Home gardening of yellow cassava and orange maize for the prevention of nutritional blindness in children: An economic evaluation and value of information analysis

Economic evaluation (see full title above)

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Abstract

Background: Vitamin A deficiency is the leading cause of childhood blindness worldwide affecting mostly Sub-Saharan Africa. We aimed to predict the cost-effectiveness of home gardening (HG) of yellow cassava and orange maize to prevent nutritional blindness in children below five years and to assess the likely value of obtaining additional information in reducing uncertainty surrounding its cost-effectiveness.

Methods: We developed a Markov model and carried out probabilistic sensitivity analysis (PSA) with a value of information analysis (VOI). We costed resources from a societal perspective and outcomes were measured in disability adjusted life years (DALYs).

Results: HG was estimated to cost an additional Intl$395.00 per DALY averted, with a 72.27% likelihood of being cost-effective at a threshold of Intl$2,800 per DALY. The EVPI was estimated to be Intl$29,843.50 for one child or Intl$925 billion for 31 million Nigerian children affected by the decision. Further research is only worthwhile for one parameter (relative risk of low serum retinol; EVPPI Intl$29,854.53 per child and Intl$925 billion for 31 million children).

Conclusion: HG of yellow cassava and orange maize is expected to be highly cost-effective in preventing nutritional blindness in children in Nigeria. Worthwhile further research includes a cost analysis of the intervention and a high-quality randomised trial to assess the effectiveness of HG on serum retinol in young children.

Keywords: vitamin A deficiency, nutritional blindness, value of information analysis, home gardening, cost-effectiveness analysis

Highlights

- Vitamin A deficiency is the leading cause of avoidable blindness in children.
- This study shows that yellow cassava and orange maize are highly likely to be cost-effective in improving serum retinol in young children in Nigeria.
- Before deciding on implementing home gardening of yellow cassava and orange maize to prevent blindness in children, further research to assess its effectiveness and a cost analysis would be worthwhile.

Introduction

According to the World Health Organisation (WHO), vitamin A deficiency (VAD) is the leading cause of preventable childhood blindness, affecting 250,000 to 500,000 children globally, with about half of these children dying within one year of going blind[1]. Globally, 190 million (33.3%) children below 5 years are suffering from vitamin A deficiency[2]. Hypovitaminosis A is most prevalent in Africa and South-East Asia, and Africa solely bears more than half of the global burden of night blindness, a subclinical symptom of vitamin A deficiency[3]. Furthermore, vitamin A deficiency is a fundamental cause of death following measles and diarrhoea in children under 5 years through the impairment of immune function[4]. About 800,000 disability adjusted live years (DALYs) are lost to Vitamin A deficiency in Nigeria annually[5].

Vitamin A deficiency is caused by prolonged poor dietary intake of vitamin A-rich foods and defined by the WHO as serum retinol level < 0.7umol/I[6]. Vitamin A supplementation has been used to combat vitamin A deficiency in children and studies have shown that it is a cost-effective intervention[7]. However, there is limited supplementation coverage for children living in rural areas[8]. A study by Aghaji and colleagues using the 2013 Nigeria Demographic and Health survey data showed that vitamin A supplementation programme coverage was 41.5%, but higher in urban (53.5%) than in rural areas (34.7%)[8].

Home gardens are small plots of land near the home managed by members of the household with minimal cost input. A home garden of 150 square metres has the potential to supply adequate fruits and vegetables to meet the vitamin A requirements for a family of six throughout the year[9]. Cassava (Manihot esculenta) and maize (Zea mays L. or corn) are staples widely grown and consumed in Nigeria[10]. Biofortification is a means of improving or enhancing the nutritional content of staple crops through selective breeding of crops and biotechnology[11]. Vitamin A biofortified maize (Orange maize) and cassava (yellow cassava) are distinctly coloured and can provide up to 50% and 25% of vitamin A daily requirement in children[12,13].

In a world of unlimited resources, effectiveness of health care interventions would be the only information needed to decide which intervention to implement. Nevertheless, because resources are always limited, an intervention being effective is not sufficient reason for it to be adopted in the healthcare setting[14]. Choices must be made on which healthcare interventions to fund. To make this decision it is imperative to know whether the intervention represents good value for the cost of implementation. Therefore, a cost-effectiveness analysis is a crucial step in deciding whether to implement an intervention. Economic evaluations compare the added costs and outcomes of healthcare interventions based on the best available evidence of their effectiveness[15]. While economic evaluation is a crucial step, some forms of economic evaluation especially decision modelling, typically use evidence from different sources each beset by uncertainty from the distributions surrounding the parameters [16]. Value of information analysis is a systematic approach that quantifies the likely value of research to reduce decision uncertainty or whether to make a decision on implementation based on available evidence[16].

This study is based on evidence from a systematic review that assessed the impact of home food production of vitamin A rich foods on nutritional blindness in children[17]. To the best of the authors' knowledge, no study has examined the cost-effectiveness of home gardening of vitamin A-rich foods or vitamin A biofortified crops using a decision analytic model. Thus, this study aims to assess the cost-effectiveness of home gardening of yellow cassava and orange maize in preventing vitamin A deficiency in children aged under five in Nigeria. Additionally, no previous value of information analysis assessing the value of obtaining additional information on adopting home gardening of yellow cassava and orange maize to prevent vitamin A deficiency in children to reduce uncertainty in the evidence has been conducted. Thus, a value of information analysis was conducted. as part of this study.

Methods

A cohort Markov model consisting of 4 health states (well, low serum retinol, blindness and death) was programmed in Microsoft Excel (Figure 1) to evaluate the cost-effectiveness of home gardening of yellow cassava and orange maize compared to no home gardening from a societal perspective, targeting children from Ovia North-East Local Government, Edo State, Nigeria. This location was chosen because VAD is a public health problem with a prevalence of 32.0% in children below 5 years in this area[6]. Cassava and maize are staple crops grown and consumed by people in this location[18].

The intervention is assumed to consist of interacting multicomponent parts, including training households in home gardening (HG) of yellow cassava and orange maize, provision of cassava stems and maize seeds, nutrition education, cooking sessions and distribution of recipe books and posters detailing health benefits of vitamin A-rich foods. This intervention is assumed to run for one year. The comparator is the status quo: no training or HG intervention (Figure 2).

There are no data on the number of children below the age of 5 in Ovia north-east local government, Edo State. Therefore, we assumed that there are 2500 children below age 5 in a village in Ovia north-east local government and modelled these 2500 children distributed within 834 households (assuming 3 under 5s in each household). We used such a village (of 834 households each with 3 under 5s) as our unit of analysis. A lifetime horizon of 80 years was used to capture the long-term impacts of irreversible blindness. The model used a cycle length of one year. The WHO recommendation of 3.50% was used for discounting both costs and benefits[19]. The health states were defined based on the epidemiology of vitamin A deficiency. The well state represents a child free from vitamin A deficiency. The low retinol state was set at ≤0.70micromoles per litre based on the WHO definition to represent the subclinical and clinical stages of vitamin A deficiency[1]. The blind health state was defined as a progressed state of low retinol where a child has little, or no light perception and the dead health state represents the terminal state of the condition. We assumed that the intervention is for one year and households will continue to engage in home gardening in subsequent years, replanting from their harvest**.**

Transition Probabilities

Table 1 shows model parameters and their distributions. Transition probabilities were derived from the most relevant available evidence[20,21]. A systematic literature search was conducted to identify the most recent and relevant data used in estimating the progression of the cohort across different health states. Transition probabilities from well state to low retinol state were derived from Imdad et al., 2017[20], as were relative risks for low retinol and death. The transition probability of moving from low retinol to well and low retinol to blind was obtained from Awasthi et al., 2013[21]. Probabilities were calculated from event rate as recommended by Fleurence and Hollenbeak[22]. Transition probabilities for moving from well health state to dead were obtained from the Nigerian life table sourced from the WHO[23]. Average male and female probability of dying were calculated from life tables. The transition probability of progressing from blind to dead was obtained from the WHO[24]. Efficacy of HG was assumed based on a randomised controlled trial conducted in Kenya by Talsma et al., 2016[25]. To the best of the authors' knowledge, this is the only published study to date that has examined the effectiveness of vitamin A cassava on serum retinol. Yellow cassava caused a modest effect of 0.04mmol/L (95% CI: 0.00, 0.07 mmol/L) increase in serum retinol. A 2 by 2 table was calculated using data from Talsma et al. 2016[25] and the relative risk of low retinol was estimated (Appendix 1).

Valuation of resources

We adopted the societal perspective for costing which covered productivity losses, cost of intervention, revenue from sale of surplus produce and health care costs. Table 2a describes the costs captured in more details. A breakdown of cassava and maize production was gathered independently from two Agric-economist experts. Costs were in naira and were converted to international dollars at 148.69 naira = Int$1[26]. A discount rate of 3.50% was applied based on the recommendation from WHO[19]. The costs of the cooking sessions, microphones, projectors, posters and recipe books were estimated based on market prices from vendors of these goods. Resources were costed for 834 households. Sales of surplus garden produce were based on assumption and imputed into the model by subtracting their value from the total cost of intervention. Opportunity cost of households working in home gardens was not included as it is assumed that these households are already engaging in home garden. Changes in healthcare costs was not included due to lack of available data on monetary changes home food production would bring to the healthcare system.

Cost of health states

Table 2b shows the costs of being in each health state and their distribution parameters. Cost of being in the well health state for the intervention and control arm was derived by making assumptions on the cost of eating vitamin A- rich foods from other sources such as beef and chicken. For the low retinol health state, cost of 3 episodes of diarrhoea in a year[27] and one episode of measles were estimated[28]. Foregone monthly livelihood in caring for a blind child in a year was estimated as the cost of the blind health state. This was estimated by multiplying an average monthly income by 12 months.

Health outcomes - Disability adjusted life years (DALY)

Appendix 2 shows the DALYs accrued by health states per year. DALYs were chosen as the health outcome measure in this study as they are useful in quantifying disease burden in developing countries[29]. Disability weight for well state was ascribed 0 and death was 1. Disability weight for low retinol and blindness was obtained from the global burden of disease study 2019[30]. Discounted DALYs for one episode of measles was added exogenously to the total DALYs in the model. Appendix 3 shows how DALYs for measles were derived. Discount rate for DALYs was 3.50% based on WHO recommendations and the total DALYs accrued over the time horizon of the model were calculated and multiplied by 834 households.

Analysis

Probabilistic sensitivity analysis (PSA) was conducted using a Monte Carlo Simulation by ascribing distributions to the model parameters. A lognormal distribution for relative risk of low retinol and death was assumed. For the transition probabilities, a beta distribution was assumed for all the health states apart from blind-to-death where a uniform distribution was assumed with the probability lying between a minimum and maximum value of the source of data. A beta distribution was used for the disability weight of low retinol and blindness, well and dead health states. A uniform distribution (plus or minus 10%) was assumed for costs data, since the cost was based on expert opinion. A multiple one-way sensitivity analysis was carried out at 95% confidence interval with the lower bound at 2.5% and the upper bound at 95%, and results are presented in a tornado diagram (Figure 3)

Model output, analysis, and presentation

Mean cost and accrued DALYs were calculated from the PSA results using 5000 simulations for the control and intervention arm separately. Incremental costs, DALYs and incremental cost-effectiveness ratios (ICERs) were calculated for each of the 5000 PSA simulations. The Point estimate ICER for the HG intervention compared to the no HG comparator was estimated as the ratio of incremental costs and incremental DALYs averted for intervention and control arm and reported as incremental cost per DALY averted.

Threshold (Intl$2,880) as recommended by Wood et al. 2016[32] was used for this study. The incremental net benefit was calculated using this threshold and the probability of cost effectiveness at different thresholds was estimated. When the incremental net benefit is greater than zero, home gardening intervention is accepted as cost-effective compared to no-intervention[33]. These data were used to plot the cost effectiveness acceptability curve by plotting the probability that home gardening is cost-effective compared to no home gardening intervention at different thresholds. The cost-effectiveness plane was also represented as scatter plot showing incremental costs and DALYs. Results were expressed with a 95% credible interval.

Value of information analysis

A value of information (VOI) analysis was carried out using the Sheffield Accelerated Value of Information online software (SAVI)[34]. The expected value of information (EVPI) expected value of perfect parameter information (EVPPI) for single and group parameters were estimated. According to UNICEF, in Nigeria there are about 31 million children under the age of five [35]. We estimated 31 million Nigerian children as the beneficial population based on the UNICEF data.

Expected value of perfect information (EVPI)

EVPI is the value of obtaining perfect information concerning all parameters of a cost-effectiveness analysis at a given threshold or willingness-to-pay. It is the monetary value of eliminating all uncertainty from a cost-effectiveness analysis. In simple terms, EVPI is the difference in monetary value between the expected net benefit with perfect information and the expected net benefit with existing evidence or information[16]. The results of the PSA were used in estimating EVPI.

In considering decision uncertainty, the expected value of perfect parameter information (EVPPI) is the value of reducing uncertainty for individual parameters included in a model. EVPPI helps decision makers to prioritise research resources. EVPPI is the difference between the expected net health benefit with existing information and the expected net benefit with perfect information for a particular parameter in the model[16,33]. Another approach that was explored in calculating the EVPPI was by grouping parameters and estimating the value of additional research in getting perfect information for the group. Briggs et al., 2006 stated that individual EVPPI for parameters does not add up to the EVPI[16]. In the same vein, EVPPI for a group of parameters may be different from the individual sum of the EVPPIs of those parameters[16]. The EVPPIs for individual parameters may be zero but when analysed as a group, the value of additional research may be significant[16,33]. While it is important to calculate EVPPI for individual parameters, it is more useful to estimate EVPPI for groups of related parameters. This would point to what kind of research study that should be prioritised. Parameters that could be conducted as a study were grouped together. Appendix 4 shows the grouping of individual parameters.

Results

From the Markov model, the mean cost for 834 households is Intl$6,123.29 for the control arm and Intl$33,670.28 for the intervention arm (Appendix 5). Incremental cost of home gardening of yellow cassava and orange maize is Intl$27,546.98 (95% credible interval: Intl$24,887.46 - Intl$30,152.26). The mean DALY accrued for 834 households in the control arm is 14,097.45 and 14,027.71 in the intervention arm, and the mean incremental benefit for HG is 69.74 DALYs averted (95% credible interval -264.84 to 109.32). The mean ICER is Intl$395.00 per DALY averted. This means that at a cost-effectiveness acceptability threshold of Intl$2,880 per DALY averted, home gardening of yellow cassava and orange maize is likely to be cost-effective in preventing vitamin A deficiency in children below the age of 5. However, at a threshold of Intl $2,880 per DALY averted, there is uncertainty with a 72.27% likelihood (probability) that home gardening of yellow cassava and orange maize is cost-effective compared to no home gardening intervention (Illustrated in the cost-effectiveness plane Appendix 6, and cost-effectiveness acceptability curve Appendix 7).

Results of the multiple one-way sensitivity analysis showed that the upper bound ICER of the relative risk of low retinol was not cost-effective. The ICER (base case 187.22) was most sensitive to changes in the probability of moving from blind to dead, low retinol to blind, low retinol to well, well to low retinol state as well as changes to the cost of HG (Figure 3).

Overall EVPI for home gardens

The VOI analysis showed overall EVPI as Intl$29,843.50 per person. This means that the value of gaining perfect information in adopting home gardening of yellow cassava and orange maize is Intl$29,843.50 per person that will be affected by this decision. With an annual population of 31 million Nigerian children, overall EVPI per year would be $925 billion. Given that no research study is likely to cost this amount, further research is likely to be worthwhile.

Overall EVPPI for single parameters

EVPPI was estimated for all the parameters. Only the relative risk of low retinol showed a substantial value in carrying out further research to resolve uncertainty (EVPPI per person Intl$29,854.53, EVPPI per annual prevalence Intl$925 billion). The relative risk of low retinol explains the effectiveness of HG of yellow cassava and orange maize in improving serum retinol in children. Other parameters demonstrated that carrying out additional research to eliminate associated uncertainty would not be worthwhile (Appendices 8 and 9)

Group parameter EVPPI

Group EVPPI showed that only prioritising research on the relative risk of yellow cassava and orange maize on serum retinol alongside cost analysis of home gardening of yellow cassava and orange maize is worthwhile (single person EVPPI – Intl$29,851.68 and population EVPPI – 925 billion). Appendix 10 shows the group of parameters and their value EVPPI.

Discussion

In this economic evaluation, we used a Markov model to predict the cost-effectiveness of home gardening of yellow cassava and orange maize in preventing vitamin A deficiency in children. Results show that HG of yellow cassava and orange maize has a 72.27% likelihood of being cost effective from a societal perspective at an acceptability threshold of Intl$2,880 with a 'best estimate' ICER of Intl$395.00 per DALY averted. This suggests that based on the best available current evidence it is likely that HG would be highly cost-effective in preventing nutritional blindness in children. However, there remains a 27.73% chance that the results may be misleading, and that wide adoption of HG would not be cost-effective. Making decisions based on uncertain results from models could be detrimental to the health of people affected by this decision and might be a waste of limited resources. Conducting more research would be a logical way of reducing uncertainty in the results of a decision model, however, the decision to gather more evidence must be worthwhile in terms of comparing the cost of that research to its intended or potential benefits in reducing uncertainty in the adoption of a new health intervention. We assessed the value of resolving the 27.73% uncertainty of HG by estimating EVPI and EVPPI.

The results of the VOI analysis showed an overall EVPI of Intl$925 billion for HG of yellow cassava and orange maize to prevent vitamin A deficiency in 31 million Nigerian children. These EVPIs have very large numbers because they represent the EVPI of a very large cumulative population that can be affected by vitamin A deficiency in Nigeria. This makes it an important research agenda because a huge number of the population are affected. The results of the single parameter EVPPI showed that, all parameters yielded no value in performing further research except relative risk of serum retinol which gave a value of Intl$925 billion. This means that further research to reduce the current uncertainty around the effect of HG in improving serum retinol would yield a good return on investment, as long as the research costs less than Intl$925 billion to undertake. However, no research study is likely to cost Intl$925 billion. This implies that further research is highly likely to be worthwhile, although the expected value of sample information (EVSI) and expected net gain of sampling (ENGS) are required to confirm this. Group EVPPI showed that undertaking an effectiveness study to assess the effect of HG of yellow cassava and orange maize on serum retinol alongside a costing analysis is worthwhile. Group EVPPI differ from single EVPPI as it estimates the EVPPI of one or more parameters simultaneously. Costing of the intervention in this study was by expert consultation. This finding highlights the importance of carrying out a costing analysis to establish the cost of HG of yellow cassava and orange maize.

This study is the first that we are aware of to use VOI to explore decisions relating to the cost-effectiveness of vitamin A interventions in children. However, VOI has been used to address the usefulness in carrying out further research in other areas of major public health concerns in Africa. Kim et al. 2017[36] carried out a VOI to understand the value of reducing uncertainty in an evidenced-based Malaria Decision Analysis Support Tool (MDAST) in East Africa. They found that obtaining perfect information to eliminate the uncertainty of the model parameters would give an increased program net benefit of 5 – 21%. The use of VOI is gradually gaining popularity in prioritising research in Africa especially in the face of scarce resources and an avalanche of health problems to address[36].

The results from this VOI show that though HG of yellow cassava and orange maize is likely to be highly cost-effective, carrying out additional research to resolve uncertainty surrounding its cost-effectiveness is highly likely to be worthwhile. It has also highlighted that a randomised controlled trial alongside a cost analysis will be valuable in researching the effect of home gardening of yellow cassava and orange maize on serum retinol. One limitation of this study is that the EVSI and ENGS which are important validations for the need in carrying out further research were beyond the scope of this study due to the complexity of estimating them and the time available for this study. The EVSI is the process of reducing the expected cost of uncertainty associated with additional research with a specified sample size. The EVSI indicates how much uncertainty is expected to be reduced thereby giving the value of additional research for a particular sample size. The ENGS is the difference between the expected cost from the trial and the cost of the trial (population EVSI – research cost = ENGS)[33,37]. It gives the value of the return on investment in further research and therefore demonstrates that the research is worthwhile if it has a value greater than zero[33,37].

This model assumed that this intervention will be a one-off cost and households will continue with home food production after the first year and replanting from their harvests. The upper limit of the value of information was used which implicitly assumes perfect implementation and adherence to the intervention by participants. This assumption may not be true as some households may quit the intervention as soon as support is withdrawn and may not have a viable harvest to replant. Outcomes were focused on children. Therefore, carer utility was excluded. Biofortification programmes require new variety of crops that have an improved resistance to disease, pests, and a more viable harvest. Using transition probabilities from a vitamin A supplementation intervention may likely have a greater chance of moving people from one health state to another compared with a home gardening intervention. Vitamin A supplementation provides a high dose of vitamin A to children whereas for home gardening, households may decide to sell their produce, harvest might be poor due to environmental factors such as crop disease, drought etc. vitamin A-rich foods will supply a lower proportion of retinol compared with vitamin A supplements. Opportunity costs of households' time in gardening was not included as it is assumed that these households are already engaging in gardening activities. Changes in healthcare costs as a result of the intervention was not included due to unavailability of data. These assumptions may have impacted on the results of the cost-effectiveness analysis. The results of this cost-effectiveness analysis should be interpreted with caution bearing in mind the assumptions made in this study.

Conclusion

In conclusion, the economic evaluation and VOI analysis presented in this study has shown that although HG is likely to be highly cost-effective in preventing nutritional blindness in children in Nigeria, it is likely that undertaking further research to derive better evidence on the effect of HG of yellow cassava and orange maize on serum retinol and a costing analysis of the intervention would be worthwhile before deciding whether to recommend this intervention.

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Table 1. Model parameters used and distribution assumptions for probabilistic sensitivity analysis

Transition probabilities	Mean	Distribution	Parameter 1	Parameter 2	Source
Well to low retinol	0.450	beta distribution	509	623	[20]
Well to dead	Lifetable				[23]
Low retinol to well	0.060	Beta	155	2429	[21]
Low retinol to blind	0.035	Beta	90	2494	[21]
Low retinol to dead	0.026	Beta	67	2517	[21]
Blind to Dead	0.60	Uniform	0.1	0.9	[24]

Footnote: For beta distribution – parameter 1 is alpha and parameter 2 is beta. For uniform distribution – parameter 1 is the minimum and parameter 2 is the maximum

Table 2a. Costing of resources and health states (Intl$ 2020)

Home garden	Unit price (Intl$ 2020)	Quantity	Total	Source/notes
Home garden				
Maize seeds	1.14/kg (170 naira)	567.13kg (680g per family for 834 households)	647.21	Expert consultation
Cassava stems	6.72 per bundle (1000 naira)	3336 bundles (4 bundles per family)	22435.94	Expert consultation
Health education				
Microphones	100.88 (15000 naira)	1	100.88	(34)
Projector	73.97 (11000 naira)	1	73.97	(34)
Posters	3.36 (500 naira)	834	2802.24	Based on assumption
Cooking session				
Recipe book	2.01 (300 naira)	834	1676.34	Based on assumption

Personnel				
NGO staff	1008.8 (150000 naira)	4	4035.20	Expert consultation
Proceeds from sale of surplus produce	5.04 (750 naira)	834	4194.40	Based on assumption
Total			27,577.38	
Cost of health states				
Health state	Unit cost	Quantity	Total	Source/notes
Well	0	0	0	
Low retinol	Diarrhoea (3 episodes/ year) • ORS – 1.34 (200 naira) • Zinc tablet – 1.34 (200 naira) • Floranom, 4 sachets (Saccharomyces boulardii) – 4.03 (600 naira) 4 × 4.03 = 16.12 Total = 18.8	3 episodes	56.40	Expert consultation
	Measles • Vitamin C – 1.34 (200 naira) • Paracetamol – 0.67 (100 naira) • Seven keys (Calamine lotion) – 5.38 (800 naira) Total = 7.39	1 episode per year	7.39	Cost of measles was added exogenously
Blind	672.54 per month (100,000 naira)	12 months	8070.48	Based on assumption
Dead	0	0	0	

Footnote: NGO – Non-governmental organization; ORS – Oral rehydration solution

Table 2b. Unit cost of health states.

Health states	Mean	Distribution	Parameter 1	Parameter 2	Source
Well	0		0	0	
Low retinol	56.40	Uniform	50.84	62.14	Based on assumption
Blind	8070.48	Uniform	7263.43	8877.53	Based on assumption
Dead	0	Uniform	0	0	

Footnote: For a uniform distribution – parameter 1 is the minimum and parameter 2 is the maximum. Costs are in Intl$

Table 3. DALY accrued per year by health states

Health states	Distribution	Mean	Parameter 1	Parameter 2	Source/notes
Well	Constant	0	0	0	[38]
Low Retinol	Beta	0.184	1.315	5.836	[31]
Blind	Constant	0.187	1.289	5.605	[31]
Dead	Constant	1	1	1	[39]

Footnote: For a beta distribution – parameter 1 is alpha and parameter 2 is beta. For lognormal distribution – parameter 1 is the log mean and parameter 2 is the standard error of log mean

Table 4. Results of cost-effectiveness analysis

Mean cost	Control: Intl$6,123.29
	Intervention: Intl$33,670.28
Mean DALYs averted	Control: 14,097.45
	Intervention: 14,027.71
Incremental cost	Intl$27,546.98 (95% credible interval: Intl$24,887.46 - Intl$30,152.26)
Incremental DALYs averted	69.74 DALYs averted (95% credible interval -264.84 to 109.32)
ICER	Intl$395.00 per DALY averted
Probability of cost-effectiveness at Int$15,000 threshold per DALY averted	72.27%