The following is part of a training exercise for MSc in International Health and Tropical Medicine students, February 2020

To what extent can DFID's support for nutrition increase the effectiveness of Gavi?

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Image courtesy of Laura Naidi

Overview

- DFID, in partnership with GAVI and various nutritional programmes, is committed to improving child health through investment in nutrition and immunisation.
- These programmes have reached 26.3 million children under 5 years with nutritional support and immunised over 760 million children.
- However, progress in achieving immunization and nutrition targets of GAVI and nutritional programmes have stagnated.
- 10 million children did not receive a single vaccine in 2018 and evidence exists to show that optimal use of current strategies to combat undernutrition will only reduce stunting by 20%.
- Although, there is no strong scientific evidence of the direct impact of nutritional status on vaccine effectiveness, many indirect benefits are highlighted.
- To thoroughly evaluate the extent to which DFIDs support for nutritional programmes improves the effectiveness of GAVI: further scientific research to understand the biochemical interactions between malnutrition and vaccine uptake, thorough economic evaluation and exploration of how nutritional programs and vaccination programmes work synergistically must be undertaken.

Introduction

In September 2015, the UK and other UN member states pledged their commitment to the Sustainable Development Goals (SDGs); a framework to "end all forms of poverty, fight inequalities and tackle climate change, by 2030, while ensuring that no one is left behind"(1) . The UK Government has a long track record of supporting international development and remains one of the world's largest donors of foreign aid. Since 2013, it has been the only G7 nation to have met the UN's aid spending target of 0.7% of its Gross National Income (GNI) on overseas aid each year (2).

Commitment to the SDGs, especially to the principle of "leaving no one behind" (3) recognises that the most effective and efficient ways of demonstrating a measurable impact (as compared to the less tangible MDGs) is to prioritise the needs of the most marginalised and socioeconomically excluded individuals, particularly those in the Global South. Furthermore, focussing on targets that cut across all SGDs such as SDG 3.8, Universal Health Coverage (UHC), ensures more efficient use of UK aid. The vaccine alliance, Gavi, is a multilateral enterprise funded largely by DFID aimed at delivering on the SGDs in an efficient and cost-effective manner. Its objectives are to accelerate the uptake of underused and new vaccines; strengthening the capacity of integrated health systems to deliver immunisation; increase the predictability of global financing and sustainability

of national financing for immunisation; and shape vaccine markets. These objectives align with DFIDs aims for a more integrated approach to country-level strategies in healthcare delivery.

The strategic partnership between DFID and its global partners has resulted in great strides towards achieving the SDG targets and showing value for money. However, as highlighted by many think tanks and independent advocacy groups, progress is lagging with respect to global health (SDG3) and nutrition (SDG2) targets. This is threatening to undermine DFIDs achievements to expand UHC as a means of eradicating poverty and promoting prosperity in low-income countries. Recognising the importance of improving immunisation coverage and effectiveness by improving nutrition and vice versa is central to addressing deficiencies in progress across these SDG targets.

Impact of DFID's support for GAVI

As investments in health go, vaccination is hailed as one of the most successful and cost-effective public health interventions of the 20th century and is key to achieving 14 out of 17 SDGs (4). The benefits derived from vaccination are immense and transgenerational. Vaccination of pregnant women protects the unborn child from disease and has been shown to drastically reduced the prevalence of neonatal tetanus and pertussis (5). In addition, vaccination protects against the emergence of antimicrobial resistance. The highly effective typhoid vaccine being rolled out in Pakistan, for example, is protective against multidrug resistant salmonella and has been projected to reduce over 160,000 deaths from typhoid infection (6).

Increased access to vital vaccines in low-middle income countries (LMICs), facilitated by the vaccine alliance, GAVI, has contributed to a significant reduction in child mortality from 14.2 million in 1990 to 6.2 million in 2018 (7)**.** GAVI's success stems from its innovative ways of raising capital (through direct grants, International Finance Facility for Immunisation Bonds and Advanced Market Commitment) and its ability to shape global vaccine markets. For every U.S. dollar spent on childhood vaccinations there is a return of 44 dollars which includes medical costs and productivity losses (8). The UK is on track to meeting its target of vaccinating 76 million children by 2020, saving 1.4 million lives (9) due solely to its multilateral partnership with GAVI, which has been widely regarded as DFID's best buy (10).

Despite these impressive global gains in averted morbidity and mortality from vaccine preventable diseases, 19.4 million children under one-year-old are still without access to vaccines (11). This can be seen by the stagnation in the rate of coverage of the DPT3 vaccine, a proxy measure of immunisation cover (11). Failure to reach these 'zero-dose' children is a reflection of inequities in access to immunisation and is arguably the most important challenge GAVI is presently facing. To maintain its strength as a highly effective tool that donors such as DFID can rely on requires GAVI to adapt and find ways to reach underserved populations.

Impact of DFID's support for Nutrition Programmes

Underserved populations are disproportionately affected by malnutrition. Since 2010, DFID has demonstrated commendable efforts in addressing global malnutrition by funding nutritional budgets through bilateral and centrally managed programmes. Many of these programmes are implemented through the Scaling Up Nutrition (SUN) framework and are categorised under two broad groups; nutrition-sensitive and nutrition-specific interventions (12). DFID emphasises the need that interventions be government-led. However, in the absence of this, DFID delivers nutritional services directly through civil society (13). In 2010, DFID developed and published a nutrition strategy paper; "*The Neglected Crisis of Undernutrition: DFID's Strategy"* (14) which outlined actions DFID would take to tackle undernutrition (13).

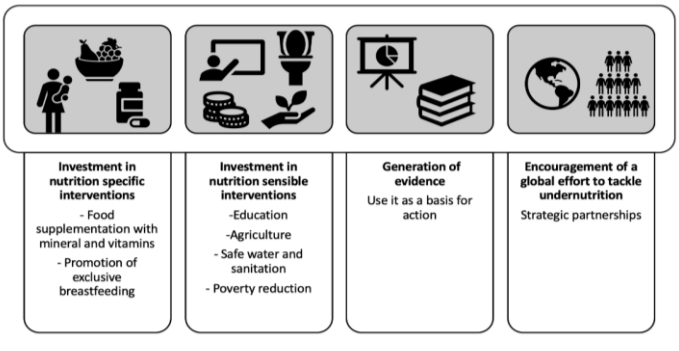

Fig. 1 DFID's 4 main pillars to tackle undernutrition (by authors)

Investing in good nutrition can bring profound benefits, such as the prevention of stunting during childhood, avoidance of cognitive impairment and poor educational outcomes and as a result contributes to increased national economic productivity (15). There is a growing body of evidence that indicates that the first 2 years of life i.e. the first 1000 days between conception and 2 years of age, are the critical period for growth and development (16). Therefore, investments during this period of development arguably have highest returns.

For many LMICs, the economic consequences of undernutrition represent losses of 10% of GDP, year-on-year (17). In 2010, DFIDs investments in nutrition amounted to a total of £463 million which was invested across 37 countries particularly in those with the highest burdens of undernutrition (12). Over the years, this increased focus and funding on nutrition has helped to continually improve outcomes. Stunting rates in LMICs have fallen by 3% from 2013 to 2017 (16). The Copenhagen Consensus Centre has estimated that by reducing the number of children who are stunted by 40% by 2030 there would be a return $45 for every dollar spent (14).

In 2013 DFID noted that despite pouring resources into nutrition-specific interventions, it could not reduce stunting by more than 20% (18). Therefore, DFIDs 2017-2020 strategic plan included expansion of quality nutrition-sensitive programmes to complement existing interventions (19). In addition, interventions to enhance nutrition of adolescent girls and prevent wasting and micronutrient deficiencies were prioritized through a four-pronged approach (19).

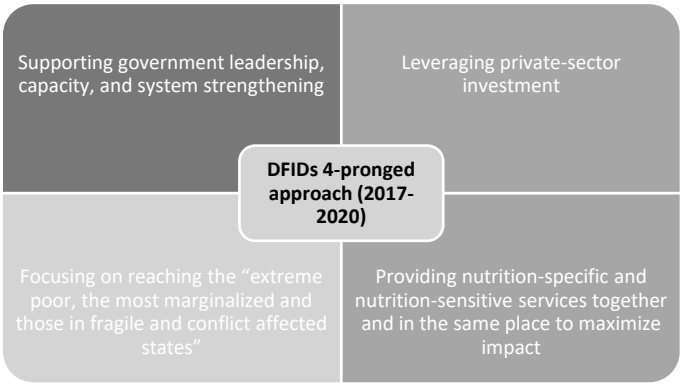

Fig. 2 DFID's four-pronged approach (by authors)

Impact of DFID's combined support for GAVI and Nutrition Programmes

The association between nutritional status and infection is bidirectional and even though the pathways between them are still to be completely elucidated, there is solid evidence to suggest that malnutrition increases the risk of death in infected children (20). Recurrent infections in turn influence nutritional status, thus perpetuating the vicious cycle. Immunisation may, therefore, be a useful intervention in malnutrition prevention programmes (21) . Moreover, in areas where immunisation programmes have broad coverage, they can be a useful vehicle to provide nutritional advice and interventions.

The interaction between a child's nutritional status and immune response is intricate and has not been fully unravelled yet (22). It has been argued that malnutrition is an immune suppressive state that affects a child's response to a vaccine. However, Savy et al (2009) described the "apparent paradox in malnutrition" where even though malnourished children are likely to die of infectious diseases, which suggests a deficient immune system, these children can still generate an adequate immune response to vaccination (22). Several studies have concluded that antibody titres achieved by severely malnourished children after vaccinations are protective, even though they might take longer to generate and might be lower compared to those with moderate malnutrition (20–23).

Despite the lack of an obvious direct link between nutrition and vaccine efficiency, it is important to explore the indirect benefits of vaccines achieved through nutritional programmes. Children born to malnourished mothers have an increased risk of Low Birth Weight (LBW) which puts them at a further risk of death from vaccine preventable diseases (24) . Yet, it has been found that vaccine uptake is low in this particular group, as a result of multiple factors. These include debilitating disease, rendering them too unstable for vaccine administration, misconceptions by healthcare workers about safety of vaccines and a lack of clear protocols and guidelines for vaccine administration in this population (25–27).

The rationale for DTAP vaccination during pregnancy is to harness trans-placental transmission of maternal antibodies to the foetus to protect neonates form vaccine preventable disease by providing them with protection even before they are born (28). DFIDs nutritional programs and Gavi's vaccination programmes that target young women and girls of childbearing age therefore work in synergy to prevent poor child outcomes.

Maternal malnutrition especially during the critical first trimester of pregnancy causes irreversible cognitive disabilities in children. Such children are prone to late enrolment in school and absenteeism (29) and may miss out on vaccination programmes that frequently target schools. In addition, stigma associated with malnutrition prevents mothers from seeking care in health facilities, making it difficult for malnourished children to be rehabilitated and identified for vaccination programmes (30). As a result, undernourished children are less likely to complete their immunizations compared to their well-nourished counterparts. Malnourished children may also be left out of school-based nutrition programmes therefore worsening their vulnerability to disease.

Taking into consideration the profound impact that both nutrition and vaccines have on a child's survival and development, the scarcity of research examining the interplay between them, is alarming. The few available studies have shown critical limitations in their design and in the quantity and quality of data presented. Furthermore, there have not been many recent studies conducted and reporting bias has been suggested in reviews (20).

Conclusion and Recommendations

Universal vaccine coverage still eludes GAVI and hence there remains a significant number of children who are not immunised. Both nutritional programs and immunisations have a positive impact on children's survival and development. However, there is not enough strong scientific evidence to decipher the extent to which DFID's support for nutrition can increase the effectiveness of GAVI. The level of available evidence concerning the relationship between nutritional status and immune response to vaccines is weak. Moreover, a thorough economic evaluation about this topic is recommended. In addition, there is little data on the uptake and timelines for vaccination in preterm and LBW children. Data on this, will give more complete evidence of performance of vaccination programs and inform the development of strategies to improve vaccine uptake in these hard to reach children (31). Therefore, it would be advisable to foster scientific interest in these areas and encourage further research to address current knowledge gaps.

It is important to note that, barriers to vaccination uptake are always context specific and interventions must be tailored to individual countries. However, there is no denying that bringing healthcare closer to communities by promoting and strengthening Primary Healthcare (PHC) as well as educating mothers on the importance of immunisation, can greatly enhance vaccine uptake (32).

Nonetheless, this group is positive about the fact that DFID's support for nutrition programs is not only a matter of increasing Gavi's effectiveness but rather both GAVI and nutrition programs synergistically working towards the ultimate end of achieving universal health coverage with optimal benefits, thus "leaving no child behind."

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