'*Hom*': a simple point of use water treatment device

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ABSTRACT

This study sought to explore a locally assembled '*Hom*' point of use water treatment device by assessing aspects of its performance and possible effects of using it on compliant households and communities. The conceptual framework highlights poverty and environmental degradation as causes and consequences of one another, with ill-health caused by water-borne diseases reinforcing both to form a cycle. Whether or not the device would play a role in interrupting this cycle depends on its capabilities and acceptance, among other factors. Survey results indicated that the device is acceptable to 84% of respondents. Analysed data collected using questionnaires from 60 randomly sampled pilot device users revealed that it is useful to its users. Yield trials results led to the conclusion that one device unit could provide enough drinking water to satisfy the needs of a large representative household. Laboratory tests of water samples filtered with cartridges used for up to 10 years in the device found the water to be safe for drinking. It is concluded that the device is effective, environmentally friendly and useful to compliant households.

Key words | ceramic, drinking water, filter, household

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INTRODUCTION

Contaminated drinking water, along with inadequate supplies of water for personal hygiene and poor sanitation, are the main contributors to an estimated 4 billion cases of diarrhoea each year, causing 2.5 million deaths. Among children less than five years old in developing countries, diarrhoeal diseases account for 21% of all deaths (WHO 2005). A growing body of evidence has shown that treating drinking water at household level is both more effective and more cost-effective in preventing diarrhoeal disease than conventional approaches such as installation of protected wells and springs (Clasen *et al.* 2004; Hutton & Haller 2004; Fewtrell *et al.* 2005). Even where water is safe at the source, unless protected by residual disinfection or improved storage, it is frequently subject to extensive recontamination during collection, storage and household use (Wright *et al.* 2003; Trevett *et al.* 2005).

While delivery of safe and reliable water services is an essential goal, literature review of existing research concluded that simple, acceptable, low-cost interventions at

household and community levels are capable of improving microbial quality of household stored drinking water and reducing risks of diarrhoeal disease and death (Wright *et al.* 2003; Clasen *et al.* 2004; Trevett *et al.* 2005). Among the options for treatment of household drinking water, point-of-use (POU) water treatment technologies based on ceramic filters have been shown to be effective in a variety of development settings (Clasen *et al.* 2005). Such filters have been shown to offer certain advantages over chemical and other approaches to POU water treatment, including their high microbial efficacy, low cost, long life, effectiveness in a wide variety of raw water characteristics, and high levels of acceptability for use by the target population (Clasen & Boisson 2006; Clasen *et al.* 2006).

In poor rural western Kenya, which is considered in this study, diarrhoeal diseases are the leading cause of morbidity and mortality among children under five years of age (WHO 2005), largely because of inadequate water treatment and human waste disposal infrastructure (Makutsa *et al.* 2001).

A 1999 health survey revealed that 66% of the population in rural Nyanza Province lacked access to safe drinking water, and 47% of children under five years had experienced diarrhoea in the preceding two weeks (CARE Kenya, unpublished data 1999). Because of the high costs of water transfer projects and water treatment plant designs for dispersed rural settlements, as is the case in western Kenya where domestic water is sourced from surface water bodies and shallow wells, inexpensive and appropriate POU water treatment technologies based on ceramic filters would be more suitable at household level. The broad objective of this study was to investigate the nature and performance of a locally assembled POU 'Hom' ceramic filter device for rendering water potable and its possible effects on users and the environment. The specific objectives of the study were: (i) to assess public acceptance potential of the device; (ii) to investigate pilot users' appraisal of the device; (iii) to evaluate yield potential of the device and relate it to household drinking water demand; (iv) to determine the potential of the device in rendering water safe for drinking; and (v) to infer possible effects of using the device by compliant households and communities, through synthesis of study findings.

METHODS

Description of the Hom device

The Hom device dates back to 1993, when it began as the first author's project and later attracted interest among household heads in Kisumu district, most of whom willingly contributed money to acquire and use it (Omedi 1999). By the end of 2004, approximately 300 units of the device had been progressively produced and acquired by pilot users in five administrative districts in western Kenya. The device is fabricated from two locally procured 20-litre white plastic buckets with lids (Figure 1a and b), two imported cartridge filter elements (Figure 2a) and a tap. Threaded nipples on the bottom plates of the hollow, can-shaped cartridges are inserted through precisely bored holes made in the bottom of the top bucket and lid of the bottom bucket, sealed with the accompanying gaskets and wing nut (Figure 2b), and a tap is inserted into the hole in the bottom bucket (Figure 1b). The cartridges are pre-tested using an emerging and unique test method before use (Omedi 2008). When water is poured into the top bucket, gravity drives it through the porous ceramic media at a rate inversely proportional to water pressure head in the top bucket into the bottom bucket, where it can be accessed only by means of the tap. Figure 3 shows the Hom device positioned in the kitchen area of one household that is using it to render their drinking water potable.

Methodology

This study used surveys, questionnaires completed by pilot users and laboratory methods to tests the acceptability, usefulness and effectiveness of the device in rendering
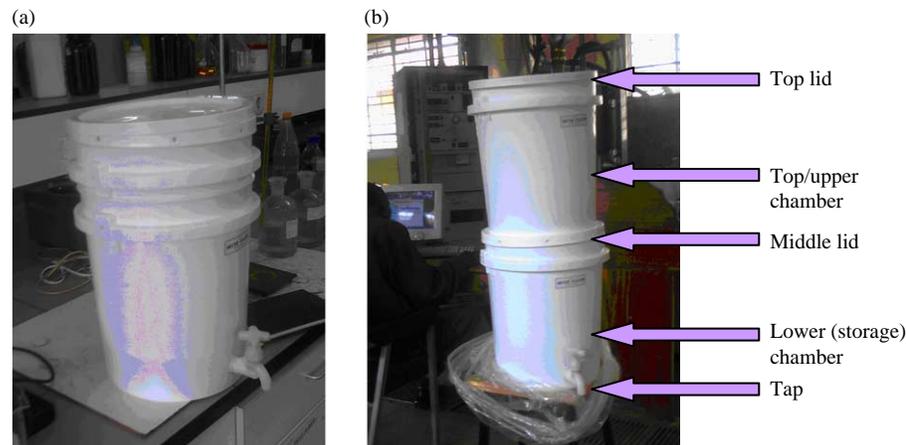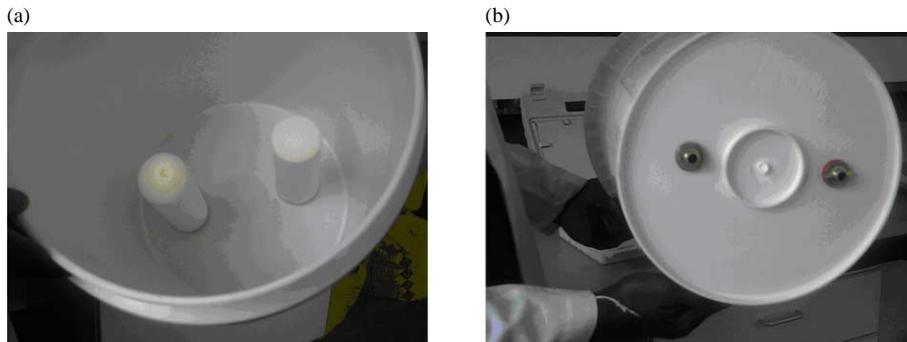
(a)   (b)

Figure 1 │ Hom device in packed (a) and working (b) positions.

(a)   (b)

Figure 2 │ Inside (a) and bottom (b) views of the upper chamber of the Hom device.

drinking water safe to users. Further concepts and findings were synthesized to infer potential benefits of the device for compliant households and communities.

Survey

To assess the public acceptance potential of the *Hom* device for rendering water potable, preliminary surveys were conducted in three convenient public exhibitions. In each exhibition venue two complete device units were displayed on a stand. The first venue considered was a three-day annual exhibition organized by the Commission for Higher Education (CHE) for Kenyan Universities held on 15–18 March 2006 in Nairobi. At a frequency of every 10–15 min, a visitor to the stand, regardless of gender, was invited to fill in a one page response sheet after being fully informed about the nature and functioning of the device

Figure 3 │ Hom device for rendering water potable in use in a household.

through observation, explanations, discussions, questions and answers provided by the presenter and stand attendants. In this way, the sample was well distributed, independent, varied and more representative of visitors to the stand (Babbie 1992). The population was all people who attended the exhibition in the three days.

The second exhibition was convened, with prior arrangements, at Nyang'ori Mission Complex (NMC) in Vihiga district, on 20 June 2006. At the Mission Complex, the device was exhibited to students and staff. Participants were allowed to observe, hold discussions with the presenter, ask questions and fully satisfy themselves as to the nature and functioning of the device, then complete a standard response sheet.

The third exhibition was convened at Ramogi Institute of Advanced Technology (RIAT) in Kisumu district on 5 July 2006. The population on exhibition day was estimated at 500 people and composed of staff, students and visitors to the institute. The pre-arranged exhibition coincided with a board meeting of the institution and a scheduled prayer meeting which added variation to the sampling frame. In total 83 response sheets were fully completed by respondents in the three exhibitions (see Table 1) and, when analysed, their opinions added value to appraisal results at household level.

Appraisal

To investigate pilot users' appraisal of the *Hom* device for treating water to quality suited for drinking, users who had acquired the device in the past were traced using their

Table 1 | Exhibition venues, dates and gender of respondents

Location	Date	Numbers of respondents	Male	Female	Percentage female
Nairobi	15/03/2006	10	5	5	50
	16/03/2006	10	4	6	60
	17/03/2006	19	11	8	42
NMC	20/06/2006	17	8	9	53
RIAT	05/07/2006	27	13	14	52
Total		83	41	42	Mean = 51

contact addresses and it was found that use of the device had spread from five administrative districts in which it was initially distributed to more than 12 districts. The wide spread could be attributed to the portability of the device. The spread and distribution of the devices to 12 districts gave variations that enriched the samples in representing households.

Out of approximately 300 units of the device produced and distributed by the end of 2004, a sample of 60 units were randomly selected based on contact addresses and questionnaires administered to respective users as respondents. Before questionnaires were administered, the purpose of the study was explained to each prospective respondent, emphasizing that participation was voluntary and that subjects could withdraw at any time. In the study, one questionnaire was administered per household resulting in a sample size of 60 households. The questionnaire used had several questions on the following issues: (i) identification; (ii) composition of household; (iii) source of domestic water; (iv) previous water treatment method(s); (v) experience with *Hom* device; and (vi) further observations.

Yield trials

Yield experimental trials were conducted based on six selected households each in Uasin-Gishu and Kisumu districts, who were using the device. The total 12 participating households were selected based on purposive sampling and were subsequently informed about the exercise through demonstrations. The procedure involved varying the interval of topping up the upper chamber with raw water to a fixed level each time and measuring the quantity of raw water added after a given time interval. Preset intervals of topping up were: 6, 8, 12, 24 and 48 h. A standard 1-litre plastic measuring jar marked at 100 ml intervals was used in each trial site to measure the quantity of filtered water after each set time interval. The same water source and pre-treatment for each set of trials was maintained as a control of physical characteristics of water for each device. Two sets of unscheduled random intervals were later introduced based on observed trends.

Water quality

To determine the potential of the *Hom* device in rendering water safe for drinking, three selected laboratories were issued with devices whose cartridges ranged in use from new to those used for approximately 12 years. Moi University Public Health Engineering laboratory established the scope of performance of a new device, used for three months and another used for up to six months. Water samples from the devices of five households in Kesses, Moi University and Kapseret in Uasin-Gishu district, which had owned similar *Hom* devices for a period of 3–6 months, were analysed. Both raw water from the top chamber of the *Hom* device and the resulting potable water from the tap of the respective device were sampled and subsequently analysed in the laboratory. Independent analyses were done by the Ministry of Water and Irrigation laboratories and by KEMRI both in Kisumu. Ministry of Water and Irrigation laboratories tested filtrate from a device with a pair of 12-year-old cartridges and another with 7-year-old cartridges. KEMRI tested samples from a device with 10-year-old cartridges. The laboratories were allowed to conduct their tests independently with the assumption that

they were equal in competence. Performance of the device in rendering water safe for drinking was mainly based on microbiological parameters.

Data analysis

Exhibition data

Responses contained in 83 record sheets from the exhibition sites were manually sorted against an arbitrary scale (Mugenda & Mugenda 1999; Kothari 2000). Attitudes reflected in the written comments were then sorted into: very positive, positive, neutral and negative towards the Hom device. The scale was dependent on the researcher's insight but was considered adequate for this exercise (Kothari 2000). Indicators of 'very positive' attitudes included where there was an instant placement of orders for the device or pledges at an offer price of Ksh3,000 (US$39), expressions of willingness to immediately get involved in its promotion or development were made, patenting/acquisition of property rights was encouraged and other such genuine personal interest was made obvious towards the device. Indicators of a generally 'positive'

attitude were: general messages of commendation, referring the presenter to others who may need it, offer of relevant suggestions on the way forward, suggesting future networking strategies and wishful expressions. 'Neutral' respondents were non-committal and were neither opposing nor supporting the idea. Doubts, discouraging remarks, and strong reflection of no interest in the device indicated a negative attitude. Collected data were analysed to answer the question 'would the public accept or reject the device'. The proportion of respondents that reflected at least a positive attitude was the sum of the two categories (Mugenda & Mugenda 1999). The sample was gender indiscriminate; sorting gender composition was on the basis of recorded names.

Questionnaire data

Sets of data gathered through questionnaires were manually sorted for each section. Relevant parts of sorted data were keyed into SPSS data sheets by which they were analysed and presented accordingly. The arbitrary scale used for assessing 17 attributes (Table 2) was weighted

Table 2 │ Assessment of the Hom device by users with respect to 17 attributes

Device attribute	Frequency per ranking scale						Good and excellent	% Affirmative score
	(a) Poor	(b) Fair	(c) Good	(d) Excellent	(e) Missing	(f) Sum	(c + d)	(c + d)/f
1. Environmentally friendly	0	0	16	44	0	60	60	100.0
2. Useful to your household	0	0	21	39	0	60	60	100.0
3. Safe storage of water	0	0	25	34	1	60	59	98.3
4. Presentable/socially acceptable	0	2	27	31	0	60	58	96.7
5. Energy saving	0	2	14	43	1	60	57	95.0
6. Convenient to use	0	4	19	37	0	60	56	93.3
7. Suitable for use in rural areas	2	1	17	39	1	60	56	93.3
8. Suitable for use in urban areas	1	1	20	35	3	60	55	91.7
9. Household cost cutting/saving	0	4	14	41	1	60	55	91.7
10. Time saving for householders	0	4	20	35	1	60	55	91.7
11. Suitability of its water for drinking	0	0	17	38	5	60	55	91.7
12. Easy to use	0	6	20	34	0	60	54	90.0
13. Water conserving	1	2	32	22	3	60	54	90.0
14. Appropriate in its technology	0	6	27	26	1	60	53	88.3
15. Suitable for use in camps/field	1	9	17	29	4	60	46	76.7
16. Adequate water yield for household	0	13	28	15	4	60	43	71.7
17. Suitable for use in disasters	5	12	17	24	2	60	41	68.3

as follows for analysis: Invalid/missing–0, Poor–1, Fair–2, Good–3, Excellent–4. The mean score (50%) in this section and similar scales corresponded to fair/neutral. Analysed data in this sub-component was presented as: descriptions, explanations, in some cases calculations. Both qualitative and quantitative methods of data analyses were applied.

Yield trial data

Yield trial data were evaluated mathematically by calculation of average yield per 24-h duration per category. Results were presented in a table for interpretation and comparison with household sizes based on per capita drinking water demand of 2 litres per 24 h duration (WHO 1985; Gleick 1996) in assessing the potential of the device.

Ethical statement

The research proposal of this study including ethical issues was approved by Moi University, School of Environmental Studies, Graduate Studies Committee.

RESULTS AND DISCUSSION

Assessment of *Hom* device potentials by the public

A total of 83 response sheets that were fully completed by respondents in the three exhibitions were analysed. The distribution of respondents by gender per exhibition is presented in Table 1. A male proportion of 49% and female 51% is a fair representation of gender at the exhibition venues for the indiscriminate sample. Results indicate that attitudes of respondents reflected in the written comments were very positive (45%), positive (39%), neutral (15%) and negative (1%) towards the device, indicating that a positive attitude towards the device on the first encounter with it is realized among 84% of respondents.

The above results imply that a significant proportion of respondents had a positive attitude towards the device, and that a boost to either positive or negative by the neutral proportion would have no significant effect on the result. Authenticity is ascertained by the respondents' act of willingly giving their names and contacts details on the response sheet.

The respondents were asked how much they were willing to pay for the device and the results indicated that most respondents (77%) were willing to pay at least Ksh2,000 per unit. Based on a recommended purchase price of Ksh3,500, the daily cost of the device over the recommended life span of six years translates to Ksh1.60 (US$0.02). This would be at most 2.3% of the income of the poor–less than a dollar a day–(UNDP 1995), with expected direct and indirect intervention against the effects of water-borne diseases, poverty among others.

Hom device appraisal by pilot users

A total of 60 questionnaires were completed by randomly selected respondents and this translated to about 20% of the device units produced and distributed by end of 2004. Distribution of respondents was found to be wide, as follows: 44 in five districts in Nyanza Province, eight in two districts in North Rift, two in two districts in South Rift, five in three districts in Western Province and one in Central Province. Male respondents made up 52% and female respondents 45% of the sample; in the remaining 3% of the sample, questionnaires were jointly completed by spouses of two respective households. The household sizes were classed into: 1–3, 4–7 and ≥ 8 classes for analysis. Results indicate that the mode class is 4–7 members, representing 58% of respondents; however, most households (65%) had more than four members.

The reliability of domestic water sources at household level was measured as number of months in a year that the main source had adequate water. Results indicate that most households do not rely on a single source of domestic water; however, 45% had 12 months of reliable supply from their main source while 17 and 13% had 8–11 and less than eight months of reliable supply from the main water sources, respectively. It should be noted that not all water sources have safe water for drinking, hence treatment challenges prevail.

The respondents were asked about their previous drinking water treatment methods. Results indicate that boiling was the most commonly used method by 75% of respondents and a further 55% of respondents were consistent in their method of treatment. These results imply that demand for fuel for boiling water is high.

The respondents were asked about the period they had used the device to render their drinking water potable. The duration of use in years by each household was classed into: more than 12, 8–11, 4–7, 1–3 and less than 1. Results indicate that the mode duration of use of the device is 4–7 years by 33% of the respondents; 58% used the device for a period of at least 4 years, whereas the longest duration of use of the device was approximately 12 years. Most devices of the respondents including the oldest were in use at the time of filling in the questionnaires. Based on these results, effectiveness of the devices used in the categories 4–7 years, 8–10 years and above 12 years would be of interest and were thus considered for water quality analysis.

The change in household drinking water situation following use of the *Hom* device for rendering water potable was evaluated. Almost all households (96%) reported to have realized an improved household drinking water situation, implying that users associate the device with such improvement, have confidence in and liking for the device based on the services it gives them. The majority of respondents interpreted improvement to mean: water was readily available, water was acceptable in appearance (crystal clear) and was of acceptable taste/smell, and was more often drunk than before, among others. On being asked about quantity of drinking water yielded, 80% of the households obtained adequate water from their devices. This implies that a significant proportion of households with 4–7 members were in this group. It would still be interesting to compare actual daily yield experimentally with the WHO recommended per capita intake of 2 litres.

Assessment of the device by its users with respect to some 17 attributes was undertaken and the results are presented in Table 2. The affirmative scores for attributes are considered as the sum of good and excellent scores (c + d) on an arbitrary scale of: poor, fair, good and excellent. The scale was weighted for statistical analysis. Invalid and missing, poor, fair, good and excellent were given weights of: 0, 1, 2, 3 and 4, respectively. Score range and attributes with equal affirmative scores were clustered for comparison by statistical analysis of trends. All means of affirmative scores were noted to be bound within the 95% confidence interval, implying that the inference scale was valid and reliable. Results indicate that 14 attributes out of 17 (82%) affirmatively scored above 86%. All respondents

affirmed usefulness of the device to their households. These results imply that the device has a potential beyond just rendering water potable.

From the results, it was further noted that 55% of respondents accessed potable water directly from the device whereas 35% stored it and accessed it from closed bottles and 10% stored the water elsewhere. Challenges of hygienic water storage and handling are noted. Repairs were carried out on the devices of 53% of respondents, 63% of respondents suggested improvements to the device and 12% suggested alternative(s) to the device. Suggestions for improvement by respondents included: demand for a larger capacity device for institutions, automated refilling systems for the raw water chamber and lockable system. Repairs involved leaking and damaged taps and replacement of cartridges and/or sheared lids. The implications of these findings are that users can handle repairs to an extent and they know what needs to be improved on the device; therefore there is potential for self-sustenance and participatory improvement is noted.

Hom device yield

Results indicate that all 12 participants in yield trials could not cope with the categories of refilling the *Hom* device three and four times a day as required. The majority managed categories C, D and E to some extent (Table 3); however, refilling intervals of 24 and 48 h were apparently most preferred by the majority of users. Other users preferred random and on-demand responses; hence two more categories, 'random' at increasing and at decreasing time-lapses were introduced, categories F and G respectively (Table 3).

Results indicated that the highest yield was 21 litres per day, achieved using refilling category G whereas the lowest yield was 4.4 litres achieved by recharging once every 48 h (Table 3). The mean of all categories was 13.2 litres per 24 h; this would satisfy at least six individuals at 2 litres per capita per day whereas the lowest yield of 4.4 litres would satisfy at least two individuals and at most 10 individuals. These results imply that the device has the potential to satisfy the daily drinking water needs of both large and small households where average households have five or six members. With respect to the earlier results that 80% of households obtain adequate water from their *Hom* devices

Table 3 │ Effect of frequency of topping up on water yield of the *Hom* device

Refilling category	Interval of topping up the device	Average yield (litres)	Min–max yields (litres)
A	Every 2 days (48 h)	4.4	
B	Daily (24 h)	7.6	6.4–8.8
C	Twice a day (12 h)	11.5	10.6–12.4
D	Randomly at less than 24 h interval	16.5	15.0–18.0
E	Randomly including intervals exceeding 24 h	14.0	13.0–15.0
F	Randomly seven times at an increasing time lapse in 24 h	17.5	17.0–18.0
G	Randomly seven times at a decreasing time lapse in 24 h	21.0	20.5–21.5
	Mean	13.2	

and 72% appraise the yield of the *Hom* device to be adequate for household use (attribute No.16, Table 2), the two have distinct meanings. A deviation of 8% representing five respondents is fairly low and in both cases yield adequacy is confirmed.

Yield from the device varies with: recharge interval (t), turbidity of raw water (τ), hydrostatic pressure (ρ), properties and conditions of cartridges such as: porosity (γ), saturation (ς), thickness (d), surface area in contact with water (a), among other parameters. Yield is therefore a function of the mentioned parameters: $Y = f(t, \tau, \rho, \gamma, \varsigma, d, a, …)$. Yield trials results show that yield is inversely proportional to interval of refilling ($Y \propto 1/t$); hence an automatic continuous flow system similar to a flush toilet cistern system would yield the largest amount of water as t will always tend to zero and will maintain a maximum hydrostatic pressure, which also ensures continuous saturated conditions in the cartridges.

Water quality

Laboratory results revealed that raw water from common water sources in Kisumu were heavily contaminated with faecal coliforms; raw water sourced from Lake Victoria and neighbouring wells were found to have faecal coliforms concentration in the range of 1,100–2,400 per 100 ml. Water sampled from sources in Uasin-Gishu district, North Rift, had a faecal coliforms concentration of less than 10 per 100 ml.

Laboratory tests results (Table 4) revealed that each of the devices with certified cartridges eliminated coliforms in water, reduced turbidity in water and maintained acceptable levels of other parameters for drinking water. The pH and hardness were noted to increase where *Hom* devices had newer cartridges, but this was not significant. The filtrate was crystal clear water with a pleasant taste.

Table 4 │ Mean performance of ceramic water filters in use for up to one year for filtering drinking water based on chemical and microbiological parameters

Parameter	Unit	Raw water	Filtered water	WHO standard	EMCR-2006 standard
Chemical parameters					
Total phosphorus	mg l^{-1}	0.92	0.30	20 max	10 max
pH	pH	7.5	7.8	6.5–8.5	6.5–8.5
Turbidity	NTU	7.9	2.2	5.0	–
Total dissolved solids	mg l^{-1}	0.30	0.19	500	–
Hardness	mg l^{-1}	15	39	250	–
Microbiological parameters					
Faecal coliforms	/100 ml	5	Nil	0	0
Total coliforms	/100 ml	TNTC	2	0	10

TNTC, too numerous to count.

Laboratory tests of filtered water sampled from *Hom* devices with cartridges of up to 10 years old found them still effective in rendering water safe for drinking. The device with up to 7-year-old cartridges eliminated all total coliforms in highly contaminated water whereas the device with 12-year-old cartridges reduced the total coliform load of highly contaminated water by at least 91%. The results for all devices with cartridges of up to 10 years old indicate that filtered water meets Kenyan and WHO drinking water standards of 0 faecal coliforms per 100 ml of water (WHO 1993; EMCR 2006). However, results for the device with 12-year-old cartridges indicate that filtered water would still need to be disinfected but at lower doses.

Some manufacturers of cartridges estimate the effective performance of each cartridge to be equivalent to filtering up to 25,000 litres of water; which may translate to approximately seven years at a rate of 10 litres per day per cartridge (close to the highest); or at least 9 years at 7 litres per day per cartridge (close to the average). From the above filtered water quality results and estimated cartridge effective performance by manufacturers, adding a factor of safety, six years as the maximum period that the cartridges should be used before replacing is reasonable.

Synthesized potentials of the *Hom* device

In conceptual context, 'synthesize' means to 'combine separate simple elements of thought into a whole and advanced concept; this implies processing information and data by reasoning from principles into a conclusion' (Chambers & Chambers 1972). Households, communities, nations and the global village all face the challenge to act locally in order to harness and intensify benefits of any available proven innovative technology to attain sustainable development. Rate and scale of compliance including spatial coverage would all be critical. The concept with respect to the *Hom* device and its potentials at household, community, national and global levels are discussed below.

Household

The device used at household level can improve quality of drinking water resulting in risk reduction of diarrhoeal disease. Also a reduction in combustion emissions could be realized by decreasing the need to boil water for drinking.

Community

The wide use of the device by communities would cut down on community healthcare costs, increase productivity and potential of communities to conserve the natural resource base, such as forests, while minimizing and managing disasters and epidemics.

National and regional

Healthy communities and nations would improve the economy and human development index, achieve government targets and visions, improve the resource base and the capacity to manage disasters and attain sustainable national development, among other things. Wide use of the device can create employment for dealers.

Global

The cumulative effects of widespread use of the device would progress to form chains in both directions between human institutions starting from the household, the most basic, to the global level. Compliant households, communities, nations and the world would harness and multiply benefits of the *Hom* device at their respective levels and between institutions to realize trickle-down effects and lateral benefits–beneficial side-effects–thereby forming more multi-directional chains and complex webs of benefits.

CONCLUSION

There is need for support for applied research to promote adoption and sustained use of POU water treatment technologies such as the *Hom* device in poor rural settings where improved water sources are scarce, sanitation coverage is imperfect and ecosystems are delicate. In this study the potential for public acceptance or rejection of the *Hom* ceramic filter device for rendering water potable was evaluated. Standard *Hom* device samples were exhibited in three sites and results revealed that 84% of the respondents reflected a positive attitude towards it, whereas 15% were initially neutral and 1% had a negative attitude. It is therefore concluded that the device has the potential

for wider use among households and that the public accepts the device and would increasingly accept it with time upon satisfying themselves as to its nature and functioning.

Appraisal results of the *Hom* device by pilot users indicate that the device has minimal known demerits and is useful to households in many ways and that it has numerous positive impacts, the potential to attract voluntary support from users, is cost effective and socially acceptable. The study established that yield of the *Hom* device depended directly on the frequency of topping up the top chamber. Results indicate that water yield from the device can be manipulated by varying the rate of addition of raw water holding other factors constant and that one device unit has the potential to yield adequate drinking water to satisfy the daily drinking water needs of a large, average and small household with up to about 10 members. The potential of the device to render water safe for human drinking was investigated and results revealed that devices with certified ceramic cartridges rendered water safe by getting rid of faecal coliforms in water, reducing turbidity and maintaining acceptable parameter limits; however, six years is the maximum period that the cartridges should be use before being replaced. By synthesizing the study findings and knowledge of the study subject as applicable to human institutions and the environment by assuming optimal compliance in use of the *Hom* device, it is concluded that ceramic water filtration has the potential to directly and indirectly satisfy many essential human and environmental needs without compromising the abilities of future generations to meet their needs.

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