Utilizing structural equation modeling to correlate biosand filter performance and occurrence of diarrhea in the village of Enseado do Aritapera in Para, Brazil

SUPPLEMENTARY MATERIAL

Survey of owners of CAWST Bios and Water Filter

Fill in survey as accurately and consistently as possible. If writing is required please make legible and be specific in answers. Interview only one person in the household. This person should be one of the caretakers of the house/household. If a response is written incorrectly, strike a line through it and rewrite correct response to the right of it. If a response is circled incorrectly, put an X through the incorrect response and circle the correct response. If both answers have Xs through them write in the correct response to the right of the answers. If the interviewee does not know the answer to the question a best guess or help from others may be asked from that household. If the answer is still unknown circle ‘other’ and write in unknown or if a ‘yes/no’ question is present, put an X through both answers. If an ‘other’ option is present but does not have a blank next to it, no writing is required for that question. Have the interviewee sign this document showing that they understand this information will be used for research purposes only.

Survey Number: _________________ (Survey Set – Number in Set, Ex. 1–1, 1–2)
Household Economic Level: Low Medium High Random
Interviewee Signature:
Community Name: ______________________________
Name of Interviewer: ______________________________
Date of Interview: _________________________________

Water Source

1. How much water do you and your family drink per day? (Liters). _____________
2. What is your primary water source for drinking? Open Well Closed Well River Bottled Water Community Distribution System Other _____________
3. What is your primary water source for washing and cleaning? Open Well Closed Well River Bottled Water Community Distribution System Other _____________
4. How do you get water during the dry season? Open Well Pump from river Walk to river Bottled Closed Well Community Distribution System Other _____________
5. How many meters away is the water source during the low point of the dry season? _____________
6. How long does it take to walk to the water source, fill up your container, and return to your house? _____________
7. What water do you drink when not at home? Unfiltered River Water Purchase Bottled Open Well Closed Well Filtered River Water Bring water from house Other _____________
8. Do you or your family filter your water through your bio-
sand filter before drinking it? YES NO (If 8. is NO go to 15.)
9. What percentage of your water that your family drinks is
filtered through the biosand filter? ______
10. How many days of the week do you or your family use
your filter? 7 6 5 4 3 2 1
11. Do you treat your water before it goes through the bio-
sand filter? YES NO
   a. If YES, how? Chlorine Solar Disinfection Filter
      through Towel Boil Settling/Clarification Other
      _____________
12. Do you treat your water after it goes through the biosand
filter? YES NO
   a. If YES, how? Chlorine Solar Disinfection Filter
      through Towel Boil Settling/Clarification Other
      _____________
13. Does the individual using the filter use different contain-
ers for gathering of water from the source and collection
of the filtered water from the biosand filter? YES NO
14. Does the collection container of filtered water have a
lid? YES NO
15. Do you typically store filtered or treated water in the
house for more than five hours? YES NO
16. Does the storage container of filtered or treated water
have a lid? YES NO
17. What kind of container do you use to store filtered or
treated water? Clay Plastic Metal Other _____________
18. How do you take water out of the storage container to
drink? Tap Ladle Cup Pour Other ______
19. Do you wash/clean your storage containers? YES NO
   a. How often? _____________

Hygiene

20. What type of toilet facility is used?
   c. During rainy season Latrine to river Latrine to closed
      pit Bucket/Barrel Bush/Field Flush/Pour flush to
closed pit Piped/Septic Tank Other _____________
   d. During dry season Latrine to riverbed Latrine to closed
      pit Bucket/Barrel Bush/Field Flush/Pour flush to
closed pit Piped/Septic Tank Other _____________
21. Is this toilet facility shared with other families on a regu-
lar basis? YES NO
22. How do you dispose of infant waste? Burn River Gar-
bage boat Other _____________
23. How often do family members use soap while bathing in
a week? _____________
24. What do you do with household trash? Burn Garbage
boat River Other _____________
25. Where is the bathroom located? Inside or Connected
to house Outside house
26. Where do you usually wash your hands? Kitchen Wash
station Bathroom Other _____________

House Information

27. Age of CAWST Biosand Filter: _____________
28. # of Bedrooms in Dwelling: _____________
29. What health issue is most common within your family?
Diarrhea Fever Cough Headache Other
30. Within your family, has there been at least one case of
diarrhea in the last week? YES NO
   a. If YES, how many different family members had diar-
rhea within the week? ______
   (and)
   b. If YES, how many total days did the family member
with the longest case of diarrhea within the household
have it within the past week? _____________
31. How many days does a single family member wait
before retrieving medicine from the health post when
they or someone else within the house is sick?
___________
32. How do you usually get to the health post or health
center? Taxi Car Taxi Boat Personal Boat Bicycle
Walk Personal Car Other _____________

Miscellaneous

33. Have you ever used the Internet? YES NO
34. Do you own a mobile phone? YES NO
35. If given the opportunity, would you be interested in
having and using electronic devices (i.e. Internet,
tables, smart phones, laptops)? YES NO

Observation (to be done by interviewer)

36. Dwelling Flooring Type(s): Wood Concrete Dirt Other
37. Dwelling Wall Type(s): Wood Concrete Dirt Metal Other
38. Dwelling Roof Type(s): Wood Concrete Thatched Metal Other
39. Type of Road Leading to Dwelling: Water Concrete/Paved Dirt Other
40. Are these located in the area where the family washes their hands? (Circle all that apply) Water Soap Towel
41. Investigation of household hygiene:
   (a) Flies present? YES NO
   (b) Animal pen within ___m of house or if elevated above water, connected to house? YES NO
   (c) Animals where they prepare food? YES NO

Observe Filter:

42. Is there a diffusion/baffle plate which is undamaged and without cracks? YES NO
43. Is the filter in a suitable place? YES NO
44. Is the sand surface flat and level? YES NO
45. Are there leaks in the concrete filter body? YES NO
46. Is there a well-fitting lid? YES NO
47. What is the depth of the water above the sand (cm)? __________
48. What is the flow of the filter (secs/100 mL)? __________
49. Is there a pipe or valve placed at the output of the filter? YES NO
50. Is there a mesh fitting at the output of the filter? YES NO
51. Is the output of the filter clean/clear? YES NO
52. How far is the toilet facility from the water gathering source (meters)? __________
53. Is the storage container of filtered or treated water clean? YES NO
54. What do the storage containers look like?
   Wide mouth (can put hand into it) Narrow mouth (can’t put hand into)

Figure S1 | Location in Brazil (Santarem, Para) where research took place.
Figure S2 | Revised model from Guatemala to Brazil. Added relationship of Improved Water Source to Filter Operation and Maintenance.

Table S1 | Occupant information

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<th>Name</th>
<th>Age</th>
<th>Education level completed</th>
<th>English or Spanish</th>
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<td></td>
<td>None Primary</td>
<td>Secondary</td>
</tr>
<tr>
<td>Mother:</td>
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<td></td>
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