work out a scheme which would protect the public from sudden fluctuations in the international market.

What steps would you like to suggest to help women and to reduce the health impacts of biofuels?

I take this opportunity to announce the freedom-from-smoke initiative for rural women, which will promote kerosene and LPG, and streamline their markets and distribution. Under this scheme, petroleum will be marketed with more vigour, small cylinders of kerosene and LPG will be approved to facilitate distribution. I would also encourage civil society to be vigilant over the diversion of subsidised kerosene for diesel adulteration. Subsidies are aimed at poor rural women but benefit dishonest traders. ■

◆ For contact details of the author, please refer to: News from the Editors

International Programmes: Focus on

WHO Initiative on Household Energy, Fuel Poverty and the Indoor Environment

Yasmin von Schirnding

WHO has long recognised that household energy and indoor air pollution represent a serious threat to the health of the poor, in particular to women and children. A number of efforts have been made, as far back as the first WHO consultation in 1992, to address the epidemiological, social and technical aspects of indoor air pollution from biomass fuel. Since then there has been intensified research on the health effects of indoor air pollution. Ongoing work includes health effects assessment studies, air pollution and exposure monitoring, comparative risk assessment studies, and estimations of the global burden of disease from indoor air pollution. The next World Health Report, on Risk Factors, will highlight some of the new findings regarding risks to health from indoor air pollution.

In the future, additional emphasis is to be placed on assessing the impact of household energy policies and intervention strategies, on the health and wellbeing of poor women and children. A special, phased, WHO joint initiative is to be implemented that is intended to contribute to the evidence, technical support and strategic alliances necessary to galvanise worldwide action on the development of sustainable and health-promoting interventions that address the household energy needs of the poor. It is hoped to demonstrate that practical and effective interventions exist that can break the traditional fuel-poverty link, and contribute to the economic and social development of poor communities.

The objectives of the initiative are as follows:

- To raise awareness among key decision-makers of the importance, for health, the environment and development, of better access to cleaner and safer household energy in the developing world.
- To provide sufficient evidence, on the potential health/environmental/economic benefits of better access to cleaner and safer household energy, to compel action by key decision-makers, and assist the promotion and development of cost-effective and culturally-appropriate interventions.

A traditional Masai house of squat construction with tiny windows. The flue no longer works, making the ventilation poor and increasing the chances of carbon monoxide stagnation. (Photo: Courtesy of Nigel Bruce)

- To substantially strengthen experience with cost-effective, economically sustainable, interventions in a representative range of countries and settings (household, community, national and international levels); by a) identifying and evaluating past and on-going interventions, and b) designing and testing new interventions that represent innovative and viable approaches to improving current patterns of household energy use.
- To disseminate this experience as widely as possible and to stimulate adaptation and implementation of policies, building capacity for ongoing development.

Project Components

The initiative has a number of elements, central to which is the identification and evaluation of a range of interventions (technical, behavioural, policy) in multiple settings in a range of countries. The success of the programme is dependant on the partnership between organisations and individuals representing the required skills and spheres of influence. Work underway includes a review of intersectoral approaches that have been used elsewhere, lessons from which could assist the development of similar approaches in the household energy sector. Assessments of policies, strategies and interventions at country level are also progressing. Initial cases studies have been prepared for the Commission of Sustainable Development, and a meeting on the topic was organised by WHO at CSD 9. Box 1 (page 9) summarises one of the case studies prepared, and highlights the gender dimensions of the problem, as well as of the solutions.

An important consultative meeting on the health impact of indoor air pollution and household energy in developing countries was organised last year by WHO and USAID, and this has contributed to the development of this initiative. A report on this topic has also been prepared for the WHO Commission on Macroeconomics and Health (see summary Box 2, page 9).

WHO is also involved in a major intervention study in Guatemala, which aims to study the impacts on health, particularly on acute respiratory infections, of an improved stove programme (Box 3, page 10).

It is hoped that over the next few years substantial progress will have been made in understanding better the nature of the health effects associated with various forms of household energy use, as well as the interventions that are likely to have significant impacts on the health of the world's poor, especially poor women and children. ■

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◆ For contact details of the author, please refer to: News from the Editors

Box 1

Case Study: Achieving Sustainable Reductions in Indoor Air Pollution and Improving Health through Participatory Community Technology Development in Rural Kenya

Working with 50 households in two poor rural Kenyan communities, participatory technology development of housing and energy interventions has been used to alleviate smoke pollution. Discussions were held with individual households and groups of women, which led to the development and installation of flued hoods, larger/more/better positioned windows, and larger eaves. Initial designs for hoods/flues were prepared with the women through discussion and sketches drawn by the women. Once installed, women commented on the convenience and smoke extraction efficacy, and further modifications were made. This has led to acceptable designs, which meet needs, and appear very effective. An assessment of the priority given to the interventions developed by the women in the project homes and in surrounding areas was made, and the likelihood is that they would be able to allocate scarce resources to these changes.

A new flue and four windows have been added to a traditional Masai house, alleviating indoor smoke pollution and improving the home environment. (Photo: Courtesy of Nigel Bruce)

Lessons Learned

Although the quantitative evaluation has yet to be completed, preliminary findings indicate that the participatory methods adopted are both effective and have the potential to be sustainable. The women have been empowered to making their homes cleaner and safer. Women within the communities are in the best position to determine what will work for them, and they must participate in the strategies for smoke-alleviation if they are to be sustainable. The abilities (assets) of these poor communities should not be undervalued. Women are very receptive to change, provided they can instigate it themselves from a position of knowledge and understanding. In the future much greater effort needs to be put into identifying low-cost, acceptable and financially sustainable mechanisms for alleviating smoke and improving the home environment.

◆ For further information, please contact:
Stephen Gitonga, Programme Manager, Energy Programme, Intermediate Technology Group (ITDG), P.O. Box 39493, Nairobi, Kenya; Email: gitonga@itdg.or.ke

Box 2

The Impact of Household Energy and Indoor Air Pollution on the Health of the Poor – Implications for Policy Action and Intervention Measures

Summary of report prepared for WHO Commission on Macroeconomics and Health

By Von Schirnding Y, Bruce N, Smith K, Ballard-Tremeer G, Ezzati M, Lvovsky K

Nearly three billion people still rely on traditional biomass fuels and coal for household energy needs. Studies have shown that indoor air pollution increases the risk of a range of childhood and adult diseases. Relative risks ratios in the range 2 to 5 have been demonstrated for acute lower respiratory infections (ALRI), particularly pneumonia, in childhood (see figure). Elevated relative risks have also been found for chronic respiratory disease and lung cancer, mainly in China, and particularly in women. The continuing high incidence of ALRI, together with the fact that it predominantly affects young children, means that this condition constitutes the major burden of disease attributable to indoor air pollution.

A wide range of interventions are available which can reduce the impact of indoor air pollution. These include changes to the source (improved stoves, cleaner fuels), home environment (better ventilation) and user behaviour (keeping children away from smoke during peak cooking times). These can be delivered through policies operating at national level (supply and distribution of improved stoves, cleaner fuels), and local level (through community development). The several hundred improved stove programmes in place in over 50 countries range from entirely local, non-governmental, advocacy, such as the ceramic stoves programme in Kenya, to Chinese initiatives reaching millions of households nationwide. Initial cost - benefit studies indicate that in terms of mortality, benefits may outweigh costs by a factor of more than ten. In terms of DALY (a measure of death and disability-adjusted life-years), data from India suggest that improved biomass stoves may save USD 50-100 per DALY, and the use of kerosene and LPG stoves in rural areas may result in 150-200 USD saved per DALY.

Well-targeted and locally relevant interventions including financial support for technical development and production, as well as for marketing and transport infrastructure (through income generation and/or micro-credit), accompanied by integrated decision-making by international players and national governments, are likely to have major impacts. Successful implementation however will require the participation of local people, collaboration between sectors with health, energy, housing, planning etc responsibilities, and an emphasis on market sustainability.

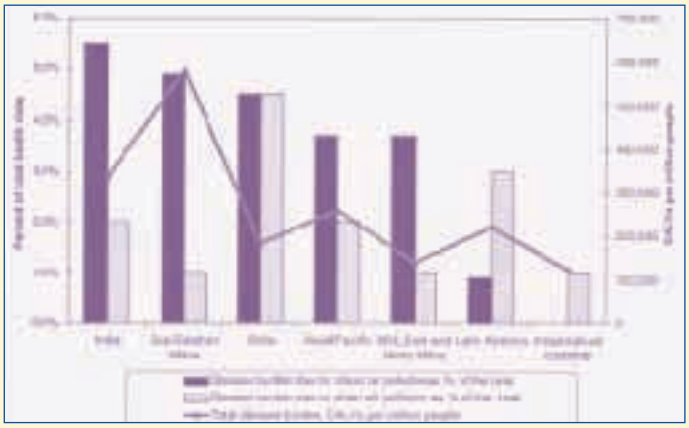


Figure: Total disease burden and disease burden arising from indoor and urban air pollution. Source: World Bank

Box 3

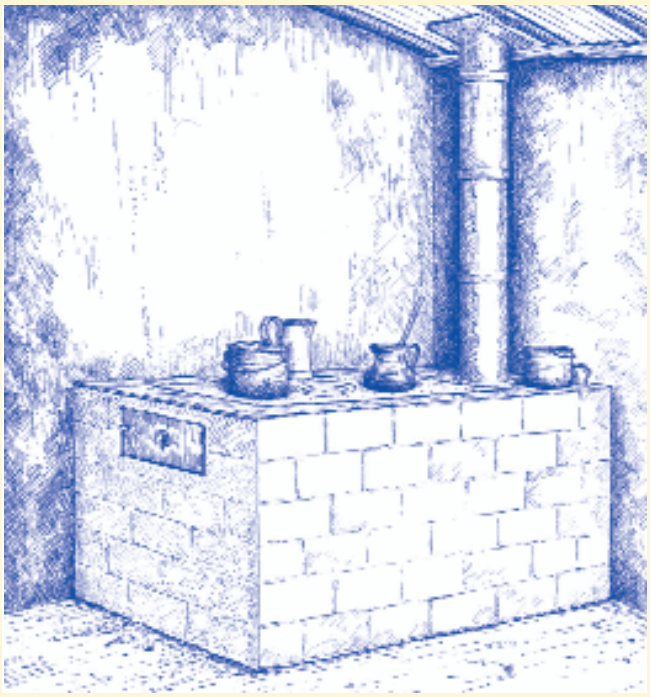
Study on Health Impacts of Reducing Indoor Air Pollution in Rural Guatemala

Indoor air pollution arising from the use of biomass fuels in developing countries is now recognised as being responsible for a substantial burden of disease among the poor. This conclusion is, however, derived from a number of observational studies, carried out in developing countries, which rely on rather poorly quantified evidence.

In order to address this weakness, WHO has supported an intervention study to directly measure the change in incidence of acute lower respiratory infections in young children due to measured reductions in exposure to indoor air pollution. After several years of development, and recent funding by NIEHS, this study is now getting underway in the rural highlands of western Guatemala. In these areas, most families are dependent on wood for their cooking and space heating needs, and the majority in the poorest areas still use an open 3-stone fire with very little ventilation.

Some 500 homes using open fires with very young children (less than 6 months old) will be invited to join the study. Half of the homes will then be offered a locally made improved chimney stove, the *plancha* (illustrated), which studies have shown is very well accepted and substantially reduces indoor air pollution levels as well as exposure of women and children. Home visits will be used to measure pollution and exposure levels, and to assess a range of important health criteria for the child and women (mothers and/or caregivers). This will continue until each child is 18 months old. The homes that continued with an open fire will then be offered a *plancha* stove.

In recognition of the importance of household energy to a wide range of social, economic and other issues that impact on women's lives and wellbeing, the study will also assess the impact of the intervention on daily time and activity allocations, cooking practices and related issues. The final development work for the study is underway, and it is expected that the stoves will begin to be installed in mid-2002, with the follow-up work being completed by mid-2004.



(Illustration: Courtesy of Nigel Bruce)

◆ For further information, please contact:
Dr Nigel Bruce at ngb@liv.ac.uk,
Professor Kirk Smith at krksmith@uclink4.berkeley.edu, or
Dr Byron Arana at baaz@cdc.gov

Gender Differences in the Impact of Biomass Fuel on Health

Prepared by Yasmin von Schirnding

The boxes below provide brief abstracts of work underway in India, Kenya and South Africa; and present interesting findings regarding gender differences in relation to biomass use and respiratory ill-health in various population groups. It is noteworthy that the work carried out in parts of India shows a higher prevalence of acute respiratory infections in young boys than in young girls, when related to biomass-burning (see Box 1), as well as in adult men compared to women, in terms of reported respiratory symptoms such as bronchitis (see Box 2). Various hypotheses have been put forward to explain these differences, some of which may be artefactual. Work in Kenya on the other hand (recently published in The Lancet by Ezzati - see Box 3) shows that adult women not only have greater exposures to indoor air pollution than men, but also are more than twice as likely to be diagnosed with acute respiratory infections. It is clear that further work is needed on the significance of gender in the relationship between biomass burning and ill-health. The relationship is likely to be complex, and to vary due to different underlying social, environmental and economic factors in various settings and contexts.

◆ For contact details of the author, please refer to: News from the Editors

An important start has been made in assessing the significance of gender in the relationship between biomass burning and ill-health. It is clear, though that further work in this area is much needed.
(Photo: Courtesy of Nigel Bruce)

Box 1

Indian National Family Health Survey Shows Greater Effect of Biomass Fuel on Acute Respiratory Infections in Boys than Girls

In India, as in many other developing countries, acute respiratory infection (ARI) is the leading cause of childhood morbidity and mortality. India has not only high rates of ARI but also a high proportion of households that use some form of biomass as their primary cooking fuel. Cooking in India is often done in poorly ventilated conditions using inefficient stoves that produce a great deal of smoke. Such stoves are often no more than a pit, a chulha (a U-shaped construction made of mud), or three bricks. Analysis of data from India's 1992-93 National Family Health Survey (a probability sample covering 99% of the population) has shown that the prevalence of acute respiratory infections (ARI) in children under three years of age is more than 50% higher among children from biomass fuel using households than among those using cleaner fuels. The prevalence of ARI is considerably higher among boys than among girls. The influence of fuel choice on the prevalence of ARI is also higher for boys than for girls. This may be due, in part, to a greater underreporting of ARI in girls, or greater underreporting for girls in biomass using households. The higher ARI rates and greater effect of smoke among boys may also be because mothers in India are more likely to carry around young boys than girls and keep them in the kitchen area while cooking. The results remain valid even after statistically controlling for several potentially confounding socioeconomic factors.

◆ For further information, please contact: **Vinod Mishra, Email: mishra@hawaii.edu, Population and Health Studies, East-West Centre, Hawaii**

Box 2

Higher Reporting of Respiratory Symptoms in Men than in Women in Rural India

Jyoti Parikh, Vijay Laxmi and Haimanti Biswas of the Indira Gandhi Institute of Development Research carried out a large Household and Health Survey using random and representative samples from rural areas in four states of India; Himachal Pradesh, Rajasthan, Tamil Nadu and Uttar Pradesh. In addition to energy and socioeconomic surveys, and an assessment of lung functioning (30,400 individuals); an analysis of respiratory problems, such as bronchitis, asthma, chest infections and tuberculosis, and eye problems was carried out for 81,000 individuals distributed among 15,293 households. Results show that 37 females in every 1000 biofuel-using households reported symptoms of bronchitis or chest infections as against 59 males in rural North India once the figures were adjusted for smoking. This could be due to a "passive cooking" effect or because men are also involved in dusty jobs such as farming. In biofuel households, eye problems are more prevalent in females (50 women versus 45 men per 1000 biofuel users). The level of education plays a significant role in symptom occurrence, particularly among females. In those households that only use biofuel, the rates of respiratory and eye symptoms in illiterate females are higher than for those with primary education. The symptoms are most likely to occur with non-partitioned indoor cooking areas, and least likely with separate kitchens or where cooking occurs outside the main dwelling. 6.5 million days, with high opportunity costs, are lost each year due to respiratory illness. Cleaner fuels, adequate ventilation, and awareness through education, can serve as policy objectives for improving the health of rural people.

◆ For further information, please contact: **Prof. Jyoti Parikh, Email: jp@igidr.ac.in, IGIDR, Mumbai, India**

Box 3

Women Have Exposure Levels Two to Four Times those of Men in Rural Kenya

A three-year comprehensive study into the impact of exposure to smoke from cooking fires on over 400 people living in rural central Kenya has recently been completed. It found that young and adult women, who regularly participate in cooking activities, have exposure levels that are two to four times higher than men. They are also on average twice as likely as men to be diagnosed as having acute respiratory infections (ARI) or acute lower respiratory infections (ALRI). Children exposed to high levels of indoor air pollution are diagnosed as having ARI in approximately 20% of weekly examinations and, the more severe, ALRI in 6%-8% of weekly examinations. The average daily exposure concentration of children under the age of 5 to PM_{10} (particulate matter smaller than 10 microns in diameter) is approximately 1500 mg/m^3 and that of adult women approximately 5000 mg/m^3. This is *many times* international standards for ambient air quality, such as the latest US EPA standard. It was found that simple, locally manufactured, improved-efficiency stoves could reduce exposure to indoor smoke by approximately 40%, and cleaner fuels (such as charcoal) by as much as 90%, compared to traditional wood-burning stoves. These results demonstrate the potential benefits of research and outreach efforts to develop, promote, and sustainably commercialise improved stoves and improved fuels which can dramatically improve the health, economic, and environmental situation of women and children in the poorest households in the world.

◆ For further information, please contact: **Majid Ezzati, Email: ezzati@rff.org, Resources for the Future, Washington, USA**

Box 4

Higher Prevalence of Asthma and Chronic Bronchitis Among Women than Men in KwaZulu-Natal, South Africa

57% of the population of KwaZulu-Natal, South Africa, live in rural areas, and there is a high reliance on biomass fuels for cooking and heating. Changes in the way houses are built have exacerbated the situation regarding indoor exposure to smoke. The traditional Zulu hut was made of thatch, with the reeds aligned in a way that allowed smoke to escape but kept out the rain. However, with more modern building materials and styles, smoke can no longer escape so readily, resulting in high exposure levels to indoor pollutants. Routine health data from KwaZulu show a higher prevalence of asthma and chronic bronchitis among women than among men, despite women smoking less. This suggests that women may be more affected by indoor pollution than men. While the South Africa National Low-Smoke Fuel Programme (which aims to introduce clean burning, more environmentally friendly, and healthier fuels) holds much promise, technical solutions may not be enough in the face of poverty and the social function of the burning fire. Partnerships with the community are needed at the microlevel to develop dialogue and to find creative solutions that combine daily survival with risk reduction. Long-term reduction in the threat of indoor air pollution depends on macrolevel socioeconomic change within society that addresses the root cause: poverty.

◆ For further information relating to this work in progress, please contact: **Sandy Glajchen, Email: sandyg@md.huji.ac.il, or Dr Elihu Richter, Email: elir@cc.huji.ac.il, School of Public Health and Community Medicine, Hebrew University, Israel**

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Gendered Sights and Health Issues in the Paradigm of Biofuel in Sri Lanka

Anoja Wickramasinghe

In Sri Lanka, biofuels are the primary source of energy and account for nearly 66% of the annual energy consumed. Annually nearly 10 million tons of wood alone, worth nearly 440 million US$, are consumed. Biomass fuel is extremely important for its contribution as a source of cooking energy, and hence to food security, an area in which the implications on nutrition and health can be contextualised.

Despite the recent expansion in the use of alternative energy sources such as hydroelectricity, natural gas and paraffin, biomass remains the most popular energy source in Sri Lanka.The household sector consumes nearly 81% of the biomass energy used in Sri Lanka. About 98% of rural households, 80% of urban dwellers, and 99% of plantation dwellers depend on biomass for cooking. Due to the increasing population, depletion of supply sources, and socioeconomic trends; the use of residues, softwood, and small twigs and trimmings has been increasing. A crucial feature is the gender-specific expectations embedded in the biofuel cycle. From gathering to combustion, women's occupations in the three domains as gatherers, carriers, and end-users have resulted in a gender-imbalanced system. The biofuel cycle as a whole has become an important source of difficulty, stress and physical discomfort for women.

The economic advantages of using biomass have undoubtedly been attractive, especially for those women who live below the poverty line and must manage their households on limited incomes. But is it fair to neglect the costs involved in the whole system, and the possible health repercussions that millions of gatherers, carriers and users are subjected to over the course of daily life, and which both families and states eventually pay for? Within this context; how the various spheres in the whole cycle are interconnected, which social sectors are at the centre of the cycle, and what health issues reoccur in the system, are all important policy-related questions.

The biofuel cycle comprises of three spheres: (1) production; (2) the flow system; and (3) the indoor sphere where combustion takes place. Health repercussions reported by the respondents emerge due to their exposure, exhaustion and subjection to the biofuel cycle. Problems faced by women as biomass providers and users in this cycle stem partly from the patriarchal social system, where men's power of control over sources of supply, income and women's labour is widely exercised. The work and the responsibilities of biomass production, and its use in the reproductive domain, have created a stereotypical injustice.

Self-Reported Morbidity

In this study, self-reported morbidity was used as an indicator of health problems. 720 households were chosen for the field survey and any deterioration in health as reported by the members of the 720 households has been recorded. Research results revealed that in each of the three spheres, health risks and the probability of health deterioration are high. Specific self-reported morbidity issues are associated with the nature of the work involved and the workplace environment for each sphere (see Table 1).

Table 1. Health problems reported by at least 60% of households

Sphere	Respondents	Self-reported morbidity
Procuring	Women (about 8% men)	Injuries Skin irritation Allergic reactions Fatigue Snake bites Backache Trauma Fungal infections Pest attacks
Carrying (Head loading)	Women	Repetitive strain injuries Stiff neck Fatigue Headache Injuries Chest pains Trauma
Combustion	Women	Coughing Bronchitis Pneumonia Acute respiratory infections Conjunctivitis Upper respiratory irritation/inflammation Poisoning Cataracts Burns Headache Sinus Skin irritation

Health Issues in the Outdoor Spheres

In this part of the cycle, various activities such as harvesting, cross-cutting, gathering, trimming, de-barking, and bundling of woody materials are performed at various locations, depending on users' access and rights to procure wood fuel (FAO,1999; Wickramasinghe, 2001a).

In gathering and carrying, women are exposed to the sun, to rain and to humid conditions. The activities that are performed tend

to cause injuries, cuts, bruises, sprains, and in some cases fractures where there are incidents of falling while pulling wood and climbing. It has been found that gatherers are subjected to snake bites, fungal infections and pests while collecting deadwood from the fields. They are exposed to harmful chemicals from fields sprayed with pesticides and herbicides, while gathering and transporting the wood. Long hours of cooking increase the chances of toxic and harmful chemicals entering the body. Skin irritation and allergic reactions are reported as consequences of this exposure, contact and subjection of the gatherers to hostile conditions. About 68% of the households reported that between two and three hours on average, excluding travel time, is spent in collecting one headload (a bundle of wood), and that this activity is often repeated three times a week.

Nearly 80% of respondents mentioned headloading as one of the most exhausting tasks in the system. Immediate health consequences are fatigue, headaches, and pains in the joints and chest. The elderly believe headloading to be the most crucial single factor causing repetitive strain injuries, and say it causes serious physical suffering. The headloading of wood several times a week over a period of more than 30 years, without having long breaks other than during the late stages of pregnancy and immediately after child delivery has weakened the joints, affected backs and also weakened the resistance to infections. For instance, the chances of getting respiratory infections, bronchitis and cardiovascular diseases are high among those who are engaged in such exhaustive tasks over a period. This whole scenario points to the direct and immediate consequences of these tasks in risk-prone environments, and their long term and cumulative consequences for health.

The Combustion Sphere

Biomass combustion within a confined space in the household interior also has serious health implications. Exposure to hazardous outputs, including particulates, causes serious health problems. Respondents are often exposed six to eight hours a day, and even longer during peak seasons in the agriculture cycle, rainy seasons, and in seasons where grains are stored above kitchen hearths for smoke-drying. The most common incidents of self-reported morbidity of those exposed and subjected to heat, flame and smoke, fall into four main categories (see Table 2).

Table 2. Self-reported health problems experienced by biomass users in cooking

Problem	Reporting
Respiratory problems	All
• Coughing	
• Chest tightness	
• Bronchitis	
• Wheezing and asthma	
• Acute respiratory infection (ARI)	
• Pneumonia	
• Sneezing	
• Respiratory tract irritation	
Nausea, loss of appetite for food	All
Headaches and sinus problems	All
Itching eyes, eye irritation, burning and stinging of eyes	All
Backache and fatigue	60%
Dizziness and lethargy	70%
Skin irritation	80%
Burns	40%
Menstrual disorders	20%
Pregnancy complications	18%
Low birth weight of offspring	6%

The first and most widely reported problems are associated with complaints related to the respiratory tract, ranging from coughs to asthma. Second is nausea and loss of appetite for food; followed by headaches and sinus, and various eye problems. As explained by a group of women "Cooking in these small kitchens is a miracle, it is like involuntary smoking, we inhale all the pollutants, and live in an aroma and polluted space, and during rainy seasons it is like working in smoke chambers".

The area affected by combustion is partly determined by the space and relative location of the cooking hearth. 60% use three-stone hearths and of these 40% also have mud spread hearths, prepared by women, with one side opening to enable wood to be inserted. 8% of those who have mud spread hearths do have improved cook stoves. However three-stone hearths are used by 88% of the households when large scale cooking is needed, meaning that the spreading of heat, smoke and flames over a wide area is somewhat unavoidable.

Only in 28% of cases did kitchens have chimneys. Only about 32% have windows for ventilation, so the possibility of carbon monoxide stagnation is high in about 68% of cases. About 48% of the households have hearths on elevated surfaces and the remaining 52% have hearths on the kitchen floor.
The two major categories of harmful outputs produced during combustion are (1) energy and heat; and (2) waste and pollutants; primarily smoke consisting of harmful gases, liquids and particulates. Interestingly, many of the outputs are actually seen by households as useful. Flame, heat, smoke, ash and soot generated during combustion, are by-products used by the households to repel and control pests, dry excess food, perform rituals, etc. None of the households depend solely on only one type of biomass or good quality woody segments. The interior conditions of the indoor workplace vary greatly; no standard type of stove/hearth is used; and the position of the hearths in the kitchen space varies. So the time spent in cooking and related work will vary as well.
Occupational hazards are reported to be most serious during the rainy seasons, both in outdoor and indoor workplaces, since biomass with relatively high moisture content is gathered, headloaded and burned. In some cases there is exposure to toxic gases where wood with high latex contents such as *Eucalyptus*, and *Pinus* are burnt. Exposure to toxic output increases when burning becomes difficult.

Women perceive the whole system as one that reduces their capacity to lead a normal life. It was explained that, "Heat itself is a threat to their own health. Exposure to heat daily for several hours and blowing the hearth to strengthen the flame, burns energy. And this exposure turns blood into water". Although no scientific testing has been done, women believe that continuous exposure to indoor air pollution will result in leukaemia and end with their death.

Ideological Grounds that Undermine Health

Despite every single household covered in this study having negative experiences with the biofuel cycle, awareness and concern at the policy level are poor. Two questions demand an answer. Firstly, why have these detrimental effects related to the tri-sphere biofuel cycle not received due attention? Secondly, are these problems marginalised due to the fact that this most vulnerable group - poor women - are themselves a marginalised group, and ideologically, women do not have equal status?

The allocation of labour and the division of responsibilities pertaining to the supply and combustion of biomass between men and women are determined by the placement of biofuel in the realm of household wellbeing - for which, according to the established ideology, women are responsible. The norm regarding cost-free procurability is conditioned by two other factors: first, the biomass fuel cycle is seen as a contribution to domestic welfare, rather than to

commodity production; and second, biofuel cycle activities are designated as one of the unpaid household chores. Self-collection for household use, and combustion for family cooking, have conveniently made it possible to ignore the effects on workplace environments. In the rural household sector every activity is dominated by women's labour. The greater the distance from the households to the gathering locations, the less men assist. The lowest participation by men is noted in gathering deadwood, and therefore their vulnerability to risks is low.

In all the villages covered in the survey, morbidity rates were only high among women, and men had no complaints other than occasional injuries. The common problems reported by women, including repetitive strain injuries, respiratory problems, nausea, headaches, itching eyes, and also skin irritations, can be attributed to their repeated engagement in the biofuel cycle. The injustice is the placement of biofuel cycle activities within women's conventional domain on the basis of socially fixed stereotypes, which ignores their vulnerability (Wickramasinghe, 2001b).
Matters requiring policy attention are not confined to energy conservation measures. A multidisciplinary approach involving housing interventions, including construction designs, chimneys to draw smoke, proper indoor ventilation, space planning and cooking arrangements, is urgently needed. For future planning, Sri Lanka is in need of gender-disaggregated data on procurement, transportation, combustion, and health issues associated with the whole biofuels cycle. Local action agendas through community participation should be a national priority since biofuel will remain the most common and widely used energy source in domestic cooking. The morbidity problems reported by women whose health is interlocked with the tri-sphere biofuel cycle should be a priority area. ■

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◆ Anoja Wickramasinghe is a Professor and Head of Geography at the University of Peradeniya, Sri Lanka, and Coordinator of the Collaborative Regional Research Network in South Asia (CORRENSA). Her research has focused on Environment, Forestry, Rural Development, Indigenous Knowledge, Common Property Management, Community Development, Wood Energy, and Women. She is the author of several books in these areas: Deforestation, Women and Forestry (International Books, 1994); People and the Forest: Management of the Adam's Peak Wilderness (Sri Lanka Forest Department); Land and Forestry: Women's Local Resource-based Occupations for Sustainable Survival in South Asia (CORRENSA, 1997); Development Issues Across Regions: Women, Land and Forestry (CORRENSA, 1997); and the author of Gender Aspects of Woodfuel Flows in Sri Lanka: A Case Study in Kandy District, Field Document No. 55, 1999, FAO/RWEDP in Asia, Bangkok. Anoja is also a trainer on participatory planning, gender analysis and environmental management.

◆ For more information, please contact: **Anoja Wickramasinghe, University of Peradeniya, Peradeniya, Sri Lanka; Tel: +94.(0)8.288.301, Fax: +94.(0)8.232.516, Email: niluwick@slt.lk**

Health Implications for Women and Children of Wood Fuel Use in Cambodia

Dara Moeung

The health implications of wood fuel usage and supply have only recently been recognised in Cambodia. This article, by a health sector professional, lays out some of the issues that need to be explored in future research.

Fuelwood is widely used as a cooking fuel in rural Cambodian homes, often in poorly ventilated conditions leading to high exposure to health-threatening air pollution. In other countries in Asia, it has been found that indoor air pollution can lead to health problems such as Acute Respiratory Infections (ARI) and coughs. In addition, a dependence on wood fuel can lead to other health problems arising from wood collection, transportation and combustion.

Women, particularly in rural areas, perform the majority of household and agricultural labour tasks in Cambodia. This heavy burden has repercussions on women's energy and education. Working in the Ministry of Health in Cambodia, the fact that there is a relationship between energy and women's health has become evident. It has not yet been possible in Cambodia to carry out any special studies into this. However, from discussions with health workers and field visits, as well as what we have learnt from experiences in other countries, we have identified a number of issues that we think could be relevant in creating a framework and "checklist" for future research on energy and women's health in Cambodia.

This note is based on a paper presented at the regional workshop on "Gender Issues in Wood Energy", held at the Asian Institute of Technology (AIT) in Pathumthani, Thailand on 21-23 November 2000 and jointly organised by the FAO/RWEDP and AIT/GenDev.

What are the Health Implications of Wood Fuel Use for Women and Children in Cambodia?

A - Wood Fuel Collection

- Less time available for infant and child care, especially breast-feeding. Collecting fuelwood for cooking consumes increasingly more time in areas of scarcity. With the increasing population, and the resultant increase in demand for fuelwood, women have to walk further and further to meet their fuelwood needs, leaving less time for rest and other household activities such as giving the necessary love and attention to the children. Infants are deprived of vital breast milk if the mother spends too much time away from home.
- Trauma
- Cuts, which can lead to tetanus, and bruises
- Allergic reactions
- Fungal infections
- Malaria: Malaria is the major cause of illness and death in Cambodia. Malaria takes a heavy toll on females and children venturing into the forest to collect wood for cooking.
- Bites from venomous snakes, spiders and insects.
- Land mine injuries: Land mines are a serious problem in Cambodia, causing it to have the highest proportion of amputees in the world. Innocent women and children engaged in collecting fuelwood are among the victims of this scourge.

B - Fuelwood Transportation

- Backache
- Severe fatigue: As women are the primary deliverers of health care and nutrition to their families, it is essential that they have adequate time to discharge these duties, while remaining in good health themselves. A fatigued or over worked, malnourished, mother cannot produce or care for healthy children.

C - Wood Fuel Combustion

1. Effects of smoke

- Acute respiratory infections (ARI). ARI in children, one of the chief causes of infant and childhood mortality, has been associated with exposure to household smoke.
- Coughs
- Bronchitis
- Still births
- Eye problems
- Cataracts: A number of factors have been found to accelerate cataract growth. These include exposure to sunlight; deficiency in Vitamin A, C, and E; smoky cooking fuels such as wood, charcoal and dung.

2. Effect of toxic gases

- Acute poisoning

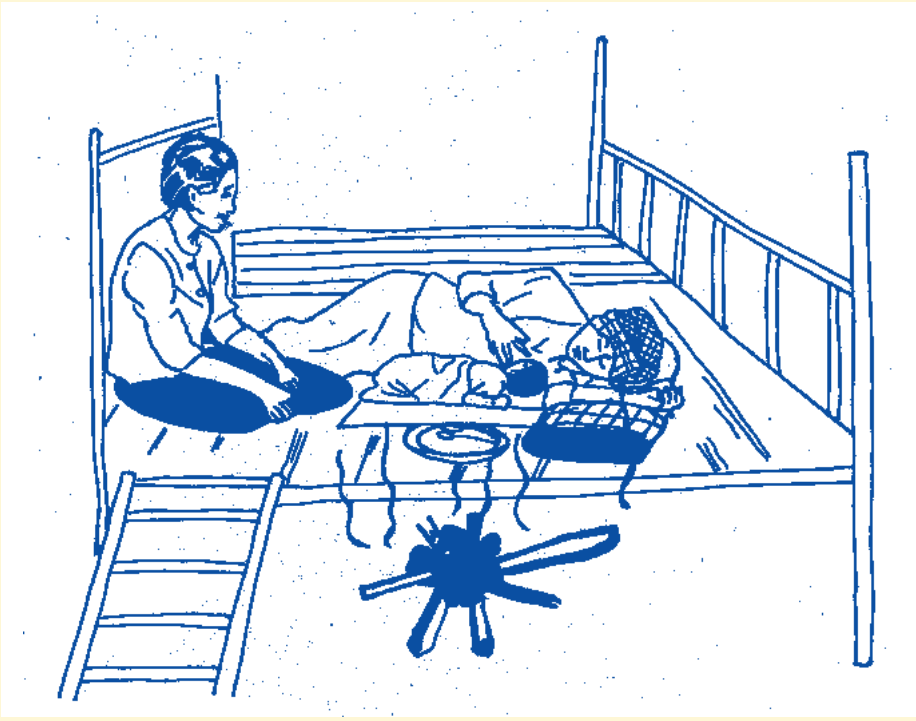
3. Effects of heat

- Burns: The danger of sustaining burns is another hazard of fuelwood combustion. While fuelwood is most commonly used for cooking, it is sometimes used to provide warmth. In rural Cambodia, it is a common practice to light a fire under the bed of a mother after childbirth, to provide heat to improve the blood circulation. This practice is continued for at least one week after childbirth, during which period the mother is not allowed to complain, even if the fire is too hot. It is up to her relatives to attend to her needs and tend the fire. This often leads to burns.

Fuel scarcity has adverse effects on the health of both mothers and children. It impacts on food availability, as household management strategies may include a reduction in frequency of cooking, leading to a loss in the nutrition gained from fast cooking foods, eating cold leftover food, or warming up previously cooked food. These strategies increase the risk of food borne diseases, impair the absorption of proteins, reduce the intake of vitamins and energy, and decrease the amount of food consumed. The health and social costs of fuel insufficiency are therefore high, and again these impact greatest on women and children.

Recommendations

Although there are a number of potential negative effects, most concern and research has been directed towards those related to exposure to smoke. More research is needed into all aspects of the problem; for example, in Cambodia, the reproductive health of expectant mothers and the future wellbeing of their babies are important areas for research. The introduction of low-cost fuel-efficient stoves to rural homes has, in other countries, helped to ease the burden on poor women to some extent. These stoves emit less smoke in the kitchen and produce more heat, thereby facilitating quicker cooking and consuming less fuelwood, leading to time-saving both by reducing the cooking time as well as the frequency of journeys to collect fuelwood. Further research in Cambodia should adopt a multidisciplinary approach, coordinating inputs from doctors, social scientists, and technical experts on improved stoves and appropriate housing design. ■



In rural Cambodia, it is a common practice to light a fire under the bed of a mother for one week following childbirth, to provide heat to improve blood circulation. The mother is not allowed to complain, even if the fire is too hot; and this often leads to burns. (Illustration: Courtesy of Dara Moeung)

◆ Dara Moeung is working at the Ministry of Health in Cambodia.

◆ For more information on this article, please contact: **Dara Moeung, Ministry of Health, No. 151-153 Kampuchea Krom Street, Phnom Penh, Cambodia;**
Tel: +855.(0)23.880406,
Fax: +855.(0)23.426841

Solar Disinfection of Water in Latin America Benefits Women and their Families

Xiomara del Rosario Torres

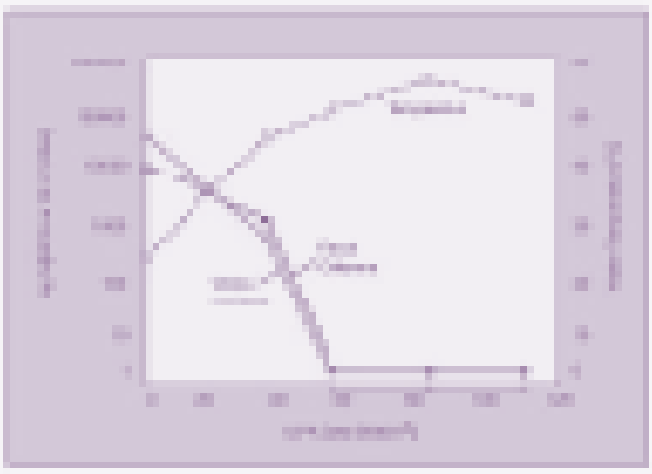
Ana Choque Salas

Solar water disinfection (SODIS) in Latin America is a possibility for thousands of people who, due to their precarious conditions, have no other option for obtaining clean drinking water.

It especially benefits women and children since they traditionally have the responsibility within the family for water collection and its treatment, including collecting fuelwood for boiling drinking water to make it safe. For many years, home methods of disinfection such as chlorination and boiling have been proposed, but both of these methods have their limitations. For example, the use of chlorine is limited by problems of supply and by the frequent rejection of treated water due to its disagreeable taste. The opportunities to boil water are limited given the high cost of fuels and/or the scarcity of fuelwood for a significant segment of the rural and peri-urban population, who continue to drink water without any kind of treatment.

Solar water disinfection (SODIS)

SODIS is a simple technology that utilises the energy of the sun to inactivate and destroy pathogenic microorganisms present in water. Basically it amounts to filling transparent bottles with water and exposing them to the sun for a minimum of six hours. Disinfection takes place through the combined action of ultraviolet (UV) radiation and the increased temperatures generated by the sun. Research has demonstrated that SODIS results in reductions of up to 99.9% in faecal coliforms, a good indicator of the faecal contamination of water. The same has been shown for *Vibrio Cholerae* bacteria. Studies are presently being done to determine the effectiveness of SODIS for parasites such as *Giardia Lamblia*.



This graph shows a sample being treated using SODIS, leading to the gradual removal of faecal coliforms.

Solar radiation arriving at ground level is composed of different types of light: ultraviolet, visible, and infrared. Of these three, UV is the most important for SODIS. The intensity of solar radiation varies as a function of latitude, location and hour of the day. The most favourable geographic area for SODIS, as for other solar technologies, is found between 15 and 35 degrees latitude North and South. These regions are generally semi-arid, with few clouds and little rainfall, thus receiving a high level of solar radiation. The semi-arid climate of the Andean zones of Bolivia (Altiplano and Valle), where the dissemination of SODIS on a large scale began this year, thus provides very favourable conditions for solar technologies. Furthermore, the ultraviolet radiation that makes SODIS effective increases significantly with altitude.

Since 1991, extensive laboratory tests carried out by the Swiss Federal Institute for Environmental Science and Technology (EAWAG), and its Department of Water and Sanitation in Developing Countries (SANDEC), have demonstrated the efficiency of SODIS in inactivating bacteria and viruses present in water. Following these laboratory trials, a series of field investigations have continued to validate the technology, as well as the implementation of demonstration projects, in a few developing countries including Bolivia. Following positive experiences in Bolivia between 1997 and 2000, especially with the acceptance of the technology by users, and considering the precarious drinking water supply situation in many marginal rural and peri-urban areas of Latin America, the SODIS Foundation was established, with the support of EAWAG/SANDEC, and the financial support of the Avina Foundation in Switzerland.

The SODIS Foundation

The SODIS Foundation, through its dissemination projects, has as its principal objective the desire to contribute to improving the living conditions of people who do not have access to clean drinking water, through the promotion and sustainable dissemination of SODIS. The initiative started in Bolivia at the beginning of 2001, and fourteen demonstration projects will be started in 2002 in Ecuador, Peru, Guatemala, Nicaragua and Honduras.

The SODIS Foundation does not implement projects directly, but rather through various partner organisations, who already have a field presence with extension workers, and can integrate SODIS into their existing programmes. To date, fifteen partner organisations working in the areas of health, education and sanitation are cooperating in the dissemination of SODIS in Bolivia. From a field evaluation presently underway, it can be estimated that there are about 8,000 family members using SODIS in Bolivia at present.

The investment costs for families wishing to use this technology are truly minimal, only the bottles have to be acquired. A considerable quantity of suitable bottles have been obtained through recycling campaigns organised directly by the Foundation or through coordination with the implementing partner organisations, followed by their distribution to sites where bottles are not easy to obtain.

Gender Perspective in Communities where SODIS is being Implemented

The planning of family activities in rural areas of Bolivia is normally related to the time of the year, including the planting and harvesting seasons, which are considered the busiest periods requiring the most family labour. Men have the major decision-making power in households, with women's rights and participation, for cultural reasons, relegated to the background. However, in spite of this, there are areas where women have roles as protagonists, areas related to family education and health, where women are able to take advantage and form focus groups to express their interests. These spaces form one of the strategic points where the dissemination of SODIS has gained most success.

In order to understand a little better the situation outlined here, we can look at the division of labour between men and women in the use and management of water as shown in the table below. From this description of the roles of men and women in water provision, we can conclude that knowledge, as well as the management, of water is the responsibility of women.

Table: Approximate division of labour between women and men in water provision in Bolivia (rural areas)

Activities	Women	Men
Wash clothes	More	Less
Knowledge of water sources	More	Less
Transport of water from the sources	More	Less
Care and management of the receptacles	Equal	Equal
Hygiene of the household environment	More	Less
Personal hygiene	Equal	Equal
Boiling water	More	Less
Transport of fuelwood	Equal	Equal
Teaching children about water disinfection	More	Less

Source: Metodología práctica para la incorporación de género en proyectos de desarrollo rural, M.R. Bejarano and R. Soriano, La Paz 1997.

Direct Beneficiaries of SODIS are Families, and Especially Women

SODIS constitutes a benefit for families, and especially for women directly since they are principally responsible for water disinfection at the level of the household. In recent work with focus groups in the rural area of Mizque, where we are working with UNICEF-Bolivia on dissemination of the technology, it was very gratifying to hear the women expressing themselves:

This girl in Bolivia is filling bottles with water, which will be disinfected using solar energy. This technique especially benefits women and children since they are responsible for water collection and treatment.
(Photo: Courtesy of Fundación SODIS)

"SODIS is good for our health, because the water that we are drinking doesn't have bugs that can cause diarrhoea."
"Now I don't have to carry wood from so far away."
"Since I know about SODIS, I take better care of my children's health."

Further, confirming a reality that needs no comment:
"It is better to teach SODIS to we mothers and not to the men!"

CENPOSEP (the Popular Center for Health, Education and Production), located in Potosi, is one of the partner institutions in Bolivia and is very conscious of this situation. CENPOSEP, together with members of its internal committees (who are leaders of grassroots organisations), plans and executes preventative health campaigns, through discussions, training workshops and home visits to families in the area. These have the principal objective of contributing to the improvement in the quality of life of families, especially to reducing the high infant mortality rates in peri-urban areas of Potosi. "Responsables Populares de Salud" (RPS), are promoting this work in the barrio (neighbourhood) of San Pedro in Potosi, including the dissemination of SODIS through various groups of women leaders. One such group is the Grupo de Madres Solidarias. The RPS meets every two weeks with these mothers for discussions on health interests, organisation and leadership, as well as to train them in handcrafts such as painting, embroidery, and even to teach them how to become bakers. The RPS are all women volunteers, each responsible for 10 families, and are part of a CENPOSEP-supported cooperative that sells bread and chilli. The work of the RPS is guided by CENPOSEP technical staff (three nurses and a woman doctor).

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◆ Xiomara del Rosario Torres is Honduran, a civil and sanitary engineer, and has worked for more than ten years in the planning and implementation of low-cost alternatives in water and sanitation in rural communities and peri-urban areas. She has worked especially on community participation of women and men, in infrastructure development, as well as on organisational work and sanitary education.

◆ Ana Choque Salas, a Bolivian originally from the mining camps, is a social communicator who has worked for a number of years in areas that contribute to reflections on social consciousness and change that is oriented to the more human development of rural and marginal urban populations, both at the level of women's organisations and of community organisations in general. She has focused especially on literacy and popular education, researching, among other things, the knowledge and degree of participation of women in natural resource activities, as well as leadership promotion. She has also produced educational materials and developed working methodologies with a view to the participation of both men and women.

◆ For more information on the article and the dissemination of SODIS in Latin America, please contact:
Xiomara del Rosario Torres, Director Fundación SODIS, or
Bruno Gremion, Deputy Director, Cochabamba, Bolivia;
Tel: 591.(0)4.4542259/4542348,
Fax: +591.(0)4.4542259,
Email: sodis@mail2.supernet.com.bo,
or sodisla@fcyt.umss.edu.bo

◆ For more information on the SODIS technology, please visit the webpage: **http://www.sodis.ch**

A typical beneficiary

Doña Nicanora de Burgos and her family live in a peri-urban zone of the city of Potosi in Bolivia. She is a real example of the women directly benefiting from SODIS technology and by the work of CENPOSEP. Each day Doña Nicanora takes advantage of the large benefits that SODIS offers, preparing cold drinks and jellies with SODIS water, which she sells to augment her family income. Doña Nicanora is happy, she no longer has to spend money on boiling water for her cold drinks and jellies; and so are the consumers of her products, since they know that the jellies they consume are prepared with safe water.

Experience with the dissemination of the solar water disinfection technology on a large scale is relatively new; nonetheless we think that, at the practical level of the beneficiary, the benefits are clear to the women because it contributes to improved health, reduces their workload, and can improve the distribution of the economic income of the family. At the strategic level it places a great emphasis on strengthening the participation of women in community organisations through actions that foster leadership and strengthen self-esteem and the capacity to transmit the message of SODIS within the communities.

The entire process for diffusing SODIS places an emphasis on spaces for reflection, for example through focus groups and educational fairs, through which we seek to achieve a working methodology that allows equitable participation by men and women. In this way we hope to avoid the roles of either becoming invisible in the challenge that we, as a foundation, have laid out: to improve the quality of life of those people most in need of safe drinking water, especially women and children. Finally, we would like to emphasise that, for the Foundation, the dissemination of SODIS technology is a learning process, through which we hope to find, in the company of our partners and especially the beneficiaries, the best means of ensuring that day by day, more people use SODIS in a sustainable way. ■

Rural Electrification Benefits Women's Health, Income and Status in Tunisia

Sawsen Chaieb

Ahmed Ounalli

Rural electrification in Tunisia is rooted in a strong national commitment to a broad programme of rural development, gender equity and a reduction in social inequities.

The increase in the rate of rural electrification, from 6% in 1976 to 88% in 2000, has been paralleled by a reduction in the incidence of poverty, from 40% at independence to 7% today; the achievement of almost full enrolment of children in primary school; the increase in life expectancy from 50 to 70 years; and an improvement in the status of women, with women now comprising a third of the labour force. The rural population in this period has stabilised, with the rate of urban growth decreasing from 4.3% in 1975 to 1.2% in 1999, despite a doubling in the total population. At present, 35% of Tunisians live in rural areas. The rate of population growth has also fallen, from 2.3% in 1975 to 1.2% in 1999. Improvements in health services programmes (including family planning) and basic education programmes were two of the three pillars of the national rural development drive that contributed to these achievements. The third pillar was rural electrification.

Gender in Tunisia

Tunisia's constitution on independence in March 1956 decreed: "All citizens have the same rights and the same duties. They are equal before the law." On August 13 - now celebrated as National Women's Day - Tunisia's first president, Habib Bourguiba, translated his keen personal interest in promoting women's rights into practice with the promulgation of a Personal Status Code that, among other provisions, abolished polygamy, instituted judicial divorce, and set a minimum age of 17 for girls to marry. The Tunisian government has invested heavily in education and health care to ensure that women are able to take advantage of their new legal rights. This equal rights policy has been remarkably consistent over the last 45 years. Further measures have been introduced to strengthen women's social and political rights, and to ensure equality in the labour market. At present, female students outnumber males in Tunisia's universities, there are 5,000 women heading private companies, and 12% of senior business executives, 35% of doctors, 50% of academics and 63% of pharmacists are women.

The Center for Research, Studies, Documentation and Information on Women (Credif) was established in 1990 to promote equal opportunities for women. In 1991, school textbooks were revised to incorporate gender sensitivity. Regular training courses help women in public and private sector institutions to build skills and confidence to help advance their careers. In 1994, Credif established "The Observatory on the Status of Women in Tunisia", which encourages research on the status of women in Tunisian society and collects and disseminates data that can be used in formulating policy.

Situation of Rural Women in Tunisia and Major Health Issues

Developments in the conditions affecting rural women are closely linked with the evolution of health and educational issues in rural areas. Improvements are clear from demographic trends since independence. In the 1950s, Tunisian women had on average six pregnancies; while infant mortality was 50%. In the 1960s, infant mortality declined drastically, while fertility boomed, resulting in a high natural population growth. By the early nineties, however, the rural fertility rate had dropped to 3.7% (compared to 2.6% in urban areas). Tunisia is now rapidly approaching a norm of two children per family.

Among the main factors that have contributed to this are:

- Rapid development of the basic health infrastructure required for the implementation of eradication programmes against endemic diseases: from 1966 to 1994, the number of basic health centres increased almost fourfold from 463 to 1730.

- Development of health personnel and a reduction in regional disparities between urban and rural in term of doctors per capita from a ratio of 1 to 10 in 1972 to 1 to 5 in 1987.
- Development of primary health care through reinforcing the role of basic health centres to include: preventive care, targeting risk groups (those with diabetes, high blood pressure), and the integration of family planning actions within these centres.
- Improvement of children's nutrition.
- Increased number and improved medical consultations before and after birth, and follow-up during pregnancy.

These factors were all supported by rural electrification, as will be shown below.

An Informal Rapid Assessment of User Perceptions

In May 2001, an informal socioeconomic rapid appraisal was carried out in connection with a study for ESMAP[1] on the main factors behind the success of rural electrification in Tunisia. This study, on user perceptions of benefits, illuminated a number of positive linkages – according to users - between rural electrification and education, health, and the quality of life. Women and girls in particular appear to have benefited from improved access to education, health services (especially in terms of reproductive health), information from TV, and economic opportunities. The assessment was carried out in four villages in three regions of Tunisia: Bizerte in the North, Siliana in the Centre-West, and Nabeul in the Northeast. The areas chosen had had electricity for between two and five years. The survey team conducted interviews with 54 households, as well as with key informants in health, family planning and rural development services, and agricultural and agro-processing users. Family planning assistants, who have a long experience of direct relationships with rural families, interviewed an additional 50 households. The appraisal explored not only perceived benefits of rural electrification, but also problems in service, for example power cuts.

User Perceptions of the Benefits of Rural Electrification: Education, Health, Status, and Income

The household users had quickly taken advantage of grid connection. Each had on average two lights per room. Refrigerator, TV, and radio ownership rates varied between 1 for every 2 households and 1 per household, and some households owned satellite dishes (nationally, 72% of Tunisian households owned refrigerators as of 1994, and 92% had televisions, of which 70% were colour). The beneficiaries were well aware of the benefits that rural electrification could bring.

It was found that users see a number of positive linkages between rural electrification and education, health, and the quality of life. This woman in Tunisia, for example, is enjoying the benefits of a refrigerator and a radio.
(Photo: Courtesy of Ahmed Ounalli)

Education is usually the number one priority for families in all walks of life in Tunisia, so it is not surprising that the first benefit of rural electrification cited by households with school-age children is improving homework and school performance, while at the same time avoiding eye problems from using candles and kerosene lamps. Schools assert that the rate of enrolment by girls has caught up with that of boys, after the electrification not only of households, but also of schools and public streets. Public lighting has reduced the risks of travelling to school - an important concern for families with girls. The construction of tarred roads, in a coordinated rural development effort, has also contributed to reducing the rate of absenteeism. Within schools, electric lighting has improved conditions, especially during the dark hours of winter, when previously each student had to bring their own candle. All this is believed to have contributed to the increased rate of graduation (60-70%) in these rural areas.

Basic health and family planning has been the second most important social priority of the Tunisian State, after education, and this is also reflected in the benefits perceived from rural electrification. Rural electrification was provided at the same time as clean water and well-equipped and staffed health clinics. For example, a nurse is always available even in these remote clinics, a general practitioner visits once a week, and a specialist health team regularly visits. Health clinics have lights, a refrigerator, negatoscope, steriliser, fans, oil heaters, radio, TV, and sometimes a video. The majority of drinking water points are equipped with pumping devices, with mains electricity much in demand to replace diesel.

Beneficiaries and health staff attributed at least part of the reduction in the birth rate in their areas to rural electrification, which increased the effectiveness of family planning and other health programmes. Clinics report being able to expand the range of their equipment and services: for example, televisions and videos are used to present programmes on public health and disease prevention in some waiting rooms; instruments can be sterilised; and vaccines for babies and anti-tetanus shots for pregnant women are more widely available. According to a nurse attached to one clinic, the availability of refrigeration for vaccines and medicines has contributed to a noticeable reduction in childhood diseases, diarrhoea and poisoning.

Women's reproductive health in particular is seen as having benefited from electrification: women with electricity organise their daily tasks so that they have time to watch TV, which passes on many health messages, for example on reproductive health and contraceptive methods; vaccinations; the prevention of sexually transmitted diseases; and health checks for breast cancer, colon cancer, etc. The family planning units in the villages now use audio-visual aids, making awareness-raising campaigns more effective. Better information for girls from family planning services, but above all from TV, is credited with the rapid decrease in teenage pregnancies. Even tube tying and implants (sterilisation), which require hospitalisation, have been facilitated by household electricity: with refrigeration, women are less reluctant to absent themselves from their household tasks, since they can prepare and store meals for their families in advance.

Women and health staff also perceive other changes in ***women's quality of life*** due to rural electrification. Both husbands and wives are reported to spend more time at home. Installation of TV (and sometimes satellite dishes) in their homes means that women have become much more aware of political events and know much more about what is going on in the world than their husbands, thus giving them the confidence to speak up and defend themselves and take on more leadership roles. Rural women and children - especially girls - are becoming more demanding about personal hygiene and more fashion conscious, following the latest TV advertisements and fashions!

Increased economic opportunities for women in the home and the village are perceived as one outcome of electrification. Electric lighting makes evening activities possible, and many girls say they prefer to stay in the village and earn a living using a sewing machine, weaving or knitting, rather than going to the city to work as maids. Sewing workshops and hairdressers (presumably a result of the increased fashion consciousness!) figure prominently among the new economic activities linked to electrification. Equipment is often donated to households through various State development programmes. Refrigeration is also valued for providing the ability to conserve food and medicines, and save money by rationalising shopping.

Recommendations for the Future

Although the initial results from this study are instructive in themselves, they highlight the need for more in-depth research investigating the aspirations of rural women, what are the remaining problems that they still face related to energy, and what could be the contribution of the energy sector in general, and electricity activity in particular, to addressing the needs of both women and men, in the health sector and beyond. ■

[1] *Rural Electrification in Tunisia: National Commitment, Efficient Implementation, and Sound Finances, by Elizabeth Cecelski, Ahmed Ounalli, Moncef Aissa, and Joy Dunkerley, draft report to ESMAP, World Bank, Washington, DC, October 2001.*

◆ Sawsen Chaieb, with a degree in Mathematical Statistics from University of Paris VII, and a Doctorate in Statistics from University of Paris VI, is at present teaching Statistics and Econometrics in a Management Institute (Institut des Hautes Etudes Commerciales de Carthage) at the University of Tunis. She has taught since 1980 in various French and Tunisian Universities and is also a member of the National Statistics Council. She participated actively in the study on the socioeconomic impact of rural electrification on rural households within three rural regions of Tunisia.

◆ Ahmed Ounalli graduated from the Faculty of Economics, University of Tunis and has a postgraduate diploma from the University of Fribourg (Switzerland) in Automation and Operations Research. His experience in the energy field dates back to 1974. At present, he is working as an Energy Economist with the Tunisian Electricity and Gas Utility. He also acts as a short-term consultant for the African Development Bank, the World Bank and other United Nations Organisations. He worked for three years with the Economic and Social Commission for Asia and Pacific (ESCAP) as a Regional Advisor within the Regional Energy Development Programme. He participated as a national consultant in the ESMAP study on the analysis of Tunisian rural electrification experience.

◆ For more information, please contact: **Sawsen Chaieb, 21 Avenue des USA, 1002 Tunis, Tunisia; Tel: +216.(0)71.782.824, Email: sawsen1999@yahoo.fr** or **Ahmed Ounalli, 14 Rue Ibn Sina, 2010 Manouba Centre, Tunis, Tunisia; Tel: +216.(0)71.800.960, Fax: +216.(0)71.798.143, Email: ounalli.a@planet.tn**

Rural Electrification in South Africa: Implications for the Health and Quality of Life of Women

Angela Mathee

Thea de Wet

South Africa has a national household electrification programme which has seen the provision of electricity to hundreds of thousands of dwellings each year. In respect of women, especially those living in rural areas, the potential benefits of a safe source of household energy include a reduction in exposure to indoor (and ambient) air pollution, enhanced health, saving of time, and improved safety, leading to an overall improvement in the quality of life. However, while undoubtedly offering wide-ranging benefits, the implementation of the electrification programme in South Africa has several important lessons in relation to women. This article describes the situation of women in South Africa, and reflects on some gender-related issues associated with rural electrification.

The Situation of Women in South Africa

A degree of inequality in socioeconomic status and quality of life exists between men and women in South Africa, especially when considering rural black women. A higher proportion of women hold unskilled jobs (56% of South African black women have unskilled jobs compared to 25% of their male counterparts), and consequently earn low wages (48% of South African black women and 26% of South African black men earn low wages) (SSA 1998). It is commonly held that "poverty is most likely to be found in a rural household headed by a black woman" (Makan 1994).

The burden of household management in rural areas is borne by women. While generally excluded from economic decision-making processes, women are nevertheless held responsible for a wide range of household tasks, including domestic hygiene, washing and ironing

This photograph shows the use of both an electrical and a coal stove in a South African household. "Backswitching" occurs during colder periods. When stoves are also to provide space heating, coal and wood stoves appear to be more cost-effective than electrical cookers. (Photo: Courtesy of Angela Mathee)

of clothing, the care and education of children, care of the sick and elderly, food provision and preparation, collection of water, as well as the collection of fuel, not only for cooking but also for water and space heating.

Women and Energy Services

The provision of safe and appropriate energy services is seen as a fundamental pillar of the programme of reconstruction and development currently underway in South Africa to address ongoing racially-based inequalities. In 1990, only 30% of South African households had an electricity supply, with a bias towards urban households. However, in remote rural farmland areas, the dwellings of wealthy, usually white, households were frequently electrified, whilst their black counterparts had to make do with more polluting solid or liquid fuels such as wood, coal, paraffin (kerosene), animal dung, and crop wastes. Such variations in the access to electricity were still evident in a 1996 national census. In the Western Cape, a largely urbanised province, 77% of households used electricity for cooking, whereas in the Northern Province, where only 11% of the population lived in urban areas, only 19% of households used electricity for cooking purposes, while wood was used as the main cooking fuel by 64% of households (SSA 1998).

The task of wood collection in rural areas usually falls to women, and to young girls or children. Wood collection increasingly involves walking ever-greater distances, as a consequence of desertification, and carrying heavy loads back to the dwelling. Amongst the risks posed in this process are assault and rape in isolated areas and musculo-skeletal injuries. This arduous task can also take up many hours of a woman's day (up to five and a half hours was reported in certain parts of South Africa), leading to time and energy poverty (DME, 1996).

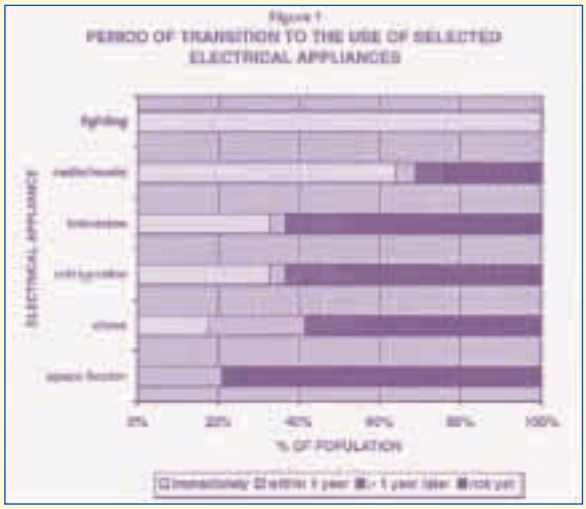
The use of solid fuels for cooking purposes provides other hazards and burdens. For example, the use of wood for cooking is often labour intensive and requires more time to be spent in the kitchen than if electricity was being used. From activity timing studies undertaken in South Africa's North West Province it appears that mothers of young children in nonelectrified villages spend more time in the kitchen than their counterparts in electrified villages. Smoke and other pollutants emitted during combustion are often concentrated in the cooking area, leading to elevated levels of exposure for women. In inappropriately designed housing, for example with small windows and limited through ventilation, indoor air quality may be particularly poor, and pollution levels far exceed the air quality guidelines set by the World Health Organisation. Faulty or substandard stoves, or the absence of a chimney, can also contribute to elevated levels of indoor air pollution. Certain behavioural practices, for example keeping windows and doors shut, and staying close to a fire while it is burning, also increase the risk of exposure to indoor air pollution. The North West Province study showed that the peak periods of wood use (and hence the periods of highest indoor air pollution levels) coincided with the presence of women in the kitchen (Mathee et al. 2001). Other risks from the use of wood and open fires include burns, ingestion of paraffin, and the destruction of property through fire.

The Accelerated National Electrification Programme

South Africa has an abundance of coal and other raw materials from which Eskom, the national electricity utility, generates electricity relatively cheaply (van Horen et al. 1993). This has enabled the implementation of an accelerated national electrification programme, under the umbrella of which around 450,000 dwellings are connected to the national grid annually. The programme aims to raise the percentage of electrified homes from 30% in 1990 to 85% by 2010 (DME 1996, MRC 1998).

Electricity Uptake at the Household Level

It had been anticipated that improved access to electricity would result in a range of benefits at the household level, including economic development, reductions in ambient and indoor air pollution, health improvements (for example reductions in acute respiratory infections and burns), and improvements in women's quality of life. However, evaluations of the programme have highlighted a number of concerns, which reflect the complexity and sustainability of large-scale interventions in the absence of initiatives to address numerous associated limiting factors, such as poverty and the role of women at the household level. Rates of transition to, and sustained levels of use of, electricity have been disappointing, and have not followed a simple linear, modernisation model (van Horen et al.1993). "Backswitching" has occurred, with households reverting to using solid and liquid fuels during colder periods, during times of economic hardship, and for reasons such as cultural or social preference; raising questions about the economic sustainability of the electrification programme.



Amongst the explanations given for the lower than expected level of electricity use, is the influence of poverty. 25% of South African households fall below the international poverty line. The very poorest households (many of which are headed by women) report that they cannot afford the electrical appliances needed for domestic cooking and space heating. As can be seen from Figure 1, the North West Province study indicated that only 18% of households had purchased an electrical cooking appliance immediately after being connected to an electricity supply. More than three and a half years after the provision of electricity, 44% of households had still not purchased a stove (Mathee et al. 2001).

Studies have shown that in electrified homes, energy consumption constitutes, on average, 4% of the household budget, while, in nonelectrified homes, 15% of the household budget is spent on energy (MRC 1998). Other studies indicate that, apart from self-collected wood at no financial cost, electricity is the most cost-effective energy source for cooking. The relatively low cost of electricity, coupled with the access programmes for the rural areas, has resulted in a much higher proportion of households using electricity for cooking in South Africa than in many other African countries. However, when considering simultaneous cooking and space heating, coal and wood burning stoves appear to be more cost-effective than electricity in the higher regions of the country (Graham and Dutkiewicz 1998).

Gender plays a significant role in fuel-use patterns at the household level. Despite women prioritising the purchase of cooking stoves; in practice lighting, entertainment and refrigeration appliances are more likely to be among the first appliances purchased (Bank et al. 1996, White et al.1996, Mehlwana and Qase 1996). This was

confirmed in the North West Province study; when women respondents in nonelectrified villages were asked about the first electrical appliance they would like, the majority of respondents (63%) said they intended to first buy an electrical cooking appliance. However, these anticipations contrasted strongly with the actual events in a nearby village where electricity had been supplied around three and a half years earlier. As can be seen from Figure 1, cooking apparatus were among the last electrical appliances to be purchased (Mathee et al. 2001). A likely explanation for the discrepancy is the more dominant economic decision-making power, and preferences, of men at the household level.

Conclusion

There is little doubt that the large-scale national electrification interventions in South Africa have provided a foundation for many communities to improve their economic wellbeing, health and quality of life. In respect of rural women, however, much more needs to be done to enhance their capacity to make use of the electricity supplied to their dwellings and, in so doing, to improve indoor environmental conditions, their health and the quality of their lives, as well as those of other household members. Sustainable responses need to consider an integrated, holistic approach to development, with both short to medium term interventions (education and behaviour campaigns), as well as longer programmes to improve the position of women at the household level and in the economy at large. ■

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◆ Angela Mathee heads the environmental health research office at the South African Medical Research Council. Formerly, she was Director of the Urban Environmental Management Department at the Johannesburg (Eastern) Metropolitan Council. Her current interests are in household energy and health, and childhood lead exposure in developing countries.

◆ Thea de Wet is an associate professor of anthropology at the Rand Afrikaans University in Johannesburg. She specialized in health and development issues. She was formerly manager of the Birth to Ten longitudinal child health and development study. Currently she is involved in the Young Lives international study of childhood poverty.

◆ For more information on the article, please contact:
Angela Mathee, South African Medical Research Council; Tel: +27.(0).11.717.2403, Fax: +27.(0)11.717.2724, Email: amathee@mrc.ac.za, or **Thea de Wet, Department of Anthropology and Development Studies, Rand Afrikaans University, P.O. Box 524, Aucklandpark 2006, Johannesburg, South Africa; Tel: +27.(0)11.489.3244, Fax: +27.(0)11.489.3329, Email: ye@lw.rau.ac.za**

The Bulletin Board

PUBLICATIONS ON GENDER, ENERGY & HEALTH

Women, Woodfuel, and Health in Adamtar Village, Nepal. Published in: Gender, Technology and Development 3(3), 1999, pp 361-377
By Suman Subba
This paper, based on a field study of 100 women in Adamtar Village, Nepal, examines the health effects of woodfuel-use on women as primary users, carrying large amounts of woodfuel to their homes and inhaling the smoke emitted while cooking. The study found a relationship between exposure to wood smoke and chronic bronchitis in women. The article concludes that forestry development programmes need to take into account access by both women and men to natural resources, and to give decision-making power over the means of production to both. As there is no immediate alternative to woodfuel in the area, appropriate technological interventions for woodfuel seem necessary in order to reduce the adverse effects on women's health.
The GTD archive can be accessed on the Internet at:
http://gendevtech.ait.ac.th/gtd/gtd.htm

Domestic Environment and Health of Women and Children, 1999. Published by TERI-UNEP
This book assesses the state of knowledge, the current situation, and the status of scientific data that link domestic environmental parameters to the health of women. It aims to identify critical knowledge gaps and needed research. Policy options, guidelines, possible interventions, and regulatory tools, to improve women's and children's health have been provided. Indoor pollution has also been reviewed in this book and gender issues are a strong component of this study. The book provides examples of how social and political

The Bulletin Board

backgrounds determine women's activities and patterns at home and at work, and how these consequently affect their health.
◆ For more information, please contact: **Information Dissemination Services, TERI, Darbari Seth Block, Habitat Place, Lodhi Road, New Delhi 110 003, India, Tel: +91.(0)11.468.2100/468.2111, Fax: +91.(0)11.468.2144/468.2145, Email: outreach@teri.res.in**

CONFERENCE INFORMATION

Third International Congress on Women, Work and Health, 2-5 June 2002 in Stockholm, Sweden
The congress is being organised by the Swedish National Institute for Working Life. The focus of the congress will be on combining society and the organisation of work with working conditions and health. *ENERGIA* has been invited to organise a symposium on gender, energy and health. Jyoti Parikh, senior professor at the Indira Gandhi Institute of Development Research and one of *ENERGIA*'s Consultative Group members, will be organising this special session.
ENERGIA is inviting you to submit a paper on gender, energy and health to be presented at this special session. The deadline for submitting papers is 31 January 2002. Four papers will be selected and the candidates will be nominated for a scholarship to attend the Congress.
◆ For more information about the special session on gender, energy and health, and for submission of papers please contact: **Anja Panjwani-Koerhuis at the *ENERGIA* Secretariat in the Netherlands. Email: a.koerhuis@etcnl.nl**
◆ For information about the Congress, please contact: **Carina Bildt, Stockholm Convention Bureau Women Work & Health 2002, P.O. Box 6911, SE-102 39 Stockholm, Sweden; Tel: +46.(0)8.5465.15.00, Fax: +46.(0)8.5465.15.99, Email: carina.bildt@niwl.se,**

Indoor Air 2002: the 9th International Conference on Indoor Air Quality and Climate, 30 June-5 July 2002 in Monterey, California, USA
Indoor Air 2002 is the official conference of the International Academy of Indoor Air Sciences, and organised in cooperation with the International Society of Indoor Air Quality and Climate. Indoor Air 2002 will present the latest knowledge from research on indoor air quality and climate, and provide a forum for related discussions. The scope of the conference includes indoor exposure, sources of the exposures, health and economic outcomes, exposure prevention and mitigation, and associated research and measurement methods. Though gender is not specifically addressed by the conference, topics with a strong gender component include: adverse pregnancy outcomes; cancer and reproductive effects; chronic respiratory or cardiac disease; productivity and economic effects; exposure assessment; and risk assessment/burden of disease. A detailed list of topics is available on the conference website given below.
◆ For more information about the conference, please write to: **Conference Secretariat, Indoor Air 2002, 343 Soquel Avenue, PMB 312, Santa Cruz, California, 95062, USA; Tel: +1.(0)831.426 01 48, Fax: +1.(0)831.426 65 22, Email: secretariat@indoorair2002.org, Website: www.indoorair2002.org**
◆ For sponsorship and exhibition information, please contact: **Hal Levin using the above postal address or phone number**. His email address is: **hlevin@cruzio.com**
Website: http://www.niwl.se/wwh

PUBLICATIONS

Food and Agriculture Organisation
Dimitra Guidebook Rural Women and Development: A directory of NGOs, research institutes and information centres in Africa and the Near East, Volume 2, 2001
The information contained in the Dimitra Guidebook is based on its database, which is freely accessible on the FAO Website (http://www.fao.org/dimitra/query/start1.idc). This volume contains profiles of organisations based in Africa and the Near East that have projects or programmes involving or concerning rural women and development. The database does not claim to be exhaustive, but rather aims to present trends encountered in the different countries. The descriptions were drawn from information provided by the organisations concerned. Energy is recognised as one of the intervention sectors.
◆ For more information, please contact: **Eliane Najros, Coordinator FAO Dimitra Project, 21 rue Brederode, B-1000 Brussels, Belgium; Tel: +32.(0)2.549.03.10, Fax: +32.(0)2.549.03.14, Email: dimitra@dimitra.org, Website: http://www.fao.org/sd/dimitra**

Gender Mainstreaming: Learning and Information Packs
By the Gender in Development Programme (GIDP), UNDP, 2001
These six information packs were designed for capacity-building specialists and staff members with substantive responsibility for gender mainstreaming. However, they have broad relevance for many applied policy and organisational change purposes, and are also of interest to the more general inquirer. The inclusion of information, knowledge and process management elements makes them particularly useful for strengthening the ability of teams and networks to work together. The packs available for download cover:
- Gender Mainstreaming
- Gender Analysis
- Thematic Entry Points
- Strategies
- Knowledge Management
- Process Management

◆ The publication can be downloaded from: **http://www.ids.ac.uk/eldis/gidp.htm**

NEWSLETTER

Indoor Air Pollution and Household Energy News in the latest DFID "Energy" Newsletter, November 2001, Issue 13
This newsletter of the United Kingdom's Department for International Development (DFID) contains information on developments, activities, and news in the energy sector, especially the DFID Knowledge and Research (KaR) programme. The current issue reports on two indoor air pollution and household energy projects:
- A project entitled Reducing Indoor Smoke Pollution and Improving Household Health, carried out by the Intermediate Technology Development Group (ITDG), in collaboration with the universities of Liverpool (UK) and Nairobi (Kenya); and
- Some work by the Child Welfare Scheme in Nepal showing how "Improved Stoves Lead to Better Health".

◆ For more information, or for free subscription to the newsletter, please visit the website at: **http://www.etsu.com/dfid-kar-energy/html/newsletters.html** or contact: **Adele Currant, ETSU, Harwell, Didcot, Oxfordshire OX11 0QJ, UK; Fax: +44.(0)1235.436551**.
Or send an email to Gill Wilkins at: **gill.wilkins@aeat.co.uk**

Next Issue

The theme of the next **ENERGIA News** (vol. 5.1), due in April 2002, will be gender, energy and social development. Your contributions, articles, and/or case studies (1500-2000 words) are most welcome. The deadline for submitting contributions to the next issue is 31st. January 2002.

ENERGIA is an international network on Gender and Sustainable Energy, founded in 1995 by a group of women involved in gender and energy work in developing countries. *ENERGIA*'s objective is to "engender" energy and "empower" women, through the promotion of information exchange, training, research, advocacy and action aimed at strengthening the role of women in sustainable energy development.

ENERGIA's approach is to seek to identify needed activities and actions through its membership, and then to encourage, and if possible assist, members and their institutions to undertake decentralised initiatives. **ENERGIA News** is the principle vehicle for this approach.

ENERGIA News is produced jointly by Energy, Environment and Development (EED, Kurten, Germany), the Technology and Development Group (TDG, University of Twente, Enschede, the Netherlands), and ETC Energy (Leusden, the Netherlands) which houses the secretariat. The focus is on practice, with a conscious effort to *interpret* and *learn* from this practice.

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◆ ***ENERGIA* Secretariat**
c/o ETC Energy
P.O. Box 64
3830 AB Leusden
The Netherlands
Tel: +31.(0)33.4326044
Fax: +31.(0)33.4940791
Email: energia@etcnl.nl
Website at: www.energia.org

Themes for future ENERGIA News

Gender, Energy and Social Development: Volume 5 > Issue 1 > April 2002
Deadline for submissions 31st. January 2002

Women and Sustainable Energy in Asia: Volume 5 > Issue 2 > June 2002
Deadline for submissions: 19th March 2002

Editorial Team

Elizabeth Cecelski
Energy, Environment and Development (EED)
c/o ETC Energy, Postbus 64
3830 AB Leusden, The Netherlands
Tel: +49.(0)2268.901200, Fax: +49.(0)2268.901230
Email: ececelski@t-online.de

Joy Clancy
Technology and Development Group (TDG)
University of Twente
P.O. Box 217, 7500 AE Enschede, The Netherlands
Tel: +31.(0)53.4893537 / 3545, Fax: +31.(0)53.4893087
Email: J.S.Clancy@tdg.utwente.nl

Margaret Skutsch
Technology and Development Group (TDG)
University of Twente
P.O. Box 217, 7500 AE Enschede, The Netherlands
Tel: +31.(0)53.4893538, Fax: +31.(0)53.4893087
Email: M.M.Skutsch@tdg.utwente.nl

Anja Panjwani-Koerhuis
c/o ETC Energy
P.O. Box 64, 3830 AB Leusden, The Netherlands
Tel: +31.(0)33.4326044, Fax: +31.(0)33.4940791
Email: a.koerhuis@etcnl.nl

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