

Table S1. The survey questionnaire used for elicitation of households salient beliefs on MSW separation at source in the Odaw river basin.

**GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT PROJECT
MUNICIPAL SOLID WASTE IMPROVEMENT WITHIN THE ODAW DRAINAGE BASIN
ELICITATION OF HOUSEHOLDS BELIEFS TOWARDS MUNICIPAL SOLID WASTE SEPARATION AT
SOURCE**

The Ministry of Sanitation and Water Resources is implementing a project that seeks to develop interventions in a participatory approach to improve the municipal solid waste management situation of communities along the Odaw River Basin in the greater Accra region of Ghana.

One of the objective of the assignment is to assess the viability of households separating their solid waste at source (that is at the point of generation). **Separation of solid waste at source (that is at the point of generation) is defined as the setting aside of (food waste and garden waste) and recyclable materials (papers and cardboards, plastics, metals, glass etc.) from the waste stream before they are collected.** It supports the diversion of recyclables from landfills to facilitate reuse, recycling, composting and anaerobic digestion.

Please spare us a few minutes to tell us what you think will be the advantages and disadvantages (if any) if you are to separate your solid waste at the point of generation in the near future. There are no right or wrong answers. We are merely interested in your opinion about what it will take for you to separate your household waste at source. In response to the questions that follow, please list the thoughts that come immediately to mind. Write each thought on a separate line as provided below.

Behavioural Outcomes

1. What do you perceive as the **advantages** if you are to separate your solid waste at the point of generation?

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2. What do you perceive as the **disadvantages** of separating solid waste at the point of generation?

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3. What else come to mind when you think about separation of solid waste at the point of generation?

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Normative Referents

When it comes to separation of solid waste at the point of generation, there might be individuals or groups who would think you should or should **not** perform this behaviour.

1. Please list the individuals or groups who would **approve of** or **expect** you to separate solid waste at source in the near future.

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2. Please list the individuals or groups who would **disapprove of** you if you are to separate solid waste at source in the near future.

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3. Sometimes, when we are not sure what to do, we look to see what others are doing. Please list the individuals or groups who are **most likely** to separate solid waste at source when the time comes.

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4. Please list the individuals or groups who are **least likely** to separate solid waste at source when the time comes.

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Control Factors

When it comes to separation of solid waste at the point of generation, you may be willing to do it, but there might be some factors that might make it easier or difficult for you to perform this behaviour.

1. Please list any factors or circumstances that will make it easy for or enable you to separate solid waste at source in the near future.

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2. Please list any factors or circumstances that will make it **difficult** for you to separate solid waste at source in the near future.

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Please circle the number below that best describe your personal opinion

DIRECT MEASURES (ATTITUDE)	
1. My separating solid waste from other waste at source for recycling purposes will be:	<i>Extremely good</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly bad</i>
2. My separating solid waste at source for recycling purposes will be:	<i>Highly beneficial</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly harmful</i>
3. My separating solid waste at source for recycling purposes will be:	<i>Extremely easy</i> [1] [2] [3] [4] [5] [6] [7] <i>Extremely difficult</i>
DIRECT MEASURES (SUBJECTIVE NORM)	
1. Most people who are important to me would think that I should separate solid waste at source for recycling purposes.	<i>Highly true</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly false</i>
2. Most people whose opinion I value would approve of my separating solid waste at source for recycling purposes.	<i>Highly likely</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly unlikely</i>
3. Most people I respect and admire would separate solid waste at source for recycling purposes.	<i>Highly likely</i> [1] [2] [3] [4] [5] [6] [7] <i>Strongly Agree</i>
4. Most people like me would separate solid waste at source for recycling purposes.	<i>Strongly agree</i> [1] [2] [3] [4] [5] [6] [7] <i>Strongly disagree</i>
DIRECT MEASURES (PERCEIVED BEHAVIOURAL CONTROL)	
1. I am confident that I can separate solid waste at source for recycling purposes.	<i>Highly true</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly false</i>
2. My separating of solid waste at source for recycling purposes would be up to me.	<i>Strongly agree</i> [1] [2] [3] [4] [5] [6] [7] <i>Strongly disagree</i>
3. If I really want to, I can separate solid waste at source for recycling purposes	<i>Strongly agree</i> [1] [2] [3] [4] [5] [6] [7] <i>Strongly disagree</i>
Sex of Respondent: Male (M) Female (F)	Age of Respondent:

Table S2. The survey questionnaire used for the main study.

GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT PROJECT, GHANA
MUNICIPAL SOLID WASTE IMPROVEMENT STRATEGY WITHIN THE ODAW DRAINAGE BASIN
SURVEY ON BELIEFS OF HOUSEHOLDS ON MUNICIPAL SOLID WASTE SEPARATION AT SOURCE

The Ministry of Sanitation and Water Resources is implementing a project that seeks to develop interventions in a participatory approach to improve the Municipal Solid Waste Management situation of communities along the Odaw River Basin in the greater Accra region of Ghana.

One of the objectives of the assignment is to assess households' knowledge, beliefs, behavioural intentions and practices towards the separation of municipal solid waste (MSW) at source (at the point of generation). Separation before collection has the potential to support the diversion of bio-waste and recyclables (e.g., plastic, paper and metals) from disposal. We are therefore interested in your **reason/willingness** to "separate" or "**not** to separate" your solid waste at source before collection.

We will appreciate your responses to some questions about the subject matter. There are no right or wrong answers. We are specifically interested in your opinions about **your household** separating solid waste at source. Please read each question carefully and kindly tell us what you really think and believe but be **honest**.

Please do not write your name on the questionnaire to avoid linking it to you personally; besides your **response will be treated confidential**. Your participation in this study is **voluntary**, so, if you do **not** want to participate, please kindly decline to participate. Some of the questions look similar but they are measuring different things, so kindly try and answer each question asked. However, do **not** answer any question that makes you feel uncomfortable. The whole process might take about 20 minutes of your time.

Note: Separation of solid waste at source is defined as the setting aside of (food waste and garden waste) and recyclable materials (papers and cardboards, plastics, metals, glass etc.) from the waste stream before they are collected; to facilitate reuse, recycling, composting and anaerobic digestion.

Please answer all sections of the questionnaire and **SELECT ONE CHOICE** only per question that best describes your opinion. If you need to change a choice of response, please **cross out** the previous one and **select a new one** instead as shown below. Please rate how much you personally agree or disagree with these statements - how much they reflect how you feel or think personally. Use the following scale:

1	2	3	4	5	6	7
Highly likely	Likely	Somewhat likely	Neutral	Somewhat unlikely	Unlikely	Highly unlikely

Example

Ghana needs a female president to realise tangible growth and development								
Strongly disagree	1	2	3	4	5	6	7	Strongly agree

In this example, if you **strongly disagree (1)** that Ghana needs a **female** president to realise tangible growth and development, *then circle the number 1 as above.*

Ghana needs a female president to realise tangible growth and development								
Strongly disagree	1	2	3	4	5	6	7	Strongly agree

On the other hand, if you feel you made a mistake in your earlier choice; and that it doesn't really matter the gender of the president of Ghana towards the realisation of growth and development, the previous answer is crossed and a new one Neutral (4) selected as shown.

Thank you in advance for your willingness to participate in this research study.

For further correspondence, you may reach the lead person through +233 (0)209333876.

Instruction: Please indicate your level of agreement to the options listed below by ticking like this [✓] in the appropriate box. Kindly provide your age and household size in the appropriate spaces provided.

Socio-Demographics

Sex		Highest Educational Level Completed							Age
M	F	No formal Education	Primary School	Middle School/ JHS	SHS	Artisan/Vocation Certificate	Technical/Vocation Diploma	Tertiary	
Marital Status of Respondent							Household Size		
Married		Widowed	Divorced	Cohabitation	Single				

JHS: Junior High School; SHS: Senior High School

Instruction: Please indicate your level of agreement to the options listed below by circling the number that applies to your opinion and beliefs.

Outcome Evaluation
1. For my household to support employment creation will be: <i>Extremely bad [1] [2] [3] [4] [5] [6] [7] Extremely good</i>
2. For my household to contribute to make this city clean will be: <i>Extremely bad [1] [2] [3] [4] [5] [6] [7] Extremely good</i>
3. For my household to earn some money will be: <i>Extremely bad [1] [2] [3] [4] [5] [6] [7] Extremely good</i>
Behavioural Belief Strength
4. My household will separate solid waste at source to support employment creation . <i>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</i>
5. My household will separate solid waste at source to contribute to make this city clean . <i>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</i>
6. My household will separate solid waste at source to make some money . <i>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</i>
Motivation to Comply
7. For issues relating to solid waste management, what my family members think we should do is most important to me: <i>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</i>
8. As far as solid waste management is concerned, my household will do what community leaders think we should do: <i>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</i>
9. For matters relating to solid waste management, my household will do what my religious leaders think we should do: <i>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</i>
10. When it comes to solid waste management, my household will do what our neighbours think we should do: <i>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</i>
11. Pertaining solid waste management, my household will do what our close friends think we should do: <i>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</i>
Normative Belief Strength
12. Our family members will expect each other to separate solid waste at source for recycling purposes.

<p>13. Community leaders will expect my household to separate solid waste at source for recycling purposes.</p> <p>14. Religious leaders will expect my household to separate solid waste at source for recycling purposes.</p> <p>15. Our neighbours will expect us to separate solid waste at source for recycling purposes.</p> <p>16. Our close friends will expect us to separate solid waste at source for recycling purposes.</p>	<p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p> <p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p> <p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p> <p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p> <p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p>
<p align="center">Perceived Power of Control to Influence Behaviour</p>	
<p>17. Having the necessary receptacles will enable my household to separate solid waste at source for recycling purposes.</p> <p>18. Experiencing regular solid waste collection services will facilitate my household to separate solid waste at source for recycling purposes.</p> <p>19. Getting knowledge of the different components in the solid waste stream will enable my household to separate solid waste at source for recycling purposes.</p> <p>20. Receiving some incentive will encourage my household to separate solid waste at source for recycling purposes.</p>	<p>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</p> <p>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</p> <p>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</p> <p>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</p>
<p align="center">Control Belief Strength</p>	
<p>21. My household will separate solid waste at source for recycling purposes if we get the necessary receptacles.</p> <p>22. My household will separate solid waste at source for recycling purposes if we experience regular solid waste collection services</p> <p>23. My household will separate solid waste at source for recycling purposes if we have knowledge of the different components within our waste stream.</p> <p>24. My household will separate solid waste at source for recycling purposes if we receive some incentive for doing so</p>	<p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p> <p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p> <p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p> <p>Highly unlikely [1] [2] [3] [4] [5] [6] [7] Highly likely</p>
<p align="center">Direct Measures (Attitude)</p>	
<p>25. For my household, separating solid waste at source for recycling purposes will be:</p> <p>26. For my household separating solid waste at source for recycling purposes will be:</p>	<p>Extremely bad [1] [2] [3] [4] [5] [6] [7] Extremely good</p> <p>Highly harmful [1] [2] [3] [4] [5] [6] [7] Highly beneficial</p>
<p align="center">Direct Measures (Subjective Norm)</p>	
<p>27. Most people who are close to us would expect us to separate solid waste at source for recycling purposes.</p> <p>28. Most people whose opinion we value would approve of us separating solid waste at source for recycling purposes.</p>	<p>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</p> <p>Definitely not [1] [2] [3] [4] [5] [6] [7] Yes definitely</p>
<p align="center">Direct Measures (Perceived Behavioural Control)</p>	

<p>29. For my household, we are confident that we can separate solid waste at source for recycling purposes. <i>Highly false</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly true</i></p> <p>30. For my household, separating solid waste at source for recycling purposes would be. <i>Very difficult</i> [1] [2] [3] [4] [5] [6] [7] <i>Very easy</i></p> <p>31. For my household, we feel that we can separate solid waste at source for recycling purposes if we really want to <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p>
Direct Measures (Moral Norms)
<p>32. My household will consider it as doing something morally right if we separate solid waste at source for recycling purposes. <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p> <p>33. For my household, we will consider it as a sense of responsibility to separate solid waste at source for recycling purposes. <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p> <p>34. For my household, we will separate solid waste at source for recycling purposes as a show of respect to the environment. <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p> <p>35. For my household, we will feel guilty if we do not separate solid waste at source to promote recycling. <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p> <p>36. For my household, we will feel better, if we separate solid waste at source for recycling purposes. <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p>
Situational Factors
<p>37. My household will have time to separate solid waste at source for recycling purposes when the time comes. <i>Highly unlikely</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly likely</i></p> <p>38. My household will have the space to separate solid at source for recycling purposes when the time comes. <i>Highly unlikely</i> [1] [2] [3] [4] [5] [6] [7] <i>Highly likely</i></p> <p>39. My household will feel convenient to separate solid at source for recycling purposes when the time comes. <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p>
Direct Measures (Behavioural Intentions)
<p>40. I plan to separate solid waste at source for recycling purposes when the time comes. <i>Definitely not</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p> <p>41. I will separate solid waste at source for recycling purposes when the time comes. <i>Definitely will not</i> [1] [2] [3] [4] [5] [6] [7] <i>Definitely will</i></p>
Behaviour, Past Behaviour And Know-How
<p>42. Do you always separate solid waste into the various components now? <i>Never</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes always</i></p> <p>43. Has your household separated solid waste into the various components before? <i>Never</i> [1] [2] [3] [4] [5] [6] [7] <i>Yes definitely</i></p> <p>44. Do you know the differences in the components of your household waste stream? <i>Not at all</i> [1] [2] [3] [4] [5] [6] [7] <i>Very much</i></p> <p>45. Kindly write down the different components of waste likely to be generated over a lunch of Rice, meat, salad and bottled water:</p> <p>46. Into how many streams would you suggest we separate the waste when the time comes?</p> <div style="display: flex; justify-content: space-around; width: 100%;"> Two Three Four Five </div>

Table S3. The code used for analysis of the TPB part of the questionnaire.

**GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT PROJECT, GHANA
MUNICIPAL SOLID WASTE IMPROVEMENT STRATEGY WITHIN THE ODAW DRAINAGE BASIN
CODING FOR ANALYSIS OF QUESTIONNAIRE ON BELIEFS OF HOUSEHOLDS ON MUNICIPAL
SOLID WASTE SEPARATION AT SOURCE**

ATTITUDE

Outcome Evaluation (1 = Extremely bad; 7 = Extremely good)

1. For my household to support **employment creation** will be:
2. For my household to contribute to making this **city clean** will be:
3. For my household to **earn some money** will be:

Behavioural Belief (-3 = Highly unlikely; 3 = Highly likely)

1. My household will separate solid waste at source to support **employment creation**.
2. My household will separate solid waste at source to contribute to make this **city clean**.
3. My household will separate solid waste at source to **make some money**.

SUBJECTIVE NORM

Motivation to comply (1 = Definitely not; 7 = Yes definitely)

1. For issues relating to solid waste management, what my **family members** think we should do is most important to me:
2. As far as solid waste management is concerned, my household will do what **community leaders** think we should do:
3. For matters relating to solid waste management my household will do what **religious leaders** think we should do:
4. When it comes to solid waste management, my household will do what our **neighbours** think we should do:
5. Pertaining to solid waste management, my household will do what our **close friends** think we should do:

Normative Belief (-3 = Highly unlikely; 3 = Highly likely)

1. Our **family members** will expect each other to separate solid waste at source for recycling purposes.
2. **Community leaders** will expect us to separate solid waste at source for recycling purposes.
3. **Religious leaders** will expect us to separate solid waste at source for recycling purposes.
4. Our **neighbours** will expect us to separate solid waste at source for recycling purposes.
5. Our **close friends** will expect us to separate solid waste at source for recycling purposes.

PERCEIVED BEHAVIOURAL CONTROL

Perceived power of control beliefs to influence behaviour (1 = Definitely not; 7 = Yes definitely)

1. Having the **necessary receptacles** will enable my household to separate solid waste at source for recycling purposes:
2. Experiencing **regular solid waste collection services** will facilitate my household to separate solid waste at source for recycling purposes:
3. Getting **knowledge** of the different components in the solid waste stream will enable my household to separate solid waste at source for recycling purposes:
4. Receiving some **incentives** will encourage my household to separate solid waste at source for recycling purposes.

Control beliefs (-3 = Highly unlikely; 3 = Highly likely)

1. My household will separate solid waste at source for recycling purposes if we **get** the **necessary receptacles**.
2. My household will separate solid waste at source if we experience **regular solid waste collection services**.
3. My household will separate solid waste at source if we have **knowledge of** the different components within our waste stream.
4. My household will separate solid waste at source for recycling purposes if we receive some **form of incentives** for doing so.

MORAL NORMS (1 = Definitely not ; 7 = Yes definitely)

- My household will consider it as doing something **morally right** if we separate solid waste at source for recycling purposes
- For my household, we will consider it as a **sense of responsibility** to separate solid waste at source for recycling purposes.
- For my household, we will separate solid waste at source for recycling purposes as a show of **respect to the environment**.
- For my household, we will **feel guilty** if we do **not** separate solid waste at source to promote recycling.
- For my household, we will **feel better**, if we separate solid waste at source for recycling purposes.

INTENTIONS (1 = Definitely not; 7 = Yes definitely), (Definitely will not; 7= Definitely will) respectively

1. My household **plans** to separate solid waste at source for recycling purposes when the time comes.
2. My household **will** separate solid waste at source for recycling purposes when the time comes.