BENEFIT-COST ANALYSIS

NUTRITION

Analysis of nutrition interventions
within India's policy framework
RAJASTHAN

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RAJASTHAN PRIORITIES
AN INDIA CONSENSUS
PRIORITIZATION
PROJECT

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TATA TRUSTS

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Academic Abstract

The prevalence of malnutrition in Rajasthan is extremely high and it performs very badly as compared to other Indian states. The intergenerational cycle of undernourishment is a concern for future prospects of its economic growth as it enters the most productive phase of demographic transition. With half of the pregnant women being anaemic and 23 percent of children being born with low birth weight (NFHS-4), the provision of essential health and nutrition inputs becomes a topmost priority. The Government of India has in place nutrition and health programmes (ICDS and NHM) which include nutrition based interventions. However, the problem in Rajasthan is the low coverage of these interventions over the last 10 years (Kohli et. al., 2017). This study is an attempt to estimate the costs and benefits accruing from increasing the coverage of the national interventions in Rajasthan. 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. Five alternate scenarios have been created on the basis of specific nutrition based interventions which include counselling for behaviour change, supplementary food, micronutrient supplements, community based treatment of Severe Acute Malnutrition and an overall package consisting of all interventions. Estimated benefits for Rajasthan from the overall package at 3 times the value of per capita SDP and discounted at 5% are Rs. 91,577 and estimated costs are Rs. 14,144 per beneficiary, resulting in a benefit/cost ratio of approximately 6. The benefit/cost ratios estimated at 3 per cent and 8 per cent discount rate are 12 and 3 respectively. Similar calculations have been carried-out for other four scenarios. To conclude, we observe substantial benefits from delivery of nutritional based interventions although we have used national cost estimates as the sub-national data is unable, but the variation in results is expected to be smaller.

Policy Abstract

Direct nutrition based interventions

- **Problem**: In Rajasthan, 39 percent of children below five years are stunted and 23 percent are wasted. 46.8 percent of women in reproductive age group are anaemic (NFHS-4). Such nutritional deficiencies adversely affect the health of mother and children.

- **Intervention**: Direct nutrition-based interventions include counselling for behaviour change, supplementary food and micronutrient supplements.

  - **Overview:** The Ministry of Health and Family Welfare and the Ministry of Women and Child Development are the major nodal agencies involved in implementing the nutrition based interventions present in India's policy framework. (Avula et al. 2013). These interventions are agreed upon by a large number of stakeholders including Coalition for Food and Nutrition Security in India (Swaminathan 2009). Bhutta et. al (2008) have done a comprehensive analysis of these interventions.

  - **Implementation Considerations:** The demographic and socio-economic conditions at sub-national level might require a tailored approach. Policy makers need to acknowledge the gap arising from inequality concerns (Sharma, 2017).

  - **Costs and Benefits**

    - Costs: It will be a six-year intervention (2016-2021). Cost will be incurred for provision of supplementary food and micronutrients which are distributed through government programmes. Cost per beneficiary is Rs. 14,144 and for a 10 percentage point increase in coverage the total cost is Rs. 233 crore. 57 per cent of the cost is the value of caregiver time and the rest are financial outlays by the state.

    - Benefits: The primary beneficiaries are pregnant women and lactating mothers and children up to 5 years of age. Benefits have been estimated in terms of reduction in terms of YLLS and YLDs as well as stunting. A 10 per cent increase in coverage would avoid 365 deaths, and reduce stunting by 20% in the population receiving the intervention. Benefits realized per

beneficiary are Rs. 91,577, 85 per cent of which represent improved lifetime productivity from avoided stunting. Total benefits for a 10 per cent increase in coverage are Rs. 1509 crore.

Interpersonal counselling for behaviour change

- **Problem:** Diarrhoea is a major contributor of deaths among children under 5 years of age in Rajasthan (6 per cent of all deaths, (GBD, 2016)). Low socioeconomic status, poor maternal literacy, inadequate breastfeeding, malnutrition, poor sanitation and hygiene practices of the mother or the care taker are the major determinants of diarrheal diseases.

- **Intervention**: Interpersonal counselling for behaviour change
  - **Overview**: A six-year intervention (2016-2021) which include counselling for breastfeeding and counselling for complementary feeding and hand washing will help in avoiding 328 deaths in Rajasthan which are related to diarrhoea.
  - **Implementation Considerations**: Community workers are overburdened and lack of supervision for effective implementation of the IEC activities could lower the potential coverage of the intervention (Jacob, 2011).
  - **Costs and Benefits:**
    - Costs: Major proportion of cost (Rs. 486) will be incurred on providing complementary feeding and hand washing education (6– 12 months of age). Cost per beneficiary is Rs. 1245 and cost for increasing coverage by 10 per cent is Rs. 21 crore. 35 per cent of the cost is the value of caregiver time and the rest are for financial outlays by the state.
    - Benefits: A total of 216 YLLS and 161 YLDs will be avoided for a 10 per cent increase in coverage, major beneficiaries are the children under 5 years of age who will benefit from reduction in diarrhoea. Stunting will be reduced by 12% in the beneficiary population. Benefits realized per beneficiary are Rs. 54,134, 85 per cent of which represent improved lifetime productivity from avoided stunting. Total benefits for a 10 per cent increase in coverage are Rs. 892 crore.

Supplementary food for mother and child

- **Problem:** The health status of a child is determined by the health status of the mother. Women who are anaemic are likely to deliver low birth weight babies, who are likely to remain anaemic and suffer from cumulative growth and development deficit. Women need to go in pregnancy with adequate body stores. Otherwise the intergenerational cycle of under-nutrition will go on perpetually. In India, the maternal and child under-nutrition rates are very high.

  - **Intervention**: Supplementary food for mother and child.

  - **Overview:** All children below 6 years of age, pregnant women and lactating mothers are eligible for availing of supplementary food services under the Integrated Child Development Scheme (ICDS) which is funded by both Central and State government.

  - **Implementation Considerations:** Supplementary nutrition need to be better targeted towards those sections that actually require the appropriate nutrition. The policy makers need to clearly frame rules for admission, quality assurance and accountability so that there are no distortions (Sharma, 2017).

  - **Costs and Benefits**

    - Costs: Costs include provision of complementary food supplements to children aged 6-12 (Rs. 985) and 12-36 months (Rs.1970) and pregnant and lactating women (Rs.1149)[1]. Marginal cost of mother's time for these activities is Rs. 8212. Cost per beneficiary is Rs. 11,532 and a ten per cent increase in coverage would cost Rs. 190 crore.

    - Benefits: The primary beneficiaries are children aged 6-12 and 12-36 months and pregnant and lactating women. The benefits will accrue through reduction in deaths and morbidity from specific diseases due to provision of improved nutrition. It is estimated that 324 lives will be saved for a ten percent increase in coverage. Stunting will be reduce by 18% in the population receiving the intervention. Benefits realized per beneficiary are Rs. 81,202 85 per cent of which represent improved lifetime

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[1] Figure in parenthesis are unit costs.

productivity from avoided stunting Total benefits for a 10 per cent increase in coverage are Rs. 1,338 crore.

Micronutrient supplementation for pregnant women during ANC visits

- **Problem:** Although micronutrients are required in small amounts for optimal health and development, their absence in diet could lead to susceptibility to infections. Their interacting effects on health, growth and immunocompetence cannot be ignored. The micronutrient deficiencies of vitamin A, iron, iodine, calcium, zinc and folic acid are common among women and children (MWCD, 2012).

  - **Intervention**: Micronutrient supplementation for pregnant women during ANC visits.

  - **Overview:** The interventions which focus on providing iron, iodine, calcium, zinc and ORS are included in the NHM RMNCH+ A programme. The intervention aims at reducing maternal anaemia, reduce the risk of preterm births and low birth weights.

  - **Implementation Considerations:** The prevalence of micronutrient deficiencies is widespread in India especially among preschool children and women in the reproductive age group. Although schemes are in place, but shortage of health workers imply lower compliance rates of government interventions (Sharma, 2017).

  - **Costs and Benefits**

    - Costs: The total cost of this intervention in Rajasthan for one year is Rs. 124 crore rupees and includes the cost of health workers, training of the workers and provision of the supplements. Cost per beneficiary is Rs. 637, all of which are financial outlays.

    - Benefits: The benefits estimated from this intervention are 4646 crore rupees. There are a multitude of impacts from the intervention: 133,787 cases of maternal anemia avoided, 47,196 avoided LBW babies, 425 avoided maternal deaths, 27,144 avoided preterm births, 1,900 avoided

preterm deaths and 298 avoided stil births.. Benefits realized per beneficiary is Rs. 23,453.

Community based treatment of children with SAM using Ready-to-use Theraputic foods (RUTF)

- **Problem:** An immediate concern in Rajasthan is wasting which has reportedly increased to 23 per cent in 2016 from 20.4 per cent in 2006. Children with weak nutritional base are more likely to experience growth failure and probably pass it on to the next generation (MWCD, 2012).

  - **Intervention**: Treatment of children with Severe Acute Malnutrition (SAM). The intervention assumes 80% treatment of wasted children throughout the state, following on the success of Phase I of the POSHAN pilot.

  - **Overview:** Children with Severe Acute Malnutrition (SAM) have nine times higher risk of dying than well-nourished children (GOI). This intervention proposes scale up of SAM screening by ASHA workers and implementation of community based management of SAM using RUTF or local-based nutritionally equivalent theraputic foods. This is similar in nature to the government of Rajasthan's POSHAN project.[2]

  - **Implementation Considerations:** This intervention would build upon the existing infrastructure and methods developed under the POSHAN project.

  - **Costs and Benefits**

    - Costs: Major components of total cost are cost of provision of RUTF for children suffering from SAM and MAM, total personnel and training cost and cost incurred by households on treatment visits. Cost per beneficiary ranges from Rs 5853 to Rs. 12,937.

    - Benefits: 4001 to 6273 avoided deaths and 4165 to 6530 avoided YLDs per year from treated SAM. Benefits realized per child treated range from Rs. 27,964 to Rs 65,938.

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[2] As of the time of writing, Phase I of POSHAN was complete and Phase II was being implemented..

The Problem

Rajasthan performs poorly on malnutrition indicators. As per the recently released National Family Health Survey-4 report (2015-16), the rate of wasting in Rajasthan has increased to 23 per cent from 20.4 per cent in 2006. The prevalence of malnutrition related illness is still a major issue and the distribution of prevalence is highly skewed across its districts. The economic growth is a function of the health of the people. Unhealthy people drag down the growth potential because they are not able to perform to their highest capabilities. The health of a child is highly correlated with the health status of her mother. In Rajasthan, almost 50 per cent women in reproductive age group are anaemic which have important repercussions for a child's health. Other determinants of health include social, economic, dietary, lifestyle, environmental, locational, institutional, and awareness. But the most important determinant is the foundation laid during the early years of life. In India, nearly half of children under five years of age die each year due to poor nutrition (Bhandari and Sinha, 2015). Income is an enabling factor. Those mired in poverty find it difficult to take a healthy diet.

Although, the Government has been consistently working towards reducing the prevalence of malnutrition in the country and is implementing several schemes/programmes under different Ministries/Departments through State Governments/UT Administrations, the success has been modest. Lack of a comprehensive approach which appreciates the nature of challenges according to the local settings along with improvement in governance will be instrumental in overcoming the challenge. Furthermore, the public health interventions for specially designed for vulnerable groups need to be strengthened with focus on socio-economic determinants (MWCD, 2012).

Overview: penetration, prevention with intervention

50 per cent of women in reproductive age group in Rajasthan's population are anaemic and 40 per cent children are stunted. Clearly, the future base of human resources is susceptible to under-nutrition which affects not only their survival but also the course of economic development. Essential health and nutrition inputs reach only less than 55 per cent of mothers and children and the consequences of poor nutrition manifest in terms of growth failure of child, reduced learning capacity, increased rate of morbidity and mortality. The

Government of India has in place nutrition and health programmes (ICDS and NHM) and most of the nutrition related diseases could be avoided by simply scaling up the interventions (MHWD, 2012).

Implementation Considerations

The progress of most of the health and nutrition programmes has been slow. The target group, for instance, of ICDS programme is mostly children after the age of three when malnutrition has already set in (Awofeso and Rammohan, 2011). Similarly, the focus on improving mothers' feeding and caring behaviour with emphasis on infant and young child feeding and maternal nutrition during pregnancy and lactation has not been much effective. Policymakers need to identify the vulnerable groups, who are in dire need of these benefits. Second step should be to further strengthen the referral to the health system to prevent diseases which could easily be avoided, particularly in rural areas where the prevalence of undernutrition is higher. Also, the key lies in involving communities in the implementation and monitoring of these interventions as the community health workers either suffer due to lack of support or are overburdened with multiple activities (Sharma, 2017).

Costs and Benefits

The overall intervention is expected to reduce the prevalence of both severe and moderate stunting by 20 per cent to 13.8 per cent and 17.4 per cent respectively in Rajasthan. The results for both the scenario presented in tables below are expected to yield sizeable benefits.

Table 1: Results Scenario 1 (primary analysis – years of life saved valued at 3x GSDP per capita)

Interventions	Benefit	Cost	BCR
Direct nutrition based interventions	91,577	14,144	6
Interpersonal counselling for behaviour change	54 ,134	1,245	43
Supplementary food for mother and child	81,202	11,532	7
Micronutrient supplementation for pregnant women during ANC visits	23,453	637	37
Community based treatment of SAM using RUTF (median)	46,951	9,395	5

Table 2: Results Scenario 2 (sensitivity analysis – lives saved valued at VSL)

Interventions	Benefit	Cost	BCR
Direct nutrition based interventions	89,573	14,144	6
Interpersonal counselling for behaviour change	52 ,950	1,245	43
Supplementary food for mother and child	79,425	11,532	7
Micronutrient supplementation for pregnant women during ANC visits	24,913	637	39
Community based treatment of SAM using RUTF (median)	76,344	9,395	8

All costs and benefits are in Rs per beneficiary, and assumes 5% discount rate

Acronyms

CMAM – Community Based Management of Acute Malnutrition

DALY – Disability-Adjusted Life Year

ICDS - Integrated Child Development Services

IDA – Iron Deficiency Anaemia

LBW – Low Birth Weight

MAM – Moderate Acute Malnutrition (-3<=WHZ<-2)

NRHM - National Rural Health Mission

NFHS - National Family Health Survey

RUTF – Ready-to-Use Therapeutic Food

SAM – Severe Acute Malnutrition (WHZ < -3)

WHZ -- Weight-for-Height Z-score

YLD – Years Lost Due to Disability

YLL – Years of Life Lost

Introduction

India is the home of 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 under-nutrition (35.7 per cent) and stunting (38.4 per cent), the proportion of children who exhibit wasting has increased over time (from 20 per cent to 21 per cent). There are marked differentials in proportion of underweight children across rural and urban areas and across different states. The percentage of children found to be underweight is higher in rural areas (38 per cent) as compared to urban areas (29 per cent) GOI (2013). The incidence of low birth-weight babies also varies across different states with Rajasthan witnessing a high number of underweight childbirths at 23.2 per cent GOI (2013). This state of affairs is completely unacceptable given the fact that it has been more than 20 years when the policies to curb under-nutrition were 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 under weight or over weight is an aggravating factor behind prevalence of numerous diseases such as diarrhoea, respiratory infections, and measles. Lack of nutrition can undermine the immunity system. Malnutrition could erode the potential growth which a country could achieve since a nation where the ability of the children to learn diminishes due to inadequate nutrition are less probable of realizing their full potential. Given that India has the highest number of deaths among children younger than 5 years of age 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 (Corsi et. 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 nutrition status of maternal and child health: Integrated Child Development Scheme (ICDS)

implemented by the Ministry of Women and Child Development, and National Health Mission (NHM) implemented by the Ministry of Health and Family Welfare. The programs have the potential to cater to the needs of all sections of the society and include all the nutrition interventions which are targeted at solving the deficiency of essential nutrients. 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 include 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 in 18 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, except for community-based management of SAM, are present in both of these programs.

Currently there is no large scale implementation of community based management of SAM using RUTF pan-India. Instead, facility-based treatment at Malnutrition Treatment Centers or Nutrition Rehabilitation Centers are the norm. In December 2015, the government of Rajasthan initiated a program – called POSHAN – to pilot a large scale CMAM initiative across 13 districts of the state (CIFF, 2018). The program screened 230,000 and treated about 9000 children for SAM with high recovery rates (Government of Rajasthan, 2018). In 2017 the program was expanded to cover 20 districts. POSHAN demonstrates that it is possible to

leverage existing healthcare infrastructure and staff, particularly ASHAs and ANMs, to deliver a CMAM program at scale in a government led initiative.

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.

Proposed Intervention Background

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 awareness creation. For the purpose of our analysis these interventions have been categorized depending on whether they are targeted at promoting the benefits of the intervention, providing supplements, micronutrients or treatment of severe acute malnutrition. 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 their study here are

discussed. Complementary feeding support and educational strategies have been observed to significantly 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 somewhere in the range of 1-2.5 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 recently released NFHS-4 reports a decline in undernutrition and stunting, but the proportion of children who exhibit wasting has increased over time. India is the home of largest number of undernourished children in the world (World Bank 2005). 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. On similar lines, 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) have done a review of the literature about 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).

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) have done a comprehensive analysis of the cost of delivering these interventions and computed unit cost from 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 the following table. We have used the unit cost data for the cost-benefit exercise.

Table 3: Details of Nutrition based interventions within India's Policy framework (Menon et. al. 2016)

Component	Intervention population	Unit Cost, India in USD	Unit Cost, India In rupees	Marginal cost of Mothers time (own calculation) in USD	Marginal cost of Mothers time (own calculation) in rupees
Counseling during pregnancy	Pregnant women	1.76	114	0.66	43
Counselling for optimal breastfeeding	Caregivers of children 0– 6 months of age	1.67	109	2.46	160
Complementary feeding and hand washing education	Caregivers of children 6– 12 months of age	7.47	486	2.15	140
Complementary feeding and hand washing education	Caregivers of children 12-24 months of age	2.8	182	1.98	129
Complementary food supplements	Children 6-12 months	15.16	985	19.44	1264
Complementary food supplements	Children 12-36 months	30.31	1970	77.75	5054
Supplementary food rations	Pregnant and lactating women	17.67	1149	29.15	1895
Calcium supplements	Pregnant women and lactating mothers	14.16	920	0	0
MMN supplement	Pregnant women and lactating mothers	7.92	515	0	0
Community based treatment of SAM (CMAM)	Children under 5 suffering from SAM	69.23 to 178.22	4,500 to 11,584	20.81	1,353
TOTAL ex. CMAM		98.92	6429.8		

Source: Menon et. al. 2016, Cost for MMN and CA from NHM. Cost for CMAM based on an phase 1 and phase 2 unit costs for POSHAN project in Rajasthan.

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. Five 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 4: 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 breastfeeding and Complementary feeding and 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.
4	Micronutrient supplementation for pregnant women during ANC visits	Vitamin A supplementation, ORS and therapeutic zinc supplements for treatment of diarrhea, Deworming, Iron supplements and IFA supplements.
5	Community based treatment of children with SAM using RUTF	Additional food rations for Severely malnourished (WAZ<3) Children and community-based treatment

Lifetime productivity benefits have been computed assuming that the interventions would reduce stunting by 12-20 per cent (Bhutta et al. 2013). 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 5: 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 reduction in stunting
2	Interpersonal counselling for behaviour change	66 per cent	12 per cent reduction in stunting
3	Supplementary food for mother and child	66 per cent	18 per cent reduction in stunting
4	Micronutrient supplementation for pregnant women during ANC visits	7.5 per cent	17 per cent reduction in low birth weight

The per capita income of Rajasthan has been projected till 2070. Observing the economic performance, we are assuming that the 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 Rs. 65 per USD. Discount rate of 3 per cent, 5 per cent and 8 per cent have been used to calculate the net present value of costs and benefits.

Methodology

Methodology: Overall, Promotion and Provision Package

To initialize the analysis, 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 6: 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

Methodology: Micronutrient supplementation for pregnant women during ANC visits

The methodology for evaluating the benefits arising from implementation of micronutrients intervention is slightly different. Here the analysis has been performed for a single year, 2018. The estimated benefits from provision of micronutrients include reduction in mortality and morbidity related with anaemia, low birth weight, pre-eclampsia and pre-term birth (presented in appendix). The reduction in relative risk from provision of appropriate micronutrients are presented in table 7 below.

Table 7: Risk reduction factor associated with conditions arising from micronutrient deficiency

	Source	RR factor
IDA with MMN	Peña-Rosas et. al., 2015	0.34
LBW (MMN vs. IFA)	Haider & Bhutta, 2015	0.88
LBW (IFA vs placebo)	Peña-Rosas et. al., 2015	0.84
Maternal death (Ca vs. placebo)	Hofmeyr et. al., 2010	0.80
Preterm birth	Hofmeyr et. al., 2014	0.76

The cost of implementing this intervention will be 124 crore rupees per year. A break-up of cost is provided in the table below. The infrastructure is already in place and the major part of the cost will be incurred for provision of the micronutrient and calcium supplements during ANC visits that women are undertaking normally. It is being assumed that during each visit a two month supply of Calcium and Multi-micronutrients will be provided to the beneficiary. The cost for health workers have been calculated by making modest assumptions about the caseload per worker, number of additional health workers and supervisors required. The scale-up cost which is the cost for scaling up the intervention includes the cost incurred on planning and co-ordination, behavioural change communication and training to health workers.

Table 8: Break up of cost, Micronutrient supplementation for pregnant women during ANC visits, Rajasthan

Components	Cost in rupees	Cost in USD	Percentage
Total cost of supplements (Rupees)	12179,47,084	187,37,647	0.980
Health worker costs (Rupees)	214,90,115	3,30,617	0.017
Total training and scale up costs (Rupees)	36,45,000	56,077	0.003
Total cost (Rupees)	124,30,82,199	191,24,342	

Methodology: Community based treatment of children with SAM using RUTF (CMAM)

To estimate the benefits from community based treatment of SAM the risk reduction factor associated with wasting for various diseases have been used from Olofin et. al. (2013).

Table 9: Hazard ratio (HR) estimates for specific causes of mortality related with wasting, WHO 2006 standards Olofin et al 2013

	Diarrhea	Respiratory Tract Infection	Measles	Malaria	Other infectious diseases
SAM	12.33	9.68	9.63	1.24	11.21
None	1	1	1	1	1

The intervention assumes a scale up of a community-based program that will actively screen and treat 80% of all children suffering from SAM using RUTF. Costs and benefits are estimated for a single year, 2018. Due to the limited evidence of this intervention in the Indian context, a plausible range of benefits and costs is presented.

Burza et al. (2015) document the results of a CMAM program in Bihar that treated 8,274 children for SAM between February 2009 and September 2011. The results indicate that of the children who had been identified and for whom the treatment had been initiated, 0.8 per cent died during treatment, 36.2 per cent defaulted during treatment, 5.6 per cent did not respond to treatment and the remaining 57.4 per cent completed treatment and recovered. Following this, we assume a low end effectiveness rate of 57 per cent from CMAM. In contrast, initial results from the POSHAN pilot in Rajasthan suggest 9 month recovery rates of 90 per cent (Chief Minister's Office of Rajasthan, 2017). This is assumed to be the high end value.

The costs for treatment of SAM and MAM include the cost of providing RUTF, recruitment of additional personnel, training and supervision of the health workers, incentives for staff and parents as well as cost incurred by households for treatment which mainly comprises of transport cost. Costs of POSHAN phase 1 are Rs 11,584 per child (Results 4 Development commissioned by NHM), while the costs of POSHAN phase 2 have been estimated at Rs. 4500 per child (Srinivasan, 2017). Modest household costs for seven half-day follow up visits are estimated at Rs. 1,353 per child based on data from NSS71 and following standard assumptions of *Rajasthan Priorities* project for valuing time. Taken together this suggests low end costs of Rs. 5,853 per child, and a high end cost of Rs. 12,937 per child treated.

Intervention Effectiveness and Calculation of Health Effects

The reduction in stunting and wasting arising from the interventions is presented in tables 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). For wasting we assume a low end effectiveness of 57%, a high end effectiveness of 90%, and median scenario of the two. Treatment of those with moderate acute malnutrition is not included in the intervention.

Table 10a: Pre and post prevalence of stunting, Rajasthan

	Pre-intervention prevalence of stunting	Intervention effectiveness	Post- intervention prevalence of stunting
Direct nutrition based interventions			
Severe	17.3%	-20.3%	13.8%
Moderate	21.8%	-20.3%	17.4%
None	60.9%		68.8%
Interpersonal counselling for behaviour change			
Severe	17.3%	-12.0%	15.2%
Moderate	21.8%	-12.0%	19.2%
None	60.9%		65.6%
Supplementary food for mother and child			
Severe	17.3%	-18.0%	14.2%
Moderate	21.8%	-18.0%	17.9%
None	60.9%		67.9%

Table 10b: Pre and post prevalence of wasting, Rajasthan

	Pre-intervention prevalence of wasting	Intervention effectiveness	Coverage (assumed)	Post-intervention prevalence of wasting
Community based treatment of SAM using RUTF - low				
Severe	7.3	-57.0	80%	3.9
Moderate	13.1			13.1
None	79.6			83.0
Community based treatment of SAM using RUTF - high				
Severe	7.3	-90.0	80%	2.0
Moderate	13.1			13.1
None	79.6			84.9
Community based treatment of SAM using RUTF - median				
Severe	7.3	-73.5	80%	3.0
Moderate	13.1			13.1
None	79.6			83.9

The 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 using the data from Global Burden of Diseases 2016. The effectiveness of nutrition interventions for diseases under different scenario is presented on the basis of available evidence.

The data for annual deaths for the first year of life of the child (2017) is given separately but the data for age group 1-4 group is available in aggregate form. Therefore, to estimate the annual benefits in terms of reduction in YLLs and YLDs we assume they are split equally across these years starting from 2018 to 2021.

Common Approach

The number of deaths and Years Lost due to Morbidity (YLDs) avoided have been calculated using the risk factor and the effectiveness of the intervention which lead to a change in the distribution of stunting or wasting. The potential impact fraction is defined as:

$$\text{PIF}_j = \left(\sum_{i=1}^{n} P_i RR_{ji} - \sum_{i=1}^{n} P_i' RR_{ji} \right) / \sum_{i=1}^{n} P_i RR_{ji}$$

Where RR_{ji} is the relative risk associated with cause due to specific disease (denoted by j) for each category of stunting or wasting (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 cause or total Years Lost due to Morbidity (YLDs). These figures have been computed using GBD 2016 data.

Two approaches have been used to calculate the mortality benefits.

Approach 1:. 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 as per guidelines of *Rajasthan Priorties* project.

Burza et al (2015) document that 14% of children relapse in SAM. Thus for the cost-benefit analysis of CMAM, we assume for 86% of the deaths avoided, the full discounted lifetime YLLs are avoided, while for 14% of cases, only one quarter of YLL is avoided.

Approach 2: The monetary benefits using the central value of statistical life have been computed. The central estimate of statistical life for Rajasthan have been assumed to be 6,860,482 or $1,05,546

For morbidity avoided, the numbers of YLDs avoided have been valued at three times the per capita SDP.

Results

Table 11 presents the Deaths avoided and Years lost to Disability (YLDs) avoided per 1000 children in 2017 birth cohort reached by the intervention in Rajasthan. The highest impact of the intervention will be to reduce the number of deaths arising because of diarrhea.

Table 11: Deaths avoided and Years lost to Disability (YLDs) avoided per 1000 children in 2017 birth cohort reached by the intervention, Rajasthan

	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
Deaths avoided						
Direct nutrition based interventions	0.34	1.51	0.08	0.12	0.17	2.22
Interpersonal counselling for behaviour change	0.2	0.89	0.05	0.07	0.1	1.31
Supplementary food for mother and child	0.3	1.34	0.07	0.1	0.15	1.97
YLDs avoided						
Direct nutrition based interventions	1.29	0.11	0.05	0.02	0.18	1.65
Interpersonal counselling for behaviour change	0.76	0.07	0.03	0.01	0.11	0.98
Supplementary food for mother and child	1.15	0.1	0.04	0.01	0.16	1.46

Table 12: 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%	13,903	17,805	470	162,357
	5%	13,229	11,225	455	77,894
	8%	12,270	6,676	433	28,677
Interpersonal counselling for behaviour change	3%	8,219	10,525	278	95,974
	5%	7,820	6,636	269	46,045
	8%	7,253	3,947	256	16,952
Supplementary food for mother and child	3%	12,328	15,788	417	143,961
	5%	11,730	9,954	403	69,068
	8%	10,880	5,920	384	25,428

Table 12 presents the avoided mortality and morbidity benefits per child. The results indicate that the mortality benefits lie in a range of Rs. 4,000 to Rs. 18,000. The productivity benefits are as high as Rs. 162,000 at 3 per cent discount rate for direct nutrition based interventions. The value of productivity benefits is significantly smaller at lower discount rates.

Table 13 presents the avoided mortality and morbidity benefits from provision of micronutrient and calcium supplementation. There are a multitude of impacts from the intervention: 133,787 cases of maternal anemia avoided, 47,196 avoided LBW babies, 425 avoided maternal deaths, 27,144 avoided preterm births, 1,900 avoided preterm deaths and 298 avoided stil births. The total YLDs avoided from all effects is 99,782 at the 5% discount rate with almost all from LBW averted. Total YLLs avoided from 2623 avoided deaths and still births are 49,823 at the 5% discount rate.

Table 13: Avoided mortality and morbidity benefit from provision of micronutrient supplementation for pregnant women during ANC visits, Rajasthan

Benefits	3 per cent	5 per cent	8 per cent
YLDs due to cases of anemia averted (maternal disabilities)	3,040	3,019	2,990
YLDs due to cases of LBW averted (children)	1,45,032	96,705	62,262
YLDs avoided due to preterm birth avoided	86	58	37
Total YLDs avoided	1,48,158	99,782	65,288
YLLs avoided from child deaths avoided due to improved birth outcomes	8,611	5,749	3,709
YLLs avoided from maternal deaths avoided due to pre-eclampsia reduction	10,182	7,449	5,113
YLLs avoided from child deaths avoided due to preterm reduction	54,849	36,624	23,624
Total YLLs avoided	73,641	49,823	32,446
Total earnings saved (Rs)	7253,08,530	3304,08,105	1153,70,877

Table 14 presents the number of deaths and YLDs avoided from the community based management of SAM, each year. The intervention would save between 4001 and 6273 lives each year, mostly from avoided deaths due to diarrhea and respitory infections. It would also avoid 4165 to 6530 YLDs per year, mostly from avoided diarrhea and other infections.

Table 14: Under-5 mortality and morbidity avoided from CMAM (80% coverage) per year

	Diarrhea	ALRI	Measles	Malaria	Other infectious	Total
Deaths avoided						
Low effectiveness of CMAM	717	2494	156	11	623	4001
High effectiveness of CMAM	1125	3911	244	17	976	6273
Median effectiveness	921	3203	147	14	800	5137
YLDs avoided						
Low effectiveness of CMAM	3179	219	114	2	651	4165
High effectiveness of CMAM	4984	344	179	3	1021	6530
Median effectiveness	4082	281	147	2	836	5348

Table 15 provides the BCRs for various scenarios of benefits and costs. The results indicate that BCRs for this intervention range between 2.2 and 11.3 depending on assumptions used. While variation is significant, it seems that the benefits-to-costs of SAM treatment are unlikely to be higher than the best preventative nutrition interventions examined in this study.

Table 15: Summary of Benefit-Cost Ratios from various CMAM scenarios (approach 1, 5% discount rate)

	High Costs (Rs. 12,937 per child treated)	Median Costs (Rs. 9,395 per child treated)	Low Costs (Rs. 5,853 per child treated)
High Benefits (Rs. 65,938 per child treated)	5.1	7.0	11.3
Median Benefits (Rs. 46,951 per child treated)	3.6	5.0	8.0
Low Benefits (Rs. 27,964 per child treated)	2.2	3.0	4.8

Conclusion

Rajasthan is grappling with a malnutrition crisis. A cost-benefit analysis of the nutrition interventions in India 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 16 summarizes the main results using approach 1 for valuing mortality benefits. This base case includes the benefits arising from increase in productivity and from avoiding mortalities and morbidities. The overall package is expected to reduce stunting by 20 per cent. The prevalence of severe stunting will reduce from 17.3% to 13.8% and moderate stunting from 21.8% to17.4%. The cost of overall package per individual is Rs. 14,144 and benefits are 91,577 resulting in a benefit cost ratio of 6. The highest benefits accrue from implementation of promotion intervention. The benefit-cost ratio in case of promotion (43), provision (7), micronutrients (37) and community based treatment of SAM (5) are also coming out to be significant.

The results from sensitivity analysis (approach 2) are similar to the primary analysis. Here, the benefit-cost ratio in case of promotion, provision and overall package are 43, 7 and 6 respectively. For micronutrients it is 39 and for CMAM it is 8 (median scenario).

Clearly, the determinants of malnutrition are known and the interventions required to overcome the problem are in place. It is the successful implementation of the schemes which is desirable. Low budgetary allocations, underutilization of existing budgets and insufficient targeting prevent existing nutrition-specific interventions from maximising their impact (Ghai et. al., 2017). The agencies of 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 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. Increasing utilization of funds in an efficient manner and maximizing the impact of nutrition sensitive interventions would be instrumental to get rid of malnutrition.

Table 16: Results Scenario 1 (primary analysis – years of life saved valued at 3x GSDP per capita)

Interventions	Benefit	Cost	BCR
Direct nutrition based interventions	91,577	14,144	6
Interpersonal counselling for behaviour change	54,134	1,245	43
Supplementary food for mother and child	81,202	11,532	7
Micronutrient supplementation for pregnant women during ANC visits	23,453	637	37
Community based treatment of SAM using RUTF (median)	46,951	9,395	5

Table 17: Results Scenario 2 (sensitivity analysis – lives saved valued at VSL)

Interventions	Benefit	Cost	BCR
Direct nutrition based interventions	89,573	14,144	6
Interpersonal counselling for behaviour change	52,950	1,245	43
Supplementary food for mother and child	79,425	11,532	7
Micronutrient supplementation for pregnant women during ANC visits	24,913	637	39
Community based treatment of SAM using RUTF (median)	76,344	9,395	8

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Appendix

Table 18: 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 19: 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	0.22	0.99	0.05	0.08	0.11	1.46
2018	0.03	0.13	0.01	0.01	0.01	0.19
2019	0.03	0.13	0.01	0.01	0.01	0.19
2020	0.03	0.13	0.01	0.01	0.01	0.19
2021	0.03	0.13	0.01	0.01	0.01	0.19
Total per cause	0.34	1.51	0.08	0.12	0.17	2.22

Table 20: 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	0.13	0.59	0.03	0.05	0.07	0.86
2018	0.02	0.08	0.00	0.01	0.01	0.11
2019	0.02	0.08	0.00	0.01	0.01	0.11
2020	0.02	0.08	0.00	0.01	0.01	0.11
2021	0.02	0.08	0.00	0.01	0.01	0.11
Total per cause	0.20	0.89	0.05	0.07	0.10	1.31

Table 21: 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	0.20	0.88	0.05	0.07	0.10	1.30
2018	0.03	0.11	0.01	0.01	0.01	0.17
2019	0.03	0.11	0.01	0.01	0.01	0.17
2020	0.03	0.11	0.01	0.01	0.01	0.17
2021	0.03	0.11	0.01	0.01	0.01	0.17
Total per cause	0.30	1.34	0.07	0.10	0.15	1.97

Table 22: 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	0.90	0.08	0.04	0.01	0.13	1.16
2018	0.10	0.01	0.00	0.00	0.01	0.12
2019	0.10	0.01	0.00	0.00	0.01	0.12
2020	0.10	0.01	0.00	0.00	0.01	0.12
2021	0.10	0.01	0.00	0.00	0.01	0.12
Total per cause	1.29	0.11	0.05	0.02	0.18	1.65

Table 23: 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	0.53	0.05	0.02	0.01	0.08	0.68
2018	0.06	0.00	0.00	0.00	0.01	0.07
2019	0.06	0.00	0.00	0.00	0.01	0.07
2020	0.06	0.00	0.00	0.00	0.01	0.07
2021	0.06	0.00	0.00	0.00	0.01	0.07
Total per cause	0.76	0.07	0.03	0.01	0.11	0.98

Table 24: 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	0.80	0.07	0.03	0.01	0.11	1.03
2018	0.09	0.01	0.00	0.00	0.01	0.11
2019	0.09	0.01	0.00	0.00	0.01	0.11
2020	0.09	0.01	0.00	0.00	0.01	0.11
2021	0.09	0.01	0.00	0.00	0.01	0.11
Total per cause	1.15	0.10	0.04	0.01	0.16	1.46

Rajasthan is the largest Indian state. It has a diversified economy, with mining, agriculture and tourism. Rajasthan has shown significant progress in improving governance and tackling corruption. However, it continues to face acute social and economic development challenges, and poverty remains widespread. What should local, state and national policymakers, donors, NGOs and businesses focus on first, to improve development and overcome the state's remaining issues? With limited resources and time, it is crucial that priorities are informed by what can be achieved by each rupee spent. To fulfil the state vision of "a healthy, educated, gender sensitive, prosperous and smiling Rajasthan with a well-developed economic infrastructure", Rajasthan needs to focus on the areas where the most can be achieved. It needs to leverage its core competencies to accelerate growth and ensure people achieve higher living standards. Rajasthan Priorities, as part of the larger India Consensus – a partnership between Tata Trusts and the Copenhagen Consensus Center, will work with stakeholders across the state to identify, analyze, and prioritize the best solutions to state challenges. It will commission some of the best economists in India, Rajasthan, and the world to calculate the social, environmental and economic costs and benefits of proposals.

COPENHAGEN CONSENSUS CENTER

Copenhagen Consensus Center is a think tank that investigates and publishes the best policies and investment opportunities based on social good (measured in dollars, but also incorporating e.g. welfare, health and environmental protection) for every dollar spent. The Copenhagen Consensus was conceived to address a fundamental, but overlooked topic in international development: In a world with limited budgets and attention spans, we need to find effective ways to do the most good for the most people. The Copenhagen Consensus works with 300+ of the world's top economists including 7 Nobel Laureates to prioritize solutions to the world's biggest problems, on the basis of data and cost-benefit analysis.