Inequalities in childhood immunization coverage in Ethiopia: Evidence from DHS 2011

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Abstract

The main objective of the research is to examine inequalities in child immunization in Ethiopia. The nationally representative Ethiopian 2011 DHS data was used for this study. There are wide inequalities in the immunization status of children in Ethiopia. Children of educated women, rich households, rural areas and Addis Ababa and Tigray Regional State have higher chances of being fully immunized. Children from the richest and middle households are less likely to be fully unimmunized by 74% and 57% respectively compared to those from the poorest households. Children from SNNP, Oromia and Amhara Regional states are 3.82, 7.00 and 3.65 times less likely to be fully immunized compared to Tigray Regional State that has the second highest proportion of fully immunized children. The preliminary findings indicate that there are unfair immunization coverage rates that give unequal chance of protection from vaccine preventable diseases for children of the future generation.

Introduction

It has been more than six decades since the World Health Organization Constitution adopted that "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition" (1).

Immunization has changed the history of child health in countries across the globe, preventing early deaths every year in addition to reducing the risk of disability caused by infectious diseases including poliomyelitis. It has a good record as one of the greatest public health achievement of the 20th century globally. However, children of humankind have been experiencing huge differences in life chances depending on where they are born and grow. While many proven, cost-effective ways to save the lives of mothers, newborns, and children exist, they are not always available to those who need them most; particularly the poor (5, 7).

The distributive pattern of health or healthcare inequality has recently become a top global health agenda, and is getting the unreserved attention of researchers (5). Socio-economic inequalities in child health are major concerns challenging the achievement of MDG in Africa more than any other parts of the world (3, 6, and 7).

Many types of inequities in health start in early life due to poor maternal health prior to pregnancy and childhood infections predominantly in socially disadvantaged segment of the population (Galobardes, Lynch, and Davey-Smith, 2004) which in the long run are correlated with health in old ages (Davey Smith and Lynch 2004).

Although there is a progressively big improvement in the health status of individuals in Ethiopia, infant and child mortalities are still intolerably high on global and regional standards (4). Many

studies have examined those childhood morbidities and mortalities but it needs critical analysis of the hidden dimensions in the health or heath care issues of the future generation. To our knowledge, there are no adequate documented evidences that can tell about the socioeconomic inequalities in child immunization in Ethiopia and this national level analysis will come up with an awakening alarm for what is not yet well known so far.

Objective

The main objective of the research is to examine socio-economic inequalities in child immunization in Ethiopia using the most recent available nationally representative data.

Methods

The data source for this study was the 2011 Ethiopia Demographic and Health Survey (EDHS 2011) children data which were collected on a nationwide probabilistic two-stage cluster sampling technique. There were 1859 children of 12-23 months old with information on their vaccination status available for this study. The detail of the methodology was mentioned on DHS 2011 report.

Immunization details of children aged 12-23 months were collected in EDHS-2011.The mothers were asked whether they had a vaccination card for each child. If the card was available, then the details of vaccinations were taken from the card and if the details were not present on the card then the mother's recall was used. If the mother could not show a vaccination card, mother's recall on the vaccinations received was used. If the child had not received any immunization the reasons for not immunizing the child was also collected.

The key explanatory variable considered for this study was household wealth status measured using a household wealth index. Variables including Regional state, type of place of residence, sex of the child, maternal age, maternal educational level, total children ever born in the household, and place of delivery were controlled.

In this analysis, child's full immunization status was used as an indicator or outcome variable whereby children who have received a single dose of BCG and measles and three doses of polio and DPT vaccines were classified as fully immunized and others as not fully immunized. Both bivariate and multivariate analyses were done to determine the presence of statistically significant associations between predictor variables and the dependent variable. For this study, p-value of 0.05 was considered as significant level.

Preliminary results

Of the 1859 (weighted) children considered in this study, 86.0% were rural, 31.6% of mothers had primary or higher education, 88.5% of mothers were married, 38.0% had five and above total children ever born, and 39.0% were Orthodox Christians religiously. In terms of wealth status, about 44.3 % of the children belong to poor households.

Socio-demographic characteristics by immunization status of study population are presented as follows. The data presents the bad picture of the poor levels of immunization in Ethiopia with only 25.0% fully immunized children, particularly worse in rural areas (21.1%) less than half of the urban areas, more among boys and in the southern, eastern and western states of Ethiopia (Table-1).

There are huge variations in the immunization performance across regional states. Full immunization ranges from a lowest of 16.3% in six States combined to a highest of 82.5% in Addis Ababa followed by Tigray Region (60.8%) (Fig. 1).

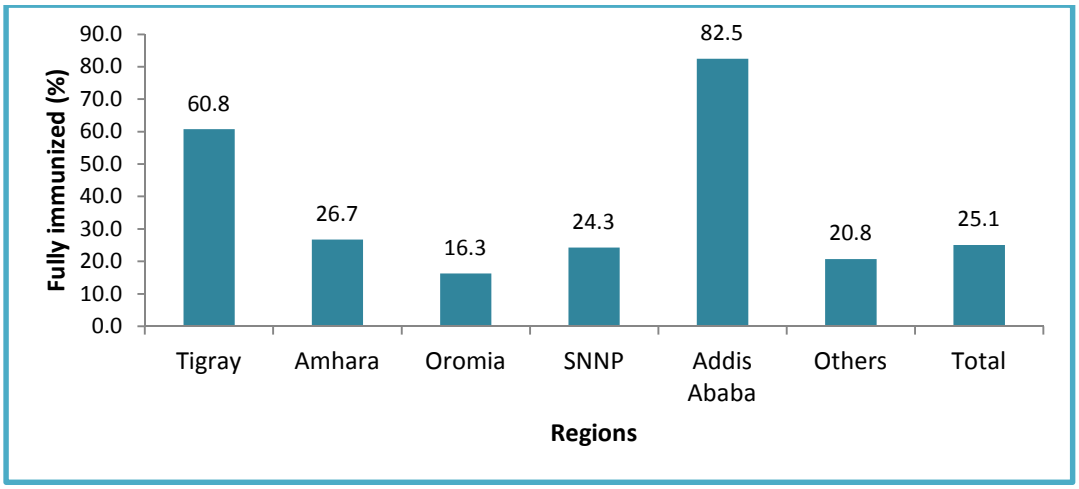

Fig. 1 Full immunization coverage by Regional States, 2011, Ethiopia

Immunization by wealth quintile and education status

National average coverage cannot clearly indicate the disparities in the immunization status of children. To this effect, we analyzed the DHS data to explore the distribution of unimmunized children by educational status of their mothers and the wealth status of the households.

Hence, the children whose mothers were educated had better chances of completing the immunization schedule. This link relates to both the difference in effect between no education and primary education, and that between primary and secondary education. Only 20.7% of children whose mothers have no education were fully immunized compared to 29.9% and 58.5% of those with primary education and secondary and higher education respectively. As the mother's level of education increases, so does the chance that her child is immunized (Fig. 2).

We find that children from the poorest households are also those with the lowest immunization status nationally. Only 17.7% of them were fully immunized compared to more than half of those from the richest households. Even there is huge disparity between those from the middle wealth status households and the richer or richest ones whereby the later is nearly three times higher than the former (Fig. 2).

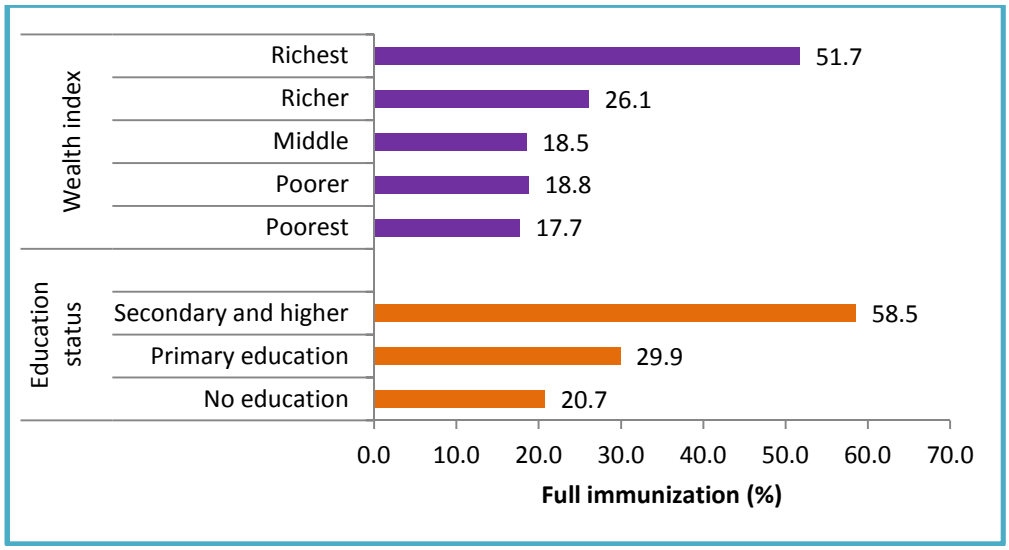

Fig. 2 Full immunization coverage by wealth status of household and educational status of mothers, 2011, Ethiopia

Table-1: Full immunization by socio-demographic variables (2011)

Variables	Fully immunized	Weighted N	Variables	Fully immunized	Weighted N
Type of place of residence			**Total children ever born**		
Urban	49.2*	260	1-2 (RC)	22.6*	634
Rural	21.1	1599	3-4	18.7	521
Religion			5+	20.1	705
Orthodox	33.6*	724	**Place of delivery**		
Muslim	17.3	629	Home	21.2*	1626
Others	22.0	504	Health facility/other	51.9	233
Respondent currently working			**Exposure to media**		
No	26.4*	1155	Inadequate	19.1*	1384
Yes	22.7	701	Adequate	42.3	473
Sex of child			**Total**	**25.0**	**1859**
Male	23.8	970			
Female	26.4	889			

*Chi-square p-value<0.0001, For sex of child, p>0.05

Binary logistic regression

After considering all the socioeconomic and demographic correlates that showed statistical significant association in the multivariate model, region of residence, wealth status and mother's exposure to media (television, newspaper and television) were identified as determinant factors for child immunization inequalities in Ethiopia (Table 2).

As per the regional variations, children from the six combined states including Dire Dawa, the second largest city in Ethiopia, were nearly four times more likely to be fully unimmunized compared to Tigray Regional State. Children from SNNP, Oromia and Amhara Regional states are 3.82, 7.00 and 3.65 times more likely to be fully unimmunized compared to Tigray Regional State that has the second highest proportion of fully immunized children. No significant difference was observed between Addis Ababa and Tigray Regional State.

Wide inequalities in immunization coverage rates are also observed across the different wealth statuses. Children from the richest and middle households are less likely to be fully unimmunized by 74% and 57% respectively compared to those from the poorest households. The multivariate analysis also shows that media exposure has significant effect on immunization status of children; children of mothers who have adequate exposure to media (at least once a week to newspaper/magazine, radio or television) are less likely to be fully unimmunized by 37% compared to those with inadequate exposure to media (less than once a week).

Table-2: Logistic regression for immunization coverage of children 12-23 months (2011)

Variables	**Sig.**	**AOR**	**95.0% C.I. for AOD***	
			Lower	**Upper**
Region				
Tigray (RC)				
Amhara	0.000	3.65	2.37	5.64
Oromia	0.000	7.00	4.18	11.72
SNNP	0.000	3.82	2.23	6.57
Addis Ababa	0.862	0.93	0.43	2.02
Others	0.000	3.98	2.55	6.22
Wealth index				
Poorest (RC)				
Poorer	0.012	0.62	0.43	0.90
Middle	0.000	0.43	0.30	0.62
Richer	0.000	0.42	0.29	0.61
Richest	0.000	0.26	0.16	0.42
Exposure to media				
Inadequate (RC)				
Adequate	0.002	0.63	0.47	0.85

*AOD=adjusted odds ratio

Conclusion

Many types of inequities in health start in early life due to poor maternal health prior to pregnancy and childhood infections predominantly in socially disadvantaged segment of the population (8, 9) which in the long run are correlated with health in old ages (8).

General national immunization coverage rates do not show the disparities within countries. To understand *who* the unimmunized children are, one must look at the distribution of immunization within countries by wealth quintile, mother's educational attainment, across regions or states, districts and urban and rural areas, and by the sex of the child.

A child is expected to be fully immunized before he/she celebrates his/her second birthday; however, only a quarter of children 12-23 months old in Ethiopia were fully immunized in 2010. Only one-fifth of the rural children were fully immunized compared to nearly 50% coverage in the urban areas. Wide inequalities in immunization coverage rates are observed across Regional States. Only about a quarter or less of the children were fully immunized in more than 80% of the Regional States ranging from 16.3% in Oromia Region to 82.5% in Addis Ababa. More than 80% of the States failed to reach 30% full-immunization coverage rate. Out of the nine Regional States and two city administrations, the highest proportion of children fully immunized was for Addis Ababa (82.5%), a 100% urban population, followed by Tigray Regional State (60.8%).

In Ethiopia, children from the poorest 20% of households are also those with the lowest full immunization rates; less than one-fifth of the poorest children were fully-immunized compared with more than 50% of the richest children. On average children from the richest households are less likely to be fully unimmunized by 74% compared to those from the poorest households. This implies that for every child fully immunized in the poorest households, three children from the richest households are immunized.

Similarly full immunization rate nearly triples as mother's education increases from none to secondary level and doubles as mother's education increases from primary level to secondary and higher level.

Generally, the results of this study illustrate that geographic disparities result in lower full-immunization for children from rural settings than their urban counterparts; of mothers with no education than their secondary and higher counterparts; of mothers in the poorest households than in the richest households. Besides, the likelihood of being fully immunized is of higher for children of mothers with adequate exposure to media compared to those from inadequate exposure to media.

Though wealth distribution across regional states may give some indication of material wealth of the families, variations because of the diversity of the people in the country can be masked without a thorough analysis of all social determinants of health outcome such as immunization status. Peoples from rural areas have different lifestyle than urban dwellers. Besides, since wealth index is constructed using measures of development status such as sanitation and type of flooring and possession of materials which are typical to specific areas, urban families may always be perceived as being in higher socio-economic status (rich or richest categories) than rural families. Therefore, further analysis by considering geographic and cultural contexts would be crucial when examining inequalities across different variables. Analyses based on state specific economic variables such as poverty ratio, per-capita, income inequality measured in terms of Gini coefficient, public health spending of the total health spending and others would give clear image of equality or equity of immunization across families.

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