Is hygiene promotion cost-effective: a case study in Burkina Faso
Borghi J, Guinness L, Ouedraogo J, Curtis V

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The authors assessed the impact of a large-scale urban hygiene promotion programme. The programme was designed to increase handwashing with soap after handling children's stools and using a latrine, and to increase stool disposal in a latrine.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised principal carers (including mothers and maids) of young children and primary school children.

Setting
The setting was the community. The economic analysis was conducted in Burkina Faso.

Dates to which data relate
The effectiveness data related to a study carried out between 1994 and 1998. The cost data for the same period were collated in June/July 1999 and were presented in 1999 prices.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

Link between effectiveness and cost data
The costing was carried out retrospectively on a sub-set of the sample that participated in the effectiveness study.

Study sample
Details of the study design and intervention were reported to have been described in full elsewhere (Curtis et al., see Other Publications of Related Interest). Details from the study were not used to supplement this abstract. The authors did not report whether power calculations were carried out to estimate the impact of chance on the results, although this might have been reported in the supplementary paper. The sample was targeted through a programme of hygiene promotion. It was appropriate for the study question as it included individuals from the general population who were responsible for caring for young children. A total of 37,319 mothers were observed throughout the study. Summary statistics were not reported here.
Study design
The authors reported that they specifically designed the study to be replicable and sustainable in the urban Burkina Faso setting. The basis of the analysis was a prospective comparative study with historical controls. There were five main elements:

- monthly house-to-house visits were conducted by community volunteers;
- health staff was trained to add participatory discussions relating to hygiene to their normal programme of health centre talks;
- a theatre group gave weekly performances;
- a series of 12 radio spots were broadcast; and
- six hygiene lessons were given in primary schools by trained teachers, with schools also receiving a starter box of soap and buckets.

The study was set up and implemented in Bobo-Dioulasso. The participants were followed for a 3-year period. The authors did not report any loss to follow-up.

Analysis of effectiveness
The primary health outcomes were the change in handwashing with soap and the number of mothers changing their behaviour. As the authors compared the same group of patients, there was no need to assess the comparability of groups before and after the study. The authors reported that they did not include the effects of stool disposal in a latrine, owing to the uncertainty about the combined impact this has with hand washing.

Effectiveness results
Handwashing with soap, observed after handling stools, rose from 12.7 to 31.3%.

An estimated 6,916 mothers changed their behaviour.

Clinical conclusions
The authors did not draw any conclusions that related only to these effectiveness data. Nevertheless, the hygiene promotion efforts had a clearly substantial impact on the behaviour of mothers in this study.

Measure of benefits used in the economic analysis
The summary measures of benefits used were:

- the estimated number of cases of diarrhoea averted;
- the estimated number of outpatient consultations and hospital referrals prevented; and
- the number of deaths avoided.

Several assumptions, supported by published literature, were made to help estimate these measures.

Direct costs
The authors estimated the costs and cost-savings from three perspectives. More specifically, the provider, the households who changed their behaviour as a result of the programme, and society. The authors reported "costs and capital items were annualised over their expected useful life at 7% discount rate". The analysis was concerned with the
research costs of the study, the set-up costs and the running costs. The household costs comprised the number of bars of soap used, the litres of water required, a pouring jug and the construction of a latrine. The quantities were obtained from interviews with a sub-sample of the participants, while the unit costs were obtained from water bills, the market place and interviews. The costs to the provider covered personnel, training, office supplies, transport, and capital items such as vehicles, equipment and buildings. Data were taken from the project expenditure records. The societal perspective was the sum of these two perspectives plus the indirect costs. The costs were reported in 1999 prices.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were measured as the opportunity cost of volunteer, teacher and health agents' time, as estimated from interviews with relevant staff and the market minimum wage. Also, as the lost income to the household from caregiver days off work, estimated from interviews with households, and the productivity loss from child death, estimated using the human capital approach and assuming an annual market minimum wage rate of US$300. These costs were estimated and reported in the same way as the direct costs. However, a discount rate of 3% was used to provide a present value estimate of lost productivity.

Currency
US dollars ($). These were converted from the Burkinabe currency CFA franc (FCFA). The average exchange rate between 1995 and 1998 was 550 FCFA = $1.00.

Sensitivity analysis
One-way sensitivity analyses were carried out to test the robustness of the results to parameter uncertainty.

Estimated benefits used in the economic analysis
An estimated 8,638 cases of diarrhoea and 105 deaths were avoided. In addition, 864 outpatient consultations with health agents and 324 hospital referrals were prevented.

Cost results
The start-up costs to the provider were $36,307 and the annual running costs were $88,733. Therefore, the total 3-year costs of the programme were $302,507 to the provider.

The total cost-savings to the provider were $10,716, giving a total net cost to the provider of $291,791.

The total costs to households were $160,125 and the total cost-savings were $9,136, giving a total net cost to the households of $150,989.

The total costs to society were $462,632 and the total cost-savings were $19,852, giving a total net cost to society of $442,780.

When including the indirect savings, the total costs to society remained at $462,632 while the total cost-savings rose to $413,819, giving a net cost to society of $68,665.

Synthesis of costs and benefits
The cost per mother converting to handwashing after contact with child stools was $42.2 from a provider perspective and $64.0 from a societal perspective.
The cost per case of diarrhoea averted was $33.8 from a provider perspective and $51.3 from a societal perspective. This fell to $7.9 per case averted if the indirect savings were taken into consideration.

The results were sensitive to the estimated number of diarrhoea cases per child per year prior to the start of the programme, and the estimated efficacy of handwashing with soap in preventing diarrhoeal disease. The results were also sensitive to an increase in the percentage of soap used by households. The results were robust to changes in other parameters tested.

**Authors’ conclusions**

Hygiene promotion might be an excellent "buy" for health providers.

**CRD COMMENTARY - Selection of comparators**

The hygiene programme was compared with the status quo (i.e. no hygiene programme), which was the current practice before the study. This is the natural comparator of choice given the longitudinal nature of the study. It enables the potential benefits of the study to be widespread.

**Validity of estimate of measure of effectiveness**

The basis of the analysis was a prospective comparative study with historical controls. Although complete details were not reported here, sufficient details were provided elsewhere to reassure the reader that the study was well thought through, both to avoid the impact of confounding variables and to maximise the power of the study through incorporating large numbers of participants. The study sample was very large, ensuring that the sample was an accurate reflection of the population in Burkino Faso. Appropriate sensitivity analyses were carried out to assess the robustness of the results, and the authors clearly indicated which parameters had a substantial impact on the results. The implications of these impacts for the generalisability of the results were also discussed.

**Validity of estimate of measure of benefit**

The estimation of benefits was modelled, given the results of the effectiveness study and some epidemiological assumptions concerning diarrhoeal diseases. The number of cases of diarrhoea averted and death avoided were the key summary measures of health benefit. These measures allow comparisons with similar programmes in any setting, and so were very appropriate for providing easily accessible results to the study.

**Validity of estimate of costs**

The authors explicitly stated the intended perspectives for the study. They appropriately included all the costs from these perspectives, reporting the results very clearly and enabling the reader to interpret the cost results for themselves. The costs and the quantities were reported separately where possible, enabling the reader to interpret the results and assess their potential meaningfulness in other settings. The unit costs were derived from published sources and interviews. Uncertainty in these estimates was not explored, as no sensitivity analyses of the prices were performed. Discounting was appropriately carried out and a price year was reported, which will aid any possible inflation exercises.

**Other issues**

The authors did not compare their findings with those from other authors. However, this is likely to have been because of the reported lack of cost-effectiveness evidence in this area. The issue of generalisability was addressed from a number of perspectives. The authors pointed out factors that both help and hinder generalisability, and used their sensitivity analysis results to predict potential settings for a similar programme. The results were not presented selectively and the conclusions drawn accurately reflected both the scope of the analysis and the results presented. Several limitations, notably those focusing on the use of the human capital approach, generalisability and the need for further work, were discussed.
Implications of the study
The authors did not explicitly state that authorities should provide such hygiene programmes. Nevertheless, the potential cost-effectiveness was well presented. Further work in numerous areas was suggested. For example, determining the cost-effectiveness ratio's acceptability, improving the understanding between specific hygiene behaviour and health (i.e. handwashing and stool disposal), and assessing the cost-effectiveness in different settings for competing interventions.

Source of funding
Funded by the United Nations Children's Fund (UNICEF) and the Ministry of Health of Burkina Faso.

Bibliographic details

PubMedID
12390603

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Burkina Faso; Child; Child Health Services; Child, Preschool; Cost-Benefit Analysis; Diarrhea /economics /prevention & control; Female; Hand Disinfection; Health Promotion /economics; Humans; Hygiene /education; Infant; Outcome Assessment (Health Care); Program Evaluation; Sensitivity and Specificity

AccessionNumber
22002001910

Date bibliographic record published
30/04/2005

Date abstract record published
30/04/2005