

PREVENTION OF BURNS AMONG CHILDREN IN WOOD FUEL USING HOMES IN RURAL GUATEMALA

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INTRODUCTION

Almost half of the world's population still relies on solid fuels – wood, crop residues, animal dung and coal – for their everyday cooking and heating needs. A high proportion of these households burn the fuel in open fires, the most common device being an arrangement being 3 stones on the floor.

Photo: Nigel Bruce/ITDG



The *plancha* is an indigenous Guatemalan stove that is well liked by rural households. The enclosed combustion chamber and waist-level work surface should prevent many burns and scalds – at least the most serious events – which are mostly caused by falling into open fires

Photo: Nigel Bruce

Risk of burns

A number of reports have highlighted the danger of burns that these cooking arrangements pose for young children, based mainly on hospital experience (Courtright 1993; Onuba 1987). Burns from falling into open fires and scalds caused by knocking over cooking pots can be very serious, and with limited access to treatment services often leave children at risk of serious infection and deformity.



Deformity and severe injury resulting from accidents with open fires

Photos courtesy of Don O'Neill, HELPS Guatemala



Intervention study

There is little information available on the true incidence of burns in rural communities, nor on the impact that improved stoves might have in preventing the most serious of these burns. We are carrying out a randomised trial of the health impacts of an improved wood stove (the *plancha*, illustrated right) in rural Guatemala, the principal outcome being acute lower respiratory infections (ALRI) in children aged up to 18 months (<http://ehs.sph.berkeley.edu/quat/>).

This study provides a unique opportunity to study the incidence of burns in these young children and their older siblings in a community traditionally using 3-stone fires on the floor, and the impact of an improved stove which (a) encloses the combustion chamber and (b) has the cooking surface at waist height out of reach of young children.

AIMS

- To determine the community incidence of burns and scalds among children in rural Guatemala
- To describe the principal causes of burns and scalds
- To determine the impact of an improved wood burning stove (the *plancha*) on incidence and severity of burns and scalds

METHODS

The study sample includes 504 homes using an open fire, recruited from a rural area of San Marcos, in western Guatemala. Eligible homes had a child under four months or a pregnant woman. Following baseline assessment, these homes were randomised to either receive the *plancha* or continue using the open fire until the child was 18 months of age (a *plancha* would then be offered). Information about burns was obtained on two groups of children:

- On older siblings of the study child, at baseline, and at 6 and 12 months after randomisation, by interview survey. A further survey at 18 months is due this autumn.
- On study children (less than 18 months), by interview and examination, at the weekly household visits for ascertainment of the primary study outcome (ALRI). A total of 450 child years was available for analysis, approximately two-thirds of the total that will be available on completion of the study.

All children with burns requiring medical attention were referred to the project physician who worked from a nearby community centre (to maintain blindness to the intervention status of the home for purposes of ALRI assessment).

RESULTS

Baseline rate of burns

Among 1044 siblings, 22 reported a burn or scald in the 6 months prior to baseline assessment, all of whom were under 6 years of age, a rate of 42.1 per 1,000 per year (95% CI = 24.7 to 59.6). 8 resulted from falling into the open fire, 8 from scalds, 6 from a hot object or pot. 15 left scars, 7 of which were larger than 2 cm in diameter, one 3 x 14 cm.

Impact of stove on burns

(a) Siblings

During the 12 months since randomisation, a total of 24 burns and scalds were reported among siblings; 16 in control homes (35.2 per 1,000 child years) and 8 in *plancha* homes (18.1 per 1,000 child years), relative risk for open fires = 1.94 (p=0.1). Of these, 10 control and 5 intervention home burns resulted in scarring. The causes of these burns are shown in Table 1.

Cause of burn	Control	Intervention
Fell into fire	7	0
Hot object (including <i>plancha</i>)	4	4
Scald	3	3
Other	2	1
Total	16	8

(b) Index children

After 74 weeks (450.1 child years) of surveillance, a total of 45 burns and scalds had been reported in study children (99.8 per 1,000 child years), 23 in control and 22 in *plancha* homes. However, of three severe burns, all occurred in control homes (see case studies in box), and the reasons for the burns differed markedly between the two groups (Table 2). Seventeen (38%) of the burns and scalds were to the hands, 12 (27%) to the face and neck, 6 (13%) to the foot: the location of burns did not differ substantially between control and intervention homes.

The reasons for burns in *plancha* homes are now being investigated. Discussion with families indicates that cultural beliefs on the importance of keeping young children warm contribute – infants are held close to the stove when being washed and dressed, the circumstances in which some of these burns are occurring.

	Control	Intervention	
Age (months)	Mean (median) 10.2 (9.4)	9.2 (8.2)	
Cause of burn	Fell into fire	17	2
	Touched hot <i>plancha</i>	0	14
	Scald	4	3
	Candle ignited cot	1	0
	Other	1	3
Severity	Requiring medical treatment	3	0
Total	23	22	

Case studies of 3 most severe cases

Case A: 15-month old boy fell from mother's lap into open fire as she leaned forward to attend to cooking (see photo). He sustained a second degree burn to whole palm of left hand. Referred for hospital admission, and recovered well.

Case B: 17-month old boy (open fire home) put his hand into a pot with boiling water and scalded left hand. Referred to study physician (did not attend clinic).

Case C: 15-month old boy burned his left hand in the open fire, and when examined had marked blistering. Referred to study physician where a second degree, infected burn was treated with antibiotic and analgesic.



Burn to left hand of study child requiring hospital admission (Case A). Photo courtesy of Anaite Diaz

CONCLUSIONS

- The baseline rate of burns in homes using open fires is estimated at 42 per 1,000 per year (95% CI = 25 to 60), of which around half resulted in scarring. Very severe burns are less common, but untreated can result in serious deformity.
- After 12 months, *plancha* use was associated with a 50% reduction in burns incidence reported among siblings (trend; p=0.1), and in burns resulting in scarring.
- In younger children (less than 18 months), the overall rate was similar in intervention and control groups, although to date more severe burns (associated with falling into fires) have not occurred in homes using the *plancha*.
- Investigation of the reasons for burns in *plancha* homes is underway, and will be used to develop advice to mothers and, if necessary, to propose design changes to the stove.
- If these findings are generalizable, given the high % of rural homes in countries using open fires (80-90% in sub-Saharan Africa, for example) the population attributable risk for burns from open fires would be substantial.

References

Courtright, P., Haile, D., & Kohls, E. 1993, The epidemiology of burns in rural Ethiopia, *Journal of Epidemiology and Community Health*, vol. 47, pp. 19-22.
Onuba, O., & Udodiok, E. 1987, The problems of burns and prevention of burns in developing countries., *Burns*, vol. 13, pp. 382-385.