**Original Research**

**Acute respiratory infection, diarrhoea and fever in young children at-risk of intellectual disability in 24 low- and middle-income countries**

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**A B S T R A C T**

Objectives: This study aims to (1) estimate the prevalence of acute respiratory infection (ARI) symptoms, diarrhoea and fever in the previous two weeks among 3–4 year old children who are/are not at-risk of intellectual disability in 24 low- and middle-income countries and (2) to investigate possible inequities in access to treatment among affected children.  

Study design: Cross-sectional survey.  

Methods: Secondary analysis of Rounds 4 and 5 UNICEF Multiple Indicator Cluster Surveys (MICS) from 24 low- and middle-income countries (n = 99,934 children).  

Results: Pooled estimates indicated that young children at-risk of intellectual disability in low-income countries were significantly more likely than their peers to have reported symptoms of ARI and diarrhoea in the previous 2 weeks, and significantly less likely to have received appropriate treatment. Pooled estimates indicated that in middle-income countries children at-risk of intellectual disability were significantly more likely than their peers to have reported symptoms of ARI, diarrhoea and fever during the previous 2 weeks. Symptomatic children at-risk of intellectual disability were significantly less likely than their peers to have received antibiotics/antimotility medication for diarrhoea or antibiotics for ARI symptoms, but significantly more likely to be prescribed antimalarials for fever.  

Conclusions: These results indicate the existence of significant inequalities and possible inequities in the exposure to and the treatment of three major infectious diseases among children who are/are not considered at-risk of intellectual disabilities in low- and middle-income countries.

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Introduction

Pneumonia, diarrhoea and malaria are major threats to child survival and well-being, accounting for approximately one-third of deaths globally of children under the age of 5 years.\(^1\)\(^-\)\(^2\)\(^,\)\(^8\) For example, it has recently been estimated that 16% of under 5 deaths are due to pneumonia, 9% due to diarrhoea and 5% to malaria.\(^4\) While significant progress has been made over recent decades in reducing mortality from all three causes, some significant challenges remain.

The number of under five deaths due to acute lower respiratory infections reduced from 1.7 million in 2000 to 935,000 in 2013 with the mortality rate per 1000 live births reducing by 48% from 13.1 in 2000 to 6.8 in 2013.\(^7\) However, the mortality rate remains high in sub-Saharan Africa (14.4), a region that in 2013 accounted for 53% of child deaths due to acute lower respiratory infections. While mortality from diarrhoea among children under five has fallen steadily over the past decades (1.5 million deaths in 1990, 622,000 deaths in 2012), diarrhoea morbidity has remained stable, with approximately 1.7 billion cases occurring annually.\(^2\)\(^,\)\(^8\) Children under 5 years of age in low-income countries are estimated to experience on average 2.9 episodes of diarrhoea per year.\(^8\) The incidence of and death rates associated with malaria have reduced from 262 million cases and 839,000 deaths in 2000 to 214 million cases and 438,000 deaths in 2015. The declines in numbers of cases and deaths between 2000 and 2015 have been achieved despite the population at-risk of malaria increasing by 31% globally.\(^1\)\(^,\)\(^7\) However, progress in sub-Saharan Africa has been significantly slower than in other regions. In 2015, approximately 80% of cases of malaria occurred in just 15 countries, 13 of which were in sub-Saharan Africa.\(^7\)

One key challenge for future progress in this area is addressing the issue of equity in the distribution of health not only across countries and regions but also among more and less ‘vulnerable’ population groups (e.g. indigenous and ethnic minority groups, rural populations, people living in poverty).\(^6\)\(^,\)\(^9\)\(^-\)\(^11\) One potentially vulnerable population that has received little attention in the study of global health is people with disabilities.\(^12\)\(^,\)\(^13\) For example, while research undertaken in high-income countries has indicated that children with intellectual disability have significantly poorer health and lower survival rates than their peers,\(^14\) we are not aware of any research that has investigated the prevalence and treatment of pneumonia, diarrhoea and malaria among children with and without intellectual disability in low- and middle-income countries. The aim of this paper is to begin to redress this imbalance by investigating the prevalence and treatment of acute respiratory infection (ARI) symptoms, diarrhoea and fever (as an indicator of possible malaria) among children with and without intellectual disability in a range of low- and middle-income countries.

Methods

We undertook secondary analysis of data collected in waves 4 and 5 of UNICEF’s Multiple Indicator Cluster Surveys (MICS).\(^5\)\(^-\)\(^9\) The MICS programme, launched in 1994, sought to generate robust country-specific data on the well-being of young children and mothers and formed the basis of measuring progress towards the achievement of the Millennium Development Goals.\(^13\) Following approval of access by UNICEF, data were downloaded from http://mics.unicef.org/ in November 2015. MICS 4 surveys were undertaken between 2009 and 2012 in 56 low- and middle-income countries, with data available at the time of download for 40 countries. MICS 5 surveys commenced in 2012 and at the time of download had been completed in 25 countries, with data available for 10 countries.

MICS contains a number of questionnaire modules. Data used in the present report were extracted from the module applied to all children under five living in the household. Details of the sampling procedure used in each country are available at http://mics.unicef.org/. In the majority of countries, cluster sampling methods are used to derive samples representative of the national population of mothers and young children. In all countries, sample weights are generated to take into account any biases deriving from the sampling method and household and individual level non-response.

Identification of children at-risk of intellectual disability

The child under five module in MICS 4 and 5 contained a ten item module which is used to derive an Early Child Development Index (ECDI). The index is based on selected milestones that children are expected to achieve by ages three and four years. The ECDI is calculated as the percentage of children who are developmentally on track in at least three of four domains; literacy-numeracy, physical, social emotional and learning. We used all five items from the literacy-numeracy and learning domains to identify children who may be considered ‘at-risk’ of intellectual disability. Items from the physical and social emotional domains were not used as they do not necessarily relate to intellectual disability.

Literacy–numeracy

Children are defined as being developmentally on track based on: (a) whether they can identify/name at least 10 letters of the alphabet; (b) whether they can read at least four simple, popular words; and (c) whether they know the name and recognise the symbols of all numbers from 1 to 10. If at least two of these are true, then in the ECDI the child is considered developmentally on track.

Learning

Children are defined as being developmentally on track based on: (a) if the child follows simple directions on how to do something correctly; and (b) when given something to do, is able to do it independently. If at least one of these is true, then in the ECDI the child is considered developmentally on track.

We identified children as being ‘at-risk’ of intellectual disability if they were reported by their primary caregiver to be unable to complete all five tasks. However, we only included data from countries that met three criteria: (a) the five items demonstrated a modest degree of internal consistency (alpha ≥ 0.5); (b) the prevalence of risk of intellectual disability was greater than 1%; and (c) the number of children identified as being at-risk of intellectual disability was greater than 50.
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