Cost-Benefit Analyses of Nutrition Interventions in India's Policy Framework

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Abstract

The Government of India has launched several important nutrition and health programmes and interventions. This study is an attempt to estimate the costs and benefits accruing from the implementation of the national interventions. The benefits are measured in terms of the number of years of life saved due to decreased child mortality and valued at 3 times the value of GDP/capita. Benefits also include the value of avoiding a brief period of life spent living with the disability arising from nutrition related illness. Productivity benefits for those who avoid stunting have also been estimated. Three alternate scenarios have been created on the basis of specific nutrition based interventions which include counselling for behaviour change, supplementary food and an overall package consisting of both the interventions. Estimated benefits for India from the overall package at 3 times the value of per capita GDP and discounted at 3% are approximately $3070 and estimated costs are approximately $159, resulting in a benefit/cost ratio of approximately 19.4. Every dollar spent on nutrition can yield benefits of more than 19 dollars. To conclude, the coverage of nutrition-based interventions for mothers is not the problem, but the low utilization poses a challenge. On the other hand, the interventions for children need to be scaled up. Promotion and provision of timely and appropriate complementary feeding practices can improve the health outcomes among both women and children.

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1. Introduction

India is home to largest number of undernourished children in the world (World Bank 2005). In 2005–2006, nearly half of all children under 5 years of age in India were stunted and 43 per cent were underweight (International Institute for Population Sciences 2007). Although recently released NFHS-4 reports a decline in underweight (35.7 per cent) and stunting (38.4 per cent), the prevalence of wasting has marginally increased (from 20 per cent to 21 per cent). There are marked differentials in proportion of underweight children across India. The percentage of children who are underweight is higher in rural areas (38.3 per cent) as compared to urban areas (29.1 per cent) (NFHS-4). Further one in five children has low birth weight.

The state-of-affairs is completely unacceptable given the fact that it has been decades since the various policies to curb undernutrition are implemented. It is true that India's nutrition status is better today with the main factors being the improvement in socio-economic factors, availability of portable water and the infrastructure like health facilities. But the dietary habits continue to be poor. Malnutrition reflected in being underweight or overweight is an aggravating factor behind manifestations of numerous diseases such as diarrhoea and various respiratory infections. Lack of nutrition can also undermine the immunity system with fatal consequences.

Malnutrition could erode the potential economic growth which a country could achieve since a nation where the ability of the children to learn and the productivity of the labour force diminishes. Given that India has the highest

number of deaths among under-five children globally and majority of them are preventable, an effective policy focussing on nutrition can lead to higher growth rate by increasing the stock of human capital (MWCD, 2012).

Nutrition diversity is one of the main predictors of child stunting and underweight (Corsiet. al., 2016). It is well documented that nutrition-based interventions could improve the health of mother and children, reduce the number of deaths and accelerate the progress in achieving the targets set for health outcomes (Bhutta et al., 2013; Bhutta et al., 2008; Horton et al., 2010). At present India has two major national programs which aim at improving the nutritional status of maternal and child health: Integrated Child Development Scheme (ICDS) implemented by the Ministry of Women and Child Development, and National Rural Health Mission (NRM) implemented by the Ministry of Health and Family Welfare.

The ICDS scheme was launched prior to NHM in 1975 to improve the health and nutrition needs of children under age 6. As part of universalization, in 2004, the scheme was expanded to cover all the regions of the country. ICDS includes a number of interventions, including which provide supplementary food, facilitate for immunization, health check-ups and referral services for both mother and child. Preschool non-formal education is also provided for children aged three to six years. However, administrative hassles in implementation, lack of adequate infrastructure, poor coverage and poor quality of food are some of the disappointments which undermine the efforts of the government.

NHM reflects the renewed focus of the government's persistence to combat the nutritional challenges facing the country. The NRHM was launched in 2005 with focus on states with poor infrastructure and low public health indicators to strengthen state health systems, with a special focus on reproductive and child health services and disease control programs. The interventions included in NHM deal directly with the direct causes of maternal and infant mortality. The working of the programs is synchronized to a great extent with NRHM operating

in collaboration with the existing health and ICDS infrastructure. The increase in staff and improved health infrastructure with commencement of NRHM has provided a much-needed booster to improve maternal and child health and their nutritional outcome. The nutrition interventions covered in this study are present in both of these programs.

Although identification of gaps and implementation and monitoring of intervention strategies is itself a challenge, the other crucial factor is the cost of financing the intervention and the extent of successful co-ordination between the two programs in a manner such that the meagre budget in the health sector is utilized efficiently. The focus of this study will be to estimate the cost of the nutrition-based interventions in India and the benefits received in terms of improved health outcomes.

2. Proposed Intervention Background

2.1. Background and Evidence of Interventions

India's policy framework now contains nutrition interventions which are targeted at improving the status of maternal and child under-nutrition. Realizing that the period starting from the moment a woman is conceived to first 24 months of the age of the child is crucial for future development, these interventions aim at providing an environment conducive for their growth. The most influential work which has led to this policy framework includes the Lancet Series on Maternal and Child Undernutrition (Bhutta et al. 2008) and the Coalition for Sustainable Nutrition Security in India (2010).

The nutritional interventions in India cover a variety of interventions for pregnant and lactating mothers and children aged 5 years ranging from nutritional supplements, food fortification, deworming, IFA and vitamin A prophylactic doses pills to and creation of awareness using IEC material. For the purpose of our analysis these interventions have been categorized depending on whether they are targeted at promoting the benefits of the intervention or providing supplements.

The evidences related to efficacy of these interventions have been studied in detail by Bhutta et. al. (2008, 2013). They provide the estimates related with reduction in risk of major disease outcomes by doing a meta-analysis of existing studies on interventions affecting maternal and child undernutrition. They also model the effect of a package of nutrition direct interventions on a variety of health outcomes in 36 countries where 90 per cent of the children suffer from stunted linear growth, particularly infant and child mortality, as well as low birth weight and stunting.

Since the authors are analysing the effect of the interventions on stunting, the specific evidences available from Bhutta et. al. (2008, 2013) are discussed in following paragraphs. Complementary feeding support and educational strategies have significant impact the growth of children. Promotion of hand washing education and its benefits is instrumental in reducing the prevalence of diarrhoea by 30 per cent. This in turn leads to a reduction in the odds of stunting. Systematic review shows that the odds of stunting increase by 4 per cent with each episode of diarrhoea (Bhutta et. al. 2008).

The deficiency of Vitamin A definitely is a cause of stunting but administering the supplementation does not seem to lower the prevalence of stunting. However, the effect of Vitamin A supplementation has been found to be significant on mortality. Zinc supplement has been observed to reduce stunting and mortality directly from 6 months onwards. The reduction in odds of stunting is as high as 15 per cent in each age group.

The modelling exercise for estimating the effect of nutrition-related interventions on mortality and stunting shows that 99 per cent coverage with feeding interventions (promotion of complementary feeding and other supportive strategies) leads to relative risk reduction in stunting by 19.8 per cent at 12 months, 17.2 per cent at 24 months and 15 per cent at 36 months. The effect of zinc intervention has been found to be significant with a relative reduction of 9.1 per cent at 12 months, 15.5 per cent at 24 months and 17 per cent at 36 months. The effectiveness of multiple micronutrients during

pregnancy and hygiene-based interventions has been found to be very low and somewhere in the range of 1 to 2.5 per cent.

It seems the complete package consisting of general nutrition strategies is quite effective with relative risk reduction being 21.7 per cent at 12 months, 17.8 per cent at 24 months and 15.5 per cent at 36 months. An intervention consisting of micronutrients leads to a 17.4 percent relative reduction in prevalence of stunting. The effect of deworming and iron supplements on stunting are negligible therefore no attempt was undertaken to model their effectiveness. Although the effect of Vitamin A, iron and deworming has been negligible but it is well documented that their deficiency could lead to a weak immune system which could lead to increased risk of infections and stunting (Caulfield et. al. 2006; Branca et. al. 2002; Reinhardt 2014).

The focus on evidence-based nutrition strategies in India assumes added significance because despite declining undernutrition rates, a high proportion of children still suffer from its adversities. The economic cost and benefit to be reaped are significant. There are a number of social and economic consequences of stunting which are well documented in literature. Stunting could lead to decrease in cognitive development, lower school performance and therefore lower the productivity potential during adulthood. For instance, Behrman, Alderman and Hoddinott (2004) estimate a decline in average income by 2.2 per cent for individuals born with low birth weight on account of stunting.

Hoddinott et. al. (2008, 2011) studied the effect of nutrition intervention during early childhood on economic productivity in Guatemalan adults and found that the prevalence of stunting was 25 per cent lower among the cohort which was provided the supplementation. They report that stunting caused a difference of 46 per cent in wages and 66 per cent in consumption. Halim et. al. (2015) also present similar insights from a review of economic consequences of maternal and early childhood interventions in low and middle income country. Thomas et. al. (2003) estimate a 20 per cent increase in income for

population aged 30-70 years when an intervention providing iron supplements is implemented. Baird. Et. al (2011) in case of Kenya estimate 20 per cent increase in earnings due to implementation of Primary School Deworming Program.

There are very few India specific studies which study the impact on income. A few studies do measure the association of Childhood HAZ with future income and find that a 1 per cent increase in HAZ at age 2 is associated with18-27 per cent more assets in India at adulthood (Sachdev et al. 2005; Bhargava et al, 2005). Then there are studies which link reduced stunting with higher education which in turn reflects better earning potential of the individual (Nandi et al , 2016). Goudet et. al. (2018) has evaluated the cost-effectiveness of a programme aimed at treatment and prevention of acute malnutrition in Mumbai slums of India. There are, however, no studies which provide cost-benefit estimates for India, taking in account the various nutrition interventions.

2.2. Description of Interventions

India's policy framework contains a number of nutrition intervention strategies. Coalition for Food and Nutrition Security in India (2010) has played a major role in recommending most of these strategies to control malnutrition and ensure food security. Menon et. al (2016) present a comprehensive analysis of the cost of delivering these interventions and estimated unit cost for the actual program. The figures are available for the most recent periods. We have considered a subset of the sub components of these interventions given our target population which include pregnant women, lactating mothers and children below the age of 5 years. Details of the specific interventions along with the target group and source are presented in Table 1. We have used the unit cost data for the cost-benefit exercise. The cost for micronutrients such as calcium supplements and multi-micronutrients have been obtained from the finances of National Health Mission.

Table 1: Details of Nutrition based interventions within India's Policy framework (Menon et. al. 2016)

Component	Intervention population	Unit Cost, India (USD)	Unit Cost, India in Rupees	Marginal cost of Mothers time (own calculation) in USD	Marginal cost of Mothers time in Rupees
Counseling during pregnancy	Pregnant women	1.76	114.4	0.3	21.7
Counselling for optimal breastfeeding	Caregivers of children 0– 6 months of age	1.67	108.55	1.2	80.3
Complementary feeding and hand washing education	Caregivers of children 6– 12 months of age	7.47	485.55	1.1	70.2
Complementary feeding and hand washing education	Caregivers of children 12-24 months of age	2.8	182	1.0	64.4
Complementary food supplements	Children 6-12 months	15.16	985.4	9.8	633.8
Complementary food supplements	Children 12-36 months	30.31	1970.15	39.0	2535.0
Supplementary food rations	Pregnant and lactating women	17.67	1148.55	14.6	950.6
Calcium supplements	Pregnant women and lactating mothers	14.16	920.4		
MMN supplement	Pregnant women and lactating mothers	7.92	514.8		
TOTAL		98.92	6429.8		

Source: Menon et. al. 2016, Cost for MMN and CA from NHM for 1 month supply.

2.3. Calculation of Costs and Benefits

The effect of nutrition interventions on stunting is well documented in literature as discussed earlier. We calculate the benefits in terms of increase in productivity, and the number of cases of mortality and morbidity avoided due to reduction in stunting. Data for stunting (below 2SD and below 3SD) has been obtained for National Family Health Survey (NFHS 4). For calculating productivity benefits, stunting (below 2SD) figures from National Family Health Survey (NFHS-4) have been used. Three alternate scenarios have been created on the basis of specific nutrition based interventions for the cost benefit analysis.

The details are presented in the following table:

Table 2: Scenario based on specific components of nutrition intervention

Scenario	Nutrition based intervention	Components included
1	Direct nutrition based interventions	All components
2	Interpersonal counselling for behaviour change	Counseling during pregnancy,Counselling for optimal breastfeedingand Complementary feedingand hand washing education
3	Supplementary food for mother and child	Complementary food supplements, Supplementary food rations, Additional food rations,Facility-based treatment and Cash transfers.

Lifetime productivity benefits have been computed assuming that the intervention would reduce stunting by 20 per cent. Following Hoddinott (2011), a reduction of 66 per cent in per capita income in adulthood has been assumed. Net present value of the benefits due to reduction in stunting has been computed assuming that the child will work till 54 years. The assumptions regarding the effectiveness of intervention of stunting and per capita income for different scenarios are based on evidences documented in literature. The following table describes the assumptions:

Table 3: Assumption regarding wages and effectiveness of specific components of nutrition intervention

Scenario	Nutrition based intervention	Wages	Effectiveness of intervention
1	Direct nutrition based interventions	66 per cent	20 per cent
2	Interpersonal counselling for behaviour change	66 per cent	12 per cent
3	Supplementary food for mother and child	66 per cent	18 per cent

The per capita income of India projected till 2070 is based on (Joe et al 2018a; 2018b). Observing the economic performance, it was assumed that real wage will grow at a rate of 6-7 per cent initially and around 3-4% period after 20 years from now. The exchange rate has been assumed to be at ₹65 per USD. Discount rate of 3, 5 and 8 per cent have been used to calculate the net present value of costs and benefits.

3. Methodology: Overall, Promotion and Provision Package

To begin, we consider the intervention is targeted at the pregnant mothers in 2016 and the cohort of children born in 2017. The assumptions for the effectiveness of the specific intervention are same as in table above. Three mutually exclusive classes of stunting have been considered: severe, moderate and none. The risk reduction factor for various diseases such as Diarrhea, ALRI, Measles, Malaria and other infectious have been obtained from Olofin (2013) and are presented below.

Table 4: Hazard ratio (HR) estimates for specific causes of mortality, WHO 2006 standards Olofin et al 2013

Stunting/Hazard ratio	Diarrhea	ALRI	Measles	Malaria	Other infectious
Severe	6.33	6.39	6.01	1.92	3.01
Moderate	2.38	2.18	2.79	1.06	1.86
None	1.00	1.00	1.00	1.00	1.00

Intervention Effectiveness

The reduction in number of deaths due to disease related causes and the associated morbidity among children aged less than 1 year and 1-4 years has been calculated by using the data on mortality and YLD from Global Burden of Diseases 2016 as the denominator. The deaths and YLDs avoided due to each intervention scenario are presented in the appendix.

As per GBD, 2016, a quarter of deaths among children in the age group 1 to 5 years are due to diarrhoea and lower respiratory infections. Also, a very high proportion of YLD associate with diarrhoea. The effectiveness of nutrition interventions for diseases under different scenario is presented on the basis of available evidence.

The reduction in stunting arising from the interventions is presented in table below. The target group are the mothers who are pregnant in 2016, and the subsequent cohort of children born in 2017. The reduction in stunting is based on Bhutta et al (2008) (refer table in previous section for reduction factor).

Table 5: Number of deaths and YLDs, India

	1 to 5 years		<1 year		1 to 4	
	Deaths	%	Deaths	%	Deaths	%
Diarrheal diseases	66,157	7.6	43,685	6.2	22,473	14.0
Lower respiratory infections	1,49,826	17.3	1,24,645	17.7	25,181	15.7
Measles	17,114	2.0	5,078	0.7	12,037	7.5
Malaria	20,362	2.4	9,325	1.3	11,038	6.9
Other infectious diseases	27,607	3.2	16,223	2.3	11,384	7.1
All causes	8,65,580	100	7,05,037	100	1,60,543	100
	YLDs	%	YLDs	%	YLDs	%
Diarrheal diseases	2,48,619	3.2	75,584	5.5	1,73,035	2.7
Lower respiratory infections	23,547	0.3	8,745	0.6	14,802	0.2
Measles	9,031	0.1	2,325	0.2	6,706	0.1
Malaria	6,104	0.1	498	0.0	5,605	0.1
Other infectious diseases	1,38,412	1.8	41,701	3.1	96,712	1.5
All causes	76,83,960	100	13,64,158	100.00	63,19,802	100

Source: GBD 2016

Table 6: Pre and post prevalence of stunting, India

	Pre-intervention prevalence of stunting	**Intervention effectiveness**	**Post- intervention prevalence of stunting**
Direct nutrition based interventions			
Severe	16.3	-20.3	13.0
Moderate	22.1	-20.3	17.6
None	61.6		69.4
Interpersonal counselling for behaviour change			
Severe	16.3	-12.0	14.3
Moderate	22.1	-12.0	19.4
None	61.6		66.2
Supplementary food for mother and child			
Severe	16.3	-18.0	13.4
Moderate	22.1	-18.0	18.1
None	61.6		68.5

3.1. Common Approach

The number of deaths and Years Lost due to Morbidity (YLDs) avoided has been calculated by using the risk factor and the effectiveness of the

intervention which leads to a change in the distribution of stunting on denominator obtained from GBD. The potential impact fraction is defined as:

$$PIF_j = \left(\sum_{i=1}^{n} P_i RR_{ji} - \sum_{i=1}^{n} P'_i RR_{ji}\right) / \sum_{i=1}^{n} P_i RR_{ji}$$

Where RR_{ji} is the relative risk associated with cause due to specific disease (denoted by j) for each category of stunting (denoted by i). Change in deaths and YLDs could be given by

$$M = \sum_{i=1}^{n} PIF_j D_j$$

Where D_j could be defined as either deaths due to specific causeortotal Years Lost due to Morbidity (YLDs). These figures have been computed using GBD 2016 data.

Three approaches have been used to calculate the mortality benefits.

Approach 1: The monetary benefits using the central value of statistical life have been computed**.** The central estimate of statistical life for India have been assumed to be $1,25,593 (Joe et al 2018a; 2018b).

Approach 2: In this approach the risk factor and potential impact fraction are first used to compute total number of deaths avoided which are then converted to YLLs avoided using the life table. The discounted values of these YLLs are 3 times the value of per capita SDP which is a standard practice in cost-benefit analysis.

Following the same logic the morbidity benefits have been calculated.

Approach 1: This approach is similar to approach 2 for calculating mortality benefits. The numbers of YLDs avoided have been valued at three times the per capita SDP.

4. Results

Table 7 presents the Deaths avoided and Years lost to Disability (YLDs) avoided per 1000 children in 2017 birth cohort reached by the intervention in India. The highest impact of the intervention will be to reduce the number of deaths arising because of diarrhoea.

Table 7: Deaths avoided and Years lost to Disability (YLDs) avoided per 1000 children in 2017 birth cohort reached by the intervention

	Diarrhoea	ALRI	Measles	Malaria	Other infectious	Total
Deaths avoided						
Direct nutrition based interventions	0.31	0.70	0.08	0.10	0.13	1.32
Interpersonal counselling for behaviour change	0.18	0.42	0.05	0.06	0.08	0.78
Supplementary food for mother and child	0.28	0.62	0.07	0.08	0.12	1.17
YLDs avoided						
Direct nutrition based interventions	1.17	0.11	0.04	0.03	0.65	2.00
Interpersonal counselling for behaviour change	0.69	0.07	0.03	0.02	0.38	1.18
Supplementary food for mother and child	1.04	0.10	0.04	0.03	0.58	1.78

Table 8: Avoided mortality and morbidity benefit per child based on two valuation approaches for mortality and a single approach for morbidity

Intervention	Discount Rate	Mortality avoided benefits (approach 1)	Mortality avoided benefits (approach 2)	Morbidity avoided Benefits	Productivity benefit
Direct nutrition based interventions	3%	$194	$153	$10.8	$2,865
	5%	$123	$145	$10.3	$1,374
	8%	$73	$135	$9.5	$506
Interpersonal counselling for behaviour change	3%	$115	$90	$6.40	$1,693
	5%	$72	$86	$6.06	$812
	8%	$43	$80	$5.61	$299
Supplementary food for mother and child	3%	$172	$135	$9.60	$2,540
	5%	$109	$129	$9.10	$1,219
	8%	$65	$120	$8.42	$449

Table 8 presents the avoided mortality and morbidity benefits per child. The results indicate that the mortality benefits lie in a range of $100 to $300. The productivity benefits are as high as $2865 at 3 per cent discount rate. The value of productivity benefits is significantly smaller at lower discount rates.

5. Conclusion

Although, the nutrition indicators of India have been improving, but there is much scope for improvement. Given the huge population base, much more efforts and resources are required to gain sizeable results. A cost-benefit analysis of the nutrition interventions in India's policy framework presented in this paper has shown that there are sizeable benefits to be reaped. Many of the diseases and morbidities which arise because of malnutrition can be avoided by provision of nutrition supplements. The programs and interventions are already in place in India. It can be safely concluded that expansion of programs and identification of the target population will benefit the economy in the long run.

Table 9 below summarizes the main results using approach 1. This base case includes the benefits arising from increase in productivity and from avoiding mortalities and morbidities. The central estimate of statistical life for India have been assumed to be $1,25,593. The overall package is expected to reduce stunting by 20 per cent. The prevalence of severe stunting will reduce from 16.3%to 13% and moderate stunting from 22.1% to 17.6%. The cost of overall package per individual is $159 and benefits are $3070 resulting in a benefit cost ratio of $19.35. Also, it could be observed that the highest benefits could accrue from implementation of promotion intervention. The benefit-cost ratio in case of promotion is $111 per child and provision is $22.

The results from sensitivity analysis (approach 2 for valuing YLLs) are similar to the primary analysis. Here, the benefit-cost ratio in case of promotion, provision and overall package are $19 per child, $109 per child and $22 per child respectively.

Table 9: Results Scenario 1 (primary analysis)

Interventions	Benefit	Cost	BCR
Direct nutrition based interventions	$3,070	$159	19.35
Interpersonal counselling for behaviour change	$1,814	$16	111.08
Supplementary food for mother and child	$2,722	$121	22.51

Table 10: Results Scenario 2 (sensitive analysis)

Interventions	Benefit	Cost	BCR
Direct nutrition based interventions	$3,028	$159	19.08
Interpersonal counselling for behaviour change	$1,790	$16	109.58
Supplementary food for mother and child	$2,685	$121	22.21

The coverage of nutrition-based interventions for mothers is not the problem, but the low utilization poses a challenge. On the other hand, the interventions for children need to be scaled up. The Central and State governments have to understand the problems which exist in the local settings and then develop a more comprehensive and robust mechanism accordingly. They have to demonstrate better governance, too. The experience of districts which have performed better can be used and similar models can be replicated. Promotion of timely and appropriate complementary feeding practices can improve the health outcomes. The involvement of communities in a responsible manner can overcome the problem due to shortage of health workers. In particular, attention needs to be paid on identifying the vulnerable population and strengthening the referral system to prevent episode of diseases which could easily be avoided. India has definitely been proactively working in this direction; hopefully, the recently launched initiatives (POSHAN Abhiyaan) with focus on nutrition will be instrumental in closing the present gaps which prevent the end of malnutrition.

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Appendix

Table 11: A list of programmes and schemes for children aged 0-3 years, 3-6 years and pregnant/lactating women.

Target Population	Programme
Pregnant and Lactating Women	Integrated Child Development Services (ICDS) Reproductive and Child Health II (RCH-II) National Rural Health Mission (NRHM) Reproductive, maternal, newborn child and adolescent health (RMNCH+A)
Children 0 – 3 years	Integrated Child Development Services (ICDS) Reproductive and Child Health II (RCH-II) National Rural Health Mission (NRHM) Reproductive, maternal, newborn child and adolescent health (RMNCH+A) Integrated Management of Neonatal and Childhood Illness (IMNCI) Rajiv Gandhi National Creche Scheme
Children 3 – 6 years	Integrated Child Development Services (ICDS) Reproductive and Child Health II (RCH-II) National Rural Health Mission (NRHM) Reproductive, maternal, newborn child and adolescent health (RMNCH+A) Rajiv Gandhi National Creche Scheme
Covering entire population	National Iodine Deficiency Disorders Control Programme (NIDDCP)

Source: The Coalition for Sustainable Nutrition Security (2010)

Table 12: Deaths avoided per 1000 children in 2017 birth cohort reached by the intervention (Direct nutrition based interventions)

Year	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
2017	0.21	0.59	0.02	0.04	0.08	0.94
2018	0.03	0.03	0.01	0.01	0.01	0.10
2019	0.03	0.03	0.01	0.01	0.01	0.10
2020	0.03	0.03	0.01	0.01	0.01	0.10
2021	0.03	0.03	0.01	0.01	0.01	0.10
Total per cause	0.31	0.70	0.08	0.10	0.13	1.32

Table 13: Deaths avoided per 1000 children in 2017 birth cohort reached by the intervention (Interpersonal counselling for behaviour change)

Year	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
2017	0.12	0.35	0.01	0.03	0.05	0.55
2018	0.02	0.02	0.01	0.01	0.01	0.06
2019	0.02	0.02	0.01	0.01	0.01	0.06
2020	0.02	0.02	0.01	0.01	0.01	0.06
2021	0.02	0.02	0.01	0.01	0.01	0.06
Total per cause	0.18	0.42	0.05	0.06	0.08	0.78

Table 14: Deaths avoided per 1000 children in 2017 birth cohort reached by the intervention (Supplementary food for mother and child)

Year	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
2017	0.18	0.52	0.02	0.04	0.07	0.83
2018	0.02	0.03	0.01	0.01	0.01	0.09
2019	0.02	0.03	0.01	0.01	0.01	0.09
2020	0.02	0.03	0.01	0.01	0.01	0.09
2021	0.02	0.03	0.01	0.01	0.01	0.09
Total per cause	0.28	0.62	0.07	0.08	0.12	1.17

Table 15: Years lost to Disability (YLDs) avoided per 1000 children in 2017 birth cohort reached by the intervention (Direct nutrition based interventions)

Year	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
2017	0.36	0.04	0.01	0.00	0.20	0.61
2018	0.20	0.02	0.01	0.01	0.11	0.35
2019	0.20	0.02	0.01	0.01	0.11	0.35
2020	0.20	0.02	0.01	0.01	0.11	0.35
2021	0.20	0.02	0.01	0.01	0.11	0.35
Total per cause	1.17	0.11	0.04	0.03	0.65	2.00

Table 16: Years lost to Disability (YLDs) avoided per 1000 children in 2017 birth cohort reached by the intervention (Interpersonal counselling for behaviour change)

Year	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
2017	0.21	0.02	0.01	0.00	0.12	0.36
2018	0.12	0.01	0.00	0.00	0.07	0.21
2019	0.12	0.01	0.00	0.00	0.07	0.21
2020	0.12	0.01	0.00	0.00	0.07	0.21
2021	0.12	0.01	0.00	0.00	0.07	0.21
Total per cause	0.69	0.07	0.03	0.02	0.38	1.18

Table 17: Years lost to Disability (YLDs) avoided per 1000 children in 2017 birth cohort reached by the intervention (Supplementary food for mother and child)

Year	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
2017	0.32	0.04	0.01	0.00	0.17	0.54
2018	0.18	0.02	0.01	0.01	0.10	0.31
2019	0.18	0.02	0.01	0.01	0.10	0.31
2020	0.18	0.02	0.01	0.01	0.10	0.31
2021	0.18	0.02	0.01	0.01	0.10	0.31
Total per cause	1.04	0.10	0.04	0.03	0.58	1.78

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