Prevalence and Socioeconomic inequalities trends in child health comparing within and between group inequalities: Food insecurity and malnutrition in Zimbabwe

Akim Tafadzwa Lukwa (tafadzwalukwa@gmail.com)

University of Cape Town School of Public Health and Family Medicine https://orcid.org/0000-0003-2534-3731

Aggrey Siya

College of veterinary medicine and biosecurity,makerere university

Karen Nelwin Zablon

National Institute for Medical Research Muhimbili Research Centre

James Azam

DST-NRF Center of Excellence in Epidemiology and Analysis

Olufunke A. Alaba

University of Cape Town School of Public Health and Family Medicine

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Research

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Prevalence and Socioeconomic inequalities trends in child health comparing within and between group inequalities: Food insecurity and malnutrition in Zimbabwe

Akim Tafadzwa Lukwa[1*], Aggrey Siya[2], Karen Nelwin Zablon[3], James Azam[4], Olufunke A. Alaba[5]

[1,5]Health Economics Unit, School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town, Anzio Road, Observatory, 7925

[2]College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University, P.O. Box 7062, Kampala, Uganda

[3]National Institute for Medical Research, P.O Box 1462, Mwanza, Tanzania

[4]DST-NRF Center of Excellence in Epidemiological Modelling and Analysis (SACEMA), Department of Mathematics, Private Bag X1, Matieland, 7602, Stellenbosch University,

Email addresses: tafadzwalukwa@gmail.com[1*], siyaggrey@gmail.com[2], knelwin@yahoo.com[3], Azam.j.mba@aims-senegal.org[4] olufunke.alaba@uct.ac.za[5]

[*]***Corresponding author:*** *Akim Tafadzwa Lukwa, Health Economics Unit, School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town, Anzio Road, Observatory, 7925*

Background

Globally nations are advocating for universal health coverage which argues for health access for all however, inequalities in child health remain a threat to this global initiative. Even though malnutrition and food insecurity are now dominating the global development agenda, there are substantial gaps on literature about patterns and trends of socioeconomic inequalities in food insecurity and malnutrition in many developing countries. Globally an estimated 3.1 million children die annually as a result of undernutrition, shockingly sub-Saharan Africa accounts for majority of the most nutritionally insecure and food insecure children in the world. In previous decades' prevalence of stunting in Zimbabwe has been erratic. This paper assessed socioeconomic inequalities in child health focusing on malnutrition and food insecurity in Zimbabwe.

Methods

The study used Demographic Health Survey (DHS) data sets of 2010\11 and 2015. Food insecurity in children was determined based on the WHO dietary diversity score. The study adopted the WHO dietary diversity score informed by the Infant and Young Child Feeding (IYCF) practices. Minimum dietary diversity as an indicator for food security is defined by a cut- off point of >4, therefore for this study children with less than 3 of the 13 food groups were defined as food insecure. Malnutrition was assessed using weight-for-age Z-scores, with children whose weight-for-age Z-score below minus two standard deviations (-2 SD) from the median considered malnourished. Concentration indices were computed to understand if malnutrition was dominant among the poor or rich. The paper used the Theil index, which is a generalized entropy measure and decomposed the indices by population subgroups (geographical clusters and socioeconomic status) so as to separate total inequality in the distribution between the selected groups and remaining within-group inequalities.

Results

For the period under review malnutrition prevalence increased by 1.03 percentage points (**p.p)** [2010/11(3.73%); 2015(4.76%)], while food insecurity prevalence decreased by 4.35**p.p** [2010/11(78.29%);2015(73.94)]**.** Prevalence of malnutrition and food insecurity increased by; 9.6**p.p** and 2**p.p** among poor children & 10.23**p.p** and 0.5**p.p** among rural children. Concentration indices showed that; children from wealthy households were more likely to be food secure (pro-rich) while, children from poor households were more likely to be nutritious (pro-poor). For nutrition status socioeconomic inequality gaps appear to be widening as the concentration indices between the two time periods increased, while for food security status socioeconomic inequality gaps appear to be contracting as the concentration indices between the two time periods reduced. Decomposed Theil indices by geographical clusters (urban & rural) for; food security status shows contracting socioeconomic inequality gaps in both geographical clusters (urban & rural), while for nutrition status the Theil indices reflect widening socioeconomic inequality gaps among urban children and contracting socioeconomic inequality gaps among rural children.

Conclusion:

The study concluded within-group inequalities to be driving most of the socioeconomic inequalities in nutritional status and food security status of children in Zimbabwe. Therefore, Zimbabwean government should design policies that focus on addressing within-group inequalities and direct food security interventions for food insecure children through availing food aid.

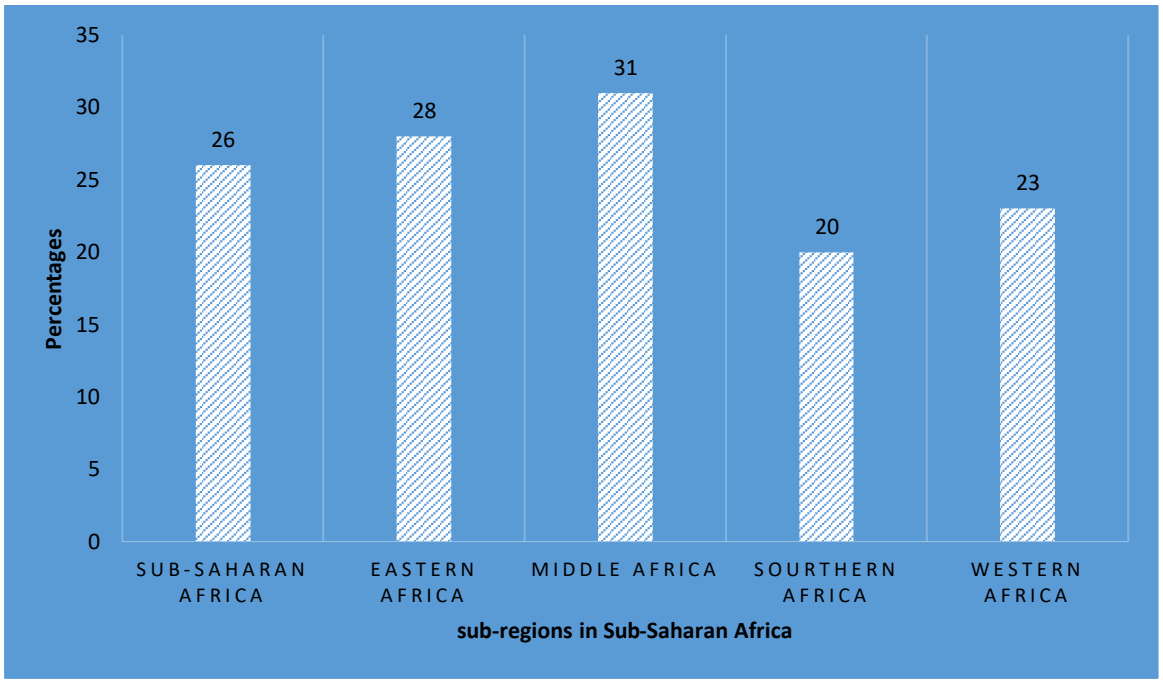
Keywords: Food Insecurity; Child Health; Malnutrition; Socioeconomic Inequalities

Background

Food insecurity is a major global concern with an estimate of 1 billion people reported to be suffering from starvation, under nutrition and malnutrition [5]. Global human population has been projected to have reached 9.7 billion by 2050 [6], reflecting on the current statistics of food insecurity, it is likely to be exacerbated. As of 2015 sub-Saharan Africa alone reported an estimate of 239 million people suffering from hunger [7]. Food insecurity and malnutrition in Africa are among public health problems dominating the continent's development agenda. The latter assertion is highlighted by the 2014 Malabo commitment which calls for "Ending hunger and reducing stunting to below 10% and underweight to below 5% by 2025" [1]. Food insecurity and malnutrition in children constitute the Sustainable Development Goal (SDG) target 2.2 "End all forms of malnutrition by 2030 and attain internationally agreed targets on stunting and wasting in children under 5 years of age by 2025…"[1]. From both aforementioned assertions argued into health policy regionally and globally the importance and relevance of understanding food insecurity and malnutrition in children can be deduced.

Child malnutrition and food insecurity are widespread phenomenon's known to be dominant in rural areas, which are mainly characterised by majority of inhabitants living in poverty [2]. As of 2010 malnutrition accounted for about 50% of the 10 million deaths each year for under-five children in the developing nations [3]. Literature argues existence of a strong correlation between malnutrition and poverty, as malnutrition is more prevalent in poor countries than in better-off countries [4]. As this is not enough, malnutrition has been reported to account for an estimated 45% of deaths among children younger than 5 years thus about 3.1 million deaths annually [8]. For the past 3 decades (1985-2016) the prevalence of stunting in sub-Saharan Africa significantly declined by 7.2% [9]. However, one in three children under the age of five is reported to be stunted, with eastern and western Africa accounting for the highest proportions thus 44 percent and 36 percent respectively, while the lowest prevalence (3 percent) is observed in southern Africa [9]. Figure 1 gives an overview of child food insecurity as of 2016, it can be deduced that middle Africa recorded the highest proportion 31% whilst southern Africa recorded the lowest of 20%.

Figure 1: Prevalence of child food insecurity across sub-regions in Sub-Saharan Africa

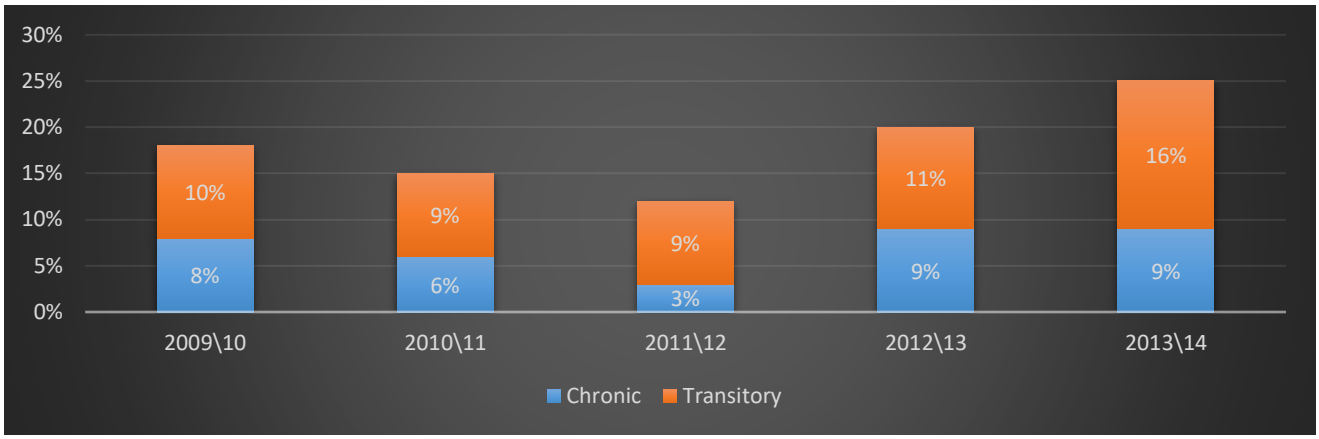


Source: FAO (Feb. 2016) Source: FAO, Voices of the Hungry Project, 2016.

The food security framework is a multifaceted concept explaining interactions of food and poverty [10,11]. Food insecurity is defined as; a state in which people do not possess physical and economic access to; sufficient, safe and nutritious food, suffice for their dietary needs [12].

Figure 2 gives a time dimension of food insecurity and illustrates both chronic and transitory food insecurity. Chronic food insecurity is defined as a long-term or persistent inability to meet minimum food consumption requirements while a short-term or temporary inability to meet minimum food consumption requirements that indicates a capacity to recover is known as transitory food insecurity [13,14].

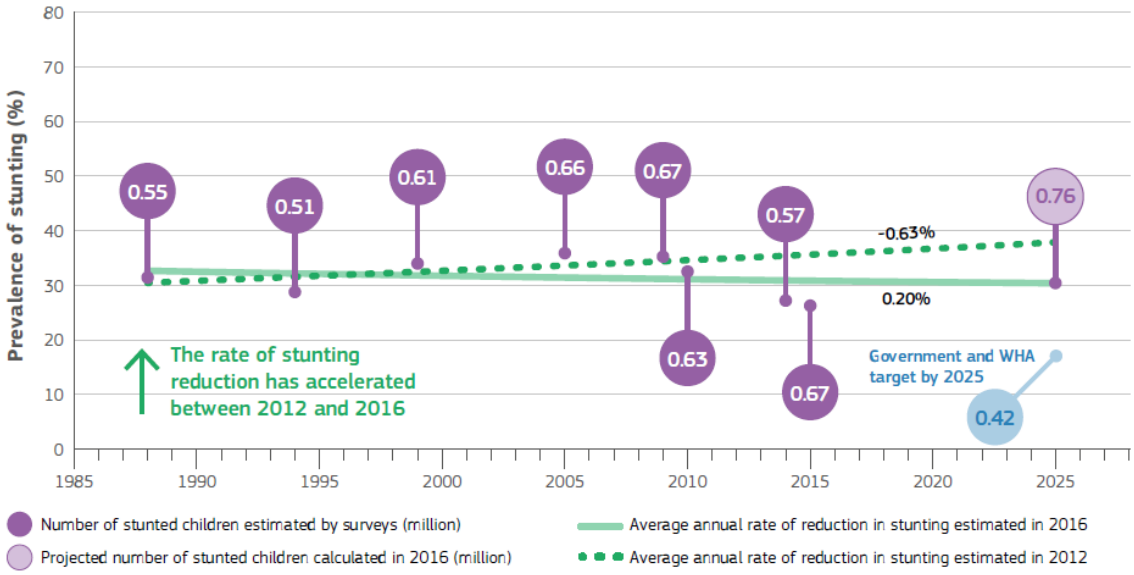
Figure 2: Estimate of chronically and transitorily food insecure rural population in Zimbabwe 2009-2014



Source:[15]

Zimbabwe is part of Sub-Saharan Africa, situated to the south of Africa. She is a land locked country hence heavily relies on agriculture and mining [16]. Agriculture is considered the back bone of Zimbabwe's economy providing more than 70% of employment [17], with 2013-14 estimates reflecting a 13% contribution of agriculture to Gross Domestic Product [18]. However, Zimbabwe ranked 46 out of 78 listed developing countries on the Hunger Index as of 2013 [19]. On the hunger index ranking, Zimbabwe fell under the "Serious" category with undernourishment being the major driving factor [17]. Several factors have been alluded to be factors fuelling food insecurity and malnutrition in Zimbabwe however; poverty, inadequate maternal and child care have been cited as the main driving factors [20].

Figure 3: Trend, projection and targets in the prevalence and number of children (under-five) stunted for Zimbabwe



Source: [21]

The prevalence of stunting in Zimbabwe has been erratic since the mid-1980s' however, post mid-1980 figure 2 reports a marginal decline in stunting, however, the number of stunted children was on the rise [21]. Stunted children rate accelerated from -0.63% in 2012 to 0.20% in 2016 (Figure 2), if this rate is maintained then projections for 2025 would imply that 0.76 million children are expected to be stunted [21].

Globally food insecurity and malnutrition are causes for concern, hence their dominance on the global health agenda. The Sustainable Development Goal (SDG) 2.1 targets to, "End hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round by 2030," [22]. Inequality decompositions of nutritional status and food security status of children can be a starting point of providing highly relevant evidence to inform health policies that ensure nutritional and food security of children. Therefore, the study assessed the prevalence and measured within and between groups socioeconomic inequalities in children mainly focusing on food insecurity and malnutrition in Zimbabwe for 2010\11 and 2015.

Methods

Data

Zimbabwe Demographic and Health Surveys (ZDHS) of 2010\11 and 2015 were used for analyses. Both data sets had population samples of 2,666 and 2,708 children respectively, aged 0-59 months. For both 2010/11 and 2015 the ZDHS samples were nationally represented by a sample of more than 11,000 households, thus yielding representative information for most indicators for each of Zimbabwe's ten provinces: Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Matabeleland North, Matabeleland South, Midlands, Masvingo, Harare, and Bulawayo. For both ZDHS studies (2010/11 & 2015) 2002 and 2012 population censuses sampling frames were used.

Outcome variables

Two indicators of food access across children age groups were assessed. These indicators have been endorsed by countries represented at the UN Statistical Commission as proxies in monitoring target 2.1 namely; prevalence of undernourishment (malnourished) and prevalence of severe food insecurity in the population [1]. Food insecurity among the children age groups was determined using the WHO dietary diversity score based on the Infant And Young Child Feeding (IYCF) practices. Dietary diversity is the number of different foods or food groups consumed over a given reference period [23]. For this study 13 food groups were considered thus; food from grains, food from tubers, eggs, meat, pumpkin & carrots, green leafy vegetables, vitamin A fruits, other fruits, liver & heart, fish, {beans, peas, lentils, nuts}, other milk products and yogurt. The IYCF tool defines minimum dietary diversity as indicator for food security by a cut- off point of >4 [23], hence for this study children with less than 3 of the 13 food groups were defined as food insecure. Malnutrition was assessed using the child anthropometric measure of weight-for-age. Weight-for-age is a composite index of height-for-age and weight-for-height hence, it takes into account both acute and chronic under-nutrition. Children whose weight-for-age z-score was below minus two standard deviations (-2 SD) from the median were considered malnourished and those above minus two standard deviations (-2 SD) from the median malnourished.

Socioeconomic status

Socioeconomic status was adopted from the wealth index for households in the original surveys (ZDHS). In both ZDHS's wealth index was reported as scores based on the number and kinds of consumer goods owned; ranging from a television to a bicycle or a car, plus housing characteristics such as source of drinking water, toilet facilities, and flooring materials. The latter scores were derived using principal component analysis and national wealth quintiles. The national wealth quintiles were compiled by assigning a household score to a household member, ranking each person in the household population by their score, and then dividing the distribution into five equal categories, each with 20 percent of the population in the original studies. For this study socioeconomic status was re-categorised from 5 (poorer, poor, middle, richer, richest) groups into 3 groups thus poor, middle and rich.

The concentration index

The concentration indices were used in assessing socio-economic inequalities in child nutrition and child food security. The latter index is expressed as a value of a health variable, assigned to an individual as a function of a socioeconomic category to which the individual belongs [24]. The concentration index is a mathematical derivative of the concentration curve. On the concentration curve; the x axis represents cumulative proportion of individuals by socioeconomic class starting with the lowest socioeconomic class (*poorest*) and ending with highest socioeconomic class (*richest*), while the y axis is the cumulative total proportion of health in these individuals [24]. The Concentration curve identifies the existence of socioeconomic inequalities in health sector/outcome variables, and is only sensitive to relative inequality [25]. The bounds of this measure are -1 and 1 with a negative (positive) value representing inequality favouring the worse-off (better-off).

As the CI is expressed in a number of ways algebraically in this study the most common in literature will be adapted for convenience;

$$CI = \frac{2}{\mu}\, cov\,(c_i; R_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Equation (1) denotes that the value of the concentration index is equal to the covariance between individual child health (c_i) and child's relative rank (R_i), scaled by the mean of health in the population (μ) and then multiplied by 2 so as to ensure that the concentration index ranges between -1 and +1 [26–28].

Theil index

To date a wide range of measures can be applied in assessing income inequalities however, this study used the Theil index which is a generalized entropy measure. Selection of this measure was informed by principles concerning the conceptual, methodological and technical qualities of the generalized entropy measures. Generalised Entropy (GE) measures are cited to be based on the idea of divergence between probability distributions derived from information theory [29–32]. The study adopted the Theil index, as unlike other measures of inequalities, only the generalised entropy class of inequality measures satisfies the five standard criteria for measuring inequalities including the attractive property of being easily decomposable by subgroups[1].

Inequality decomposition was done by population subgroup so as to separate total inequality in the distribution into components of inequalities between the selected groups and the remaining within-group inequality. For this study we used the syntax ***ineqdec0*** which is a stripped-down version the syntax ***ineqdeco*** as we intended to include zero and negative incomes in calculations hence, only estimates availed are of the GE(2) index only. The aforementioned approach is functional in explaining the relationship between inequalities in the whole population and inequalities within and between subgroups (*residence, socio-economic status and child age groups*). Theoretically, Theil index ranges from 0 to infinity, with 0 being a state of equal distribution and values greater than 0 representing increasing levels of inequality [33,34]. Data analysis was done using Stata version 13.1 (Stata Corp, Texas, United States).

[1] (1) Anonymity (names do not matter) (2) Population Principle (population share is what matters) (3) Relative Welfare Principle (welfare share is what matters, not absolute amounts of welfare) (4) Dalton Transfer Principle (transferring welfare from a richer person to a poorer person should indicate a fall of inequality and vice versa) (5) Decomposability (summation of within-group and between-groups inequality should be equal to total inequality) [43–46]

Results

Table 1: Sample distribution and prevalence of malnutrition and food insecurity among children aged 0-59 months by Residence, Socioeconomic status, Mothers' Education, Child age for Zimbabwe 2010/11 & 2015

Characteristics	**Prevalence of malnutrition %**		**% Difference**	**Prevalence of food insecurity %**		**% Difference**
	2010/11	**2015**		**2010/11**	**2015**	
Child Sex						
Male	54.42	49.01	-5.41	49.70	48.44	-1.26
Female	45.58	50.99	5.41	50.30	51.56	1.26
Household Wealth Index						
Poor	46.56	56.16	9.6	51.75	53.75	2
Middle	20.19	20.33	0.14	19.03	18.41	-0.62
Rich	33.26	23.51	-9.75	29.22	27.84	-1.38
Mothers' Education						
No Education	1.47	1.34	-0.13	1.32	1.53	0.21
Primary	27.17	32.87	5.7	36.82	36.43	-0.39
Secondary	70.22	61.59	-8.63	59.62	58.96	-0.66
Tertiary	1.14	4.21	3.07	2.24	3.08	0.84
Child Age						
Neonates	42.88	36.50	-6.38	49.48	45.01	-4.47
Infants	33.23	36.71	3.48	25.77	27.55	1.78
Children	23.89	26.79	2.9	24.75	27.44	2.69
Residence						
Urban	27.70	17.47	-10.23	21.06	20.56	-0.5
Rural	72.30	82.53	10.23	78.94	79.44	0.5

Note: *Sample size and overall prevalence: for 2010/11; 2,714 children; overall malnutrition prevalence [3.73%]; overall food insecurity prevalence [78.29%]: Sample size and overall prevalence: for 2015; 2,835 children; overall malnutrition prevalence [4.76%]; overall food insecurity prevalence [73.95%]*

Over the period under review malnutrition prevalence increased by 1.03 percentage points (**p.p**) [2010/11(3.73%);2015(4.76%)] while food insecurity prevalence decreased by 4.34**p.p.** In 2010/11 of the 3.73% children that were malnourished majority were poor male neonates residing in the rural areas and the mothers had at least attained secondary education while for 2015 of the 4.76% majority were poor females residing in the rural areas and the mothers had also at least attained secondary education. For both time periods of the 78% [2010/11] and 74% [2015] food insecure children majority were poor neonates residing in the rural areas and the mothers had at least attained secondary education.

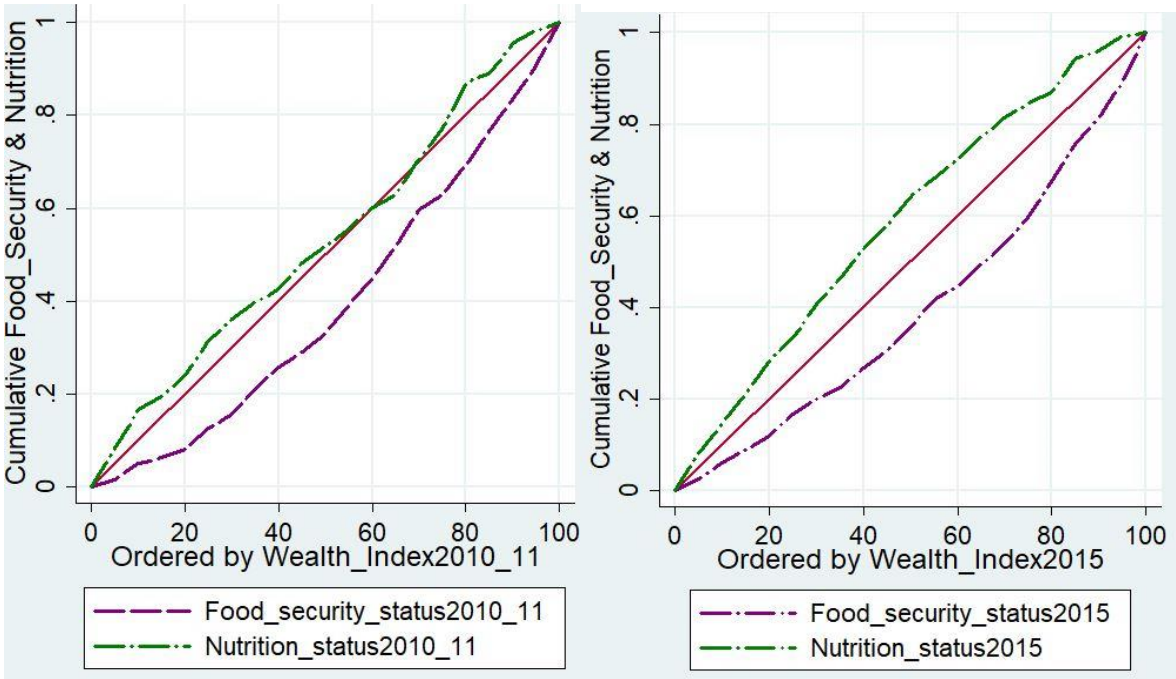
Table 2: Concentration indices of nutrition status and food security status

	2010/11 Concentration index	2015 Concentration index	Absolute difference	*** {***p<0.01; p<0.02; p<0.05***}
Nutrition status	-0.0616	-0.1768***	0.1152	
Food security status	0.2137***	0.2063***	-0.0074	

Note*: Sample size for 2010/11 is 2,714 children, Sample size for 2015 is 2,835 children*

Concentration indices of nutrition status were negative (pro-poor) for both time periods which means that poor children were more likely to be nutritious, while concentration indices for food security status were positive (pro-rich) for both time periods which means children from wealthy households were more likely to be food secure.

*Figure 4*a: 3b; *Concentration curves for food security and malnutrition for 2010/11 and 2015*



The concentration curves in both time periods concur with concentration indices as they show food security status to be pro rich (children from wealthy households more likely to be food secure) and nutrition status to be pro poor (children from poor households more likely to be nourished).

Decomposition by residence

The study focused on two household characteristics in assessing income inequalities thus; location of the household and socioeconomic status. Economic inequalities among regions and socioeconomic classes within a country may can be attributed as the driving force of income inequalities as uneven progress in development across regions can result in the diversification of income and worsening income of inequalities [35].

Table 3: Population share and household income share of subgroups for food security distinguished by residence; 2010/11 & 2015

Region	2010/11				2015			
	Population share	**Mean**	**Relative mean**	**Income share**	**Population share**	**Mean**	**Relative mean**	**Income share**
Urban	0.2415	0.30	1.47	0.3555	0.3198	0.37	1.45	0.4629
Rural	0.7585	0.16	0.85	0.6445	0.6802	0.20	0.79	0.5371

Table 4: Population share and household income share of subgroups for nutrition status distinguished by residence; 2010/11 & 2015

Region	2010/11				2015			
	Population share	**Mean**	**Relative mean**	**Income share**	**Population share**	**Mean**	**Relative mean**	**Income share**
Urban	0.2415	0.31	1.00	0.2407	0.3198	0.03	0.66	0.2114
Rural	0.7585	0.04	1.00	0.7593	0.6802	0.05	1.16	0.7886

As reflected in table *5* and *6* it can be deduced that for both time periods majority of the children resided in the rural areas and accounted also for the greatest proportion of income. To note there is small variances between income share and population share which makes the two geographical clusters comparable.

Table 5: Theil index for subgroups for food security status and nutritional status distinguished by residence

Region	Food security status			Nutritional status		
	2010/11	**2015**		**2010/11**	**2015**	
	Theil index [*GE (2)*]	**Theil index [*GE (2)*]**	**Absolute difference**	**Theil index [*GE (2)*]**	**Theil index [*GE (2)*]**	**Absolute difference**
Urban	1.1465	0.8364	-0.3101	12.0385	16.1539	4.1154
Rural	2.3524	1.9495	-0.4029	11.9878	9.0000	-2.9878

Table 7 shows contracting socioeconomic inequality gaps for food security for both time periods in both geographical clusters. However, socioeconomic inequalities were more dominant in the rural areas as it recorded theil indices higher than in the urban for food security. For nutritional status socioeconomic inequalities appear to have widened in the urban areas while in the rural areas the gaps contracted. As the theil indices in the urban increased while in the rural areas the indices decreased (Table 7).

Table 6: Decomposition of the Theil index by residence for food security status and nutritional status

Region	Food security status				Nutritional status			
	2010/11		**2015**		**2010/11**		**2015**	
	Theil index [*GE (2)*]	**Contribution**	**Theil index [*GE (2)*]**	**Contribution**	**Theil index [*GE (2)*]**	**Contribution**	**Theil index [*GE (2)*]**	**Contribution**
Overall	1.9237	100%	1.4343	100%	12.0000	100%	10.5081	100%
Within-Group	1.8882	98.4%	1.3872	97.5%	12.0000	96.4%	10.4811	92.7%
Between Group	0.0355	1.6%	0.0471	2.5%	0.0000	3.6%	0.0270	7.3%

Decomposed results of food security by residence show that; for 2010/11 about 1.6% of the income inequality can be explained by where the child resides with more than 98% of socioeconomic inequalities as a result of within group income fluctuations while for 2015; 2.5% of income inequalities are explained by where the child resides and more than 97% are explained by within group income fluctuations (table 8). For nutrition; for 2010/11 over 96% of income inequalities can be explained by within group income variability and about 4% can be explained by where the child resides. While for 2015; within group income variations can explain over 92% of income inequalities with about 7% explained by where the child resides (table 8). Thus for food security within

group income variations can explain 97.5%-98.4% of income inequalities while where the child resides can explain 1.6%-2.5% income inequalities.

Decomposition by socio-economics status

Table 7: Population share and household income share of subgroups for food security distinguished by socio-economic status; 2010/11 & 2015

Socio- economic class	2010/11				2015			
	Population share	Mean	Relative mean	Income share	Population share	Mean	Relative mean	Income share
Poor	0.4833	0.14	0.67	0.3214	0.4361	0.18	0.69	0.3029
Middle	0.1922	0.26	1.26	0.2424	0.1617	0.23	0.88	0.1429
Rich	0.3244	0.28	1.34	0.4363	0.4021	0.36	1.34	0.5543

For food security in both time periods the poor had the biggest population share, however accounting for the least proportion of income share (table 9).

Table 8: Population share and household income share of subgroups for nutrition status distinguished by residence; 2010/11 & 2015

Socio- economic class	2010/11				2015			
	Population share	Mean	Relative mean	Income share	Population share	Mean	Relative mean	Income share
Poor	0.4833	0.04	1.05	0.5093	0.4361	0.06	0.55	0.5447
Middle	0.1922	0.03	0.82	0.1574	0.1617	0.05	0.18	0.1789
Rich	0.3244	0.04	1.03	0.3333	0.4021	0.03	0.28	0.2764

Table 9: Theil index for subgroups for food security status and nutritional status distinguished by socio-economic status

Socio-economic class	Food security status			Nutritional status		
	2010/11	2015		2010/11	2015	
	Theil index [*GE (2)*]	Theil index [*GE (2)*]	Absolute difference	Theil index [*GE (2)*]	Theil index [*GE (2)*]	Absolute difference
Poor	3.1453	2.2854	-0.8599	11.3636	8.3134	-3.0502
Middle	1.4222	1.6900	0.2678	14.7647	9.4546	-5.3101
Rich	1.3025	0.9034	-0.3991	11.6667	15.5147	3.8480

Table 11 shows contracting socioeconomic inequality gaps among the poor for food security and nutrition for the period under review. However, for the wealthy class socioeconomic inequality gaps appeared to have contracted for food security and widening for nutrition (table 11).

Table 10: Decomposition of the Theil index by residence for food security status and nutritional status

Region	Food security status				Nutritional status			
	2010/11		2015		2010/11		2015	
	Theil index [*GE (2)*]	Contribution	Theil index [*GE (2)*]	Contribution	Theil index [*GE (2)*]	Contribution	Theil index [*GE (2)*]	Contribution
Overall	1.9237	100%	1.4343	100%	12.0000	100%	10.5081	100%
Within-Group	1.8708	97.2%	1.3840	95.7%	11.9960	94.3	10.4741	96.4%
Between Group	0.0530	2.8%	0.0502	4.3%	0.0040	5.7%	0.0341	3.6%

Table 12 results show that when decomposed by socioeconomic status for food security 95.7%-97.2% of income inequalities can be explained by within group income variations and 2.8%-4.3% of income inequalities can be explained by the socioeconomic group to which the child belongs. For nutrition 94.3%-96.4% income inequalities can be explained by within income group income variations and 3.6%-5.7% income inequalities can be explained by which socioeconomic class the child belongs.

Discussion

Indeed, child malnutrition is a widespread phenomenon, particularly in rural areas, where most of the inhabitants live in poverty and food insecurity[2]. Dietary diversity scores were cited to remarkably be well-related to socio-economic factors [36,37]. A study done Mali found a strong significant relationship between socio-economic status and dietary diversity [38]. Dietary diversity was cited as a significant interaction effect determinant in three countries; Malawi, Haiti, and Peru [39]. The latter assertions concur with findings of this study as children from the lowest socioeconomic class recorded highest food insecure and malnourishment prevalence's.

A number of factors can be alluded to food insecurity and malnutrition among households. Food insecurity and malnutrition in children is mainly driven by; chronic poverty, failed policies, physical & natural constraints [40]. Widespread poverty, poor infant and young child care practices, and low dietary diversity were cited to be among key structural drivers of hunger and malnutrition in Zimbabwe [17]. The latter arguments concurred to our findings as; majority of malnourished and food insecure children resided in the rural areas and aged 0-24 months (neonates & infants) recording high prevalence's of food insecurity indicating low dietary diversity.

More recently, Amara and Jemmali (2017) analysed the patterns of inequalities in health relative to nutrition outcomes among children under five in Tunisia. Their study used using Shapley decomposition to estimate the relative contributions of circumstances and found out that parents' education, parental wealth, and place of residence were the key factors influencing inequalities in child health [41]. Literature argued geographic location to be an important determinant of malnutrition, citing stunting to be worse among rural than urban children [20], this was consistent with our findings for both time periods as they show that rural children were the most malnourished. Zere and McIntyre (2003) investigated the correlation between socioeconomic status and malnutrition among children under five in South Africa. The study found malnutrition to be highly concentrated in the poorest regions of South Africa [42]. This was also true in our study, as malnutrition and food insecurity was also more prevalent among rural children belonging to the lowest socioeconomic class. Decomposed results of this study showed within group income variations to be a strong indicators of explaining socioeconomic inequalities, the latter findings also concur with results of the Poland study [35].

Limitations of the study

There is need for further investigation of figure 3a as it shows the concentration curve for nutrition status crossing the 45_0 line, hence a dominance test would need to be carried out. Also demographic health survey responses on children feeding solemnly rely on the 24-hour recall method, hence the results might not reflect children's past feeding dietary pattern thus results on food security are prone to recall bias.

Conclusion

In order to avail efficient and effective policy recommendations and interventions that advocate for health equity as well as enhance nutritional and food security well-being of children, it is necessary to first understand the levels of malnutrition & food security. With existence of socioeconomic disparities in nutritional status and food security status among children by socioeconomic status (poor, middle & rich) and geographical locations (rural or urban) evident in Zimbabwe. Increasing access of healthy food among children thus targeting food insecurity and malnutrition is of utmost importance. The latter policies should be tailor made to specifically target within and between group inequalities.

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Abbreviations

DHS- Demographic Health Survey

GE- Generalised entropy (GE)

IYCF- Infant and Young Child Feeding

SD- Standard Deviation

SDG- Sustainable Development Goals

UN-United Nations

WFP- World Food Programme

WHO- World Health Organisation

ZimVac- Zimbabwe Vulnerability Assessment Committee

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Authors' contributions
ATL designed the study, wrote the paper, analysed results, reviewed the paper and submitted it for publication; SA reviewed the paper in preparation for publication, KZN reviewed the paper in preparation for publication, ES reviewed the paper in preparation for publication, JA reviewed the paper in preparation for publication and OA designed the study and reviewed the paper in preparation for publication.

Ethics approval and consent to participate
No ethical approval was sought as the parent studies DHS were cleared on ethics also this is a secondary data analysis hence data sets are publicly available.

Competing interests
No competing interests between the authors

Consent for publication
Consent from all co-authors was obtained.

Figures

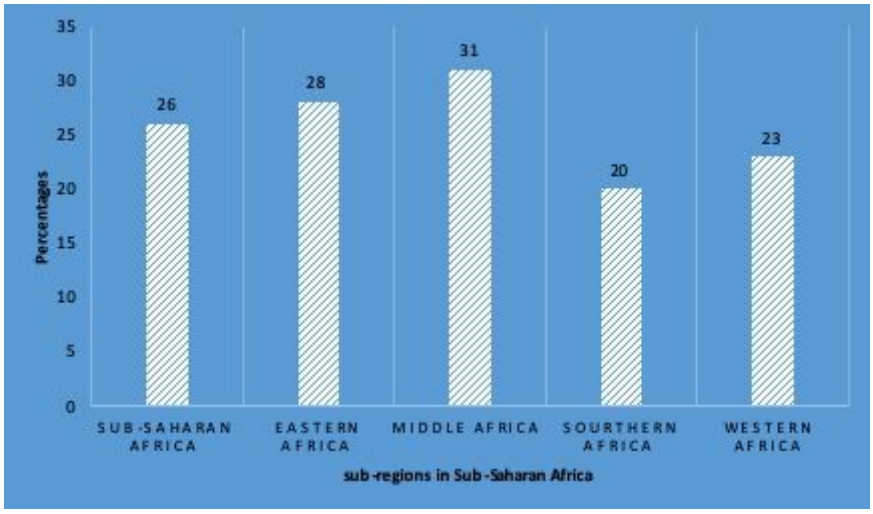

Figure 1

Prevalence of child food insecurity across sub-regions in Sub-Saharan Africa

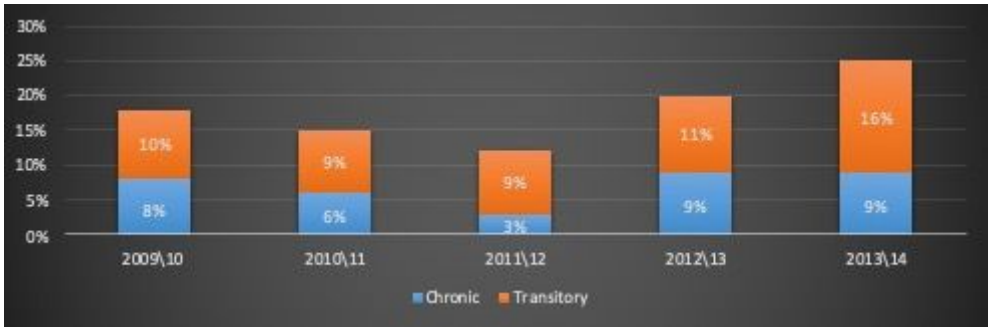

Figure 2

Estimate of chronically and transitorily food insecure rural population in Zimbabwe 2009-2014

Figure 3

Trend, projection and targets in the prevalence and number of children (under-five) stunted for Zimbabwe

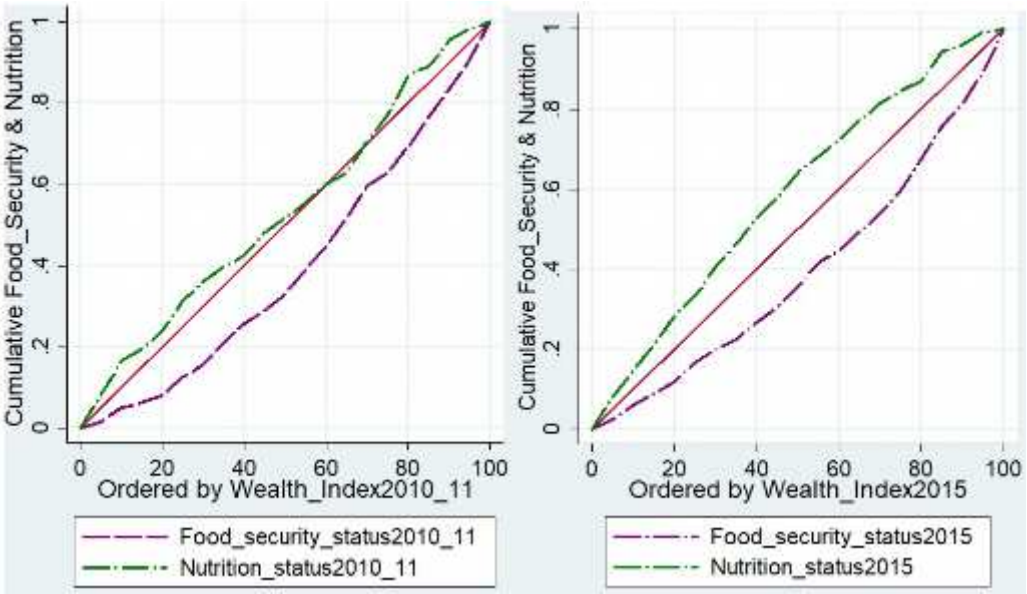

Figure 4

4a: 3b; Concentration curves for food security and malnutrition for 2010/11 and 2015