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Addressing Micronutrient Deficiencies in Zimbabwe: Achievements, Challenges and Future Actions

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Abstract: Objective: This paper explores lessons learnt from national health policies, strategies and nutrition interventions introduced in Zimbabwe post-independence to address the burden of micronutrient deficiencies. Methods: A desk review was conducted on national policies, and strategies to improve micronutrient status. The paper highlights key achievements, challenges, opportunities; and finally closes by highlighting current and future policy and intervention issues related to micronutrient deficiencies. Results: Great progress has been made towards addressing iodine deficiency, VAS (vitamin A supplementation) in children, iron folate among pregnant and lactating mothers, and establishing regulatory frameworks for food fortification. Initial findings from multi-sector nutrition interventions show great potential for the reduction of micronutrient deficiencies. Current micronutrient interventions need scaling up and strengthening. Nutrition advocacy and communication has remained limited and this is negatively impacting on demand driven programming for the control of micronutrient deficiencies. Conclusions: Strong partnerships within and outside government are needed to influence multisectoral programming and coordination mechanisms. Strong connections and linkages with agriculture, social protection, health and education are needed for optimal integrated nutrition sensitive programming to ensure sustainable access to micronutrient rich foods. High level government commitment at the national level is necessary for strong multi-disciplinary nutrition programming.

Key words: Micronutrients, nutrition security, food security, nutrition policy.

1. Introduction

It is estimated that 88% of the world faces the burden of 2 or all of the following: stunting, anemia and obesity [1]. Among children under the age of 5 years in Southern Africa, an estimate of 28% (approx. 2 million) are stunted, 12% (approx. 1 million) are overweight and 44% of children aged 6-59 months suffer from vitamin A deficiency [1]. There is an estimation that 2 billion people suffer from micronutrient deficiencies, particularly iron, iodine, zinc and vitamin A [1]. Effects of micronutrient deficiencies are broad and varied depending on the micronutrient of interest. However, micronutrient deficiencies have major implications on growth and development and deficiencies result in reduced productivity, disability and quality of life [2, 3].

Zimbabwe is reported as experiencing three forms of malnutrition—overweight, anemia and stunting [4]. Micronutrient deficiencies in Zimbabwe exist across all socioeconomic divides and transcend the commonly noted urban/rural disparities [5, 6]. Among women of childbearing age and children under the age of 5 years, anemia was reported as 27% and 37% respectively [6]. Strategies to address exclusive breastfeeding and wasting in children below 5 years are the only programs noted to be on course in the country, and with some progress on stunting for children below 5 years and anemia among women of reproductive age [4].

The implications of micronutrient deficiencies among children, particularly in the first 1,000 days of a child's life, a critical period for growth and

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development, persist into adult life with profound effects and implications on health and socio-economic productivity [7-9]. Therefore, adequate nutrition is key in ensuring the productivity of future generations and directly translates to the achievement of SDGs (sustainable development goals) 1, 2 and 3 aimed at eradicating hunger and poverty and improving good health. It is with this regard, that Zimbabwe finds it imperative to address all forms of malnutrition including micronutrient deficiencies.

2. Materials and Methods

2.1 Key Milestones and Current Strategies to Address Micronutrients Deficiencies in Zimbabwe

The following interventions are discussed in chronological order based on the interventions that were first introduced in the country. Fig. 1 provides a summary of the key milestones in micronutrient interventions post-independence in 1980 to 2018. To date, these micronutrient interventions are currently being implemented in Zimbabwe and they are included in the current national policy and guidance/strategic documents, i.e. Food and Nutrition Policy; 2014-2018 NNS (National Nutrition Strategy); Food Fortification Strategy; and the 2016 Nutrition Advocacy and Communication Strategy.

2.1.1 Iron Folate Supplementation

Iron and folate supplementation for pregnant women has been one of the primary health care strategies in Zimbabwe since 1980 with all public health facilities in the country supplied with iron and folate tablets for all pregnant women attending anti-natal care services. The service is free of charge and data from health facility registers suggest that coverage of women receiving supplements is always over 90%. Iron and folate supplementation coverage remains relatively high as facilities consistently provide pregnant women, with a low national coverage due to poor data transmission from facilities. The major complication is that data on IFA supplementation are not readily available in the national health information system for regular analysis and addressing gaps.

National surveys like the ZDHS (Zimbabwe Demographic Health Survey) have reported low compliance with taking the tablets daily for at least 90 days in pregnancy [6]. Though factors related have not been fully elucidated, complaints of taste and smell of the tablets have been reported from pregnant women to health workers providing antenatal services [10]. Therefore, low compliance has resulted in persistently high levels of anemia among pregnant women in the country.

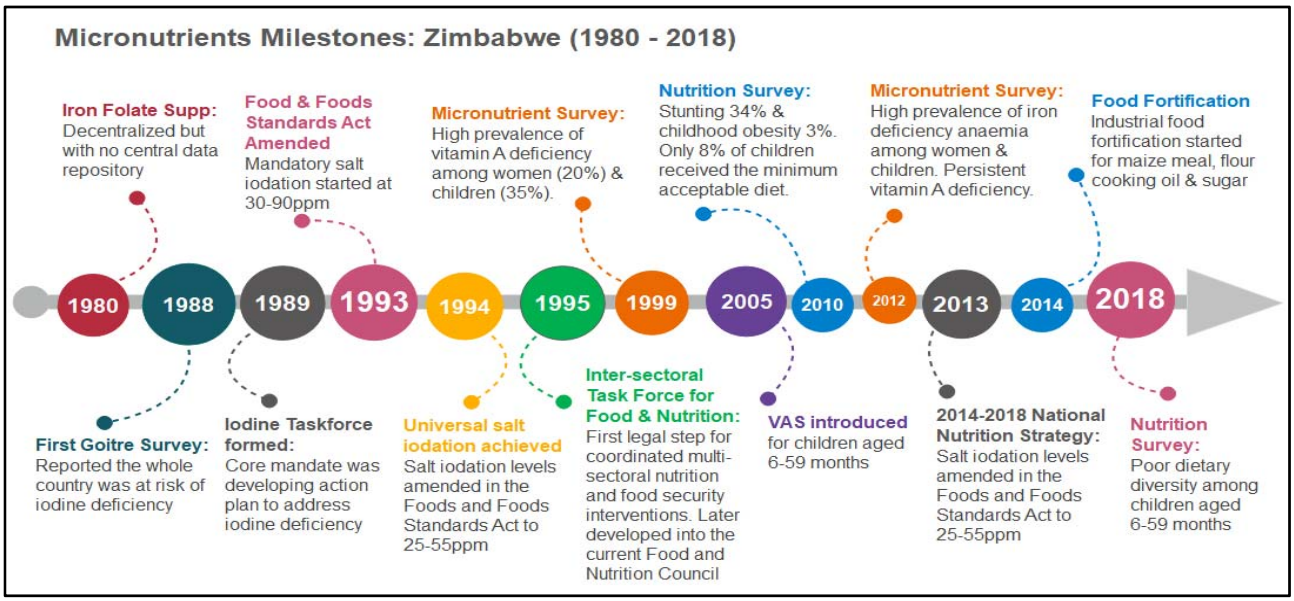

Fig. 1 Summary of key milestones in addressing micronutrient deficiencies in Zimbabwe (1980-2018).

2.1.2 IDD (Iodine Deficiency Disorders)

A national goiter survey was conducted in 1988 and found that the whole of Zimbabwe was at risk of IDD. According to the 1988 survey, total goiter rate ranged from 11% in Harare to 79% in Murewa District [11]. In 1989 an inter-sectoral committee was established to develop a national plan of action to address IDD. An IDD program coordinator was appointed to coordinate all IDD activities. Since Zimbabwe imported majority of its salt from Botswana, salt industries in Botswana were consulted and standards agreed upon [11]. In 1994, the Food and Food Standard Act of 1973 was amended making salt iodization mandatory with iodine levels of 30-99 ppm (SI (Statutory Instrument) 69 of 1995). A monitoring system was put in place to ensure that all salt coming into the country was within the national standards and that all households in the country could access and consume iodized salt.

Urinary iodine levels reportedly increased 3-fold between 1991 and 1995, with the prevalence of hyperthyroidism the highest among those aged 40-60 years and 14 recorded deaths at Parirenyatwa Hospital (major referral center) from thyrotoxicosis [12]. The problem of iodine-induced hyperthyroidism was acknowledged and policy adjustments rectified the problem by reducing salt iodization levels from 30-99 ppm (SI 69 of 1995) to 25-55 ppm (SI 44 of 2000) [13].

Despite the initial challenges of hyperthyroidism and thyrotoxicosis, by 1995, 93% of households were consuming iodized salt at the recommended levels and Zimbabwe was recognized as having achieved the universal salt iodization. The 1999 micronutrient survey found that the proportion of household consuming adequately iodized salt had increased to 97% and urinary iodine levels had reduced from 450 to 245 μg/L [14]. To date, access and utilization of iodized salt has remained consistently over 90%, with the 2010-2011 and 2015 ZDHS surveys reporting 94% and 95% respectively [6, 15].

2.1.3 VAS (Vitamin A Supplementation)

VAS is one of the high impact child survival strategies adopted by Zimbabwe in 2002 following the 2002 recommendations from the IVACG (International Vitamin A Consultative Group) on mass VAS to prevent vitamin A deficiency and reduce young child morbidity and mortality in countries with U5MR (under 5 mortality rates) ≥ 50/1,000. VAS was integrated into NIDs (National Immunization Days) in 2002, and thereafter integrated into routine EPI (extended program on immunization) services. The VAS coverage from routine EPI services as the main delivery mechanism proved to be very low as a 46% VAS coverage for children 6-59 months of age was reported [16]. An assessment carried out under the FNSSS (National Food and Nutrition Sentinel Site Surveillance) in November 2004 reported that over 60% of children aged 6-59 months in 10 sentinel districts had not received VAS in the past 6 months [16].

In order to increase and sustain high coverage, Zimbabwe introduced bi-annual CHDs (Child Health Days) in July 2005. Using CHDs as the main delivery mechanism, the country sustained over 80% VAS coverage for children aged 6-59 months between July 2005 and June 2010. Due to the high costs of implementing CHDs campaigns, Zimbabwe moved back to strengthening routine EPI at health facilities and outreach services as a more sustainable mechanism of delivering both EPI and VAS services. Routine EPI at health facilities and outreach points is currently the main mechanism of delivering vitamin A to children aged 6 to 59 months.

By 2012, vitamin A deficiency remained a problematic with 21% of children aged 6 to 59 months and 24% of WCBA (women of child bearing age) found to be deficient [5]. Children aged 6-59 months across the country continue to receive VAS every 6 months through the EPI, and a reported coverage of 69% for 2017 from the government routine health data system, District Health Information Software 2 (DHIS2) [17]. Annual mass drug administration campaigns conducted by the MOHCC (Ministry of Health and Child Care) have been shown to boost

coverage as shown by data within the DHIS2. To further improve micronutrient nutrition of the population, Zimbabwe now has mandatory food fortification for 4 food vehicles with vitamin A: vegetable oils, sugar, wheat flour and commercial maize meal.

2.1.4 National Micronutrient and Nutrition Surveys

Since 1980, Zimbabwe has conducted 2 national micronutrient surveys and 2 national nutrition surveys. The first-ever national micronutrient survey in Zimbabwe was conducted in 1999 and reported a high prevalence of vitamin A deficiency among women and children in the country; 20% of pregnant women had serum retinol < 20 μg/dL and 59% of lactating women had breast milk retinol < 30 μg/dL, while 35% of children (6 to 71 months) and 18% children (6 to 14 years) had serum retinol < 20 μg/dL [14]. The 1999 survey found that 58% of children aged 6 to 71 months were anemic and 28% of pregnant women were also anemic [14]. The second national micronutrient survey conducted in 2012 found that among children aged 6 to 59 months, 72% had iron deficiency and 31% had anemia [5]. The 2012 survey reported that 19% of children aged 6 to 59 months had vitamin A deficiency and among pregnant women, 54% had iron deficiency and 26% had anemia [5].

The first nutrition survey in 2010 reported a high prevalence of micronutrient deficiencies across socioeconomic divides and the rural/urban classification, with an estimated total number of affected people as 7 million (over half the population) [18]. The 2010 survey findings necessitated prompt action at both policy and intervention levels to ensure that nutrition and food security issues were addressed. The second national nutrition survey (2018) reported very poor dietary diversity among children aged 6-23 months, with 4% receiving the minimum acceptable diet and 16% receiving the minimum dietary diversity [19].

2.1.5 National Nutrition Policy and Strategic Documents

The 1995 Inter-sectoral Taskforce for Food and Nutrition was the first national step towards a holistic multi-sector effort towards addressing malnutrition and food security. In 1998, The Taskforce and the Ministry of Health presented the FNSP (Food and Nutrition Security Policy) framework. It is from this early effort that the FNC (Food and Nutrition Council) was finally established in 2001 as the government-mandated organization for nutrition and food security coordination, promotion, and analysis [20]. The FNC formation was necessitated by a growing concern that the health ministry may not be fully equipped to manage the multi-sectoral nature of some issues such as nutrition and food security [20].

The FNSP was launched in 2013 and reiterated the government's commitment towards improving food and nutrition security. The 2013-2018 FNSP was developed in line with the ZIMASSET (Zimbabwe Agenda for Sustainable Socio-Economic Transformation) 2013-2018 blueprint that identified nutrition and food security 1 of the 4 pillars/clusters for economic recovery. Seven policy commitments were outlined in the FNSP, i.e., policy advice and analysis; agriculture and food security; food safety and food standards; food security; nutrition security (including WASH (water, sanitation and hygiene) & health services); food and nutrition information and early warning systems; social assistance; and national capacity for research and learning [21]. The Joint Implementation Matrix was developed under the ZUNDAF (Zimbabwe United Nations Development Assistance Framework) translating the FNSP among other developmental issues into implementable goals and objectives for both the government and UN agencies involved [22].

The 2014-2018 NNS was prompted by the ZIMASSET and the 2013-2018 FNSP. A multi-sector holistic approach was used for the nutrition strategy, encompassing sectors identified by the FNSP. The nutrition strategy highlighted 6 priority areas, and 2 of these priorities emphasize the need for improved nutrition status of 4 key groups, i.e. infants, young children, adolescents and women of reproductive age

[23]. Specific micronutrient objectives included in the strategy are on improved status of vitamin A, iron and folate; and increased demand/consumption of fortified foods of the identified 4 key groups [23].

The 2014-2018 Food Fortification Strategy, first of its kind in Zimbabwe, was launched to guide policy efforts and program implementation to address micronutrient deficiencies that had been highlighted by the 2012 National Micronutrient Survey [24]. The fortification strategy was developed in line with the broader vision outlined by the 2014-2018 NNS. The SI 160 of 2016 allowed for voluntary fortification by the food industry and compulsory fortification being enforced from July 1, 2017. With regards to the SI 160 and other acts (Food and Food Standards Act and the Public Health Act), regulatory monitoring of compliance is done to ensure consumer protection.

The 2016 Nutrition Advocacy and Communication Strategy adopted 4 thematic areas from the 2014-2018 NNS. Thematic areas 1 and 2 of the communication strategy have specific objectives on improved micronutrient status of vitamin A, iron and folate; and increased demand/consumption of fortified foods, focusing mainly on children, adolescents, and women [25]. The national nutrition survey (2018) added a nutrition knowledge assessment component and reported low awareness for fortified foods (12%), biofortification (6%) and MNPs (micronutrient powders) (7%) [19].

2.1.6 Food Fortification

The fortification strategy focused on the addition of key deficient micronutrients to basic commodities commonly consumed in all households, i.e., maize meal, wheat flour, cooking oil, and sugar. SI 160 of 2016 made fortification mandatory for the noted commodities from July 1, 2017. Industrial fortification has faced a significant number of hurdles in Zimbabwe. Key stumbling blocks are attributed to the macro-economic environment, with players from the industry citing foreign currency shortages for the importation of necessary equipment and fortificants [26]. In addition, resistance to mandatory fortification by key industry representatives such as Millers' Associations has been linked to limited appreciation of the health significance of fortification [26-28]. Other industry representatives for sugar and cooking oil manufacturers have embraced fortification with all products being fortified [29] with initial challenges in labeling as they had to exhaust previous packaging materials which did not show that the products were fortified.

2.1.7 Micronutrient Supplementation

Acknowledging that industrial fortification would not effectively cover whole population, use of MNPs for home fortification was rolled out to the rural communities in 2017 by the MOHCC and UNICEF (United Nations Children's Fund). The MNPs program targets children aged 6-23 months whose diet has been reported by recent multiple surveys as significantly deviating from the minimum acceptable diet for the age group [6, 30, 31].

The MNPs distribution was initiated at the health facility level, with a well-known risk of limited compliance among caregivers who would cite concerns such as long distances to the health facility. However, the distribution used health facilities as a short-term strategy mainly as a way of capacitating local health staff in distribution, handling, and reporting on utilization within the program [32]. The MNPs guidelines highlighted that in the long term, the facility staff distribute the MNPs to VHWs (Village Health Workers) who then are distributed to the caregivers within their communities according to their registers [32]. Data for the MNPs program are integrated with VHW monthly return forms and integrated into the routine data systems of the MOHCC for upward transmission.

2.1.8 Nutrition Advocacy and Education

BCC (behavior change communication) is a key component of the 2014-2018 NNS. Nutrition received little attention and priority among communities and policymakers, until the advent of the 2008 Lancet

series on Maternal and Child undernutrition which provided interventions applicable in various contexts [33]. Limited progress in nutrition indicators towards achieving the MDGs (Millennium Development Goals) also hints to limited political, possible underestimation and misunderstanding of nutrition issues resulting in the noted poor resource allocation to nutrition and food security issues [34].

Community-based nutrition activities have integrated BCC to raise more awareness and create demand for nutrition services. Of note, efforts currently focus on having increased male support and involvement, particularly on infant and child feeding. Being patrilineal communities, men as heads of households are very influential in achieving optimal infant and child feeding. Several interventions have piloted the concept of male champions to identify key entry points to successful male support in improving nutrition outcomes for infants and young children, e.g. the USAID (United States Agency for International Development) funded programs *Amalima* male champions formative research, and ENSURE (Enhancing Nutrition, Stepping Up Resilience and Enterprise) program which advocates for increased male support for women. The limitation with most of the interventions is limited documentation and lessons sharing, making context-specific literature scarce.

2.1.9 Dietary Diversity, Nutrition-Sensitive and Sustainable Agriculture

Inextricably linked with agriculture, dietary diversity is a key aspect in improving the nutrition status of the majority of the Zimbabwean population. Literature suggests that the diet of the majority of the population is lacking in multiple micronutrients, in part owed to poverty, food insecurity and limited nutrition knowledge [6, 35]. Current strategies to improve the nutrient composition of food crops include bio-fortification. Though currently in its infancy, the Government of Zimbabwe, through the Ministry of Lands, Agriculture and Rural Resettlement is working on producing seed for yellow maize, yellow fleshed sweet potatoes, and iron and zinc enriched beans [36]. Bio-fortification contributes to improved micronutrient status of small communal subsistence farmers who do not purchase their staple and other food crops.

MCBM (multi-sector community based model) for stunting reduction. The MCBM is an integrated approach to addressing stunting through planning and coordination with various social line ministries, developmental partners and donors. Within the communities, the MCBM program covers nutrition, health, agriculture, WASH, social protection, gender and early child development (education). The government and UNICEF piloted the MCBM in 4 rural districts. Following the noted success of the MCBM, by end of 2018 the program was implemented in 29 of 60 rural districts in the country and the government, UN agencies and other partners aim to roll out the program to the rest of the country [37].

3. Discussion

3.1 Challenges and Key Lessons Learned in Addressing Micronutrient Deficiencies

Iron and folate coverage is presumed to be very high, with the challenge being in data transmission/reporting from health facilities into the routine health information systems. Compliance, on the other hand, is reported as low. As noted earlier, drivers of low compliance are the complaints of side effects (taste, smell and changes in stool composition and color) from taking iron folate supplements [10].

Risks for salt iodization are related to the prevailing socio-economic challenges in Zimbabwe that have resulted in a high net influx of commodities (including salt). Imported goods present a new challenge from the possibility of non-iodized salt influx. Responsibility for salt iodization issues has been moved under the Food Fortification Committee which has overall responsibility for all other micronutrient deficiencies.

Vitamin A coverage has continually remained below the national targets, with reported coverage of 69% for 2017 according to government routine health data system [17]. Strategies are being piloted to improve coverage, and one of the key interventions is task-sharing of vitamin A with Village Health Workers. In partnership with Clinton Health Access Initiative and UNICEF, the MOHCC initiated a pilot study in 2016 in Manicaland Province and the study is nearing completion. Data from the pilot study were being integrated and reported through the normal health information system. Preliminary analysis and reports from the pilot study suggested an improved coverage, high feasibility, cost-effectiveness and capacity of VHWs in the administration of vitamin A drops to children within their communities.

The major challenge on the launch of the home fortification using MNPs was the lack of communication prior to the roll-out of the intervention. Lack of advance communication caused an initial misconception among communities that MNPs were synonymous with food aid. Besides this initial confusion, uptake and compliance to using MNPs for children aged 6-23 months are reported as high. In communities that are conducting food demonstrations with support from UNICEF and MOHCC, the MNP knowledge and adherence is very high. Therefore, integrating nutrition interventions within the communities may further produce synergistic effects and even improve value for money (i.e. return on investment).

Nutrition advocacy and communication has been slow due to a noted lack of human resources committed to this activity particularly at the MOHCC who is the custodian of all disseminated health messages. The development of nutrition advocacy and communication plan added a significant advantage to ensure that all nutrition programmatic areas receive attention on media platforms. Prior to the launch of mandatory fortification, advocacy efforts sensitized communities on all micronutrients to increase the demand for fortified products.

Integrated multi-sector nutrition programs to address key nutrition challenges such as stunting are having a positive impact on changing the outlook of the nutrition landscape. Multi-sector programs such as the MCBM have proven that capacitating local communities through technical support and financing to spearhead their developmental agenda have direct and high impact on addressing nutrition challenges.

3.2 Recommendations

Micronutrient interventions need be scaled up with: provision of maternal, adolescent and child micronutrient supplementation (vitamin A, iron and folate); implementation of staple food fortification at scale (iodine, vitamin A, iron, folate, zinc and B-vitamins) including advocacy for home fortification at scale; BCC to promote consumption of micronutrient rich foods and fortified staples; de-worming of children and WCBA. Increased collaboration with other sectors like agriculture and the food security sector, leverages resources and influences production and utilization of micronutrient rich foods like biofortified maize with vitamin A: beans with iron and folate, sweet potatoes with vitamin A.

To ensure optimum growth and child survival, micronutrient interventions need to be well integrated into other child survival interventions: e.g., proportion of children breastfed within one hour of birth (timely initiation of breast feeding) needs to be increased from the current 58.9% to 70% by 2020; rates of exclusive breastfeeding among children aged 0-5 months increased from 61% to 65% by 2020; the proportion of children who are fed complementary foods in a timely manner (introduction of solid/semisolid/soft food) increased from 87.3% to 92%; the proportion of children aged 6-23 months receiving a minimum acceptable diet increased from 11% to 50% by 2020; and the proportion of children receiving vitamin A supplements twice yearly (full VAS coverage) increased from 43% to 80%.

An integrated approach is required to support service delivery scale-up of high impact quality nutrition interventions with up to at least 80% coverage by building capacity of health facilities and health workers at all levels to be able to plan, implement, and coordinate delivery of maternal nutrition, infant and young child feeding, and micronutrient supplementation. The nutrition program should also focus on capacity development of communities to demand and take ownership of nutrition services. As few nutrition indicators are incorporated within the National Health information system, strengthening capacity of nutrition managers at national and subnational to collect, analyze and use nutrition data for children and women should be prioritized.

Noting the prevailing socio-economic challenges in Zimbabwe that have resulted in most basic commodities being imported, there is need to strengthen integration with environmental health at points of entry. This integration ensures that imported products meet the national standards to protect the gains of fortification for both universal salt iodization coverage and other fortified basic commodities. Inclusion of salt iodization in routine surveys such as the MICS (Multiple Indicator Cluster Survey) and ZDHS would be a step towards integration of all health issues and improving resource utilization as surveys are resource-intensive.

4. Conclusions

Micronutrient deficiencies continue to be of public health important ace in Zimbabwe affecting a large proportion of the population particularly women and children regardless of socioeconomic status. Whilst burden is disproportionately higher in low-income communities, advocacy and communication should cover the whole population. Strong partnerships in and outside government are needed to influence multisectoral programing and coordination mechanisms and strong connections with agriculture, social protection, health and education for optimal production and utilization of micronutrient rich foods.

Capacity development of communities to demand and increase uptake optimal services is critical for the sustainability and success of nutrition programs. Small scale multi-modal nutrition education interventions have been shown to significantly improve nutrition knowledge and attitudes, and such approaches need to be utilized to gain traction in improving nutrition education in all communities.

Commitment at the national level needs continued strengthening as nutrition underlies most developmental programs. Therefore, engagement with policy makers needs to be improved to ensure that nutrition receives the attention it requires to streamline it into various developmental agendas and key social line ministries such as agriculture and education.

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