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Maternal Employment and Child Nutritional Status in Cameroon: An Investigation Using the Heckman Selection Model

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Abstract: Nearly half of all deaths among children under five years of age across the globe results from under nutrition. This study examines the effect of maternal employment on child nutritional status in Cameroon using secondary data from the 2018 Cameroon Demographic and Health Survey (CDHS). We used a weighted sample of 4497 children U5 years born to women age 15–49. The Chi-squared tests and The Heckman selection model were used to examine the effects while controlling for other explanatory factors. Our results show that maternal employment has a significant ($p<0.1$) negative effect on child nutritional status in Cameroon. Children of employed mothers are at a higher risk and more likely to be stunted (0.3%) wasted (1.7%) or underweight (3.1%) compared to children whose mothers are unemployed. Particularly, mother's occupation in agriculture has negative effect on child nutritional status; this has a negative and significant effect of 4.5% on underweight and negative and significant effect of 8.8% on stunting. Full-time maternal work increases stunting by 1%; wasting by 0.2% and underweight by 1.1% even though not-significant ($p>0.1$). On the basis of these findings, we suggest that interventions aimed at improving children's nutrition should promote breastfeeding in work places and flexible working conditions that can permit nursing mothers to maintain close contacts with their children even during working time.

Keywords: Maternal Employment, Child Nutritional Status, Heckman Selection Model, Cameroon

1. Introduction

Nutrition is of prime importance in every society. Child nutrition is particularly important since children are a source of hope to the world. They are considered important economic resources and contribute in the socio-economic development of every nation [30]. The Nutritional status of a child is a key determinant of his or her well-being [22, 25]. Proper nutrition is an indispensable element for the growth, development and health status of children. Malnutrition is an important health and welfare problem in childhood and may produce serious negative effects on the growth and development of children [6, 18]. In adulthood, malnutrition slows down human productivity and increases absenteeism at work which limits one's capacity to contribute to the country's output [21]. Malnourished children often suffer from a wide range of health problems amongst which are: stunted growth, wasting, underweight, poor recovery from

illnesses, vulnerability to diseases and infections with the most severe being an increased risk of death.

At a global level, One out of every three children under the age of 5 is undernourished and one out of two suffers from "hidden hunger" and deficiencies in vitamins and other essential nutrients [29]. Stunting is still a global problem and account for 22.5% of children. Most malnourished children are found in the Low- and Middle-Income Countries (LMICs) particularly in south East Asia and Africa [20, 28]. The results of the 2018 Cameroon Demographic Health survey show that, 29%, 4% and 11% children are stunted, wasted and underweight respectively. Stunting is more prominent in the rural areas especially in the North with over 41% of stunted children.

As the subject becomes increasingly important, several frameworks and strategies have been established to mitigate malnutrition among infants. The Cameroon government put in place the National health development plan and the growth and employment strategic documents in which child's health is a top government priority. The millennium and sustainable development goals is a global call which aims to end all forms of malnutrition by creating a decent and favourable employment conditions that integrates more women into the labour market.

Today, a good number of researchers have proposed measures in curbing child malnutrition. Most studies have stressed on the importance of maternal employment, as it produces favourable nutritional outcomes in children. In recent times, there has been a remarkable increase in the proportion of women taking part for paid jobs in the labour market. This appears to be one of the most significant social and economic manifestation in modern history. The increasing trend has been so renown that academic attention in developing countries have been noticed [24]. The proportion of women in employments in Sub-Sahara Africa as well as other developing countries registers about 69% which is above the 65% global rate [17].

There is, a growing literature that has emerged to explore how maternal employment affect health outcomes in children. There exist two pathways through which maternal employment can affect nutritional status. On the one hand, maternal employment can increase family's income and improve household's welfare. Wealthier families are often associated with better nutritional outcomes than their counterparts. It also reduces poverty and limits the threats of food shortage in the home. On the other hand, maternal employment limits maternal time spend in child care [3]. Working mothers have limited time for child care activities such as proper breastfeeding, preparing good food for children and taking them to health care administrators. Also, mothers who engaged in stressful work may end up exhausting themselves after long working hours. The fact that mothers have to resume work shortly after putting to birth may also translate into cognitive weaknesses in their children [22].

There is therefore a point of trade-off that exist between maternal additional income from work and limited time for child care but to predict the direction of the relationship between maternal employment and child nutritional status remains empirical. Existing findings on this topic appears limited and with mix and contradictory conclusions. For example, Shuhaimi and Muniandy [23] investigated the association between maternal employment status and nutritional status among children in selected kindergartens in Malaysia and concluded that maternal employment reduces the prevalence of severe wasting. The authors, reveal that severe wasting was higher among children of non-employed mothers (17%) than in children of employed mothers (7%). The results differ slightly from in a cross-sectional study in Ethiopia on the effects of maternal employment among children aged 6–59 months, found a slight difference in the overall nutritional status of the children of employed mothers and those of unemployed mothers [8]. The positive impact results from the increase in maternal income which adds to family's resources, additional income could be used to prepare high quality meals, seek medical facilities, increase the consumption of household nutritional items like refrigerators, gas cooker, pots etc. it could also translate into improved living conditions through the construction of a modern toilet, connecting to a good source of drinking water and living under hygiene conditions.

Conversely, other similar studies have found a negative association between maternal labour participation and child nutritional status. The literature on maternal employment and child health in Nepal basing attention on the importance of job type and timing across the child's first five years and found a significant negative connection on the nutritional status of children whose mothers were currently employed than those whose mothers were not currently unemployed [2]. A strong negative relationship was also found in Egypt between the nutritional status of children of employed mothers [22]. Their results further suggest that male children had poorer height for age Z-score than female. Investigating on this similar subject in rural Tanzania, stunting was higher among children of working mothers than those whose mothers do not work either on the farm or off the farm [4].

Maternal work type characteristics also have an effect on child nutritional status. In determining factors leading to under nutrition of children under the age of 5 in the Brazilian scenario, it was found that domestic work does not have any influence on child's weight for age (WAZ) but significantly associated to child's height for age (HAZ) [1]. The effects of maternal work for earnings on children's nutritional status in two adjacent urban communities was examined in Guatemala but found a negative link between domestic work and child's weight [7]. Infants of domestic workers weighted significantly less than those of non-workers. In line with the results, the link between formal and informal work on child nutritional status was compared and a negative association between informal maternal employment and nutritional status among children in Tanzania [15].

On the effect of maternal agricultural work and time on child nutritional status, negative results were found [17, 19] while others [4, 12] found no evidence. Consistent with these

results while assessing the nutritional status of children under 5 years of age in Tanzania, a negative effect was found between maternal time spent in agriculture and child's health [19]. The same negative results were found in Uganda while examining the relationship between maternal employment and nutritional status of under five children while adjusting for other explanatory variables [17]. Their results suggest that children whose mothers engage in agriculture had higher nutritional problems as compared to children whose mothers engage in professional work. On a similar study exploring the changes in maternal time use over four agricultural seasons in order to analyse the effects of maternal labour supply on child food intake in Bangladesh, no evidence was found but mothers working time spent in agriculture reduces the food intake for children aged 6-59 months [12]. Notwithstanding, the results of an investigation of maternal time spent in on-farm agriculture in rural Tanzania had no significance with health outcomes in children [4].

The Chi square approach was used in Tombel and the results found that poor child health negatively affects maternal labour force participation especially in agriculture, marketing, cooking and to a certain extend family's income [24]. Using data from the second Cameroonian household consumption survey to investigate the determinants of child malnutrition in Cameroon, a positive association was found between household consumption spending and short-term child nutritional status [9]. In particular, male-headed households seem to be more effective in achieving better child health than their female counterparts. In addition, older household heads were more likely than their younger counterparts to achieve positive nutritional outcomes.

While exploring the associations between the dimensions of women empowerment and childhood stunting and wasting from a logistic regression view using data from the Cameroon Demographic and Health Survey of 2018, the results suggest that mother's economic status was associated with greater odds of childhood stunting and lower odds of childhood wasting [26]. The effect of maternal labour force participation on child well-being in Cameroon was also assessed using data extracted from the 2018 Cameroon Demographic and Health Survey. The results of the Instrumental Two- Stage- Least Squares (IV2SLS) revealed that maternal labour force participation had a positive and statistically significant effect on child well-being in Cameroon [18]. An investigation of the link between maternal employment and child health in South Africa was done using a two-step Generalized Method of Moments and Probit model. The findings suggest an association between maternal employment and child health [20]. Additionally, the results suggest evidence of maternal employment's impact on the likelihood of child obesity.

There is an extensive literature on the effect of maternal labour force participation on child nutritional status but the same subject remains relatively scarce for Cameroon and none has used the Heckman estimation technique, which has the following particularities. The Heckman correction is a statistical technique to correct bias from non-randomly selected samples or otherwise incidentally truncated dependent variables, a pervasive issue in quantitative social sciences when using observational data. Conceptually, this is achieved by explicitly modelling the individual sampling probability of each observation (the so-called selection equation) together with the conditional expectation of the dependent variable (the so-called outcome equation). This paper therefore uses Heckman estimation technique to examine the effect of mother's participation in the labour market on the nutritional status of under five children in Cameroon while taking into considerations certain particularities of the Cameroon labour market. The rest of this work is organised as follows. Section 2 presents the methodology and data. Section 3 summarises the descriptive statistics. Section 4 gives results and discussion, and section 5 concludes.

2. Methodology and Data

2.1. Data Source

This paper uses data from the 2018 Cameroon Demographic and Health Survey (CDHS) collected by the National Institute of statistics (NIS) in direct collaboration with the Ministry of Public Health. The survey is a national representative of the country and data was collected on a sample of 9733 children, aged 0-59months born to women age 15-49 years. The survey collected data on height and weight of children, employment status of parents, fertility, marriage, sexual activity, family planning methods, breastfeeding practices, nutrition, child mortality, maternal and child health etc. Only children whose anthropometric measures were registered during the survey are useful for this study. Given the fact that some mothers did not give information on the anthropometric measures of their children, this drops the sample to 4587children. The 45 children in the data set that were coded as "flagged cases" for errors were simply transformed into missing variables to avoid bias estimate. This resulted in a drop in the total sample size to 4497children actually retained for estimations.

2.2. Estimation Strategy

This study has as objective to analyse the effect of maternal labour force participation on child nutritional status. Maternal labour force participation is a binary variable indicating whether a works or not. A mother participates in the labour market if she is employed to work. We use the Heckman selection model to investigate this relationship. Following [10, 11, 13] the Heckman selection model assumes that there exists an underlying regression relationship. The Regression equation is:

$$Y_i = X_i\theta + u_{1i} \tag{1}$$

The dependent variable Y_i , however, is not always observed. Rather, the dependent variable for observation i is observed in selection equation if:

$$Z_i\phi + u_{2i} > 0 \quad (2)$$

Where $u_1 \rightarrow N(0,\sigma)$, $u_2 \rightarrow N(0,1)$ and corr $(u_1, u_2) = \rho$

When $\rho \neq 0$, standard regression techniques applied to the first equation yield biased results. Heckman provides consistent, asymptotically efficient estimates for all the parameters in such models.

We will assume that the CNS is a function of Maternal labour force participation, whereas the likelihood of nutrition (the likelihood of being stunted or wasted being observed) is a function of socio-economic variables and (implicitly) of CNS.

Heckman assumes that CNS is the dependent variable and that the first variable list (Maternal labour force participation) is the determinant of CNS. The variables specified in the select () option (socio-economic variables) are assumed to determine whether the dependent variable is observed (the selection equation). Thus, we fit the model and we assumed that CNS is observed if:

$$CNS = \lambda X_i + \gamma Z + \varepsilon_i \quad (3)$$

CNS= child nutritional status, X_i = Vector of Maternal labour force participation variables, Z=vector of socio-economic variables. ε_i = error term. Thus, we fit the model as follows

$$STUNTED = \beta_0 + \beta_1 Mother\_employ + \beta_2 M\_occup + \beta_3 Sesonality + \gamma Z + \varepsilon_1 \quad (4)$$

$$WASTED = \alpha_0 + \alpha_1 Mother\_employ + \alpha_2 M\_occup + \alpha_3 Sesonality + \gamma Z + \varepsilon_2 \quad (5)$$

$$UNDERWEIGHT = \lambda_0 + \lambda_1 Mother\_employ + \lambda_2 M\_occup + \lambda_3 Sesonality + \gamma Z + \varepsilon_3 \quad (6)$$

We assumed that *STUNTED, WASTED or UNDERWEIGHT* is observed if $\phi Z + \varepsilon_i > 0$ where Z is vector of socio-economic variables specified in the select.

2.3. Variables and Measurements

Outcome Variable: The outcome variable in this study is child nutritional status. This study uses anthropometric indicators to access the effects of malnutrition among children in Cameroon. Child nutritional status (CNS) is measured using the Z-scores anthropometric indicators which include: the height-for-age (HAZ) score, the weight-for-height (WHZ) score and the weight for age (WAZ) score. They are generally calculated using the child growth standard of world health Organization which ranges from -6 to 6. In this calculation, all children whose height for age, weight for height or weight for age are below minus two standard deviations (-2 SD) from the median of the reference population are classified as stunted, wasted and underweight respectively and those with HAZ, WHZ and WAZ of -2 or more are considered to be normal. The Z-score values for any of the indicator is generated using the formula:

$$Z\_Score = \frac{A-M}{\sigma}$$

A is the individual observed value of child's measure, M is the median of the reference population for the same sex and age, and σ is the standard deviation (SD) in the reference population. The median value is calculated on well-nourished children of the same age and gender standardized by the standard deviation of the reference population.

Height-for-age (HAZ)

Low height-for-age measure reflects past undernutrition or chronic malnutrition. It is an indicator of stunting, which may result from chronic malnutrition. Stunting is linked to a number of long-term factors which include chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty.

Weight-for-height (WHZ)

Weight-for-height (WHZ) is an index which shows thinness in relation to child's height. it is also called wasting. Wasting result from short-term malnutrition due to acute starvation or severe disease, famine etc. Wasting indicates current or acute malnutrition resulting from failure to gain weight or actual weight loss.

Weight-for-age (WAZ)

This refers the condition of being underweight for a specific age. Low weight-for-age index reflects both chronic and acute undernutrition. Underweight is a combine measure of stunting and wasting and it is an indicator use to assess changes in the magnitude of malnutrition over time. In the framework of our study, the three main anthropometric indicators are best suitable.

Explanatory variable: The main explanatory variable is mother's participation in the labour market categorised into maternal employment and maternal job characteristics. Maternal employment is a binary variable comprising women who are presently working and those who did not work in the past seven days but who are regularly employed and were absent from work for leave, illness, vacation, or other reasons during the survey. It is coded as 1 "if the mother works" and 0 "if she does not work". A maternal job characteristic is captured through mother's occupation and work seasonality. Mother's occupation is polynomial and shows the profession of the mother. But in our study, It is coded as 1 "if the mother works in agriculture or self-employed'' and 0 "if not''. Seasonality of work measures the frequency of maternal work and coded "0" for occasional employment/seasonal employment and "1" for full-time employment.

We used a set of control variables which were grouped into maternal characteristics including maternal education coded as 0 for "No education" and 1 for "Primary/Secondary/Higher". Mothers age was recoded as 0 for "[15-24]'' and 1 for "[25-49]''. Marital status as 0 for "single", 1 "Married". We also control for child characteristics. Child's age was coded as 0 for "[0-24]'' and 1 for "[25-49]". Childs sex as 0 for "male", and 1 for

"female". Finally, we controlled for household socio demographic characteristics which include residence coded with 0 for "Urban" and 1 for "Rural". Wealth quintile and sex of household head were coded as 0 for "Poor" and 1 for "Rich".

3. Results

3.1. Descriptive Statistics

The analysis was performed with the help of STATA version 14. The Pearson chi-squared tests of independence were used at the bivariate level to examine the degree of dependence between nutritional status of children and the main explanatory variables. The Heckman selection model was the use to test the effect of maternal labour force participation and child nutritional status. The results of this analysis are presented in the form of coefficient.

In our analysis of the total sample of 4497 children represented in the data, nearly three out of ten children under 5 (28.35%) were stunted, 3.94% were wasted and 10.06% were underweight. This statistics tie with the report of the 2018 Cameroon demographic health survey which shows that 29%, 4% and 11% of children are were stunted, wasted and underweight respectively.

Among women who took part in the survey as presented in table 1, 67.47% were employed and just about 1463 of the women (32.53%) were not working. Table 1 further shows that out of the 4497 women represented in the survey, 1587 women were agricultural workers (48.8%). Women who work full time were many (53.75%). About 1504 women (46.25%) were employed in seasonal jobs or worked occasionally.

With respect to educational attainment, more than 50% of the women (77.16%) have received at least primary education while 22.84% of the women did not go to school at all. 30.20% of the women were young mothers [15-24years] and more than half (69.80%) were old or mature mothers [25-49 years]. Among them, more than half (59.86%) were either married or living together with a man. About 40.14% of the women were singles. This include those who were separated, divorced, widows and those who did not marry. 1933 children (42.98) were below 24 months of age. 865 of the children (19.24%) were having ages between [24-35 months] and 1699 children (37.78%) were between [36-59] months of age. 82,54% of the women were living with partner, Married, in union, divorce, widow while only 17,46% were single.

Regarding child's characteristics, we noticed that over half (50.49%) of the children were males and 49.41% were females. More than half of the children (54.75) lived in households in the rural areas while 45.25% live in urban areas.

Concerning the household characteristics, Table 1 further shows that 42.54% of the households live in the poorest or poorer wealth quintiles while 42.54% of households live in the richer or richest wealth quintiles. Majority of those who headed families (82.30%) were men and only 17.70% women answered that they were household heads.

Table 1. *Descriptive analysis of the dependent, explanatory variables and socio-demographic characteristics.*

Variable	Nature	Frequency (n)	Percentages (%)
Height for Age (HAZ)	1=Yes	1 275	28,35
	0=No	3 222	71,35
Weight for height (WHZ)	1=Yes	175	3,94
	0=No	4 271	96,06
Weight for Age (WAZ)	1=Yes	452	10,06
	0=No	4 040	89,94
Variables of interest			
Maternal Employment status	unemployed	1 463	32,53
	Employed	3 034	67,47
Occupation	No	1 665	51,20
	Agriculture-self-employed	1 587	48,80
Seasonality of Employment	Occasional/seasonal	1 504	46,25
	Full time	1 748	53,75
Control Variables			
Maternal characteristics			
Maternal education	No Education	1 027	22,84
	Education	3 470	77,16
Mothers age,	[15-24]	1 358	30,20
	[25-49]	3 139	69,80
Marital status	single	785	17,46
	married	3 712	82,54
Child's Characteristics			
Childs age,	[0-24]	2 020	44,92
	[25-49]	2 477	55,08
Childs sex,	Male	2 225	50,59
	female	2 275	49,41
Household Characteristics			
Residence	Urban	2 035	45,25
	Rural	2 462	54,75

Variable	Nature	Frequency (n)	Percentages (%)
Wealth quintile	Poor	1 913	42,54
	Rich	2 584	57,46
Sex of household head	Male	3 701	82,30
	Female	796	17,70

Source: author's calculation using CDHS (2018).

3.2. Bivariate Analyses of the Relationship Between Maternal Employment and Child Nutritional Status

Table 2 shows that, there is a statistical difference between the modalities of stunting and those of the maternal labour force participation regarding the significance level of p value ($p<0.1$). Table 3 shows that there is a statistical difference between the modalities of wasting and those of mother's participation in the labour market outside of Maternal Employment status indicating a non-significant p value ($p>0.1$) but significant at the level of p value ($p<0.1$). The same statistical difference exists between Underweight and maternal labour market participation at the significance level of p value ($p<0.1$) as shown in table 4.

Table 2. *Bivariate analyses between Stunting and mother's participation in the labour market.*

Variables of interest	Measurements	Stunted (%)		P value
		0=No	1=Yes	
Maternal Employment status	Unemployed	8,27	24,26	0,003
	Employed	20,08	47,39	
Occupation	No	11,47	39,73	0,000
	Agriculture-self-employed	18,08	30,72	
Seasonality of Employment	Occasional/seasonal	15,28	30,97	0,000
	Full time	14,27	39,48	

Source: author's calculation using CDHS (2018).

Table 3. *Bivariate analyses between wasting and mother's participation in the labour market.*

Variables of interest	Measurements	Wasted (%)		P value
		0=No	1=Yes	
Maternal Employment status	unemployed	1,44	31,08	0,244
	Employed	2,50	64,98	
Occupation	No	1,46	49,69	0,031
	Agriculture-self-employed	2,08	46,77	
Seasonality of Employment	occasional/seasonal	2,05	44,34	0.012
	Full time	1,49	52,11	

Source: author's calculation using CDHS (2018)

Table 4. *Bivariate analyses between Underweight and mother's participation in the labour market.*

Variables of interest	Measurements	Underweight (%)		P value
		0=No	1=Yes	
Maternal Employment status	Unemployed	2,67	29,90	0,004
	Employed	7,39	60,04	
Occupation	No	3,17	47,98	0,000
	Agriculture-self-employed	7,33	41,52	
Seasonality of Employment	Occasional/seasonal	6,22	40,10	0,000
	Full time	4,28	49,40	

Source: author's calculation using CDHS (2018).

3.3. Analysis of the Effect of Maternal Employment on Child Nutritional Status Using Heckman Selection Model

Considering the estimating function for stunting, we observe that maternal employment has a negative but insignificant effect on stunting. More precisely, a one percent increase in maternal employment has a negative impact of 0.3% on child stunting, which reaffirms that working mothers have not had time to really breastfeed their children. With regard to the mother's occupation, we note that when the mother is employed, particularly in agriculture, this has a negative and significant effect of 8.8% on stunting. This is probably due to the peasant farming which dominate in Cameroon and traditional land fragmentations practices which doesnot encourage high yield per family. The fact that most women very poor peasant and spend much time in the farms due to long distances may explain this negative effect. These results are in line with those in Uganda [17]. The seasonality of the mother's employment has a positive but non-significant effect on stunting, i.e. full-time work increased the child's stunting. These results corroborate to

those of [20] in the case of South Africa and [26] in the case of Cameroon who found a negative impact of the mother's employment on the child's nutritional status.

Looking at the mother's characteristics, we observe that children whose mothers are educated are less likely to suffer from stunting. Specifically, mothers who received at least primary education reduced stunting in their children by 2.9%. The mother's age had a positive but non-significant effect of 1.2% on stunting; in other words, the children of mothers aged over 25 were more likely to be stunted.

Looking at the child's characteristics, we see that the child's age has a positive but non-significant effect on stunting. In other words, children who have already reached 25 months or more are less likely to be stunted than children less than 25 months. Female children are significantly ($p<0.1$) more likely (3.5%) to avoid stunting than male children. Children living in rural areas are significantly ($p<0.1$) more likely (5.7%) to be stunted than those living in urban areas. Children from wealthier homes are 4.9 times less likely to be stunted than children from poorer homes, but this effect is insignificant ($p>0.1$). wealthy families have the access to a lot of facilities including food, quality nutrition, health, medical attention, good water source, electricity. Such families often live in clean and ventilated environment which promotes better nutrition for children. The estimated effect of the inverse Mills ratio in this function is -0.452. The IMR is statistically significant at the 1% level, which confirms our preference for the modelling and estimation strategy using the Heckman selection model, as it simultaneously eliminates the structural parameters of endogeneity, unobserved heterogeneity and sample selection bias.

Table 5. *Heckman Selection Model for STUNTING Function.*

STUNTED	Coef.	St.Err	t-value	p-value	[95% Conf	Interval]	Sig
Maternal employment	-0.003	0.032	-0.10	0.921	-0.066	0.059	
Mother occupation	-0.088	0.02	-4.49	0.000	-0.126	-0.049	***
Seasonality of work	0.01	0.013	0.77	0.439	-0.016	0.037	
Education	0.029	0.021	1.35	0.177	-0.013	0.07	
Mother age	0.012	0.011	1.04	0.298	-0.011	0.034	
Marital status	-0.01	0.013	-0.77	0.439	-0.037	0.016	
Child age	-0.02	0.016	-1.24	0.214	-0.052	0.012	
Sex of child	0.035	0.016	2.23	0.026	0.004	0.066	**
Residence	-0.057	0.019	-2.93	0.003	-0.095	-0.019	***
Constant	0.777	0.055	14.12	0.000	0.669	0.885	***
Wealth Quintile	-0.049	0.039	-1.27	0.203	-.0125	0.027	
Constant	0.934	0.054	17.43	0.000	0.829	1.039	***
IMR	-0.452	0.005	90.5	0.000	-0.462	-0.441	***
Mean dependent var	0.705		SD dependent var		0.456		
Number of obs	3292		Chi-square		86.488		
Prob > chi2	0.000		Akaike crit. (AIC)		4180.690		

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: author's calculation using CDHS (2018).

Considering the function estimating wasting, we observe that the mother's employment has a negative but insignificant effect on wasting; more precisely a one percent increase in maternal employment has a negative impact on the child's nutritional status of 1.7%, which shows that working mothers have not had time to really breastfeed their children. This result corroborates those of [18, 26]. who found a negative impact of the mother's employment on the child's wasting. The seasonality of the mother's employment had a positive effect on emaciation, i.e. full-time work increased the child's wasting.

Considering the mother's characteristics, we observe that, as far as the mother's education is concerned, the children of mothers who have received at least primary education are more likely to be well nourished. Specifically, the fact that mothers had at least a primary education significantly increased the nutritional status of their children by 3.7%.

Looking at the child's characteristics, we observe that the child's age has a positive and significant effect on wasting. In other words, children who have already reached 25 months and over are less likely to be wasted than children under 25 months. Table 6 presents the details of the effect of maternal employment on child wasting. The estimated effect of the inverse Mills ratio of -0.183, which is statistically significant at the 1% level, confirms our preference for the modelling and estimation strategy using the Heckman selection model because it simultaneously eliminates the structural parameters of endogeneity, unobserved heterogeneity and sample selection bias.

Table 6. *Heckman Selection Model for WASTING Function.*

WASTED	Coef.	St.Err	t-value	p-value	[95% Conf	Interval]	Sig
Maternal employment	-0.017	0.013	-1.27	0.204	-0.042	0.009	
Mother occupation	0	0	-0.00	0.999	0	0	
Seasonality of work	0.002	0.007	0.24	0.808	-0.012	0.015	
Mother age	0	0	0.00	0.999	0	0	
Education	0.037	0.008	4.44	0.000	0.021	0.053	***

WASTED	Coef.	St.Err	t-value	p-value	[95% Conf	Interval]	Sig
Marital status	0	0	0.00	1	0	0	
Child age	0.017	0.007	2.65	0.008	0.005	0.03	***
Sex of child	0.003	0.006	0.47	0.636	-0.01	0.016	
Residence	0	0	0.00	0.999	0	0	
Constant	0.939	0.018	52.94	0.000	0.904	0.973	***
Wealth Quintile	0	0	-0.00	0.999	0	0	
Constant	0.408	0.046	8.82	0.000	0.318	0.499	***
IMR	-0.183	0.002	91.5	0.000	0.188	0.179	***
Mean dependent var	0.965		SD dependent var		0.185		
Number of obs	3267		Chi-square		32.986		
Prob > chi2	0.000		Akaike crit. (AIC)		-1647.891		
*** p<.01, ** p<.05, * p<.1							

Source: author's calculation using CDHS (2018).

Considering the function for estimating underweight (low weight for age), which is the composite of stunting and wasting, we observe that mother participation in the labour market, has a significant negative effect, on this composite indicator in particular, a one-percentage-point increase in maternal employment has a negative impact of 3.1% on child underweight, confirming that working mothers have not had time to really breastfeed their children. With regard to the mother's occupation, we note that when the mother is employed, particularly in agriculture, this has a negative and significant effect of 4.5% on underweight. The seasonality of the mother's employment had a positive (1.1%) but non-significant effect on stunting, i.e. full-time work increased stunting. These results corroborate those of [20] in the case of South Africa, [18, 26] in the case of Cameroon who found a negative impact of the mother's employment on the child underweight.

Looking at the mother's characteristics, children whose mothers received education, are more likely to avoid being underweight. Mothers that received at least primary education significantly reduced underweight in their children by 13.1% than their counterparts. The mother's age had a positive and significant effect of 1.8%, meaning that the children of mothers aged over 25 were more likely to be underweight. Children of married mothers were less likely to avoid underweight, but this effect was not significant.

Looking at the child's characteristics, we observe that the child's age has a positive but non-significant effect on underweight. In other words, children who have already reached 25 months of age or more are significantly less likely to be underweight than children under 25 months of age. Girls are significantly ($p<0.1$) more likely (1.2%) to be underweight than boys. Children living in rural areas are more likely (0.9%) to be underweight than those living in urban areas, but this is not significant ($p>0.1$). Children from wealthier homes are more likely (6%) to avoid being underweight than children from poorer families, but this effect is not significant ($p>0.1$). The results of the effect of maternal employment on child underweight is shown in Table 7. The estimated effect of the inverse Mills ratio in this function is 0.300. The IMR is statistically significant at the 1% level, which confirms our preference for the modelling and estimation strategy using the Heckman selection model, as it simultaneously eliminates the structural parameters of endogeneity, unobserved heterogeneity and sample selection bias.

Table 7. *Heckman Selection Model for Underweight Function.*

UNDERWEIGHT	Coef.	St.Err	t-value	p-value	[95% Conf	Interval]	Sig
Maternal employment	-0.031	0.014	-2.22	0.026	-0.059	-0.004	**
Mother occupation	-0.045	0.013	-3.45	0.001	-0.07	-0.019	***
Seasonality of work	0.011	0.011	0.99	0.325	-0.011	0.032	
Education	0.131	0.014	9.15	0.000	0.103	0.159	***
Mother age	0.018	0.007	2.38	0.017	0.003	0.032	**
Marital status	-0.007	0.014	-0.54	0.592	-0.035	0.020	
Child age	-0.003	0.010	-0.34	0.737	-0.022	0.015	
Sex of child	0.012	0.011	1.13	0.257	-0.009	0.033	
Residence	-0.009	0.013	-0.74	0.462	-0.035	0.016	
Constant	0.822	0.034	23.95	0.000	0.755	0.890	***
Wealth Quintile	0.06	0.059	1.03	0.302	-0.054	0.175	
Constant	3.239	0.058	55.89	0000	3.126	3.353	***
IMR	0.3009	0.0036	83.58	0000	0.293	0.308	***
Mean dependent var	0.895		SD dependent var		0.307		
Number of obs	3252		Chi-square		170.085		
Prob > chi2	0.000		Akaike crit. (AIC)		1462.117		
*** p<0.01, ** p<0.05, * p<0.1							

Source: author's calculation using CDHS (2018).

4. Conclusions

The study examined the effects of the mother's participation in the labour market on the child's nutritional status in Cameroon. The three anthropometric indicators widely known for measuring malnutrition in children, namely stunting (low height for age), wasting (low weight for height) and underweight (low weight for age) were used as dependent variables while controlling for other explanatory variables. At the end of our analyses, we observed mainly a negative effect of maternal employment on child's nutritional status in Cameroon. The fact that a mother is employed to work, most especially those who work full time and in agriculture has a significant negative impact on the nutritional status of their children. We contextualized our study by taking into account the fact that Cameroon predominantly an agricultural-based economy. Nursing mothers are therefore bound to suffer from a triple time constraint for agricultural work, paid and unpaid domestic work which involves childcare. These results lead us to make the following recommendations: Interventions aimed at improving children's nutrition should promote breastfeeding in work places and flexible working conditions that permit nursing mothers to maintain close contacts with their children while working. Additionally, the government and interested partners should encourage agricultural undertakings by rendering them accessible and descent.

Conflicts of Interest

There is no conflict of Interest.

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