CHARCOAL AND FUELWOOD PRODUCTION: IMPLICATIONS FOR POVERTY REDUCTION
Robert B. Richardson, PhD
Michigan State University

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OUTLINE

- Introduction
- Charcoal and fuelwood
- Zambia
- Charcoal consumption and production
- Household survey data
- Results and discussion

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INTRODUCTION

- Vast reliance on fuelwood in developing world
- Per capita consumption highest in Africa
  - Women usually collect firewood for cooking, heating
  - Widespread in rural areas
  - Occasionally purchased (28% rural, 48% urban)
- Increasing demand for charcoal in urban areas
  - Access to forests
  - Alternative fuels are relatively expensive
  - Value may be greater for rural households

INTRODUCTION (continued)

- Income generation opportunities for rural households
  - Expansive market
  - Stable prices
  - Low startup costs
- Implications for poverty reduction
- Most research concerned with forest depletion, sustainable use of natural resources
- Role in household income?
OBJECTIVES

- Motivated by the contribution of charcoal and firewood to rural livelihoods in Zambia
- Determinants of market participation
- Household survey (2001) of 6,922 rural households
  - Nationally-representative sample
- Households revisited in 2004
  - Opportunities for panel data analysis
    - Market participation, entry, and exit
    - Attrition and new entrant bias
  - Third phase in May, 2008

CHARCOAL

- Per capita fuelwood consumption is declining
- Charcoal increasingly a prevalent source of energy
  - Cooking
  - Heating
- Sustainable production is important regionally
  - Energy dependence
    - Low price
    - Stable market
  - Contributes to household income
    - Urban entrepreneurs
    - Rural livelihoods
ZAMBIA

- Landlocked country in southern Africa
- Tropical climate
- Flat plateau (1000-1500 m)
- Nine provinces
ZAMBIA (continued)

- High poverty rate (74%)
- Poor households and non-timber forest products
- Reliance on fuelwood decreases with higher incomes
- Important consideration for poverty reduction

CHAPOSA, 1999

CHARCOAL (continued)

- Charcoal considered an essential commodity in urban households
- Basic Needs Basket
  - Monthly cost of essential food, non-food items
  - Family of six (two 90-kg bags per month)
  - Charcoal expenditures: ZMK45,000-124,920 (US$12-33)

<table>
<thead>
<tr>
<th>Urban Area</th>
<th>Cost of Charcoal (Kwacha)</th>
<th>% of non-food items</th>
<th>% of total Basic Needs Basket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kabwe</td>
<td>45,000</td>
<td>7.95%</td>
<td>4.32%</td>
</tr>
<tr>
<td>Kitwe</td>
<td>124,920</td>
<td>19.68%</td>
<td>10.64%</td>
</tr>
<tr>
<td>Livingstone</td>
<td>88,400</td>
<td>11.55%</td>
<td>6.93%</td>
</tr>
<tr>
<td>Luanshya</td>
<td>99,360</td>
<td>23.03%</td>
<td>10.31%</td>
</tr>
<tr>
<td>Lusaka</td>
<td>121,000</td>
<td>11.52%</td>
<td>7.76%</td>
</tr>
<tr>
<td>Ndola</td>
<td>90,000</td>
<td>13.63%</td>
<td>7.38%</td>
</tr>
</tbody>
</table>

Basic Needs Basket, March 2007
CHARCOAL CONSUMPTION

- Most households collect firewood
- Purchased charcoal is second most common

<table>
<thead>
<tr>
<th>Sources of energy</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchased firewood</td>
<td>3.3%</td>
</tr>
<tr>
<td>Collected firewood</td>
<td>58.2%</td>
</tr>
<tr>
<td>Purchased charcoal</td>
<td>19.8%</td>
</tr>
<tr>
<td>Produced charcoal</td>
<td>3.5%</td>
</tr>
<tr>
<td>Electricity</td>
<td>14.9%</td>
</tr>
<tr>
<td>Kerosene/paraffin/gas</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Living Conditions Monitoring Survey, 1998

CHARCOAL PRODUCTION

- Bigger trees cut into smaller logs
- Burned in a kiln
- Primarily the work of men and older boys
- Meant for sale

CHAPOSA, 1999
Ease of entry and exit
Stable market
Important source of income in agricultural off-season

Net annual benefit from charcoal production:
ZMK646,000 – 810,000 (US$171-214)
Compares favorably with net benefit for maize farmers (mean - ZMK 675,000)
Employment, social stability, income distribution
## SURVEY DATA

- Household survey (2001) of 6,922 rural households

<table>
<thead>
<tr>
<th>Province</th>
<th>Household surveyed (#)</th>
<th>With charcoal income (%) (n=162)</th>
<th>With &gt;75% charcoal income (%) (n=96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>714</td>
<td>16.1</td>
<td>19.8</td>
</tr>
<tr>
<td>Copperbelt</td>
<td>393</td>
<td>11.1</td>
<td>9.4</td>
</tr>
<tr>
<td>Eastern</td>
<td>1,331</td>
<td>4.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Luapula</td>
<td>777</td>
<td>11.1</td>
<td>8.3</td>
</tr>
<tr>
<td>Lusaka</td>
<td>214</td>
<td>3.7</td>
<td>4.2</td>
</tr>
<tr>
<td>Northern</td>
<td>1,363</td>
<td>15.4</td>
<td>12.5</td>
</tr>
<tr>
<td>Northwestern</td>
<td>472</td>
<td>3.1</td>
<td>5.2</td>
</tr>
<tr>
<td>Southern</td>
<td>872</td>
<td>19.1</td>
<td>19.8</td>
</tr>
<tr>
<td>Western</td>
<td>786</td>
<td>15.4</td>
<td>13.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6,922</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

## SURVEY RESULTS

<table>
<thead>
<tr>
<th>Attributes</th>
<th>All households</th>
<th>With charcoal income</th>
<th>With &gt; 75% charcoal income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>6,922</td>
<td>162</td>
<td>96</td>
</tr>
<tr>
<td>Male head of household (%)</td>
<td>77.0</td>
<td>86.2</td>
<td>83.9</td>
</tr>
<tr>
<td>Household size (mean number)</td>
<td>5.75</td>
<td>5.92</td>
<td>6.03</td>
</tr>
<tr>
<td>Education of household head (mean, in years)</td>
<td>5.66</td>
<td>5.60</td>
<td>5.53</td>
</tr>
<tr>
<td>Landholding size (hectares)</td>
<td>3.1</td>
<td>3.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Land cultivated (hectares)</td>
<td>1.5</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Distance to nearest town (km)</td>
<td>34.9</td>
<td>26.4</td>
<td>26.5</td>
</tr>
</tbody>
</table>
**SURVEY RESULTS**

(continued)

<table>
<thead>
<tr>
<th>Attributes</th>
<th>All households</th>
<th>With charcoal income</th>
<th>With &gt; 75% charcoal income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household income (mean, 000 ZMK)</td>
<td>2,076</td>
<td>3,468</td>
<td>3,890</td>
</tr>
<tr>
<td>Income per adult (mean, 000 ZMK)</td>
<td>692</td>
<td>1042</td>
<td>1044</td>
</tr>
<tr>
<td>Crop income per hectare (mean, 000 ZMK)</td>
<td>938</td>
<td>896</td>
<td>821</td>
</tr>
<tr>
<td>Crop income share of income (%)</td>
<td>73.1</td>
<td>47.0</td>
<td>47.6</td>
</tr>
<tr>
<td>Off-farm income share of income (%)</td>
<td>25.8</td>
<td>52.9</td>
<td>51.6</td>
</tr>
<tr>
<td>Charcoal income (000 ZMK)</td>
<td>40</td>
<td>1,742</td>
<td>2,532</td>
</tr>
<tr>
<td>Charcoal income share of off-farm (%)</td>
<td>2.6</td>
<td>72.8</td>
<td>96.3</td>
</tr>
</tbody>
</table>

**DISCUSSION**

- Charcoal-producing households are more likely:
  - To be male-headed, less educated, larger
  - To be located near urban areas
  - To earn higher total household income (67% higher)
    - absolute and per-capita
  - To rely more on off-farm income sources (and less on crop income)
- Market opportunities are attractive for rural household income generation
- Implications for poverty reduction
CONCLUSIONS

- Income from charcoal activities decreases with higher incomes
  - Pathway out of poverty?
- Dual concern for depletion of forest resources and poverty reduction
  - Highlights the importance of a comprehensive natural resource policy
  - Breadth of perspectives

CONCLUSIONS (continued)

- Implications for future research
  - Integration of 2004 panel data
    - Entry and exit
    - Attrition
    - Changes in market effects
  - Third household survey in May 2008
    - Temporal analysis
    - Spatial analysis
- Collaborative outreach efforts
- Policy implications
Thank You!