Empirical Evidence for Linkages: Energy, Gender and the MDGs

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The Millennium Development Goals (MDGs) were adopted in 2000 at a United Nations Assembly summit as a set of time-bound, measurable goals and targets to be achieved by 2015. In September 2005, they were re-endorsed at a World Summit to review progress. Although there is no MDG on energy, the independent commission UN Millennium Project report has identified energy, including electricity and safe cooking fuels, as an essential infrastructure service and part of the “means to a productive life.”

While many assumptions have been made about the linkages between energy and the MDGs, few empirical studies are available that provide convincing evidence for policymaking. The present study sought to conceptualise indicators and then to collect empirical evidence – preferably quantitative data – on linkages among gender, energy and the individual MDGs on poverty, education, gender equality, child mortality, maternal health, HIV/AIDS and major diseases, and environmental sustainability. Table 1 shows the indicators that were assessed in this empirical review.

**MDG 1: Extreme Poverty and Hunger**

Women’s time is a key constraint to agricultural production, income-earning and family nutritional status of the poor. There is good evidence in the studies reviewed for time and effort savings of 1 to 4 hours daily in cooking, fuel collection and food processing, when energy is made available for these tasks; but there is insufficient evidence on how these time savings are used. There seems to be a

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<th>Millennium Development Goals</th>
<th>Gender &amp; energy perspective indicators relate energy access with impact on:</th>
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| **Goal 1. Eradicate extreme poverty hunger by 50%** | 1. Time & effort spent (Male/Female, Boy/Girl) in cooking & fuel collection and in food processing; and use of time saved  
2. Income generation (M/F) direct applications in agriculture, home industry, extension in work hours through lighting, energy entrepreneurs  
3. Reduction in household expenditures on energy  
4. Improvement in social capital, income generation |
| **Goal 2. Achieve universal primary education of boys and girls** | 1. School attendance (B/G)  
2. Hours of study (B/G)  
3. School performance (B/G) |
| **Goal 3. Promote gender equality and empower women** | 1. Literacy (M/F)  
2. Leisure time (M/F)  
3. Access to information through media & telecommunications  
4. Transformation of gender roles in the household (M/F)  
5. Control over & access to energy services (M/F)  
6. Voice and participation of women  
7. Violence against women in energy sector  
8. Employment of women in the energy sector |
| **Goal 4. Reduce child mortality (by 2/3 the <5 mortality rate)** | 1. Indoor air pollution (IAP) exposures and acute respiratory diseases due to biomass fuel use (M/F, B/G)  
2. Low birth weight due to maternal overwork  
3. Quality of primary health care and vaccination  
4. Women’s workload and child care  
5. Burns and kerosene poisoning  
6. Fuel scarcity, water boiling and cooked foods |
| **Goal 5. Improve maternal health (reduce mortality by 4/5)** | 1. Recommended health behaviours (e.g. cooking food) for persons living with HIV/AIDS (PLWHA)  
2. Reduced women’s burden of care for PLWHA  
3. Reduced drudgery for women LWHA  
4. Reduced exposure to disease vectors for women LWHA  
5. Sterilisation of equipment  
6. Risk of infection from violence during fuel collection  
7. HIV/AIDS induced poverty and deforestation from increased natural resources dependancy |
| **Goal 6. Combat HIV/AIDS, malaria, and other diseases** | 1. Deforestation & fuel collection  
2. Climate change & traditional biomass use  
3. Access to clean water & sanitation  
4. Access to cooking energy and electricity by slum dwellers (M/F) |
| **Goal 7. Ensure environmental sustainability incl safe drinking water and slum dwellers** | 1. Deforestation & fuel collection  
2. Climate change & traditional biomass use  
3. Access to clean water & sanitation  
4. Access to cooking energy and electricity by slum dwellers (M/F) |
positive correlation between the availability of electricity and time spent on fuel collection and cooking – but we don’t understand exactly why.

Better energy access could directly help women’s income-earning activities. We know from anecdotal evidence that women use biomass energy in their micro-enterprises, especially food processing, and use electricity to extend the working day for home industries and agriculture. But we don’t know how much income these improved fuels and lighting result in generating, nor how much control women have in decisions on the use of increased incomes. Donor-supported projects have illustrated how “energy enterprises” that manufacture or sell energy equipment, such as cook stoves, or produce energy for sale, such as the multi-purpose platform, can be successfully owned and operated by women. But mostly, women’s energy enterprises have operated at small scale and their sustainability under market conditions is not known.

Savings in energy costs and energy efficiency could effectively increase household income and food consumption. There is good evidence for reduction in household expenditures on energy of 20-50% with more efficient and lower cost cook stoves and lighting fuels. But it is not clear whether these savings are used to increase food consumption or are rather offset by increased energy use.

**MDG 2: Universal Primary Education**

Access to modern energy could free up time for girls to go to school or to spend time on homework. Most studies found focused on electrification. Increased school attendance by girls is associated with electrification, and there is some evidence too of better school performance by girls. Hours of study are also possibly increased, but the latter data is not available for boys and girls separately. There is some evidence for an increase in girls’ schooling when their time in domestic chores, especially water fetching, is reduced. The effects of saving women’s time (in general) and of adoption of improved stoves and cooking fuels (specifically) on girls’ education are not known though.

**MDG 3: Gender Equality and Women’s Empowerment**

Women’s wellbeing, empowerment, and education are driving factors in other MDGs, such as reducing children’s malnutrition. There are good examples where energy access has empowered women by giving them more choices about how to organise their work more effectively. Most studies show that women usually choose to devote their extra time (due to reduced drudgery or a longer day with electric lighting) to increasing their other productive and reproductive work hours. Although women do sometimes increase their time in leisure (an important indicator of women’s empowerment), entertainment or social recreation, the studies reviewed show that this is more likely for men.

There is good evidence that in electrified households, women’s access to information has been increased through TV and other media, and there are cases where this can be said to have led to empowerment. There is little evidence for increased reading by women with electrification, too. It would be useful to know more about this and also the potential for TV and media to promote family bonding and gender cooperation, as hinted by some studies.

Changing gender roles in the household and voice and participation by women in the community in energy transitions tend to be extremely variable and likely depend on many factors that we would like to know more about. There are examples of changing gender roles in the household with new energy sources, with men sharing domestic technology use more. But there are many examples of the opposite. There is mixed evidence on control over and access to energy equipment, with men normally remaining in the decision making seat. In energy projects where a strategy to involve women has been deliberately pursued, this has often improved their status and voice in the community as well. There is little evidence of an association between modern energy and indicators of women’s empowerment such as increased access to paid work, or better representation of women as energy professionals or in energy decision-making bodies. There are few studies on women professionals in the energy sector, but evidence is that women face the same obstacles as in other scientific and technological professions: they are greatly outnumbered by men, who take up most management and leadership positions, and face sexual harassment, both in the North and South. However this has been little studied.

Evidence on sexual violence in fuel collection is anecdotal, but this is a problem that deserves further investigation.

**MDGs 4 and 5: Child Mortality and Maternal Health**

Child mortality and maternal health are clearly improved by modern cooking fuels, with good evidence on reduced acute respiratory infections (ARI) and reduced drudgery affecting neonatal survival (though the latter has not been specifically related to energy). There is some evidence too on their association with lower birth weights. The reasons for differences in ARIs between men and women, boys and girls, are still speculative, though. Access to electricity and to modern cooking fuels both correlate in macro studies with reduced infant mortality, even controlling for income.

Electricity’s role in the provision of primary health services has been documented, but not specifically related to health outcomes. One study in Uganda did relate better communications through solar energy, with improved maternal health. There is little evidence that electrification makes rural health clinics more attractive to staff. Little is known about the importance of energy in avoiding diarrhoea (by boiling water), nor its role in nutrition (e.g. making nutrients in cooked food more available, affecting food choice), beyond anecdotal evidence.

**MDG 6: HIV/AIDS, Malaria and Other Major Diseases**

There were virtually no studies found on the relation between energy availability and gender issues in HIV/AIDS, malaria and other major diseases, but the possible links are highly suggestive and worthy of investigation, especially in Africa. Acute respiratory infection (associated with biomass cooking) is known to activate tuberculosis, the most common HIV/AIDS opportunistic infection. Inadequate
sterilisation may be a factor behind the transmission of HIV/AIDS, especially to pregnant women, in health clinics, that is being documented. Fuelwood collection rape may also be a transmission vector.

Given the importance of rest, hygiene, and practices such as eating cooked foods and boiling water, adequate energy availability is likely to be important in improving the quality of life for persons living with HIV/AIDS (PLWHA); in reducing women’s burden of care for PLWHA, and in enabling self-care for women LWHA. Work by GTZ ProBEC in Malawi with improved stoves uses an integrated framework to help alleviate impacts of HIV/AIDS on households and women in particular.

**MDG 7: Environmental Sustainability**

There is good evidence that improved stoves save thousands of tonnes of fuelwood, and in urban and locally-deforested rural areas where large quantities of wood are used, this could be significant in reducing deforestation (target 9). The evidence is that in most rural areas though, women’s collection of household fuel does not cause deforestation. More importantly, women in their role as forest managers and in tree planting, do contribute to reforestation.

The use of more efficient household cooking fuels has been estimated to contribute to greenhouse gas reductions, though this is insignificant compared to overall emission figures from other sources. Some correlation of access to clean water (target 10) with electrification has been found, but the role of energy specifically in the provision of safe drinking water in relation to women’s roles has been little studied. Energy has also been linked with improving the lives of women slum dwellers (target 11), but again, its precise role is not well understood.

**Conclusion**

There is good evidence for a number of linkages between energy, gender and the MDGs, ranging from time savings and reduced household expenditures, to increased school attendance by girls, empowerment through having more choice in organising work and through access to TV and media, to acute respiratory illness, maternal health and reduced infant mortality, to deforestation and greenhouse gas emissions. There are many areas though where evidence is suggestive but needs to be more convincing for policy and planning, including on HIV/AIDS, energy’s role in women’s income generation, maternal and child health outcomes, and voice and participation of women.

A major challenge in carrying out the empirical review was that the emphasis on incorporating gender concerns in energy projects and reporting on the impacts of energy interventions on MDG indicators is very recent. Even worse, data has seldom been disaggregated to show the differential impacts on women and men. For every study that showed the impacts of an energy project on women and men, perhaps ten others were reviewed that either did not provide quantitative information on impacts at all, or mentioned only “people”, “households” or “children”, and did not give the impacts on women and men or boys and girls separately. In many “studies”, generalisations about benefits for women were made without data or empirical support.

From a gender perspective, what emerges most strongly from the evidence, in fact, is that while energy may have important effects on women in relation to the MDGs, this varies greatly according to the social and economic environment, which necessitates a different strategy for women’s involvement in the energy intervention. It is critical therefore to delve more deeply into the dynamics of under what conditions energy “makes a difference” in the linkages between gender and energy, in case studies and operational project implementation.