International Journal of Educational Development 48 (2016) 79–83

Contents lists available at ScienceDirect

International Journal of Educational Development

journal homepage: www.elsevier.com/locate/ijedudev

Costs, and cost-outcome of school feeding programmes and feeding programmes for young children. Evidence and recommendations

E.A. Kristjansson [a,*], A. Gelli [b], V. Welch [c], T. Greenhalgh [d], S. Liberato [e], D. Francis [f], F. Espejo [g]

[a] School of Psychology, Faculty of Social Sciences, University of Ottawa, Ottawa, Canada
[b] IFPRI, Washington, D.C., United States
[c] Bruyère Research Institute, University of Ottawa, Ottawa, Canada
[d] Centre for Primary Care and Public Health, Baarts and the London School of Medicine and Dentistry, London, UK
[e] Nutrition Research Team, Menzies School of Health Research, Charles Darwin University, Darwin, Australia
[f] Epidemiology Research Unit, University of West Indies, Mona Kingston 7, Jamaica
[g] World Food Program, Rome, Italy

ARTICLE INFO

Article history:
Available online 24 December 2015

Keywords:
School feeding
Child development
School attendance
Educational achievement

ABSTRACT

Our objectives for this study were to provide updated, realistic data on the costs and cost-outcomes of school feeding in Low and Middle Income Countries. We also aimed to identify factors that may influence effectiveness and therefore, cost effectiveness of the interventions. To do this, we combined data on effect sizes for physical and psychosocial outcomes from two Cochrane systematic reviews with new data on the costs of school feeding. We simulated the costs of preschool feeding based on the school feeding costs. We found that he average for low- and middle-income countries combined was US$72, with large variations across countries. We also found a wide variation in costs for different outcomes. We suggest several ways in which effectiveness may be improved and cost-per outcome lowered for both programmes.

1. Introduction

Worldwide, an estimated 795 million people were chronically undernourished between 2012 and 2014; the vast majority of them in low and middle-income countries (LMIC) (FAO, 2014). Although this figure represents a decrease of 200 million from 1990 levels there is still much work to be done. Reflecting this, the Open Working Group on Sustainable Development Goals has proposed 'ending hunger and achieving food security' as a major goal for the post-2015 Development Agenda (United Nations, 2014).

Many of those affected by undernutrition are children; in 2015, worldwide, 159 million children were stunted and 50 million children were wasted (GROUP U-W-WB, 2015). In 2011, undernutrition was responsible for 45% of all deaths for children under five years of age (Black et al., 2013). Throughout childhood, undernutrition and micronutrient deficiencies contribute to higher risk of infection and chronic disease in adulthood (Barker, 2001; Prentice and Moore, 2005). They can also impair psychomotor and cognitive development (Walker et al., 2007; Scrimshaw, 1998; Worobey and Worobey, 1999; Meeks Gardner et al., 1995a). Hunger and undernutrition have important consequences for school-aged children as well. In 2012, the World Food Program estimated that, across the world, 67 million school-aged children did not even attend school (Programme, 2012). Another 66 million children went to school hungry; hunger can impair attention and motivation; undernutrition at this age can impair cognitive abilities (Bryan et al., 2004), and school performance (Programme, 2012; Bryan et al., 2004; Meeks Gardner et al., 1995b). Moreover, short-term hunger can adversely affect attention and interest (Read et al., 1973); missing breakfast is particularly problematic for those children who are most undernourished (Pollitt, 1995; Bundy et al., 2013).

Interventions during early childhood and the school years to reduce undernutrition can maximize developmental, educational potential and educational attainment. They can also enhance lifelong health and well-being. Effective interventions to improve child nutrition can contribute to several proposed post-2015 goals: 'end hunger, achieve food security', 'ensure healthy lives and promote

* Corresponding author.
E-mail address: kristjan@uottawa.ca (E.A. Kristjansson).

http://dx.doi.org/10.1016/j.ijedudev.2015.11.011

well-being for all' and 'ensure inclusive and quality education for all '(page 6) (Goals OWGotGAfSD, 2014). However, in order to realize these goals, decision makers need to be able to identify which of these interventions are effective and why; they also need evidence on their costs, cost per outcome and cost-effectiveness.

1.1. The interventions

School feeding and feeding programmes for young children are common responses to child under-nutrition and its sequelae. School feeding programmes, in particular, are widespread. Global estimates show that approximately 370 million children received school feeding in 2012 (Programme, 2013). Recent survey data suggests that every country in the world is providing some form of food to its school children; though coverage is weakest where the needs are greatest (Programme, 2013).

Supplementary feeding programmes for disadvantaged young children provide energy and nutrients through food or beverage to children to ameliorate or prevent undernutrition (Beaton and Ghassemi, 1982). Programme goals include: prevention or amelioration of growth failure, improved survival, lower morbidity, promotion of normal cognitive and behavioural development and increasing enrolment and attendance at school (Beaton and Ghassemi, 1982; Beaton, 1993a).

School-feeding programmes are designed to support the education of children living in poverty and food insecurity through two main pathways. The first involves increased access to and participation in school (e.g. enrolment, attendance, drop-out) (Kazianga et al., 2008). The second pathway involves increased learning ability (e.g. attention, cognition) through improved intake of macro- and micronutrients (Adelman et al., 2008; Greenhalgh et al., 2007). The impact of the school-feeding in each of the above areas occurs through a number of complex mechanisms, detailed analysis of which is beyond the scope of this paper and discussed elsewhere (Greenhalgh et al., 2007).

Scaling-up and consolidating these interventions requires considerable resources and a steady flow of funds: across low-income countries, school-feeding programmes, on average, cost about US$50 per child per year (Gelli et al., 2011a). Therefore, it is essential to undertake a careful assessment of benefits and trade-offs of these interventions (Alderman, 2011). Key to this assessment is an understanding of the cost-effectiveness of alternative implementation approaches.

Despite the fact that these programmes are both well established as part of development aid, there is a dearth of knowledge on their costs and cost-effectiveness. This is partly due to the methodological complexity required in the aggregation of simultaneous, multiple outcomes of school feeding. In the absence of cost-effectiveness data, evidence on the costs per unit outcome can provide important insights for policymakers. To our knowledge, however, only one study in the literature exists on the cost outcomes of school feeding (Galloway et al., 2009a) and none exist for pre-school feeding. Our previous study (Galloway et al., 2009a) combined data from our earlier systematic review of school feeding (Kristjansson et al., 2007a) with data on school-feeding costs from four low-income countries. This study found that school feeding costs per child per year were on average US$40 (ranging from US$28 to US$63) per child per year. The cost per extra day of attendance was less than US$10 per child, while the cost per extra kilogram of weight ranged from US$38 to US$252. Costs for cognitive and learning outcomes were also variable.

1.2. Objectives

Our objectives for this paper were (1) to provide new and more robust estimates on the costs per unit outcome of school feeding in LMIC by combining new data from two systematic reviews with data from a newer, more comprehensive costing study covering 62 countries (Gelli et al., 2011b), (2) to provide a preliminary estimate of some cost-outcomes for preschool feeding and (3) to provide some insight from our process findings into factors that may influence effectiveness and therefore, cost effectiveness.

2. Methods

2.1. Systematic reviews

We used outcome data from two previous systematic reviews; a review of school feeding programmes (Kristjansson et al., 2007b), updated in 2015 (Kristjansson et al., 2015a) and a review of feeding programmes for children aged three months to five years (Kristjansson et al., 2015b) (hereafter referred to as preschool feeding, although it included infants as well). We followed the procedures outlined by the Cochrane Collaboration (Higgins et al., 2011), one of the world's leading producers of systematic reviews. To better understand how context and implementation affected results, we conducted process evaluations, including realist reviews (Pawson et al., 2005).

Although both reviews included studies from across the world, we used only data from Low and Middle Income Countries for this paper. Thirteen of the 25 school feeding studies and 29 of the 32 preschool meal studies were from LMIC and therefore included in our cost per outcome analyses.

The school meal programmes comprised breakfast, lunch or snacks delivered in the school setting. The school meals/snacks comprised local vegetables and grains, pre-prepared biscuits, and/or milk; a few included meat. Participants ranged in age from 6 to 19 years.

The preschool meal programmes were delivered in preschools/daycares (9 studies) or delivered to the children's homes (20 studies). A variety of foods were used including: locally produced fruit, vegetables and cereals as well as fortified biscuits, milk, and Ready to Use Therapeutic Foods. On average, the school meal programmes provided 401 kcal per day (range 90–680) while the preschool meal programmes provided an average of 397 kcal per day (range 89–784).

2.2. Calculating costs

Herein, we briefly summarize the methodology for calculating costs in the present paper. We based our estimates on analyses done by Gelli and Daryanani (2013) because they were standardized to a fixed caloric ration and 200 day school year across 62 LMIC. Gelli's data (Gelli and Daryanani, 2013) were collected from several sources, including previously published World Food Programme (WFP) data, reports from government ministries, grey literature, and published reviews. Programme expenditures were collected across all supply chain activities alongside data on number of feeding days and planned kilocalories, and cost per child estimates were then standardized. Where relevant, programme costs were also adjusted to account for school-level costs using scaling parameters from previous studies (Gelli et al., 2011a). All data were validated by WFP country offices. Cost data were reported as cost per child per school. All estimates were converted to US dollars using an internet-based currency converter set to a fixed reference date of 1 June 2008.

For the purposes of this paper, in order to make the cost-outcome data as realistic as possible, we re-standardized the cost estimates from the 2013 paper (Gelli and Daryanani, 2013) to the average kcal given in studies in the two systematic reviews (401 kcals for school feeding and 397 kcal for pre-school feeding) (Gelli et al., 2011a; Galloway et al., 2009a).