Determinants of anaemia among children 6-59 months in Albania

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Abstract

Aim: This paper analyses the associations between socio-economic determinants and anaemia among children 6-59 months of age in Albania, in order to improve the targeting of interventions for better health and nutrition outcomes for Albanian children.
Methods: The analysis uses data from the Albanian Demographic and Health Survey 2008-2009 (ADHS). To assess the anaemia status of children and their mothers, ADHS measured blood haemoglobin levels using the portable HemoCue system. Measures were taken only for children six months of age or older.
Data are analysed using descriptive statistics, chi-square test of independence (significance level set at both $P \leq 0.05$ and $P \leq 0.01$). Binary logistic regression was used to measure the odds ratios of all the confounding factors. All analyses were carried out using the SPSS statistical software.
Results: Bivariate analysis showed that age of the child ($P < 0.001$), age of the mother ($P = 0.054$), educational level of the mother ($P = 0.005$), household wealth index ($P = 0.013$), region ($P < 0.001$) and urban/ rural residence ($P < 0.001$) were significantly related to anaemia. In the multivariate analysis, the youngest group of children (6-23 months) were 3.5 times more likely to be anaemic ($P < 0.001$); urban children aged 6-23 months were five times more likely to be anaemic ($P < 0.001$); children living in mountainous areas were 1.6 times more likely to be anaemic ($P < 0.05$); girls living in coastal areas were 1.6 times more likely to be anaemic ($P > 0.05$), and; boys living in mountainous areas were 1.8 times more likely to be anaemic ($P > 0.05$).
Conclusions: Interventions to address anaemia as an important public health concern in Albania should use a combination of nutrition-specific and nutrition-sensitive approaches and should also take into consideration characteristics of the high-risk population subgroups.

Keywords: anaemia, determinants of nutrition outcomes, nutritional status of children.

Introduction

Anaemia is an important public health problem that affects people in both developing and developed countries. Malnutrition is associated with more than one third of all child deaths every year worldwide. Under-nutrition is more than food insecurity. It even exists in food secure communities and may also be caused by inadequate knowledge on infant and young child feeding, poor care practices, and lack of access to health and other social services (1).

According to WHO database, anaemia affects around 1.62 billion people worldwide with the highest prevalence seen in preschool–age children 47%, followed by 42% among pregnant women (2). Micronutrient deficiencies including iron deficiency, also known as "hidden hunger," are associated with adverse health outcomes and hindered social and economic development.

The large majority of anaemia is estimated to be caused by dietary deficiencies. Fifty percent of anaemia is a direct result of iron deficiency (due to lack of sufficient consumption of high-iron containing foods, such as animal products and legumes), with the remainder due to other dietary deficiencies such as vitamin A deficiency, deficiencies of vitamin B12 and folate, and health conditions that interact negatively with iron status, such as malaria, HIV, other infectious diseases, sickle cell disease, and other inherited types of anaemia (3).

The consequences of anaemia for children—approximately half of which is due to iron deficiency—include increased morbidity and mortality, stunting, lower performance in school, cognitive delays, and apathy. In adults, anaemia is associated with weakness and fatigue, lower productivity, and increased risk of maternal mortality from postpartum haemorrhage (4).

When children are undernourished before their 2nd birthday, they can suffer irreversible cognitive and physical damage. The consequences continue into adulthood, they accumulate in lower economic productivity and poor social development in affected communities, and are passed on to the next generation as undernourished girls and women have children of their own (5).

Micronutrient malnutrition including iron deficiency, can affect all age groups, but young children and women of reproductive age tend to be among those most at risk of developing micronutrient deficiencies (6).

The WHO report of 2005 (2) estimated that 31% of Albanian pre-school children suffer from anaemia. Although small scale studies on anaemia prevalence in children have been conducted in the past, Albanian Demographic Health Survey –ADHS (7) was the first nationally representative study to report on prevalence of anaemia among children in Albania. According to this survey, 17 % of children 6-59 months have some level of anaemia, in-cluding 11 percent of children who are mild-ly anaemic (10.0-11.9 g/ dl) and 6 per-cent who are moderately anaemic (7.0-9.9 g/ dl).

Inadequate infant and young child feeding including breastfeeding and complementary feeding, contribute to child malnutrition and micronutrient deficiencies. ADHS shows that 39% of children 0-6 months are exclusively breastfed, as recommended by WHO and UNICEF, and only 25% of children are feed according to recommended infant and young child feeding practices. These data are supported by previous breastfeeding surveys (8).

Though the economic growth in Albania has improved food security and the overall nutrition status, the malnutrition persists. Causes of micronutrient malnutrition in Albania include a combination of household food insecurity, poor infant and young child feeding and care practices and inadequate access to quality health services.

Household food insecurity contributes to poor nutrition outcomes of Albanian children. According to a baseline survey (9) conducted in 2010 in the northern part of the country and peri-urban areas of Tirana 34-43% of households have difficulties in providing food for their families year round.

Malnutrition is associated with about 1/ 3rd of child mortality in Albania. According to a cost benefit analysis (10) malnutrition is associated with about 1/ 3rd of child mortality in Albania and the burden of malnutrition on national economy may total nearly $100 million annually, or 0.7% of GDP. For each $ invested in preventing malnutrition the country may save 4 $ in return. Current investments in nutrition in general and infants and young child feeding in particular, are very small given the magnitude of the problem and the potential impact.

This paper analyses the associations between socio-

economic determinants and anaemia among children 6-59 months of age in Albania in order to improve the targeting of interventions for better health and nutrition outcomes for Albanian children.

Methods

The analysis uses data from the Albanian Demographic and Health Survey 2008-2009 (ADHS). The ADHS is a nationally representative survey with a sample of 8,994 households and a 98 percent response rate. All women aged 15-49 in these households and all men of age 15-49 in half of the households were eligible to be individually interviewed. In addition to the data collected through interviews with these women and men, capillary blood samples were collected from all children aged 6-59 months. The 2008-09 ADHS used a two–stage sample design. In total, 450 PSUs were selected for the ADHS sample, including 245 urban PSUs and 205 rural PSUs, covering four geographical regions: mountains, central, coastal and urban Tirana, while the Second Stage Units (SSUs) were the households.

To assess the anaemia status of children and their mothers, blood haemoglobin levels were measured using the portable HemoCue system. Measures were taken only for children six months of age or older. Anaemia was coded as a dummy variable with a value of "1" if the children were anaemic and "0" if not anaemic.

The independent variables considered were classified into four groups. Child related characteristics included current age of the child, sex of the child, and birth order; mother's characteristics the age of the mother and her educational level; the household characteristics included a wealth index and number of children in the household; while regions and rural/ urban status were the community level characteristics.

The place of residence is coded as a category variable. Region is measured by four dichotomous indicators, indicating whether the household is located in a Mountain, Coastal, or Central region, or in Tirana urban.

The education level of the mother is categorised by levels of the study (primary or lower, secondary and higher). The age of the mother is a category variable with three groups (15-24, 25-34 and 35-49 years).

Data are analysed using descriptive statistics, chi-square test of independence (significance level set at both $P \leq 0.05$ and $P \leq 0.01$).

Binary logistic regression was used to measure the odds ratios of all the confounding factors.

All analyses were carried out using the SPSS statistical software. In all analyses carried out, sample weights were used to restore the representativeness of the study sample.

Results

Differentials of the outcome variables, bivariate analysis

Anaemia rates are higher among younger children aged 6-23 months (29%), children of mothers with lower education (20%), children living in the poorest families (20%), and children living in mountainous (24%) and rural areas (21%) [Figures 1-3].

Figure 1. Anaemia by place of residence

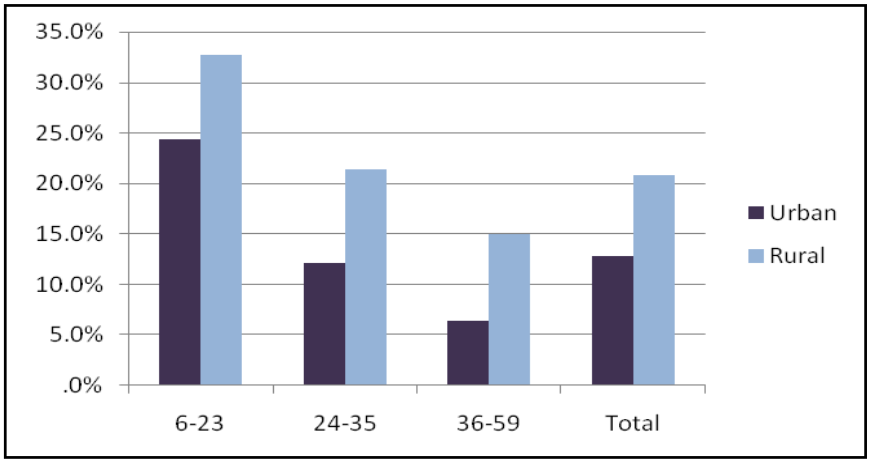


Figure 2. Anaemia by the wealth index

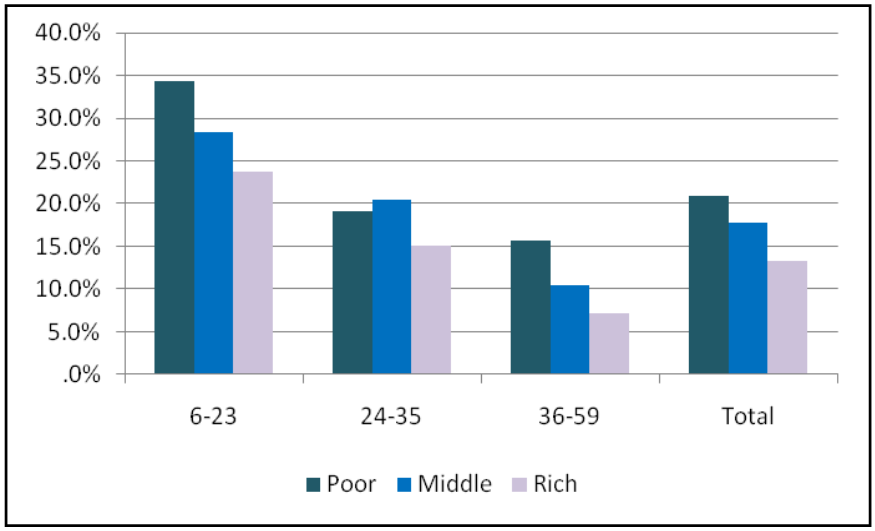
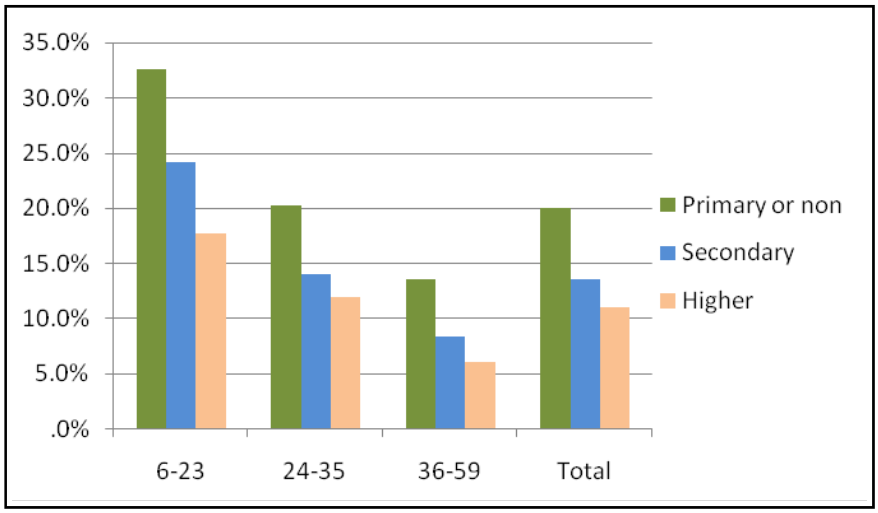


Figure 3. Anaemia by educational level of the mothers



Bivariate analysis showed that age of the child (P<0.001), age of the mother (P=0.054), educational level of the mother (P=0.005), household wealth index (P=0.013), region (P<0.001) and urban/ rural residence (P<0.001) were significantly related to anaemia.

Determinants of outcome variables / multivariate analysis

Within the category age of the child, the youngest group of children (6-23 months) were 3.5 times more likely to be anaemic as compared to children 36-59 months that were used as the reference category (P<0.001).

There was no difference between boys and girls for this variable (age of the child), after controlling for other factors. Urban children aged 6-23 months were five times more likely to be anaemic than children 36-59 months of age living in urban areas (P<0.001).

Children living in mountainous areas were 1.6 times more likely to be anaemic compared to children living in the central region (P<0.05). Girls living in coastal areas were 1.6 times more likely to be anaemic (P>0.10). Boys living in mountainous areas were 1.8 times more likely to be anaemic (P>0.10). Children living in Tirana were 45% less likely to be anaemic (P<0.05). Children living in rural parts of mountainous areas were 1.6 times more likely to be anaemic compared to children living in rural areas in the central region (P>0.10) [Table 1].

Table 1. Model results for the determinants of anaemia – total, girls, boys, rural, urban

	Total	Girls	Boys	Rural	Urban
Child characteristics					
Age of child in months					
6-23	3.491***	3.542***	3.643***	2.898***	5.017***
24-35	1.652*	1.618+	1.539	1.580+	1.826
36-59	1.000	1.000	1.000	1.000	1.000
Sex of the child					
Female	0.987		1.000	0.944	0.996
Male	1.000	1.000		1.000	1.000
Birth order					
First	1.000	1.000	1.000	1.000	1.000
2	0.970	0.849	1.127	1.221	0.650
3	0.690	0.341**	1.166	0.726	0.648
4+	0.506*	0.650	0.359*	0.557	0.341
Maternal characteristic					
Age of the mother					
15-24	0.602	0.710	0.460+	0.581	0.607
25-34	1.028	1.261	0.842	0.877	1.267
35-49	1.000	1.000	1.000	1.000	1.000
Education level					
Primary	1.593	1.527	1.803	1.397	1.711
Secondary	1.199	0.921	1.669	0.899	1.488
Higher	1.000	1.000	1.000	1.000	1.000
Household characteristic					
Wealth quintile					
Poor	0.944	1.153	0.775	0.910	0.717
Middle	0.878	0.982	0.746	0.801	1.019
Rich	1.000	1.000	1.000	1.000	1.000
Geographic characteristic					
Region					
Coastal	1.333+	1.589+	1.139	1.346	1.293
Mountain	1.600*	1.353	1.854+	1.632+	1.330
Urban Tirana	0.449*	0.312*	0.552		0.434*
Central	1.000	1.000	1.000	1.000	1.000
Residence					
Rural	1.430	1.146	1.824+		1.000
Urban	1.000	1.000	1.000	1.000	

* Binary logistic regression, valid cases = 1304 children

*** p<0.001, ** p<0.01, * p<0.05, +p<0.10

Discussion

Anaemia is a widespread public health problem associated with an increased risk of morbidity and mortality, especially in pregnant women and young children. Previous studies have indicated a relationship between anaemia and the risk of maternal mortality and effects of anaemia on child cognition.

A study of child nutrition in the Commonwealth of Independent States (CIS) countries shows anaemia rates ranging from 20-40% (11).

Children are at risk for anaemia starting from the 4th month of life (12). The peak prevalence of iron deficiency anaemia occurs at around 18 months and then falls as iron requirements decline and iron intake is increased through complementary foods (3).

Bivariate analysis shows that age of the child, age of the mother, education level of the mother; household wealth index, region and urban/ rural residence were significantly related to anaemia. Similar risk factors for anaemia including age of the child, mother's education and urban/ rural residency have been identified in other studies (11,13).

Parents' level of education may be considered an important socio-economic factor for the occurrence of anaemia. A higher level indicates increased chances of having a job and an income and consequently, easier access to iron-rich foods. Many studies show that the percentage of children with anaemia is significantly higher among those from low-income families (14).

By contrast, in multivariate analysis, anaemia was positively associated with age of the child and the region, and inversely associated with birth order. Further disaggregation of the independent variables by gender and urban/rural helped identify the most vulnerable groups that could be considered for specific targeting of integrated nutrition interventions. Specific at-risk groups include younger children (6-23 months) living in urban areas, girls living in coastal areas and boys living in mountain areas.

The analysis identifies the most vulnerable population groups including very young children, young children living in urban areas and children living in rural mountainous areas.

Age of the child is an important determinant as shown by this analysis. The period from pregnancy to 24 months of age is a crucial window of opportunity for reducing under nutrition and its adverse effects. Programmes, as well as monitoring and assessment, should focus on this segment of the care continuum (15).

Families living in rural remote/ mountainous areas tend to have low access to food (16). They may also have inadequate resources for care, and may not be able to utilize resources for health on a sustainable basis.

There is a considerable body of literature documenting the rural/urban disparity in child health outcomes. This literature demonstrates that on average urban children are better nourished and less likely to suffer from malnutrition (16-19).

However, more recent evidence from 47 countries shows that in a considerable number of countries the urban poor have higher rates of malnutrition and mortality than their rural counterparts (20).

Although childhood malnutrition has typically been a less severe problem in urban than rural areas, the accelerated rates of urbanization raise new concerns regarding increasing rates of urban malnutrition. Factors that affect malnutrition in urban areas include: greater dependence on cash income and lower reliance on agriculture and natural resources, higher percentage of female headed households, greater involvement of women in income generating activities outside the home, smaller family size and weaker social and family networks, and limited availability of affordable alternative child care (21).

Recommendations

Global evidence shows that economic growth is not enough and that direct multi sectoral nutrition interventions are required. Iron deficiency could be addressed by a combination of interventions. Dietary changes and Flour fortification (FF) with iron and other micronutrients are the most sustainable interventions. However, considering that children are at risk from anemia starting at a very early age and may not be completely covered from FF, additional interventions are needed to address this public health concern, including exclusive breastfeeding, supplementation with micronutrient powders (MNPs) and, nutrition sensitive approaches

through social protection programmes to protect children against vulnerability.

Conflicts of interest: None declared.

References

1. UNICEF. Improving child nutrition - the achievable imperative for global progress. NY, 2013.
2. WHO. Worldwide prevalence of anemia.1993-2005: Geneva, WHO Global Database on Anemia; 2008.
3. Black R, Lindsay AH, Bhutta AZ, Caulfield LE, de Onis M, Ezzati M, Mathers C, Rivera J. Maternal and Child under nutrition: global and regional exposures and health consequences. Lancet 2008;-371:243-260.
4. WB. Improving Nutrition through multi sectoral approaches; Washington, 2013.
5. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, Sachdev HS. Maternal and child under nutrition: consequences for adult health and human capital. Lancet 2008;371:340-357.
6. Shrimpton R et al. Worldwide timing of growth faltering: implications for nutritional interventions. Paediatrics 2001;107:E75.
7. INSTAT, Institute of Public Health (Albania) and ICF Macro. Albania Demographic and Health Survey 2008-09. Tirana, Albania: INSTAT, Institute of Public Health (Albania) and ICF Macro; 2010.
8. UNICEF, Ministry of health of Albania, IBFAN. Monitoring of breastfeeding practices in infants and young children in Albania. Tirana, 2007.
9. IPH, INSTAT, UNICEF, WHO, FAO. Albania: Baseline Food and Nutrition Survey. Tirana, 2010.
10. Ministry of Health, Ministry of Agriculture, UNICEF. Albania: Cost benefit analysis of nutrition interventions. Tirana, 2010.
11. Cattaneo A, Timmer A, Bomestar T, Bua J, Kumar S, Tamburlini G. Child nutrition in countries of the Commonwealth of Independent States: time to redirect strategies. Public Health Nutrition 2008;11(12):1209-1219.
12. Kraemer K, Zimmermann MB. Nutritional Anaemia. New York: Sight and Life Press. Basel, 2007.
13. Teta IN, Receveur O, Kuate-Defo B. Risk factors for moderate to severe anaemia among children in Benin and Mali: Insights from a multilevel analysis. Food and Nutrition Bulletin 2007;28(1):-76-89.
14. Osorio MM. Determinant factors of anaemia in children. JPediatr (Rio J) 2002;78(4):269-78.
15. Bryce J, Coitinho D, Darnton-Hill J, Pelletier D, Pinstrup-Andersen P. Maternal and child under nutrition: effective action at national level. Lancet 2008;371:510-526.
16. Fotso JC. Child health inequalities in developing countries: Differences across urban and rural areas. International Journal for Equity in health 2006;5:9.
17. Fotso JC. Urban-rural differentials in child malnutrition: Trend and socioeconomic correlates in sub-Saharan Africa. Health and Place 2007;13:205-223.
18. Menon P, Ruel M, Morris S. Socio-economic differentials in child stunting: results from 11 DHS data sets. Food and Nutrition Bulletin 2000;-21(3):282-289.
19. Ruel M, Garret J, Morris S, Maxwell D, Oshaug O, Engle P, Menon P. Urban challenges to food and nutrition security: A review of food security, Health and caregiving in the cities. Food Consumption and Nutrition Division Discussion Paper 51 1998; International Food policy Research Institute, Washington DC.
20. Van de Poel E, O'Donnell O, Van Doorslaer E. Are urban children really healthier? Evidence from 47 developing countries. Social Science & Medicine 2007;65:1986-2003.
21. Smith L, Ruel M, Ndiaye A. Why is child malnutrition lower in urban than in rural areas? Evidence from 36 developing countries. World development 2005;33(8):1285-1305.