

# Stove Safety Testing

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Nate Johnson



# Motivation

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- ❑ Stove hazards include cuts, burns, scalds and loss of property
- ❑ People with little technical experience in safety are designing and implementing stoves
- ❑ Need exists for a standardized set of safety guidelines and metrics
- ❑ Conventional methods require expensive equipment and technical experience

# Injuries

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Third-degree burn from skirt fire.



Scald from overturned pot.

# Background Investigation

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- Must factor in local needs and abilities
  - Cooking conditions and family culture
  - Cooking needs
  - Technology and technical expertise
  
- Data set included over 40 types of stoves
  - Solid biomass (most common)
  - Liquid/gas
  - Solar (box and focal)



# Hazard Identification

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- ❑ Hot surfaces and open flames
- ❑ Cookstove construction and center of gravity
- ❑ Sharp edges and points
- ❑ Cookstove integrity and uncontrolled fire
- ❑ Fuel concerns



# Safety Guidelines

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**Guideline 1:** Exterior surfaces should be smooth and not cut flesh.

**Purpose:**

- a) Reduce risk of cuts that can become infected.
- b) Lessen occurrence of skirts and clothes that catch stove and result in tipping.

**Guideline 2:** Cookstove should not be easily overturned.

**Purpose:**

- a) Reduce risk of scalds from overturned pots.
- b) Prevent burning fuel from spilling from stove.

# Safety Guidelines

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**Guideline 3:** Burning fuel should not be exposed.

**Purpose:**

- a) If stove happens to tip over, fuel will not be spilled.
- b) Crackling wood cannot be expelled from stove.
- c) Children unable to touch burning fuel.

**Guideline 4:** Area surrounding the cooking surface should be flat.

**Purpose:**

- a) Reduce risk of scalds from overturned pots.



# Safety Guidelines

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**Guideline 5:** Surfaces should not burn when touched.

**Purpose:**

- a) Reduce 1<sup>st</sup> and 2<sup>nd</sup> degree burns for adults.
- b) Reduce 1<sup>st</sup> and 2<sup>nd</sup> degree burns for children.

**Guideline 6:** Heat transfer to surroundings should not start fires.

**Purpose:**

- a) Eliminate risk of house fires from stoves put close to the walls or near combustibles.



# Safety Guidelines

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**Guideline 7:** Construction touched during cooking should not burn.

**Purpose:**

- a) Eliminate 1<sup>st</sup> and 2<sup>nd</sup> degree burns from handles or doors.
- b) Allow proper use of handles or doors.

**Guideline 8:** Chimney should be shielded from touch if burns possible.

**Purpose:**

- a) Greatly decrease risk of 1<sup>st</sup> and 2<sup>nd</sup> degree burns from touching hot chimneys.

# Safety Guidelines

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**Guideline 9:** Flames touching cookpot should be concealed.

**Purpose:**

- a) Eliminate 1<sup>st</sup>, 2<sup>nd</sup> degree burns from contact with flames.
- b) Eliminate risk of 3<sup>rd</sup> degree burns from skirt fires.

**Guideline 10:** No flames should exit the fuel loading area, storage container, or transfer mechanism.

**Purpose:**

- a) Eliminate risk of 3<sup>rd</sup> degree burns from skirt fires.
- b) Stop fuel leaks.

# Implementation

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- Experimentation
  - Stoves Analysis Lab – ISU
  - Aprovecho Research Center – Oregon
  - Honduran Association for Development – TWP, AHDESA
  
- Summarized procedures and safety evaluations conducted for over 40 stoves.

# Awareness and Development

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- ❑ Academic influence – conference proceedings, journal articles (2), experiences in classroom and study abroad courses
- ❑ Peer review – masters thesis, stoves groups (heat-sensitive paint)
- ❑ With help of people like you 😊

# Questions?

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