Salt sales survey: a simplified method to evaluate population salt reduction programs

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“Cocaine? Thank God - I thought you were doing salt.”
Background

Salt intake

High blood pressure

TOP risk factor of global disease burden in 2010

Cardiovascular disease
(62% strokes, 49% CHD)
Background

- Salt intake in China is one of the highest in the world (≈ 12-14g/d).
- ≈80% added by consumers.
- More than 1 in 4 adults have hypertension.

24h urine collection:
√: accurate
×: High participant burden; costly;
×: Completeness?
Aim

To determine whether a salt sales survey could serve as a simplified method to evaluate community-based salt reduction programs
CRHI-SRS main study design

120 villages in 10 counties from 5 provinces

Randomization

Control (60 villages)
- No intervention

Intervention (60 villages)

Randomization

HE+PS (30 villages)
- Health Education
- Delivery of salt substitute
- Price Subsidy

HE (30 villages)
- Health Education
- Delivery of salt substitute

≈2400 individuals collected one 24h urine collection at the end of the trial
Salt sales Survey

166 Shops invited

129 shops recruited

Random sampling

PS+HE (30 villages)

HE (30 villages)

Control (60 villages)

- 10 villages
- 10 villages
- 10 villages

50 shops

56 shops

60 shops

- 1 had no telephone
- 3 closed down 1 merged by another shop
- 5 could not be reached

- 1 refused to participate
- 1 did not sell salt
- 1 closed down
- 8 could not be reached

- 2 refused to participate
- 2 closed down
- 12 could not be reached

129 shops recruited

An independent researcher called the shopkeepers monthly to collect salt sales data
Regular salt vs Salt Substitute

1 g 100% NaCl 1 g 65% NaCl

\[ \text{Blood pressure} \]

0.25 g NaCl (salt)
0.25 g KCl

\[ \text{Blood pressure} \]
Results

Salt substitute sales trend by group

The last HE intervention

The last PS intervention

Daily SS Sales Per shop (kg)

PS+HE

HE

Control

2012 2013

Results

Salt substitute sales trend by group

The last PS intervention

The last HE intervention
Results

Salt substitute sales vs 24h urinary K
Results

Salt substitute sales vs 24h urinary Na
## Results

<table>
<thead>
<tr>
<th>Effect size (Intervention vs control)</th>
<th>Assessed by 24-hour Urine</th>
<th>Estimated from SS sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>difference in sodium intake</td>
<td>-7.0 mmol/d</td>
<td>-8.0 mmol/d</td>
</tr>
<tr>
<td></td>
<td>114%</td>
<td></td>
</tr>
<tr>
<td>difference in potassium intake</td>
<td>14.1 mmol/d</td>
<td>14.2 mmol/d</td>
</tr>
<tr>
<td></td>
<td>101%</td>
<td></td>
</tr>
</tbody>
</table>
Results

- **Cost**
  - **Salt sales survey:** ¥RMB 57,000 (≈ $10,000)
  - **24h Urine collection:** RMB 420,000 (≈ $70,000)

- **Graph**
  - **SS sales survey for 24 times in all the shops in 30 villages**
  - **24h urine collection for 2400 individuals in 120 villages**

- **Legend:**
  - Blue line: SS sales survey
  - Green line: 24h urine collection
Summary - Salt sales survey

1) SS sales: PS+HE > HE > control
   • 24h urinary K: PS+HE > HE > control
   • 24h urinary Na: PS+HE < HE < control

2) Intervention effect estimated from SS sales
   • Potassium: 114% of that from 24h urine.
   • Sodium: 110% of that from 24h urine

3) Larger statistical power

4) Lower cost
Limitations

• ? Salt intake level

• Suitable situation:
  • Salt added by consumers is major source
  • Population should be stable
  • Community-based
Conclusion

• A salt sales survey could serve as a **simple**, **sensitive** and **cost-effective** method to evaluate community-based salt reduction programs where salt is mainly added by the consumers.
Acknowledgement

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  - Changzhi Medical University

- **Participants**
Thank you!

Any Questions?
Timeline

Intervention

- Price subsidy
- Delivery of Salt substitute
- Health education

Survey

- Monthly salt sales survey
- 24h urine collection

Dates:
- May 2011
- July 2011
- Sep 2012
- Dec 2012
- June 2013
Daily sales of Total salt (kg/d/shop)

- PS+HE
- HE
- Control