

Preventive Zinc supplementation to children (6 to 59 months)

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Description of condition and intervention

Zinc as a micronutrient is essential for cellular growth and metabolism. Deficiency of Zinc may limit childhood growth and reduce resistance to combat infections in children. Zinc deficiency is assumed to be prevalent in LMICs. Preventive Zinc supplementation has consistently shown benefits in bringing down all-cause incidence of diarrheal cases in children under five years of age. Diarrhoea is one of the leading causes of under-5 mortality globally. It also predisposes children to risk of other illnesses like respiratory infections and impaired growth. Preventive Zinc supplementation have been used in Global modelling of stunting strategies including those suggested by Lancet 2013 package of recommended interventions to call attention to this importance in child diet. There has been no effort in implementing Zinc supplementation in LMICs. Coverage of diarrheal management remains low. (Sources: Lancet 2021 and WHO). This evidence brief assesses effects and costs for one intervention being analyzed in FairChoices: DCP analytical tool (For an overview of other interventions, see appendix below and the separate evidence briefs for these):

NUTR01-02-04

Zinc to children 6 to 59 months

Recommendations for this intervention

Disease Control Priorities	Indications/recommendations	Applicability Lower MIC settings
This intervention was included in the Disease Control Priorities 3 rd edition	Children should be provided with 10-20 mg Zinc supplementation per day for 13 to 14 days (10 mg zinc per day for infants under 6 months of age) WHO	

Source: World Health Organization, G. Zinc supplementation in the management of diarrhoea. DCP3 Chapter 9 Diarrheal disease

Intervention attributes

Type of interventions & delivery platform

Table 1: Type of interventions & delivery platform

Intervention	Type	Delivery platform
Preventive Zink supplementation	Prevention	Community

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Moderate level of urgency

Population in need of interventions

Table 2: Population in need of interventions

Intervention	Treated population		Affected population		Disease state addressed
	Treated age	Treated fraction	Affected age	Affected fraction	
Preventive Zinc supplementation	0 to 4 years	According to Henriksen et al. All children with the condition from six months until five years should be treated, treated fraction is 1 (Unpublished work in progress)	0 to 5 years (from six months and children up to five years)	Those with the condition, both genders: According to Henriksen et al. All newborns and children up to five years are affected which is equal to 1 (Unpublished work in progress)	Diarrheal disease
	0 to 4 years	According to Henriksen et al. All children with the condition from six months until five years should be treated, treated fraction is 1 (Unpublished work in progress)	0 to 5 years (from six months and children up to five years)	Those with the condition, both genders: According to Henriksen et al. All newborns and children up to five years are affected which is equal to 1 (Unpublished work in progress)	Lower respiratory infections

Disease stage/condition addressed

This intervention delays or prevent development of infections related to Zink deficiency

Intervention effect and safety

Table 3.0: Effect and safety of Zinc supplementation in children

Effect of intervention	Certainty of evidence
Incidence reduction: Mayo-Wilson et al 2014. found that giving preventive Zink supplementation gives a relative risk of 0.87 in incident cases of all-cause diarrhea (95% CI 0.85 to 0.89)	⊕⊕⊖⊖ Moderate quality of evidence

Table 3.1: Effectiveness and safety of Zinc supplementation in children

Effect of intervention	Certainty of evidence
Incidence reduction: Lassi et al 2016. found that giving preventive Zink supplementation gives a relative risk of 0.87 in incident cases of pneumonia (95% CI 0.85 to 0.89)	⊕⊖⊖⊖ Low quality of evidence

Model assumptions

Table 4.0: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Intervention	Preventive Zink supplementation	
Cost calculation		
Treated population	See table 2	Epidemiological data from Global Burden of Disease study
Effect calculation		
Affected Population	See table 2	
Affected gender	See table 2	
Affected fraction age	See table 2	
Affected fraction	See table 2	

Comparison	Placebo	
Incidence Reduction (RRR)	0.13	RRR For both studies is 13%

Intervention Cost

The total unit cost is estimated to be USD 2.22 (Year: 2020) per child per case for the prevention of infectious diseases related to Zinc deficiency according to *Henriksen et al. (Unpublished Work in progress)*

References

World Health Organization, G. Zinc supplementation in the management of diarrhoea. 11 February 2019; Available from: https://www.who.int/elena/titles/zinc_diarrhoea/en/.

Keusch, G., Walker, C., Habte, D., Das, J., Horton, S., 2016. "Diarrheal Diseases". In: Disease Control Priorities (third edition): Volume 2, Reproductive, Maternal, Newborn, and Child Health, edited by R. Black, M. Temmerman, R. Laxminarayan, N. Walker. Washington, DC: World Bank.

Lassi, Zohra S., Anoosh Moin, and Zulfiqar A. Bhutta. "Zinc supplementation for the prevention of pneumonia in children aged 2 months to 59 months." Cochrane Database of Systematic Reviews 12 (2016).

Mayo-Wilson, Evan, et al. "Zinc supplementation for preventing mortality, morbidity, and growth failure in children aged 6 months to 12 years of age." Cochrane Database of Systematic Reviews 5 (2014)

Other references to strengthen this intervention:

1. Keats, E.C., et al., *Effective interventions to address maternal and child malnutrition: an update of the evidence*. Lancet Child Adolesc Health, 2021. **5**(5): p. 367-384.
2. Heidkamp, R.A., et al., *Mobilising evidence, data, and resources to achieve global maternal and child undernutrition targets and the Sustainable Development Goals: an agenda for action*. Lancet, 2021. **397**(10282): p. 1400-1418.
3. World Health Organization, G. *Zinc supplementation in the management of diarrhoea*. 11 February 2019; Available from: https://www.who.int/elena/titles/zinc_diarrhoea/en/.

Appendix

Literature Review for effectiveness & safety

This literature search is an example of level 4 evidence(metaanalysis) for intervention inputs taken from DCP3. (Despite low significant level for efficacy)

Level of evidence of efficacy studies:

1. Low (expert opinions, case series, reports, low-quality case control studies)
2. Moderate (high quality case control studies, low quality cohort studies)
3. High (high quality cohort studies, individual RCTs)
4. Very high (Multiple RCTs, metaanalysis, systematic reviews, clinical practice guidelines)

An overview of all NUTR interventions in FairChoices-DCP analytical tool (Interventions assessed in this evidence brief are marked in bold)

NUTR01-01	Daily Iron Folic acid supplementation (pregnant women)
NUTR01-02	Calcium supplementation, pregnancy
NUTR01-03 households	Food and caloric supplementation to pregnant women in insecure
NUTR01-04-02	Promotion of breastfeeding and/ or complementary feeding
NUTR01-05	Intermittent Iron-folic acid supplementation (Menstruating women)
NUTR01-06	Food to non-pregnant women in insecure households
NUTR01-02-01-01	Daily iron supplementation for children 6 to 23 months
NUTR01-02-01-02	Daily iron supplementation in children health center
NUTR01-02-02	Intermittent iron supplementation in children (24 -59 months)
NUTR01-02-03	Vitamin A supplementation to children 6 to 59 months
NUTR01-02-04	Zink to children 6 to 59 months
NUTR01-02-05	Food to children, if below basic food poverty line
NUTR01-03-01	Management of severe acute malnutrition without medical complications
NUTR01-03-02 complications	Management of severe acute malnutrition associated with medical