Methods Appendix
Factors Affecting Adoption of Insecticide-Treated Bed Nets, Household Water Treatments, and Improved Biomass Cookstoves

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1. PubMed Search

Articles were chosen from the PubMed database using a key word search designed to select studies that focused on factors affecting adoption of three technologies: insecticide-treated bed nets (ITNs), household water treatments, and improved biomass cookstoves. To identify articles on bed nets, we searched the key words: insecticide treated bed nets, bed nets, mosquito nets, and ITNS. To identify articles on point-of-use water treatments, we searched the key words: point of use water treatment, point of consumption, water purification, filtrations, filters, and disinfection. To identify articles on improved biomass cookstoves, we searched the key words: biomass cookstoves, cook stoves, and cookery. To further identify articles that specifically addressed adoption of health practices, we searched the key words: barrier, behavior, uptake, efficacy, effective, adoption, accept, motivation, psychology, education, promotion, marketing, attitude, accessibility, evaluation, social marketing, marketing, health services, needs, demand, power, prejudice, decision making, educational status, family socioeconomic factors, health promotion, health knowledge, attitudes, practice, patient acceptance of health care, health services accessibility, consumer participation, and health care surveys. The exact algorithm for the search can be found in section 7 of this methods appendix.

PubMed was chosen as the database to be used after excluding PAIS, CINAHL, ERIC, Web of Science, Google Scholar, PsycINFO, POPLINE, and OneSource based on low article yield. Final key words were selected based on individual database searches of multiple terms using a trial and error method to identify those with the highest yield of articles. The terms with the highest yield of articles were then compared for article relevance. The final optimized search of Appendix I was run on August 20, 2010 and yielded a total of 1105 articles.

2. Initial Article Screening

The full article list was subjected to an initial screen by two independent coders (C.W. and L.P.). Each article was evaluated for relevance based on key words in the title and abstract. Terms that were deemed relevant included bed nets, ITNs, point-of-use, water treatment, improved biomass cookstoves, cookstoves, use, practice, uptake, adoption, KAP (Knowledge, Attitudes, and Practices), accepted, received, community response, and compliance. Each article was required to have one technology term and one term describing use in the abstract or title to be considered relevant. C.W. and L.P.
compiled individual lists of relevant articles from the PubMed database search and reconciled differences to create a final list of articles to code. This list consisted of 283 total articles, where 175 were relevant to ITN use, 28 to point-of-use water treatment use, and 7 to improved biomass stoves use. 73 of the 283 articles could not be located. The remaining 822 articles were excluded as not relevant to the technology adoption questions under study.

3. Article Coding

C.W. and L.P. individually evaluated the 210 relevant articles that were returned by the search to code four broad categories of characteristics influencing technology adoption: health, comfort/taste/aesthetics, ease-of-use/convenience, and socio-cultural norms. Factors were only coded if the study undertaken by the article’s author(s) concluded that they had a significant influence on adoption of the technology in question. Factors cited as having been identified by other researchers were not coded unless the entire purpose of the article was to serve as a review summarizing previous research. Hypothetical cases or author speculation not based on the results of the study itself were not coded.

No distinction was made between factors that increased or decreased adoption; only overall significance of each factor was judged. For a given article, each of the four categories of factor was coded either as having been mentioned as significant to adoption or as not having been mentioned as having a significant effect on adoption (or having been explicitly mentioned as insignificant). Significance was assessed quantitatively (p-value <0.05) where the study included statistics that allowed such an assessment and qualitatively otherwise (e.g., “The most significant factor mentioned by users of ITNs was discomfort resulting from the heat of the net”). No evaluation was made of the relative importance of each factor—i.e. a factor that was statistically significant to adoption behavior but which had a small effect compared to other factors would still be coded as significant.

4. Factor Definitions

**Health** was coded if a reason for use or non-use of the product related to anticipated improvement or degradation in quality or length of life, elimination or prevention of disease or illness, or any other factor connecting with the overall health of the individual or his/her family. This category covered cases where a user’s perception of health as being important or unimportant influenced the adoption of the product as well as ones in which adoption was affected by the belief that the product would worsen health or be less effective than traditional remedies. If beliefs regarding the ability of the product to improve health were shown to be important to adoption, both “health” and “sociocultural” were coded. Safety concerns around a product that influence adoption are covered by this category.
Examples that would be coded for “Health”
- Users adopted an insecticide treated net in order to lower the risk of contracting malaria.
- Point-of-use water treatment was used to prevent diarrheal disease.
- People used improved biomass cookstoves to reduce the risk of respiratory disease caused by indoor air pollution.
- Users did not adopt a water treatment system because its chlorine smell was associated with damage to health.

Comfort/Taste/Aesthetics (“Comfort”) was coded if uptake was affected by the technology’s being more or less pleasing to the individual than current alternatives, including in terms of physical comfort, taste, or aesthetics. These are primarily private beliefs about what makes a product appealing; influences with a strong social component were coded instead under “Sociocultural.”

Examples that would be coded for “Comfort”
- Bed nets were favored for preventing the nuisance of mosquito bites.
- Bed nets were not used because they unpleasantly exacerbated night-time heat.
- Improved stoves were used because they reduced irritation from smoke.
- Water treatments were used or not used because they improved or degraded the taste of water.
- Respondents cooked on traditional stoves because the food tasted better.
- Dirty bed nets were not used because they were visually unappealing.

Ease-of-Use/Convenience/Compatibility (“Convenience”) factors were those related to ease-of-use, compatibility with existing habits, or time burden relative to current approaches.

Examples that would be coded for “Convenience”
- Bed nets were not used because they were difficult to hang.
- Water treatment methods were not used because they required significant time.
- Respondents did not use improved biomass stoves because they cooked more slowly.
- Improved biomass stoves were not used because their fuel was difficult to obtain.

Sociocultural factors revolved around belief systems or social norms that affect adoption. This category covers perceptions about the efficacy of a technology that may be rooted in deeply held cultural norms about what solutions are most effective or which are socially acceptable. This category may involve motivations associated with social pressure, embarrassment, or other concerns around social status.

Examples that would be coded for “Sociocultural”
- Men or adolescent girls are immune to malaria, so they do not need to use bed nets.
- Malaria is not a single disease, and so a particular prevention method targeting malaria is not compelling.
• Guinea worms come from inside the body rather than from contaminated water, so water treatment methods are not compelling.
• Insecticide treated nets were not used because villagers believed they resembled traditional burial shrouds.
• People used bed nets because they were in the habit of doing so and all their neighbors did the same.
• People boiled water because they were in the habit of doing so and all their neighbors did the same.
• Point-of-use water treatments were adopted at a higher rate in towns where owning this product was considered a symbol of wealth.

5. Coding Reconciliation

C.W. and L.P. compared individual coding results from each of the 210 coded articles. Discrepancies were resolved on a case-by-case basis by discussing the recorded evidence for each factor. In cases of ambiguity the original article was referenced, and if no consensus was reached, the discrepancy was noted and discussed by the research group. M.C.T. did an overall review of the coding and made a few modifications in line with the coding definitions above.

6. Studies from PubMed Search Explicitly Mentioned in Article

• Adler T. Better Burning, Better Breathing: Improving Health with Cleaner Cook Stoves. Environmental Health Perspectives 2010;118(3):A124-9. (Described how First Energy measured lung function of prospective stove customers to show damage from traditional biomass cooking.)
• Gupta SK, Islam MS, Johnston R, Ram PK, Luby SP. The Chulli Water Purifier: Acceptability and Effectiveness of an Innovative Strategy for Household Water Treatment in Bangladesh. Am J Trop Med Hyg 2008;78(6):979-84. (Showed that even understanding arsenic toxicity and knowing someone suffering from it was not associated with Chulli water purifier user.)
• Firth J, Balraj V, Muliyil J, Roy S, Rani LM, Chandresekhar R, Kang G. Point-of-Use Interventions to Decrease Contamination of Drinking Water: A Randomized, Controlled Pilot Study on Efficacy, Effectiveness, and Acceptability of Closed Containers, *Moringa oleifera*, and In-home Chlorination in Rural South India. Am J Trop Med Hyg 2010;82(5):759-65. (Reported that closed containers were popular because households lacked containers, but that unfortunately this method was not efficacious from a health perspective.)
Algorithm for PubMed Search


8. Full Bibliography of Studies Coded


• Blanton E, Ombeki S, Oluoch GO, Mwaki A, Wannemuehler K, Quick R. Evaluation


- Dunston C, McAfee D, Kaiser R, Rakotoarison D, Rambeloson L, Hoang AT, Quick RE. Collaboration, cholera, and cyclones: a project to improve point-of-use water

is inversely related to bed net use in Gabon. Malar J. 2008 Apr 18;7:60.


- Gu W, Novak RJ. Predicting the impact of insecticide-treated bed nets on malaria transmission: the devil is in the detail. Malar J. 2009 Nov 16;8:256.


• Kiwuwa MS, Mufubenga P. Use of antenatal care, maternity services, intermittent presumptive treatment and insecticide treated bed nets by pregnant women in Luwero district, Uganda. Malar J. 2008 Mar 1;7:44.


• Leake DW Jr, Hii JI. Observations of human behavior influencing the use of insecticide-impregnated bednets to control malaria in Sabah, Malaysia. Asia Pac J

• Maxwell CA, Rwegoshora RT, Magesa SM, Curtis CF. Comparison of coverage with insecticide-treated nets in a Tanzanian town and villages where nets and insecticide are either marketed or provided free of charge. Malar J. 2006 May 21;5:44.


