

# Why Doorstepping can increase household waste recycling

**2014.11.15**

**Beijing**

# Municipal Solid waste (MSW) has become an import issue



2.2 billion tons per year by 2025

Shanghai: **20,000** tons / day



**2.5** tons truck for transport → **50** km

World (2025): **2.2** billion tons



**2.5** tons truck → **5.5 million** km

**5.5 million** km = **137.5** equator

# Waste disposal

Developing countries :

**landfil**

**No collection**

Developed countries :

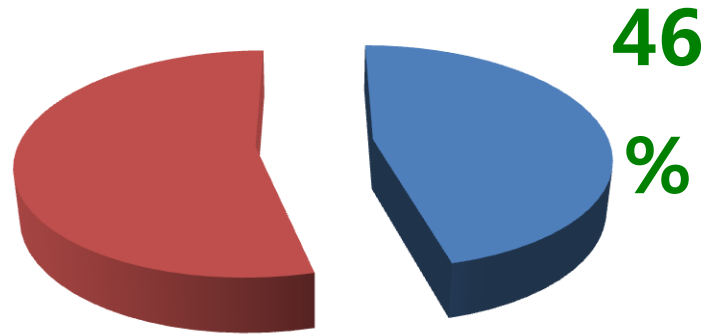
England :

**43.2%  
recycling**

Germany :

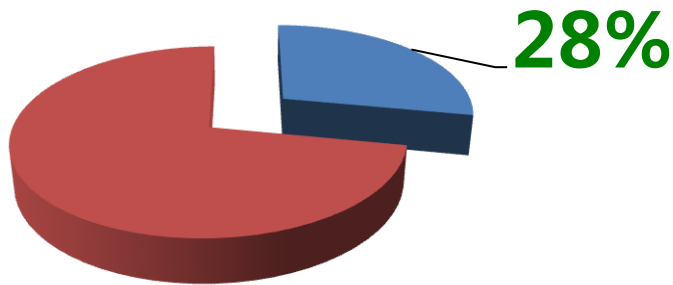
**62%  
recycling**

# Waste composition



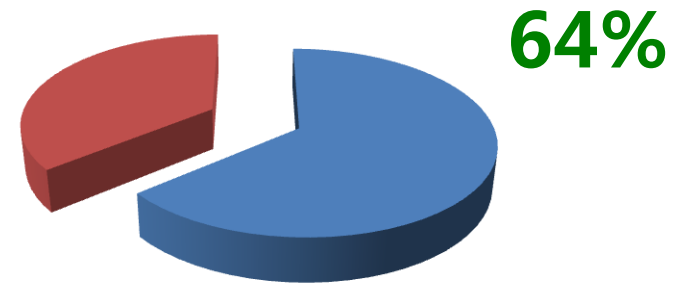
■ food waste ■ none food waste

## Global average



■ food waste ■ none food waste

## High income countries



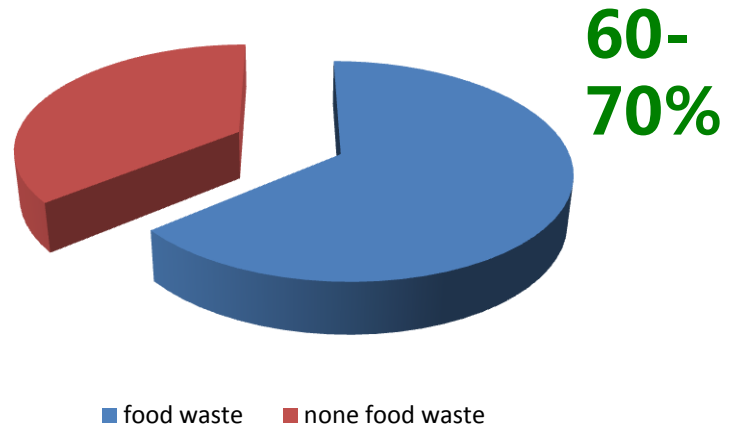
■ food waste ■ none food waste

## Low income countries

# Shanghai



23 million



Residential waste content

Urgent Goal

~~landfill~~



resources

biogas

fertilizer

compost

Processing facilities

demand for products

commercial possibilities

collection infrastructure

legislation and enforcement

Residents ' cooperation

Sufficient?



Success

# Options to facilitate this behavior change

Incentives

Feedback

Simple provision of information

Provision of items:  
kitchen caddies

Local volunteers

Doorstepping

# Pilot scheme in Shanghai (2011)

Incentives

Feedback

Simple provision of information

Provision of items: kitchen caddies

Local volunteers

Doorstepping

Poor results



# Options to facilitate this behavior change

Incentives

Feedback

Simple provision of information

Provision of items: kitchen caddies

Local volunteers

Doorstepping

Our focus

# Doorstepping

Cited as “effective” (no tests)

But not well defined

- Diverse conceptual approaches used
- Difficult to be specific about lessons for future planning

# Waste management

No standard way of describing, categorizing or conceptualizing,  
Local case-study based descriptions

Case studies	Different focus of Doorstepping
Read (1999)	<b>educational terms</b> (e.g. interaction, persuasion, social learning)
Bernstad et al. (2013)	<b>structural barriers</b> (facilities, skills, action planning)
Corterill et al. (2009)	<b>delivery methods</b> (written or face-to-face information)

necessary to find determinants leading to behavior change that  
have links across all of them

# Breaking down doorstepping into elements

## Waste Management Terminology

Cluster dozens of case-study-defined determinants in waste management into 40 broad categories.

Disadvantage: not being linked clearly to determinants of behavior change established in literatures

# Breaking down doorstepping into elements Behavior Change Terminology

Try to cover all possible parameters and become  
**unmanageable**

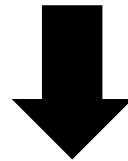
Focus on their main theoretical constructs at the risk  
of missing other key determinants

Develop approach of Michie:

**Behavior change**

**128 constructs**

**17 theories**



**12 domains**

This approach would in principle allow us to link doorstepping activities to **determinant clusters** which themselves already had **links to behavior change** theoretical constructs

# 11 domains in WM

<b>"Michie" Domains adapted</b>	<b>WM operationalization</b>
Knowledge	basic information that the scheme existed, and what materials went where
Facilities	vital equipment and staff to make it feasible
Skills	the practical ability to sort
Belief of Capabilities	do residents believe they can do it; that their community can do it
Belief of Consequences	actions make a difference
Norms/Social Influences	recycling is considered 'normal' and others may have a view on it
Prompts	reminders which re-motivate action
Role Clarification	who should do what?
Action Planning	exactly how, actually?
Motivation/persuasion	extra pushes towards the making of a decision to recycle
Emotion	positive or negative emotions anywhere which might be significant to the behavior change observed

# Using 11 domains analyze major DS studies

Useful??

<b>Domains</b>	<b>Read (1999)</b>	<b>Timlett and Williams (2008)</b>	<b>Coterill et al. (2009)</b>	<b>Bernstad et al. (2013)</b>
Knowledge				
Facilities				
Skills				
Belief of Capabilities				
Belief of Consequences				
Norms/Social Influences				
Prompts				
Role Clarification				
Action Planning				
Motivation/persuasion				
Emotion				



# Using 11 domains analyze major DS studies

Domains	Read (1999)	Timlett and Williams (2008)	Coterill et al. (2009)	Bernstad et al. (2013)
Knowledge	•	•	•	•
Facilities			•	•
Skills				
Belief of Capabilities	•	•	•	
Belief of Consequences				•
Norms/Social Influences				
Prompts		•		
Role Clarification				
Action Planning				•
Motivation/persuasion	•	•		
Emotion	•	•	•	

**USEFUL!!**

# Methods

Choose a site for DS which had recycling already ongoing

11 domains

Quantitative data

Qualitative data

1

- Pre - Questionnaires
- Pre - Measurement

2

- Doorstepping intervention

3

- Post-Questionnaires
- Post-Measurement

4

Extra:

- Focus Groups
- Semi-structured interviews

# Site choice : typical community in Shanghai, #13



23 million

Shanghai

Live in



Gated Communities

200-2000 families

IN

2-20 buildings

Our site

Built in 1998

986 households

75 stairwells  
up to 6 floor

2700 residents

# Reasons for #13

## Information we know

History

Community Committee

Local Volunteers

## Feasible of measurement

Stabilized sorting schemes

Predictable waste

collection time

No leakage of waste

Other candidates are less prepared

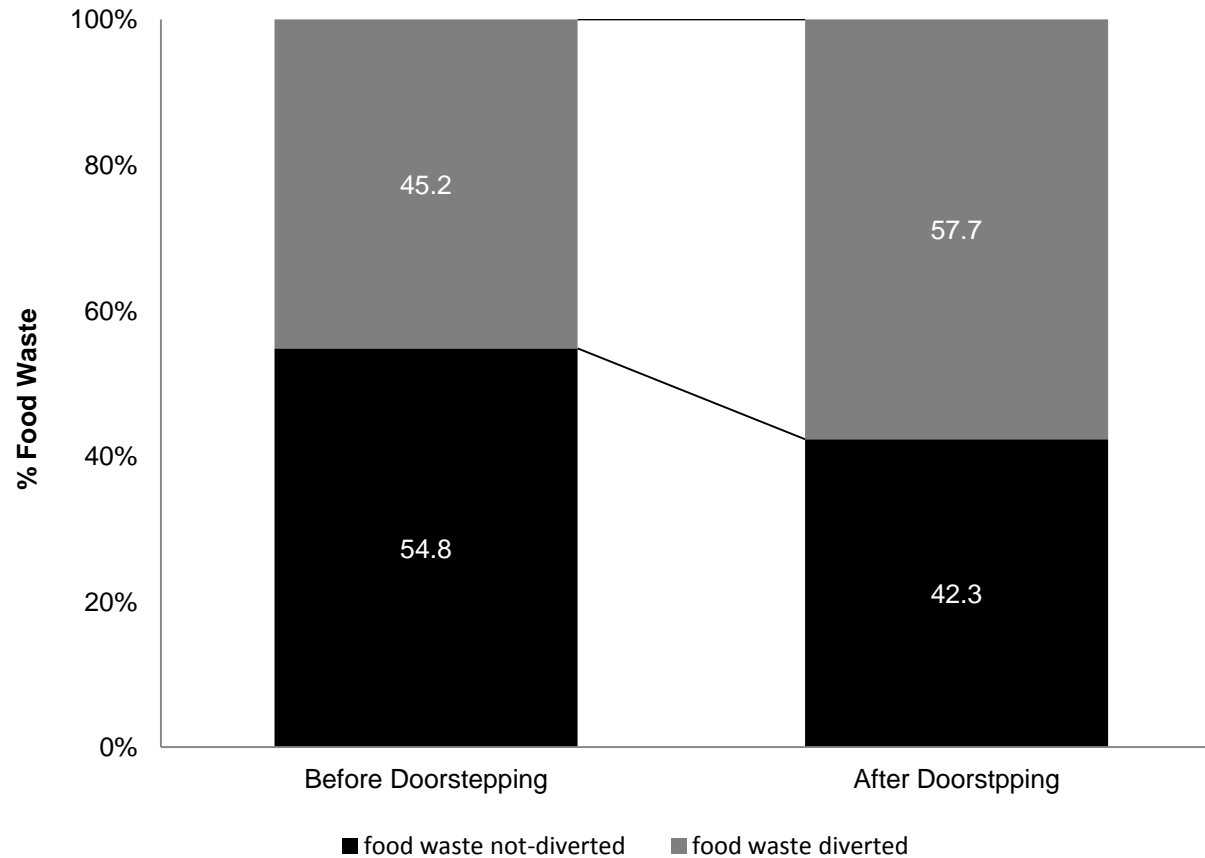
# Doorstepping design: 67% interaction rate achieved

Details	Target Domains
<b>Information at the door about Environmental Consequences</b>	Belief of Consequences
Provision of Stickers & magnets	Prompt
	Emotion
Local & university volunteers Knock at door	Norms
No particular focus on	Knowledge, Facilities, Feedback, Motivation, Belief of Capability, Action Planning

## Training of volunteers

- Rehearsals to ensure they are aware of the differences between determinants and did not accidentally emphasize any.

# Findings



**12.5% increase in Food waste capture rate**

**(statistically significant)**

# Findings

## Belief about consequences

Table 3

Answers	Yes	No	Not sure
Pre-questionnaire	68.5 <sup>a</sup>	20.7	10.9
Post-questionnaire	71.2 <sup>a</sup>	11.2	17.6

<sup>a</sup> These numbers were already very high in China, compared to normal responses from residents from normal communities.

**Surprise!**

- This is not a statistically significant change
- The level of BOC is already high

Conclusion: **Not reason for success**

# Evaluation of impact from residents

Questionnaires

Focus groups

Semi-structured interviews



# Findings

## Norms

## Emotions

## Prompts

Emotion	<i>"It is 'xinku' for volunteers to come up and down (the stairs)."</i>						
Prompts	<i>"It is good to have doorstepping as a reminder; we may forget to sort the waste...long term reminders are n</i>						
Norms	<i>It (doorstepping) will promote certain pressure. Even though it is only a little stress, it will have an effect of</i>						
Norms	<i>It (doorstepping) brings an invisible pressure...It is better to self-regulate, but if not, then pressure from ot</i>						
Emotion	<i>"It (propaganda) can touch people, especially the doorstepping type. Residents should be touched. If they</i>						
Prompts	<i>"Because the doorstepping itself is a reminder...people will regard it as something important if you doorstep</i>						
Norms	<i>Now I feel there is a social atmosphere building up step by step [with reference to the doorstepping]. Since</i>						
Norms	<i>"Some pressure from outside cannot come from inside an individual...If a person does want to move forward</i>						
Norms	<i>"...it would be better for the block leaders to pay more attention (e.g. do doorstepping), as they live in the b</i>						
Emotion	<i>"It (frequent doorstepping) would work, but I think it will bother people too much and they will be negative a</i>						
Emotion	<i>You're 'xinku'.</i>						
Emotion	<i>"...it (appearing in person at the door) makes them embarrassed."</i>						
Emotion	<i>"It is difficult and 'xinku' to do this job and it takes time."</i>						
Prompts	<i>"It is OK to remind residents every six months via doorstepping. We will possibly forget it as time goes by.</i>						
Emotion	<i>"I remember that (the doorstepping) ... you are 'xinku'."</i>						

## Learning useful for improving local design

- Belief of Consequences was not even a minor determinant of the behavior change
- Social Norms and Emotion were significantly activated determinants
- Prompting as a minor contributor
- many local residents are sensitive to the character and visible behavior of the doorsteppers, it should be possible to enhance the effects already seen.
- The role of Social Norms deserves further exploration, with the data suggesting that some residents are sensitive to community norms

## Learning useful for doorstepping programs elsewhere

- the usefulness of analyzing and designing doorstepping via consideration of several clusters of determinants of behavior change
- it is operationally not difficult to investigate a large range of determinants, using post-intervention qualitative data collection designed to reveal evidence of them
- These results indicate a much deeper lesson not seen in the literature: that doorstepping should not be considered a generic 'strategy' but one with several elements, and that researchers need to be vigilant about concluding and reporting which were key determinants.

# Conclusions

Our DS has 12.5% increase based on our design

We find Norms, Emotion are key elements with Prompt a minor effect and BOC no effect

Our specific results are useful for future intervention planning in Shanghai

Our approach has likely usefulness in other recycling programs

**Thanks!**

# Evaluation of impact from waste quantity

$$RW = NFW_{\text{not div}} + FW_{\text{not div}}$$

$$\text{Recycling} = FW_{\text{div}}$$

$$CR_{FW} = FW_{\text{div}} / (FW_{\text{div}} + FW_{\text{not div}})$$

Requirements: >91 kg & 5% households

Collection time: 6 am, 9:30 am, 5 pm

Sample: all waste within 3 consecutive days