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Original Research Article

Reducing stunting among less than five years children in Nagaland, India: a lives saved tool projection from 2018-2025

Lincoln Priyadarshi Choudhury*

Independent Researcher, New Delhi, India

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***Correspondence:**
Dr. Lincoln Priyadarshi Choudhury,
E-mail: lincolnchoudhury@gmail.com

ABSTRACT

Background: Malnutrition is one of the key public health challenges for the state of Nagaland, India. In the backdrop of the global call for a reduction in malnutrition, this paper explores the feasibility of the state reaching the global targets reducing stunting among less than six years age children by 2025.
Methods: Data from Census, National Family Health Survey were primarily used. Based on published literature, ten interventions that influence stunting were selected. The lives saved tool module of Spectrum software was used for analysis. This paper examined the effect of above interventions on stunting among zero to five-year old children. Three different scenarios with different coverage combinations were created for the years 2012 to 2025 and compared with global targets.
Results: The analysis found that in none of the three scenarios the state will be achieving the global target. The projected stunting levels in 2025 will vary between 3-21% increase from the baseline figures in 2012. Though with increased coverage, the increasing trend of stunting could be reversed by 2025. Reaching the global target of 40% reduction in stunting by 2015 from the 2012 levels may take more time than the year 2025.
Conclusions: Long-term programs with specific targets and processes need to be developed to address malnutrition. The scale of interventions, translation of behaviour change interventions at the household level and addition of new elements to an integrated program may achieve a better result.

Keywords: Lives saved tool, Nutrition, India, Policy

INTRODUCTION

Situated in north east part of India, nearly two million people live in the state of Nagaland.[1] The state is known to have poor health and nutrition indicators.[2,3] Malnutrition is considered as the foremost factor contributing to death and disability in the state which is known to have relatively poor health system.[4,5] The latest National Family Health Survey (NFHS 2014-15), indicates improvement in nutrition indicators from the previous round in the year 2005-6.[6] The Government of India (GoI) provides support for maternal and child health programs, nutrition or supplementary food and pre-school education etc. for children 6 months to 72 months of age and subsidized food items for those below the poverty line.[7,8] The anganwadi centers (AWC) are specialised local service provision units for providing services to improve the nutrition status of mothers and children through a gamete of services. Poor program implementation and access to services like 35% of children receiving supplementary food, less than 10% of mothers receiving benefits from the AWC during pregnancy and breastfeeding, nearly 22% of children and 24% of women were anaemic and 29% children were found to the stunted.[9]

In response to the global call for improving the nutrition status by reducing stunting by 40% by 2025 from the 2012 level, the GoI, has recently augmented the existing nutrition interventions to a mission mode by infusing additional resources.[10] The Government has also taken steps to improve the health interventions, water and sanitation interventions.[11-14] Evidences suggest towards influence of other interventions on the nutritional status of children.[15] Different possible future scenarios were analyzed in this paper to understand the effect of all the efforts or interventions among 0 to 5 years children in the state, and if the state will be able to reach the global goal locally.

METHODS

The Spectrum software has been used at international level to forecast the effect of interventions on specified diseases or health events like.[16] Recently it was used to forecast the effect of oral rehydration treatment, zinc program and immunization interventions on mortality.[17,18] This is the first time this tool is used to reflect on the nutrition of children in the sub-national context in India. Three key modules of the tool are Demproj- a demographic projection module, AIDS impact model (AIM) and lives saved tool (LiST) were used for this analysis as per the technical guidelines provided. Additional technical support was obtained from LiST team and experienced LiST users, through personal communication using email. A subnational projection was created using Spectrum version 5.61, from the year 2011 to 2025.

For demographic projection, the age and sex break up data from 2011 India census, total fertility rate from National Family Health Survey-4 (NFHS-4), Age-specific fertility rate of UN Asia model, with Cole-Demeny West model was used.[19] For the AIM module, HIV incidence information was calculated using the recently published estimation.[20] The HIV treatment coverage data was taken from the midterm review of national HIV control program in 2015, and state health department website.[21,22] The basic inputs for LiST module like under 5 mortality, infant mortality was taken from sample registration system. The baseline information for, the year 2011, maternal child health cover was calculated by linear interpolation of findings of NFHS-3 and NFHS-4. Ten interventions enlisted in LiST with effect on stunting were considered for analysis.[23]

The year 2012 was considered to compare the progress till 2025. A total of three scenarios were compared to find out how much stunting can be reduced at scenario-1 in which if the current level of coverage (NFHS-4) remains same till 2025, scenario-2 in which if the linear trend in coverage from NFHS-3 to NFHs-4 remains same till 2025 and scenario-3 in which if coverage of interventions (affecting stunting) is increased from the current year 2018 to 90% in 2025.[15]

RESULTS

In the year 2012, the estimated number of children less than 5 years was 245,000, out of which nearly 64,000 were stunted.

Population and stunting trend

The number of children aged less than 5 years is estimated to increase from nearly 298,000 in the year 2018 to 302,000 in 2022 followed by a gradual decline to 298,000 in the year 2025. All three scenarios vary with respect to trend or level of stunting (Table 1). In the first scenario, the number of stunted children will increase from 78,500 in 2018 to 79,400 in 2022. From the year 2022 onwards stunting trend will decline to reach 78,000 in 2025. During the period of 2018 to 2025, annually stunting can be avoided between 2500 to 2700 children.

In the second scenario, the number of stunted children will decline steadily from 77500 in 2018 to 74,000 in the year 2025. The number of children among whom stunting will be avoided will double from 3500 annually in 2018 to 6500 in year 2025.

Table 1: Estimated trend of the annual number of children 0-5 years and stunted children (0-59 months) and number of stunting cases that could be avoided: 2018 to 2025.

Year	2018	2019	2020	2021	2022	2023	2024	2025
No. of children <5 years	297727	299711	301116	301746	301819	301315	299973	297782
Number of stunting cases								
Scenario-1	78401	78741	79032	79234	79289	79094	78629	77926
Scenario-2	77491	77378	77181	76923	76547	75950	75113	74066
Scenario-3	77491	77021	76108	74647	72565	70344	68160	66000
Number of stunting cases avoided								
Scenario-1	2556	2638	2649	2657	2660	2655	2641	2619
Scenario-2	3482	4026	4535	5012	5455	5859	6225	6554
Scenario-3	3482	4385	5621	7326	9511	11581	13330	14801

In the third scenario, by the year 2025, the stunting figures will reduce to 66,000 annually from nearly 77500 in 2018. The number of children who can avoid stunting will increase from 3500 in 2018 to 14800 in the year 2025.

Variations in interventions

A ceiling effect is noticed in some interventions with respect to the level of coverage i.e., improved water source, improved sanitation, and breastfeeding (Table 2). At a lower level of coverage, at NFHS-4 level, complementary feeding, hand washing with soap, improved sanitation, water connection at home are key contributors to the reduction of stunting. At higher levels of coverage complementary feeding, micronutrient supplementation, water connection at home and hand washing with soap were found to be the major interventions that contributed to the reduction of stunting. Improved sanitation, hygienic disposal of stool, vitamin A supplementation balance protein energy supplementation made relatively small contributors to the reduction of stunting at a higher level of coverage.

Table 2: Number of stunting cases avoided as per intervention, with 90% coverage between 2018 and 2025.

	Scenario-1			Scenario-2			Scenario-3		
Year	2018	2022	2025	2018	2022	2025	2018	2022	2025
Micronutrient supplementation	100	112	111	122	181	311	122	1,610	2,660
Balance protein energy supplementation	7	8	7	8	12	21	8	88	336
Maternal age and birth order	8	14	18	6	9	16	6	8	12
Birth interval	1	1	1	0	1	1	0	1	1
Breastfeeding	97	107	106	115	166	264	115	143	178
Complementary feeding	497	576	572	612	923	1652	612	2,614	5,503
Vitamin A	69	76	76	87	120	186	87	223	320
Improved water source	37	41	41	45	63	97	45	59	69
Water connection at home	308	343	340	377	521	808	377	849	1,975
Improved sanitation	458	508	505	559	707	815	559	579	578
Hand washing with soap	568	632	627	694	961	1490	694	815	1,163
Hygienic disposal of stool	215	239	237	262	363	563	262	337	535

DISCUSSION

The estimated number of stunted children aged between 0-5 years age in 2012 is 64,307. The global target is to reduce the stunting by 40% by the year 2025, which is nearly 38,500, children aged between 0-5 years. The first scenario seems to have little effect in changing the existing conditions and showing a trend similar to demography among less than five year age. The second and the third scenario manage to bring downward trend, though none of them provide figures close to the expected number of stunting by the year 2025. Given all of the above scenarios, there is a possibility of reversing the trend of stunting in the state with continuing incremental investments to maintain the rate of change or targeting to increase the coverage of the interventions up to ninety percent. However, the state will miss the 40% reduction of stunting from 2012 level by 2025.

Strengths and weaknesses of the analysis

The analysis draws data mostly from the large-scale surveys. The calibrations for all the three LiST modules, has been done as per the established procedures and has taken the local level information. The interventions that are considered in the program have clear logical causal linkage. The interventions without a clear causal linkage like results based financing and conditional cash transfers are not taken in to consideration.[23-25] The interventions which affect mortality among children like immunisation etc, are expected to influence the denominator, are not included in this analysis.

Assumptions in the scenarios

In-order to address the issue of what will be the future coverage level, the approach was to consider two scenarios based on surveys and one on the possibility of 90% coverage if the supply- management side responds to the global call. For the scenario-1 the key assumptions are based on coverage reported in NFHS-4 the coverage levels remain as they are. For scenario-2, the linear trend between NFHS-3 and NFHS-4 was considered to be maintained till the end of the projection. However, as the third scenario needed to reflect the program scale-up realities a 'S' shaped interpolation with program coverage saturating towards 2022.

Current intervention, too many systems

There are four government departments that have the potential to influence the context of stunting among children less than five years i.e., Department of Health of and Family Welfare which provides iron-folic acid (IFA) supplementation for pregnant women, weekly IFA supplementation of adolescent girls in school, Vitamin A for children; Department of Social Welfare (DSW) that provides supplementary food, IFA to out of school young girls; Department Public Health Engineering providing drinking water connectivity at home, toilets at household

levels, Department of Food and Civil Supplies (DF and CS) which provides food grains to a large number of families including those who are below poverty line.[26] The DF and CS in collaboration with the DSW provides additional nutritional support for young adolescent girls in three districts of the state.[27] A majority of the above interventions are either free of cost (i.e., IFA, supplementary nutrition for children) or provided at subsidized rates (i.e., toilet, water connection at home). In order to progress towards global aim for stunting, there are three key challenges to be met which are scale and depth of the program, adding new elements seamlessly and behaviour change interventions.

Scale and depth of the program

Most of the interventions are existing in some form or other. The key observation from this analysis is that barring a few interventions, most of them have low coverage. The NFHS-4 report suggests nearly one in every four women took IFA tablet during pregnancy, but less than one in every twenty women took the tablets for more than 100 days.[9] One can find similar patterns in breastfeeding, complementary feeding, and other interventions. Similarly, access to improved water source contributes to the nutritional status of children and the coverage is good, however, this analysis suggests that 'drinking water connection at home' has better results than those with 'access to improved water source' only. Evidence also suggests the importance of quality of water in the context of malnutrition.[28,29] Thus improving both scale and depth of existing programs is the logical step towards improving the stunting status among children.

Adding new elements seamlessly

Similar to the findings of this analysis, other supplications also suggest that appropriate complementary food during weaning is the single most important factor that can reduce stunting, whereas the integrated child development services (ICDS) program is focused on supplementation of food, not complementary feeding.[30,31] The newer programs focusing on nutrition need to take these facts into consideration. The existing program of IFA supplementation can be enriched by adding multiple micronutrient supplementation. In order to improve the stunting rates children, multiple micronutrient intakes during pregnancy play a key role. The interventions like weekly iron-folic acid supplementation for adolescent girls by National Health Mission and Scheme for adolescent girls by DSW can be strengthened by adding other micronutrients and making it a single program.[11,27] Similarly adding the knowledge of hand washing with soap or hygienic disposal of children's stool during pregnancy, can be turned to practice and after childbirth and continued in the anganwadi centers to improve the outcomes. Similarly, the focus on breastfeeding and weaning food should be put into practice.

Behaviour change interventions

Nearly 380,000 people in the state of Nagaland live below the poverty line, which is nearly 20% of the state population.[32] Analysis of house hold surveys suggests that children from poor households tend to be disproportionately affected by malnutrition and food insecurity can lead to malnutrition.[33,34] Though the government provides supplemental food for the poor through the public distribution system and targeting children in ICDS program, it is mostly in the form of rice, wheat or pulses. These items contribute towards improving the protein energy status of the family members, but may not sufficient to meet the food diversity that is required to improve the nutritional status of mother and child.

Behavior change is a major strategy, not only to achieve immediate results, but sustaining the change as well. At least six interventions that can influence stunting among children like balance protein energy nutrition, micronutrient supplement, breastfeeding, complementary feeding, hand washing and hygienic disposal of stool have a strong behavior component. Unless behavior change is addressed at the household level, particularly through incorporation of local foods, promotion of cooking methods that preserve and provide necessary nutrition to mother, the existing challenges will continue to adversely affect the stunting status. Behaviour change strategies have shown positive result in improving the nutritional status of children elsewhere, including behaviour change interventions beyond communication interventions or direct interventions which have positive effect on acceptance and utilisation of some of the above interventions may be considered with clear understanding of lag period to see the effect of such interventions.[35,36]

CONCLUSION

Stunting among children is a key health issue in Nagaland. The analysis presented here based on the three scenarios estimates that achieving the global target is unlikely by 2025. Development of long-term programs with specific targets and processes are crucial to achieve the goal. These should include integrated implementation strategy focusing on behaviour change at the household level and improving the package of items and services provided both to pregnant women and children.

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