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RESEARCH PAPER

Smoking, standard of living, and poverty in China

T-w Hu, Z Mao, Y Liu, J de Beyer, M Ong

See end of article for authors’ affiliations

Correspondence to: Professor Teh-wei Hu, PhD, School of Public Health, University of California, Berkeley, Room 412 Warren Hall, Berkeley, CA 94720, USA; thu@berkeley.edu

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moking increases the risk of incurring cancers, cardiovascular disease, and other smoking related illnesses that result in higher medical expenditures, lower productivity, and premature death. Many international studies have addressed this long term negative impact of smoking on health and personal welfare.1–4 Smoking also has a short term immediate negative impact on household living standards, by diverting scarce household resources from essential expenditures. Cigarette expenditures can reduce the nutritional status of low income households by displacing expenditures on food.5–9 A study conducted in the Minhang district near Shanghai (1995) reported that smokers in 2716 households spent 17% of their household income on cigarettes.7

China is the largest cigarette consuming country in the world, with more than 320 million smokers.8,9 In spite of recent rapid economic growth, China is still considered a low income country. Therefore, it is important to understand the relationships between smoking status, household standard of living, and poverty in China.

Low income and high income households differ in terms of the amount of tobacco consumed, types of cigarettes smoked (high price v low price, foreign v domestic brands), and cigarette expenditures. It has been asserted that, especially in developing countries, smoking takes up a large portion of the household budget of low income households, thus depriving them of money for essential expenditures.5–7 A concern is that an increase in the tobacco tax will increase the financial burden on low income households. Smoking increases the risk of incurring cancers, cardiovascular disease, and other smoking related illnesses that result in higher medical expenditures, lower productivity, and premature death. Many international studies have addressed this long term negative impact of smoking on health and personal welfare.1–4 Smoking also has...
Table 1  Sociodemographic and economic characteristics of study—household sample

<table>
<thead>
<tr>
<th></th>
<th>Urban (n = 2575)</th>
<th>Rural (n = 829)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of household (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>62.0</td>
<td>91.0</td>
</tr>
<tr>
<td>Female</td>
<td>38.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Age of head of household (%)</td>
<td>50+ years</td>
<td>8.8</td>
</tr>
<tr>
<td>Size of household (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2</td>
<td>14.0</td>
<td>4.9</td>
</tr>
<tr>
<td>3</td>
<td>59.0</td>
<td>15.1</td>
</tr>
<tr>
<td>4–5</td>
<td>24.2</td>
<td>63.7</td>
</tr>
<tr>
<td>≥6</td>
<td>2.8</td>
<td>16.3</td>
</tr>
</tbody>
</table>

Table 2  Urban and rural household monthly income expenditure patterns and smoking information, 2002

<table>
<thead>
<tr>
<th></th>
<th>Urban Poor (n = 140)</th>
<th>Urban Near-poor (n = 463)</th>
<th>Urban Non-poor (n = 1972)</th>
<th>Rural Poor (n = 149)</th>
<th>Rural Near-poor (n = 534)</th>
<th>Rural Non-poor (n = 524)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income (Yuan)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarette expenditures (Yuan)*</td>
<td>29</td>
<td>46</td>
<td>127</td>
<td>24</td>
<td>29</td>
<td>49</td>
</tr>
<tr>
<td>Food (%)</td>
<td>60.3</td>
<td>54.9</td>
<td>40.3</td>
<td>61.8</td>
<td>59.2</td>
<td>42.4</td>
</tr>
<tr>
<td>Housing (%)</td>
<td>3.6</td>
<td>4.2</td>
<td>8.8</td>
<td>3.6</td>
<td>4.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Education (%)</td>
<td>6.6</td>
<td>5.4</td>
<td>11.0</td>
<td>5.7</td>
<td>10.6</td>
<td>15.5</td>
</tr>
<tr>
<td>Clothing (%)</td>
<td>5.7</td>
<td>4.5</td>
<td>10.3</td>
<td>5.7</td>
<td>6.5</td>
<td>6.7</td>
</tr>
<tr>
<td>Other (%)</td>
<td>17.2</td>
<td>24.3</td>
<td>20.3</td>
<td>9.4</td>
<td>4.9</td>
<td>19.3</td>
</tr>
</tbody>
</table>

Urban: Poor: monthly capita < 1.43 Yuan (or US$0.60 per day); near-poor: 1.44–286 Yuan; non-poor: > 286 Yuan. Rural: Poor: monthly capita < 54 Yuan (or US$0.22 per day); near-poor: 53–83 Yuan; non-poor: > 83 Yuan. *US$ = 8.23 Yuan.

Beyond understanding differences in smoking behaviour, it is useful to examine how cigarette expenditures differ as a percentage of total expenditures across different household income groups. As shown in table 2, for both urban and rural households, the higher the household income, the higher the cigarette expenditures. These higher cigarette expenditures are reflected in both the amount of cigarette consumption and the price paid per pack. For example, the urban poor households consumed 7.6 packs of cigarettes a month, the urban near-poor households consumed 9.8 packs a month, and the urban non-poor households consumed 15.5 packs a month. Overall, the rural households consumed more cigarettes than urban households: 21.8 packs a month for the rural poor households, 24.1 packs for the rural near-poor, and 28.8 packs for the rural non-poor.

However, significant differences are seen in the average prices paid per pack of cigarettes by smokers: 3.8 Yuan for the urban poor households, 4.7 Yuan for the urban near-poor households, and 8.2 Yuan for the urban non-poor households. On the other hand, the price per pack in rural areas ranged from 1.1 Yuan for the poor households to 1.7 Yuan for the non-poor households, a much narrower price difference. As a result, monthly cigarette expenditures were much higher for non-poor than for poor households.

Table 2 indicates that urban higher income households spent more (four times) on cigarettes than low income urban households, largely because they purchased more expensive cigarettes, including foreign brands in some cases. Rural high income households spent more (two times) on cigarettes than rural low income households, largely because they consumed more cigarettes, with the price paid per pack showing less variation across rural income groups. Further, urban and rural smokers differed greatly in both the number of cigarettes consumed and price paid per pack: urban smokers smoked fewer cigarettes than rural smokers, and they paid much higher prices per pack.

Beyond understanding differences in smoking behaviour, it is useful to examine how cigarette expenditures differ as a percentage of total expenditures across the different household income groups as shown in table 2. Among urban smoking households, cigarette expenditures accounted for an average of 6.6% of total expenditures of poor households.
6.7% for near-poor smoking households, and 9.1% for non-poor smoking households. Among rural smoking households, cigarette expenditures averaged 11.3% of the total household expenditures of poor households, 9.9% for near-poor smoking households, and 8.4% for non-poor households. These figures imply that in urban areas, cigarettes are a luxury good, with cigarette expenditures increasing as a percent of total expenditures as income increases. However, the opposite is true in rural areas—as income rises, cigarette expenditures decrease as a percentage of total expenditures, a so-called “normal good”.

The patterns are more consistent across rural and urban areas when one looks at the percentage of total income (rather than expenditures) spent on cigarette consumption. In both urban and rural areas, this percentage is higher for poor households than for non-poor households, but highest of all for near-poor households. Urban poor households spent 5.8% of their reported income on cigarettes compared to 4.6% in urban non-poor households, and 5.9% in near-poor households. The differences are wider among rural households, with 7.1% spent in poor households, 8.9% in the near-poor households, and 5.7% for non-poor households.

REGRESSION ANALYSIS

Using the total sample of households, a regression model was used to estimate the impact of smoking status on total household expenditures minus cigarette expenditures. The main components of interest were food expenditures, housing expenditures, clothing expenditures, and education expenditures.

In examining the impact of smoking on household expenditures, a number of key explanatory variables help determine household expenditures. These include household income, size of the household, age and educational level of the head of the household, and smoking status. As income increases, urban households and rural households may show different patterns of change in spending on food, housing, and clothing because tastes and opportunities to expand income are quite different. Thus, an interaction term was introduced in the model. Smoking status was measured in two different forms: number of packs smoked per month and the amount of cigarette expenditures per month, by each household. The amount of household expenditures is directly associated with the size of the household; thus, both dependent variable expenditures and explanatory income variables were adjusted by household size. It would be ideal to use age adjusted equivalent weighted household size to analyse household expenditures functions. Unfortunately, the survey data do not include the age distribution information. A general regression model was specified as follows:

$$ E_i = b_0 + b_1 SM + b_2 In + b_3 Age + b_4 Ed + b_5 HS + b_6 UR + b_7 UR* In + u_i $$

Where $E_i$: Per capita total household expenditures minus cigarette expenditures

### Table 3 Impact of cigarette consumption on household expenditures (n = 3402)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total expenditures (minus tobacco)</th>
<th>Food</th>
<th>Housing</th>
<th>Clothing</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-1.27*</td>
<td>-0.01</td>
<td>-0.55*</td>
<td>-0.46*</td>
<td>0.47*</td>
</tr>
<tr>
<td>Household size</td>
<td>-41.52*</td>
<td>-19.59*</td>
<td>-8.39*</td>
<td>-8.33*</td>
<td>-13.52*</td>
</tr>
<tr>
<td>Education level</td>
<td>33.30*</td>
<td>20.39*</td>
<td>4.00*</td>
<td></td>
<td>6.93*</td>
</tr>
<tr>
<td>Income per capita</td>
<td>0.06*</td>
<td>0.02*</td>
<td>0.01*</td>
<td>0.00</td>
<td>0.07*</td>
</tr>
<tr>
<td>Amount of cigarette consumption</td>
<td>-2.90*</td>
<td>-0.48*</td>
<td>-0.40*</td>
<td>-0.21*</td>
<td>-0.15*</td>
</tr>
<tr>
<td>Urban*income</td>
<td>0.16*</td>
<td>0.03*</td>
<td>0.02*</td>
<td>0.02*</td>
<td>0.00</td>
</tr>
<tr>
<td>Urban</td>
<td>-42.93*</td>
<td>28.11*</td>
<td>-5.02</td>
<td>4.67*</td>
<td>-4.67</td>
</tr>
<tr>
<td>Constant</td>
<td>318.79*</td>
<td>100.27*</td>
<td>63.68*</td>
<td>57.86*</td>
<td>57.94*</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.4856</td>
<td>0.4511</td>
<td>0.1483</td>
<td>0.3575</td>
<td>0.2918</td>
</tr>
</tbody>
</table>

*Indicates coefficient is significant at p<0.01, two tailed test.

POLICY IMPLICATIONS

The survey results indicate that low income households bought much lower priced cigarettes than high income households in China. Lower income households also smoked fewer cigarettes than high income households, especially in rural households. However, given their relatively low income, households under the poverty level allocated a higher percentage of their income for cigarettes than did non-poor households. The analysis shows a clear reduction in spending...
on other goods in smoking households. Therefore, if households stopped buying cigarettes and spent the money on other goods instead, households could improve their overall standard of living. This is especially true for poor households.

One policy issue is the effect that higher cigarette taxes would have on low income households versus high income households—that is, whether higher taxes would impose an undue burden on low income households. Four factors would affect the tax impact: (1) cigarette prices paid by people with different income levels; (2) amount of cigarette consumption at different income levels; (3) their respective price elasticity of demand for cigarettes; and (4) the type of tax imposed on cigarette consumption.10–11

Smokers in lower income households in China paid less per pack and smoked fewer cigarettes than higher income smokers, and low income smokers had higher price elasticity than higher income smokers: −1.9 for low income households, −0.7 for middle income households, and 0.5 for high income households.12 The additional financial burden caused by a tax increase would be much less for low income households than for high income households. If the tax is a fixed percentage of cigarette price, as with an ad valorem tax, instead of a specific tax, which is a fixed amount on each pack regardless of its price, then the additional tax burden from a tax rate increase on low income households would be even lower. For instance, using table 2 as an example, a 0.40 Yuan specific tax increase per pack would become a 10.5% (0.40/3.8 Yuan) per pack price increase for poor urban households, an 8.5% (0.4/4.7 Yuan) price increase for near-poor households, and a 7.8% (0.4/8.2 Yuan) increase for non-poor households. Given the different price elasticities, the poor smokers would reduce consumption by 20%, near-poor households by 5%, and non-poor households by only 2%. So the “average” poor household that bought 17 packs of cigarettes per month at 3.8 Yuan per pack, or 64.6 Yuan, when faced with a 10.5% price increase, would buy 14 packs per month at 4.2 Yuan, and spend a smaller total of 58.8 Yuan per month after the tax increase. An average non-poor household that bought 18 packs per month at 8.2 Yuan, spending a total of 147.6 Yuan, would decrease consumption very little after the tax increase. If these households bought the same number of packs each month, total spending would rise to 154.8 Yuan; if they cut back by one pack per month, total spending would be reduced very slightly to 146.2 Yuan per month. On the other hand, based on the average price per pack of cigarettes paid by different income groups, as shown in table 2, the effect of an across the board 10% increase in price, such as an ad valorem tax, would be that poor household smokers would pay an extra 0.38 Yuan per pack, near-poor household smokers would pay an additional 0.47 Yuan per pack, and non-poor smokers would pay 0.82 Yuan more per pack. The reduction in cigarette consumption, according to their different price elasticities, would be 19% for poor smokers, 7% for near-poor smokers, and 5% for non-poor smokers, respectively. Total monthly spending on cigarettes for the “average” poor smoker would fall from 64.4 Yuan to 56.8 Yuan (13.6 packs at 4.18 Yuan each), whereas the average non-poor smokers would buy one pack less, but the price increase would mean total spending would increase from 147.6 to 153.3 Yuan. The ad valorem type tax is much more efficient at shifting the tax burden from poor to non-poor households.

Currently China levies a fixed 64% tax at the producer level, equivalent to a 38% tax at the retail level.13 This is a relatively low rate compared to the cigarette tax rate around the world.14 The analysis of these survey data suggests that raising cigarette tax rates in China would reduce consumption more among low income households than among high income households, increasing available household funds for other major household items, such as food, housing, clothing, and education. Furthermore, an ad valorem tax instead of a specific tax would lower the financial burden of a higher cigarette tax on low income households, and in this respect would be more “pro-poor”.

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Authors’ affiliations
T-w Hu, University of California, Berkeley, California, USA
Z Mao, Sichuan University, Sichuan, China
Y Liu, Harvard University, Cambridge, Massachusetts, USA
J de Beyer, World Bank, Washington DC, USA
M Ong, Stanford University, Stanford, California, USA
Competing interests: none declared

REFERENCES