

Why do Caregivers Protect their Children from Indoor Air Pollution in Rural South Africa?

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Abstract

Indoor air pollution has been associated with acute lower respiratory infections amongst children less than five years old in developing countries. Very little is known about the factors that influence the impact of behavioural interventions designed to reduce child indoor air pollution exposure. Eight focus group interviews were used to identify motivations and barriers to the uptake and sustainability of a behavioural intervention in rural South Africa. Results highlighted improved perceptions of health, reduced drudgery and prestige as motivators for caregivers to protect their children from indoor air pollution exposure. Barriers included the need for space heating during winter, perceptions of indoor air pollution being an acceptable part of rural existence and the gendered nature of household energy practices. The study supports the argument that improving health consideration plays an important, but not sufficient, role in influencing behavioural change to reduce child indoor air pollution exposure.

Key words: Indoor air pollution, biomass energy, child respiratory health, behavioural change, environmental health

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Introduction

Over half the global population (3 billion people) are reliant on solid biomass fuels such as wood, coal, crop residues and animal dung for their domestic energy requirements (The World Resources Institute, 1998). When burned indoors in open fires or rudimentary appliances, the incomplete combustion of solid biomass fuels release high concentrations of pollutants such as particulate matter (PM), carbon monoxide (CO), oxides of nitrogen, sulphur dioxide (SO₂) and volatile organic compounds into the living environment (Smith 1987; Bruce

et al. 2000). Exposure to indoor air pollution has been associated with a number of ill-health outcomes including acute lower respiratory infections (ALRI) such as pneumonia amongst children less than five (Bruce *et al.* 2000; Smith *et al.* 2000). Indoor air pollution accounts for over 800 000 under five deaths annually in high mortality developing countries (Ezzati *et al.* 2002)

By the late 1990s enough epidemiological evidence of the probable link between indoor air pollution and child ALRI existed to call for evaluation studies of the benefits of indoor air pollution interventions (von Schirnding *et al.* 2002). The intervention field understandably turned towards technical interventions (such as cleaner burning fuels and improved cook stoves) based on the evidence of their effectiveness. How-

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ever, despite significant development efforts and evidence of their effectiveness, the costs to governments, donor agencies and households associated with technical intervention efforts are still prohibitive for many poor rural contexts in developing countries (Goldemberg 2004).

Behavioural change has been promoted as a relatively cost-effective strategy to reduce child indoor air pollution in poor rural contexts requiring very little monetary or technical investment. Behaviour(s) – for example, where people burn fires (indoors versus outdoors) (Albalak *et al.* 1999); how fuels are prepared and fires are kindled (Bussman and Visser 1983 cited in Manibog 1984); how people use windows (Still and MacCarty 2006); how appliances are maintained (Reid *et al.* 1986); and where children and adults are located in relation to indoor fires (Ezzati *et al.* 2000) – may affect indoor air pollution exposure. However, inadequate information exists on the effectiveness of behavioural change in reducing child exposure to indoor air pollution (Barnes 2005). Even less information exists about the factors that influence behavioural change.

The assumption that a lack of *biomedical* understanding(s) of the health problem is the primary reason that many people do not engage in protective behaviours has dominated the field. This is reflected by the many calls for health education (see Armstrong and Campbell 1991, Robin *et al.* 1996, Cerqueiro *et al.* 1990, Shah *et al.* 1994) as well as at least one recent study that relied on a health education intervention to reduce indoor air pollution exposure (Tun *et al.* 2005). The study found very little impact on indoor air pollution related behaviours (Tun *et al.* 2005) possibly because very little

information is known about other, perhaps more complex, factors (beyond intrapersonal perceptions of health) that might influence behavioural change.

This paper reports on a qualitative evaluation of a behavioural intervention in a rural South African context where indoor air pollution continues to be a major challenge. Although household access to electricity in South Africa has significantly increased since 1994, poorer communities continue to rely on polluting fuels for their domestic energy requirements. South African epidemiological studies show evidence consistent with the international literature with the likelihood of ALRI between 2 and 4 amongst children living in households using polluting fuels compared to households using electricity. Indoor air pollution may be responsible for the deaths of up to 1400 children annually (Barnes *et al.* 2009). Rural areas are particularly problematic because fuels such as wood and cow dung are collected free of charge and in close proximity to households. In response to this, a behavioural intervention was designed to reduce child indoor air pollution exposure in a poor rural village in the North West province.

A separate quantitative evaluation took place prior to the qualitative evaluation reported here (see Barnes *et al.* 2007). The quantitative evaluation used a before-after quasi-experimental design with a control group. Baseline data were collected in an intervention (n=149) and a matched control (n=175) community; the intervention was implemented in the intervention community only; and follow-up data were collected one year later amongst the same households. Despite the fact that indoor air pollution was

reduced in both communities, the intervention group performed better than the control group. For example, the net median reductions associated with the intervention were: $PM_{10}=57\%$, $CO=31\%$ and CO (child) $=33\%$ amongst households that burned indoor fires. The quantitative study, therefore, provided tentative evidence that a health behaviour change intervention was associated with reductions in child indoor air pollution exposure. This article reports on the qualitative study that took place immediately after the quantitative study and focuses on the motivations and barriers to the adoption and maintenance of the behavioural intervention over a 12 month period.

Before proceeding, however, it is important to describe the intervention.

The intervention

Based on the two phases of formative research (Barnes *et al.* 2004 a&b), the following behaviours were promoted: *burn outdoors when possible (for example, when it is warm enough to do so); open at least two sources of ventilation during peak emission times (for example, during ignition and when fuels are added to fires); and reduce the amounts of time that children spend in proximity to indoor fires.*

The intervention commenced with a presentation at a special community meeting held at the chief's homestead. The objectives of this meeting were twofold: (a) obtain community acceptance of the project and (b) enhance the diffusion of the key messages beyond the target households with young children into the wider community. Approximately 50 households were represented at this meeting. A key outcome was that the traditional community leadership structure agreed to include indoor air

pollution as a standing item on their agenda throughout that winter.

The main thrust of the intervention involved door to door visits to each household in the intervention village ($n=175$). Two once-a-week visits were conducted with each caregiver and other family members present in the selected households by trained health communicators. The communication strategy was based on a Trials of Improved Practices (TIPs) methodology (Dicken and Griffiths 1997). During the first visit, hereafter referred to as the counselling visit, trained communicators discussed the health effects of indoor air pollution exposure with the primary caregivers and others present. The counselling visit began with the communicators sharing knowledge of the biomedical link between indoor air pollution and child respiratory health including the pollutants contained in smoke, why children were particularly vulnerable to the health effects, how the pollutants affect children's lungs and health outcomes associated with exposure.

Following the information sharing session, communicators discussed current behaviours and possible modifications to those behaviours. No recommendations were forced upon families. Instead, communicators assisted each family (usually the primary caregiver and whoever was available at the time), through a process of negotiation, with identifying the behaviours that participants felt would be feasible while still effective. For example, in some instances families felt that, from the outset, outdoor burning would be too difficult to perform and communicators discussed the two other alternatives with them.

Once household members agreed to what they would try and to what degree,

communicators then facilitated a discussion of *how* they would perform those behaviours (Dicken and Griffiths 1997). Household members were asked questions such as: who is going to take responsibility for looking after the child while the primary caregiver was cooking during winter? Do you have enough clothes to keep the child warm if you burn outdoors during winter? If the caregiver looks after the child away from the fire, can someone else do her chores? Who is going to take responsibility for opening and closing windows? What if a window is broken? Are you able to fix it? What will happen if others do not want you to burn outdoors, what will you do? In so doing, household members were encouraged to think through the actual implementation of the behaviours and possible barriers that they were likely to encounter. The counselling visit took between 60 and 90 minutes to complete. A time and date was agreed upon for communicators to conduct a follow-up visit one week later.

Each household was visited one week later (reminder visit) to determine how household members were coping with the agreed behaviours and encourage them to continue. Communicators used the opportunity to consolidate the previous week's discussions, to answer participants' questions and to encourage them to continue with the agreed behaviours. The reminder visits took between 30 and 60 minutes to complete

Methods

Qualitative evaluation using focus group discussions was used.

Study setting

The study took place in two poor rural villages, *Madibe Makgabane* and *Tsunyane*, in

the North West province of South Africa. The area is characterised by high unemployment (only 28% of adults between 15-65 years old are formally employed), low household incomes (23% of households earn less than 800 South African Rands or 106 USD per month) and low educational attainment (32% of adults over 20 years old have no formal education or have only completed part of their primary school education) (Statistics South Africa 2003). Households were un-electrified and relied exclusively on solid fuels such as wood and animal dung for the domestic energy requirements. Winter temperatures were low enough (sometimes as low as -5 degrees Celsius) (South African Weather Bureau 2005) to expect that households would bring fires indoors for space heating.

Vegetation types included dry bushveld and Kalahari deciduous *Acacia* thornveld (North West Provincial Government 2003). Trees were found in relative abundance close to rural villages and villagers typically collected dead branches and dried sticks for fuel. In addition, cattle and donkey dung was collected free of charge from communal grazing fields or along paths and used as fuels. Baseline indoor air quality monitoring confirmed the fact that indoor air pollution was a major problem in the study villages.

Sample and sampling

Participants in the qualitative study were randomly selected from the initial sampling frame. Two rounds of focus group discussions were used to collect qualitative data. The first focus group interviews were conducted four weeks after the end of the quantitative data collection activities and were

based on a set of pre-determined questions. The second round of focus group interviews were conducted approximately six weeks after the first round of focus groups and were based on both the quantitative results that were emerging as well as clarifications from the first round of focus group discussions. In all, 8 focus group discussions were conducted. Because of the rapport established between research participants and between the participants and the research team in the first focus group, and the potential for comparability of responses in the focus groups, the same participants were invited to both rounds of interviews.

Process

The focus groups typically included between 6 and 8 participants and were conducted in seTswana. Participants were usually female caregivers of young children although two focus group discussions included one male in each. Participants were informed of the purpose of the interviews, assured of confidentiality, the inconvenience they may experience and the fact that the interviews were going to be tape recorded as approved by the Ethics Review Committee. Participants were asked to participate and sign a consent form. A separate consent form was signed for the interviews to be tape recorded. Participants included a trained interviewer, the author, a research assistant (to translate to the author) and the research participants.

The interviewer used a semi-structured interview schedule to guide the interview. Typically, research participants sat in a circle while the interview was conducted while the research assistant would quietly translate to the author. The author, with the assistance of the research assistant and the interviewer, would occasionally ask questions when ne-

cessary. The interviews were conducted under a tree where community meetings are held or in a school hall.

The focus group interviews were between one and two hours in length. Participants were offered light snacks and beverages during the interviews and a child minder was available to look after young children during the interviews.

Interviews were tape recorded, translated from seTswana to English and transcribed into a word processing programme using a modified Jefferson method (Potter and Wetherall 1987). Interview transcripts were assigned an identity code based on group (intervention or control), round of interview (one or two) and the number of the interview (one two, three or four).

Transcription conventions are defined as:

- P3 Participant number three
- = Speech interrupted by another speaker
- (3) Pause duration. For example, (3) indicates a 3 second pause.
- CAPS Emphasis by the speaker
- Emboldened** Emphasis highlighted by the author

Analysis

The data were analysed thematically (Miles and Huberman 1994) because this approach identifies themes not previously espoused in the literature. The author collected extensive field notes both during the two quantitative data collection phases as well as during the focus group interviews. These notes were continuously referred to during the analysis.

Results

The study explored the factors that influenced the uptake and sustainability of the

intervention 12 months after being exposed to it. What follows are the reported motivations and barriers to behavioural change identified in the focus groups.

Motivations

Improved health perceptions

Exposure to the intervention was associated with a noticeable improvement in health perceptions among caregivers in the intervention group. The following extracts highlight a discussion of the health effects of indoor air pollution amongst the intervention group (extract one) compared to the control group (extract two). The extracts are taken from the first round of focus group discussions.

Extract 1 (intervention group)

Interviewer (I): When we were here last year, a woman visited each of you to inform you of the dangers of indoor fires. Do you remember?

P2: Yes, we understood that smoke is not good for children and also for adults
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P3: = but the danger of the smoke was emphasized more in children, it was emphasized that pneumonia (sehuba sa kgookgoo) is dangerous for children.

I: When we were here we asked you to perform some behaviours, can you recall them?

P1: We were asked to burn outdoors. She also asked me to open the windows and doors when we bring fires indoors.

I: I'm, uh, sorry to interrupt but I'm trying to understand something here. Surely you knew this before the lady came to visit you last year? Did you not know that breathing in smoke is unhealthy and

causes diseases before this study? You yourself said you've been sick from the smoke from fires before.

P6: Yes, of course. I knew about smoke =

P1: = I even learnt about it in school.

P6: Yes, me too. I knew that it causes lung sickness, makes children cough. But what I didn't know was how bad it was. I didn't know that children can die from it. The woman told me that children can get sick very quickly and die from it. I knew they could get sick but I didn't know they could die from what you call

=

P3: = pneumonia

All: Yes.

Extract 2 (control group)

Interviewer (I): You mentioned smoke caused by indoor fires, what do you think is the effect of that smoke on children?

P3: I know that it is very dangerous it is not good for the baby

I: What do you think it can do?

P1: It can cause sickness

I: What kind of sickness?

P4: I don't know.

P3: You have to open windows to let the smoke out.

I: Okay, what is the reason for letting the smoke out?

P2: Like she said, it is not good for the child.

I: I'm trying to find out what diseases are caused by smoke.

P2: The smoke makes her cough.

I: How do you know it is the smoke =

P5: Yes. It also hurts the eyes, makes them water.

P7: It makes you dizzy especially when you bend over to blow on the fire like this "pheeuw pheeuw" ((showing actions)). You can sometimes fall down after you blow on the fire!

All: ((Laughter))

P1: It causes chest problems.

I: Can you die from breathing smoke in?

P6 & 7: No...

The above extracts illustrate the differences in perceptions of the health concerns related to indoor air pollution in the intervention and control communities approximately one year after the intervention. In terms of recalling the messages, caregivers in the *intervention group* could, for the most part, remember the key messages of the intervention; that is, burn outdoors, and if you bring a fire indoors; open windows and doors and keep children away from fires. In addition, participants could remember that intervention emphasized the dangers of smoke amongst children and more specifically, could identify pneumonia as the main disease outcome associated with child indoor air pollution exposure. Importantly, respondents cited exposure to the intervention and consequent improvements in their understandings of the health consequences as the primary reason for improving their behaviours.

In extract one, I asked participant 6 whether or not she knew that smoke was unhealthy before the interview as she herself had mentioned that she had previously become ill presumably because of inhaling smoke. She and participant 1 confirmed that they did indeed know about the harmful effects of smoke before the intervention and that they had even learnt about it as part of their formal schooling education. According to them, they were previously aware that in-

door air pollution was bad for them in a general sense and may cause "lung sickness" and "cough". What they were not fully aware of, however, was how serious the health effects of child indoor air pollution was, in other words children can die through pneumonia within a few days. It is the improved perception of the seriousness of indoor air pollution exposure that participants reported to benefit from the intervention and which influenced them to engage in protective behaviours.

In comparison, many participants in the control group (extract 2) knew that smoke was harmful to young children but mostly associated symptoms such as cough, dizziness and teary eyes in the *vicinity* of fires with indoor air pollution exposure. These were usually short term upper respiratory symptoms that disappear after intense exposure smoke from fires. The control group rarely mentioned disease clusters that can occur beyond the immediacy of fires. When disease outcomes were probed, participants were mostly vague about the health effects and offered answers such as "it is very dangerous and not good for the baby". More concerning was the fact that certain participants did not believe that indoor air pollution exposure may result in death.

Analyses of the qualitative data suggests that compared to the (similar) control group that did not receive the intervention, exposure to the intervention did increase caregivers' understanding of the specific disease outcome that is, pneumonia, associated with child indoor air pollution exposure. Much more valuable in influencing whether caregivers' burned outdoors, however, was the emphasis of the *seriousness* of pneumonia. In other words, children can die from pneumonia due to indoor air pollution exposure.

More importantly, establishing the conceptual link between pneumonia and indoor air pollution may have influenced caregivers' decisions to improve their behaviours. Whether caregivers actually managed to engage in protective behaviours, however, depended on whether or not certain enabling factors were in place at the household level such as support from the rest of the family and having alternatives to keeping warm (discussed in more detail below).

Reduced drudgery

Some caregivers in both groups reported that a key motivation for outdoor burning as well as opening windows was a reduction in the dirt and odour generated fires when fires were burned indoors. In the following extract, for example, participants highlighted the fact that smoke causes clothes to smell, leaves black soot on the walls and ceilings and that condensation caused by (the often many) people that sleep in the kitchen in during winter leads to soot droplets that stain clothes and linen and which is very difficult to get out. In addition, ash and burned embers end up on the floor creating a mess. The inconvenience in terms of time and effort needed to clean their homes, therefore, was viewed by some caregivers as a motivation for burning outdoors. Extract 3 is taken from a focus group in the control group.

Extract 3

P6: It is also better to burn in the outdoors because when you burn indoors the house fills with smoke. It is very easy to make an outdoor fire because there is no smoke in the house.

Interviewer (I): I see. Why don't you want smoke in the house?

P3: It stinks awful! Most of the time we try to avoid the smoke. We don't want our clothes to smell of smoke from the fire especially from cow dung. You know you can tell the difference?! Wood smoke is bad especially Morutwana (type of wood) but cow dung is worse! I feel sorry for all those children who go to school with their clothes smelling of smoke. The other children tease them. Their mothers don't care.

P4: I also don't want the walls and ceiling in my house to be black =

P2: = uhm sometimes when we used to sleep in the burning room at night, water forms on the ceiling. You know what I mean (2) like from people breathing and black drops would fall on us and stain our clothes and blankets. It is hard to get those stains out.

I: I see.

P4: The ash from the fire also dirties the floor of the house. It blows all over when you open the door. You have to sweep and sweep.

After the interview:

P1: I am sorry for not being at home when you arrived, I thought you were coming on Monday. I have to apologise for the house being so dirty when you came to visit me. I was in Mafikeng and the girls brought a fire inside. They don't do this when I'm there. The girl was at school so there was no one to clean the house, I am sorry it wasn't cleaned when you got here. One of the children told me there

was ash all over the floor and the dishes were not washed.

I: It is not a problem, I am grateful that there was someone there when I arrived and they were able to answer my questions while you were not here.

It is relatively easy to understand that some caregivers would want to burn outdoors to reduce the drudgery associated with having to clean after fires were burned indoors. However, as indicated in the extract, there were also elements of prestige related to outdoor burning.

Prestige

Outdoor burning was viewed as a symbol of prestige in the villages. Having a clean and organised domestic environment was viewed as symbolic of higher social standing by many participants. In contrast, indoor burning and the negative effects thereof were often couched in terms of shame, neglect and lower social standing. In extract 3 above, for example, P3 speaks about the smell associated with cow dung. She distinguishes amongst the smell of different fuels and highlights, in particular, the fact that the smell of cow dung is particularly pungent. Dried cow dung was often couched in the qualitative interviews as the least desirable fuel and mostly used by people of lower social standing. It was often suggested that it was also the easiest fuel to collect because cows roam freely and defecate along the village roads and within homesteads and dry thus making it popular amongst 'lazy' people who do not wish to collect wood, which involves a longer walk. She comments on the fact that it is possible to 'smell' children whose families use cow dung indoors and that these children generally stand out and are teased by other children. Care-

givers of such children a positioned as neglectful – "their parents don't care." In contrast, caregivers who use wood and who burn outdoors were positioned as putting in more effort to keep their homes and children clean in their homes and generally of higher social standing.

Similarly, P1 approaches the interviewer after the focus group (but while the tape recorder was on and the other participants had left) and apologises for the poor state of her house when the interviewer visited. She mentions that she does not allow a fire to be brought indoors but when she is not home her teenage daughters disobey her and bring a fire indoors. She also mentions that one of the younger children told her that there was ash from the fire on the floor and that the dishes were not washed. P1's apology is framed within a context of the indignity of having a dirty house particularly in the context of the discussion that focused on the shame of bringing a fire indoors and having an unkempt living environment.

Engaging in protective behaviours, therefore, was often represented in interviews as progressive, symbol of personal development and 'the right thing to do'. In contrast, indoor burning was represented as backward and neglectful given the negative health and domestic implications. A shift from dangerous to protective behaviours, therefore, was viewed as a symbolic *process* of personal development from 'backward' to 'progressive'.

The qualitative study highlighted a number of motivating factors that could explain the results of the quantitative study. Equally important to this study, however, was to identify the barriers to outdoor burning. The following section highlights barriers to behavioural change.

Barriers to behavioural change

The need for space heating

As expected, an important barrier to outdoor burning was the cold winter temperatures. Winter temperatures can be extremely low in the study setting making behaviours such as burning outdoors and opening windows very difficult given the space heating function of fires. In the following extract, participants describe the familiar winter pattern of outdoor burning during warmer parts of the day in winter but bringing fires indoors during the early evenings when the ambient temperatures drop. In response to the interviewer's questions about concerns about their children's health, participants suggested that the warmth of fires for space heating outweighed the health benefits of outdoor burning.

Extract 4:

Interviewer (I): Why do you bring a fire inside the house and not outside?

P1: We make the fire in there when it is cold. We only sit next to it in winter when it is cold, in summer we just burn outdoors.

I: What about your children's health? Are you not concerned about them inhaling smoke?

P5: Yes, but what can we do? We have to live with smoke in our homes because it's cold outside. I don't want my children to be cold.

I: I understand, but is there nothing you can do to reduce smoke?

P7: I suppose we can keep them away from fires or open a door. But it is hard.

While many participants generally agreed that smoke was harmful to their children's health and could identify steps to

reduce exposure, they suggested that the cold made it very difficult to change their behaviours during winter. In addition, many caregivers believed that it was non-nurturing to allow their children to be cold when they could bring a fire indoors. The immediate benefit of space heating outweighed the health consequences of indoor air pollution exposure. At the end of the extract, P7 suggests that she could open windows or keep children away from fires but this is very difficult to do so.

Indoor air pollution and rural existence

Many indoor burners in both groups questioned the link between indoor air pollution exposure and adverse health effects. These participants were also more likely to draw on the notions that indoor air pollution is an acceptable part of rural existence. Extract 5 is taken from the intervention group.

Extract 5

Interviewer (I): Do you think cooking outdoors might be a solution to smoke?

P8: No. Why should we? Smoke is part of our culture. Our grandmothers all burned fires inside and they lived to an old age. We can't get rid of fires, until we get electricity there is nothing we can do. Even keeping children away from fires is difficult, they want themselves around fires.

P4: I agree electricity will be the answer.

All: Yes.

P8: Everything we use makes smoke, so how can we reduce it if we still have to use them. Everything we use makes smoke, so I don't understand what we can do about.

P3: Also, even if we wanted to, sometimes our families don't want to. If my husband wants to bring a fire indoors then there is nothing I can do. He will just make it inside.

In extract 5, P8 (the only male respondent) suggests that *"smoke is part of our culture. Our grandmothers all burned fires inside and they lived to an old age."* Drawing on his 'first hand' observations that smoke did not harm her ancestors, he makes it difficult to counter his claims that indoor air pollution is an acceptable part of rural existence.

He goes on to suggest that not only is behavioural change very difficult (*"even keeping children away from fires is difficult, they want themselves around fires"*) but even if it were possible, the fact that people were still reliant on biomass fuels means that there is still likely to be smoke. Similar to previous extracts, he questions the value of behavioural change if the source of the pollution is not removed for example, through the use of electricity for cooking and space heating. He criticises the interviewers question about the value of outdoor burning and notes that *"everything we use makes smoke, so I don't understand what we can do about."*

The end of the extract reveals a gendered issue in relation to burning location. P3 points to the fact that even though she wished to burn outdoors, sometimes her family members wanted to burn indoors. She suggests that if her husband (in particular) wished to bring a fire indoors, then she was usually powerless to influence his actions. Gendered roles in relation to domesticity were also highlighted as a barrier to behavioural change. The following section describes how gendered perceptions

of women's time were a barrier to behavioural change.

Gender and women's time

An important factor for why family members (mostly men) did not consider the inconvenience of indoor burning is the low value attached to women's unemployed labour. In the study context, unemployed women are mostly considered responsible for domestic and childcare duties because they are thought to have the 'free time' to do so. In reality, of course, women's 'chores' are labour and time intensive and as highlighted above, would prefer to keep their homes cleaner through, for example, burning outdoors. Extract 6 is taken from the intervention group.

Extract 6

Interviewer (I): As a woman, do you feel that it is your responsibility to perform household work?

P1: Yes, as a woman it is your responsibility to perform household duties especially when you are unemployed. When you are working you can always tell other family members to do what. When you a woman who is unemployed, you don't rest. If you did not finish with your today's work, you can always finish it tomorrow. But you can't really finish.

I: Do you feel sometimes that it is too much for you?

P1: Yes, but there is nothing you can do. As a woman, you have to do everything because men are too lazy even to do the garden. I collect wood and cook but I even have to renew the segotlo because my husband can't do it.

P2: We were advised by our elders to do things for ourselves. Husbands can't cook

but they also don't do the garden. Women are instead expected to perform heavy duties in the house especially the garden. When people come to visit and find the grass in the yard, they are asking why the woman is not removing it and not mentioning the man.

P3: As a man I help my wife at home but only if she is not around, not when she is home. I can't wash the dishes when my wife is there ((laughs)).

In extract 6, P1 while accepting a degree of responsibility for domestic chores because she was unemployed and at home during the day (“Yes, as a woman it is your responsibility to perform household duties especially when you are unemployed”), goes on to suggest that there is little trade-off between chores traditionally assigned to women and those by men. She suggests that men are lazy and women end up doing both men’s duties (gardening and house maintenance) as well as duties traditionally assigned to women (domestic and child care responsibilities). She mentions that husbands “can’t cook but they also don’t do the garden. Women are instead expected to perform heavy duties in the house especially the garden.” P3, one of two men in the focus group interview, concurs with the idea that it is a women’s responsibility to maintain the home. He suggests that he helps out with domestic duties only if his wife is not available. When she is available, it is her responsibility to clean the house. Men such as P3 are likely to be less supportive of outdoor burning and will bring a fire indoors if they perceive women as having the responsibility and, because they are unemployed, the ‘free’ time to clean up after them. In addition, gender inequalities are reinforced through

social expectations placed on women. P2, for example, suggests that when people visit and the grass is long, visitors usually question why the woman (and not the man) of the house has not cut the grass. Social pressure on women to maintain a clean and healthy domestic environment reinforces the low value attached of women’s time and labour. Although issues of gender are highlighted in one extract, the theme emerged in many of the focus group interviews.

Discussion

Results highlighted a number of factors that reportedly influenced behavioural change in rural South Africa. Improving caregivers’ perceptions of the link between indoor air pollution and health was particularly important in relation to the uptake and sustainability intervention. Participants in the intervention group spoke more concretely about the health effects of child indoor air pollution exposure and behaviours to reduce indoor air pollution compared to participants in the control group. Importantly, the intervention also improved caregivers’ perceptions of the seriousness of their children’s exposure to indoor air pollution, which in turn, influenced behavioural change amongst selected participants. Results confirmed the need for health education, but a focus on the seriousness of child exposure may be more beneficial than more general messaging about the health effects of indoor air pollution exposure.

In addition, the study found that a key motivation for caregivers to burn outdoors was not only reduced drudgery in having to clean ash and soot, but was also symbolic of higher social standing (prestige). The shame

and perceived lack of domestic pride associated with indoor burning may explain why participants also improved their behaviours. These findings are similar to a study in rural Benin. Jenkins and Curtis (2005) found that motivations for poor people to want latrines had very little to do with health considerations. One of the strongest motivations included *prestige* – to avoid the shame of having to defecate in open fields; to experience a new, more progressive kind of lifestyle, that is, ‘wanting a better life’, to leave a lasting legacy for descendants and to aspire to upper class ways of living. Similarly, caregivers in this study wanted to avoid the shame (odour and dirt) of indoor burning, believed that outdoor burning was symbolic of aspiring to a better quality of living; did not want their children to experience the health consequences and shame of indoor burning and aspired to higher classes who are perceived to burn outdoors and who are not perceived as lazy or neglectful.

Many caregivers, however, intended to engage in protective behaviours for the reasons cited above but lacked the ‘enabling factors’ (Hubley 1988). A key enabling factor was the need to address the need for space heating during winter. Some caregivers of young children found it cruel and non-nurturing to let their children get cold during winter by not bringing a fire indoors. Indeed some caregivers found the advice to burn outdoors contradictory as they believed that their children had a higher risk of developing respiratory infections if they were exposed to the cold compared to if they breathed in polluted air but were warmer.

Familial support for outdoor burning may play a key role in whether intentions to change behaviours are translated into actual behavioural change or not. In particular,

some families disregarded women’s intentions to burn outdoors because of the perception by some men that it was unemployed women’s obligation to clean up after them because they had the ‘free’ time to do so. In reality, of course, the labour burden on rural women is large. For example, studies have found that rural women in developing countries work considerably longer than men (11-14 and 8-10 hours respectively) and that these tasks, for example, walking large distances and collecting wood that weighed up to 35 kilograms, were incredibly labour intensive (Bembridge and Tarlton 1990; Cecelski 1987). Many female participants reported that there was significant social pressure on women to respect the wishes of their male counterparts, for example, to burn indoors, but with little or no support from them to contribute to reducing the labour burden to, for example, clean up the ash and soot afterwards.

Gendered roles in relation to household energy have been reported in a number of studies. Jeffrey *et al.* (1989), for example, found that men in rural India refused to collect and dry cow dung for fear of being labelled as lower class. The obligation to collect and dry cow dung fell on women, not only because of their perceived lower social status, but importantly because they were perceived to not contribute to the household economy and had the free time to do so (Jeffrey *et al.* 1999). Similarly, a study on the social determinants of energy use in low income urban settlements in South Africa also found that one of the reasons that men were opposed to electrification was the perception that women would become lazy, through for example, the purchase of domestic appliances such as electric irons and stoves (Mehlwana and Qase 1999). Such

perceptions also falsely imply that women are naturally more inclined carers of families and their domestic environments and therefore do not mind the hard work.

Conclusion

The quantitative study found that people reduced child indoor air pollution exposure following exposure to a behavioural intervention. Factors that influenced behavioural change, however, were not limited to intra-personal perceptions health but pointed toward complex factors at the environmental (for example, weather), interpersonal (gender) and community (prestige) level. It is important for discussions about indoor air pollution interventions to move beyond simplistic notions of how and why people may protect themselves from smoke to reflect the multitude of factors highlighted in this paper. The study also highlights the value of a mixed methods approach to understanding not only the effectiveness of interventions, but the factors that influence them. It is hoped that this study will inform further debate about the role of behavioural change to reduce child indoor air pollution exposure in developing countries.

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Mila (N.S.), Vol. 11, 2010

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