Impact of COVID-19 on Nutritional Outcomes in Rural Zimbabwe

Does Household Cereal Food Insecurity Status Matter?

Contents

Abstract

On the basis 2019 and 2020 Zimbabwe Vulnerability Assessment Committee (ZimVAC) Rural Livelihoods Assessment (RLA) data, this paper seeks to investigate the impact of COVID-19 on household nutritional outcomes for under-5 children. Furthermore, it investigates the heterogeneity in the impact thereof on the basis of the household food security status. The paper employs independent t-tests to measure differences of year-on-year proportions and propensity score matching techniques to cater for the endogeneity associated with being affected by COVID-19. The paper offers five major findings. Firstly, there was a deterioration in the feeding practices of children in the COVID-19 period (2020) in comparison to 2019. Secondly, marital status, income and province are statistically valid correlates of household probability of being affected by COVID-19. Thirdly, Age and education of household head are negatively related with household probability of having malnourished children. Fourthly, we find no statistically significant treatment effect of COVID-19 on malnutrition. Finally, there is no food insecurity heterogeneity in the impact thereof. The last two findings point to the need for a dynamic analysis of the impact of COVID-19 on malnutrition using panel data due to the dynamic nature of the disease

1 INTRODUCTION

The COVID 19 Pandemic became one of the most devastating global disasters in the year 2020. Globally 2,237,799 (WHO Worldometer 01/02/2021), and in Zimbabwe as of 30 January 2021, 1193 people have died (Civil protection department) and the percentage of children affected keeps growing. Children are affected in various ways which can be direct through the actual contracting of the virus and also through more indirect means which could relate to a caregiver or guardian being affected to the extent of stifling or completely destroying their livelihoods and nurturing ability. The 2020 RLA was undertaken against a continuously evolving food and nutrition security situation.

The performance of the agricultural season negated by the consecutive drought, coupled with the COVID -19 pandemic have affected the livelihoods of the rural and urban population. COVID-19, was declared a pandemic on 11 March 2020, and has literally turned the world 'upside down' since it started in Wuhan, China (ZIMVAC,2020). According to the (World Food Programme, 2020) the number of acute food insecure people in these at-risk countries could increase from an estimated 149 million pre-COVID-19 to 270 million before the end of the year if life-saving assistance is not provided urgently. Recent estimates also suggest that up to 6,000 children could die every day from preventable causes over the next six months as a result of pandemic-related disruptions to essential health and nutrition services (WFP, 2020)."The pandemic could reverse years of progress made in the battle against malnutrition, with children in Asia and sub-Sahara Africa being hardest hit – especially those in poorer households or in crises and conflict zones "(Fore, UNICEF,2020). Discussed below are the objectives, methodology, and the major findings of this mini assessment based on 2020 ZimVAC RLA results.

2 Assessment Methodology

Findings of this study were generated mainly from ZimVAC RLA 2020 survey and partly ZimVAC 2019 RLA survey which were both cross-sectional studies whose design was guided and informed by the Food and Nutrition Security Conceptual framework. In order to minimise risk of spreading COVID-19 throughout the process strict Infection Prevention and Control (IPC) protocols were followed which guided operations from survey planning to data collection and report writing. Further innovative approaches were applied in data collection there include the use of primary caregivers in measuring children using Mid-Upper Arm Circumference (MUAC) tapes and assessment of oedema. The dataset for the 2020 assessment was comprised of 11971 households and 5,499 children whilst in 2019 15157 households were reached with 11908 children.

2.1 Objectives

- *To assess household level characteristics associated with the probability of being affected by COVID-19.*
- *To assess household level characteristics associated with having malnourished children.*
- *To assess the short-run impact of COVID-19 on malnutrition.*
- *To assess food insecurity heterogeneity in the impact of COVID-19 on malnutrition.*

In our pursuit to develop key narratives from the latest ZIMVAC to assess the Impact of COVID-19 on nutrition status of children, summarised below is a description of key findings that came out of the RLA 2020 and 2019 which give a context to the effects of COVI-19 on children's nutrition in Zimbabwe.

3. Results and discussion

3.1. Descriptive analysis

Table 1. Background characteristics by COVID-19 status

	Household affected by COVID-19?	Difference [Y – N]			
	Yes [Y]	No [N]			
	Mean	S.D	Mean	S.D	
Observations # (%)	1,391	(25.93%)	4,058	(74.47%)	
Household head age [Years]	45.837	15.252	47.322	15.918	-1.485***
Married living together	0.723	0.448	0.720	0.449	0.002
Married living apart	0.080	0.271	0.064	0.245	0.016*
Divorced/seperated	0.059	0.236	0.045	0.208	0.014*
Widow/widower	0.131	0.338	0.158	0.365	-0.027**
Never married	0.007	0.085	0.012	0.108	-0.005
Household head is female	0.268	0.443	0.289	0.453	-0.021
None	0.121	0.327	0.110	0.313	0.012
Primary level	0.360	0.480	0.383	0.486	-0.023
ZJC level	0.143	0.350	0.153	0.360	-0.010
O' level	0.338	0.473	0.328	0.470	0.009
A' level	0.020	0.138	0.010	0.102	0.009**
Diploma/Certificate after primary	0.004	0.066	0.004	0.063	0.000
Diploma/Certificate after secondary	0.010	0.100	0.009	0.097	0.001
Graduate/Post-Graduate	0.004	0.060	0.002	0.045	0.002
Household size	5.706	2.139	5.772	2.201	-0.066
Mentally ill member	0.097	0.354	0.097	0.329	0.000
Chronically ill member	0.139	0.424	0.125	0.402	0.014
HIV/AIDS affected	0.045	0.206	0.057	0.232	-0.013*
Income [ZWL]	2,484	5,326	2,521	10,700	37
Manicaland	0.082	0.274	0.126	0.332	-0.044***
Mash Central	0.275	0.447	0.116	0.320	0.159***
Mash East	0.109	0.311	0.180	0.385	-0.072***
Mash West	0.111	0.315	0.115	0.319	-0.004
Mat North	0.090	0.286	0.128	0.334	-0.038***
Mat South	0.112	0.316	0.100	0.300	0.012
Midlands	0.120	0.325	0.138	0.345	-0.018*
Masvingo	0.101	0.301	0.096	0.295	0.004

Notes: The final column shows the results of two-tailed t-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 percent levels of significance.

3.1.1. Background characteristics by COVID-19 status

Table 1 above displays the background characteristics of households by their COVID-19 status. The table shows of the 5,499 households with under-5 children in rural Zimbabwe, 25.93% were affected by COVID-19. The table further shows that households that were affected by COVID-19 were headed by younger people than those that were not affected, 1.485 years at the 1% level of significance. Furthermore, at the 10% level of significance they were likely to be married living apart or divorced/ separated. There was also a significant difference in the provincial distribution of the COVID-19 affected households, with the provinces of Manicaland, Mashonaland East, Matabeleland North and Midlands having a statistically significant lower proportion than the national average, whereas Mashonaland Central province has a statistically higher likelihood of a household being affected by COVID-19 before controlling for confounding variables. Figure 1, below further shows that COVID-19 had a very big effect on sources of income and access to food.

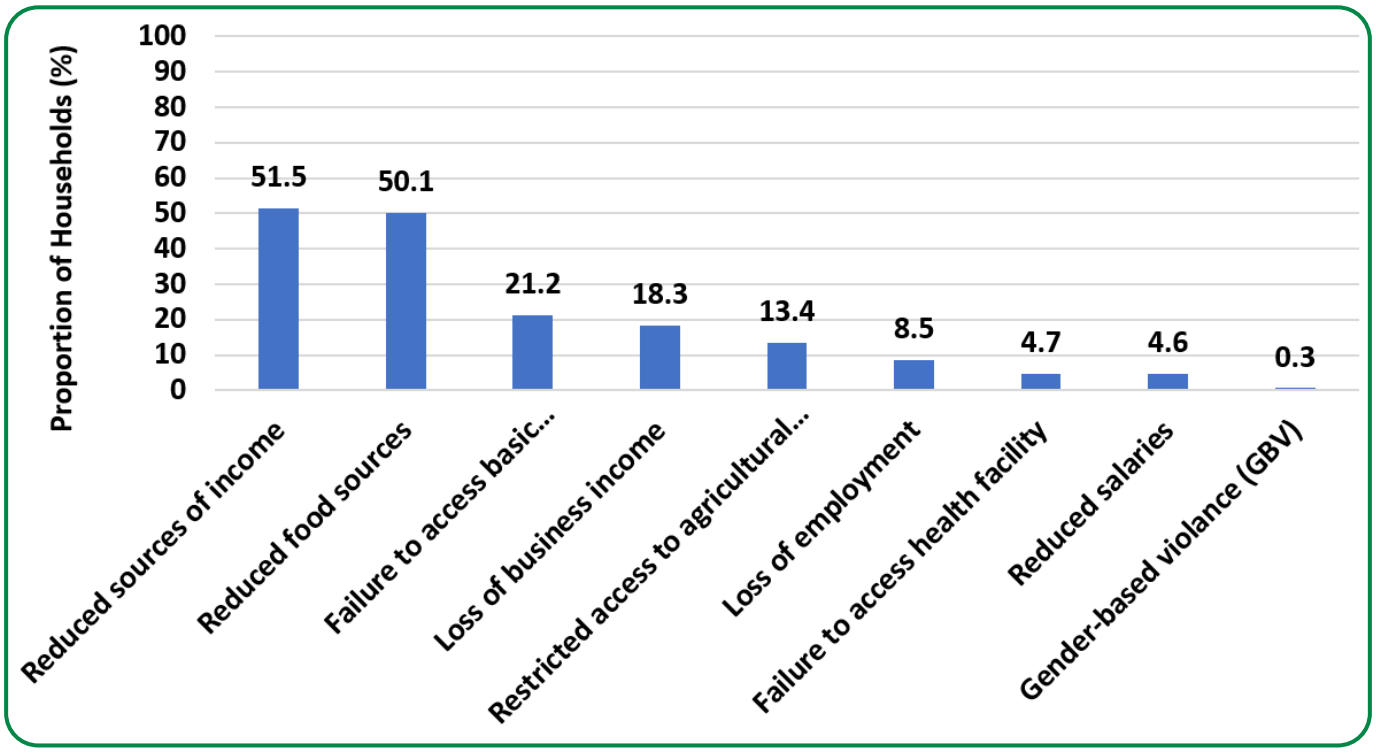

Figure 1. Effects of COVID-19 on Livelihoods (March-August 2020)

3.1.2. Differences in feeding practices for children 6-23 months by year

Table 2. Differences in feeding practices for children 6-23 months by year

	Survey year	Difference [Y – N]			
	2020	2019			
	Mean	S.D	Mean	S.D	
mdd	0.005	0.073	0.051	0.220	-0.046***
mmf	0.065	0.246	0.177	0.382	-0.112***
mad	0.002	0.045	0.023	0.151	-0.021***

Notes: The final column shows the results of two-tailed t-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 percent levels of significance.

Table 2 above displays the differences in feeding practices (minimum meal frequency, minimum dietary diversity and minimum acceptable diet) by year for children. The table shows that there were statistically significant differences in feeding for the aforementioned feeding practices at 1% level of significance. Minimum meal frequency declined from 38% in 2019 to 7% in 2010, minimum dietary diversity fell from 22% to 5% and minimum acceptable diet worsened from 15% in 2019 to 2% in 2020.Results also highlighted that feeding practices deteriorated significantly between the 2019 and 2020 period. Deterioration of feeding practices can impact negatively the nutrition status of children. This worsening situation could be as a result of COVID-19 pandemic hence the need to ascertain this panel data is required.

3.1.3. Differences in malnutrition by COVID-19 status

Table 3. Differences in malnutrition by COVID-19 status

	Household affected by COVID-19?	**Difference [Y – N]**			
	Yes [Y]	No [N]			
	Mean	S.D	Mean	S.D	
SAM [MUAC]	0.0050	0.0708	0.0049	0.0700	0.0001
MAM [MUAC]	0.0165	0.1276	0.0153	0.1227	0.0013
SAM [MUAC for Age]	0.0237	0.1522	0.0251	0.1566	-0.0014
GAM [MUAC for Age]	0.0518	0.2216	0.0537	0.2255	-0.0020

Notes: The final column shows the results of two-tailed t-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 percent levels of significance.

Table 3 above displays the differences in malnutrition by COVID-19 status of the household. The table shows that before controlling for confounding variables, there were no statistically significant differences in malnutrition levels of the households by the COVID-19 status of the household. SAM (MUAC) for age stood at 0.5% for the COVID-19 affected households, whereas it was 0.49% for the non-affected households. The descriptive results in the table indicate that in the short-run there was no difference in the malnutrition levels of COVID-19 affected versus unaffected households calling for long-run analysis employing panel data.

3.1.4. Malnutrition levels by cereal food insecurity status of the household

Table 3 displays the levels of malnutrition levels of the households by their cereal food insecurity status. The table shows notable differences in the levels of malnutrition in terms of MUAC for age between food insecure households and secure households. Cereal food insecure households have higher likelihood of having a malnourished child in comparison to their counterparts that are food secure before controlling for observed confounders. SAM (MUAC for Age) at 2.73% is 0.72% higher for food insecure households in comparison to 2.01% for food secure households at the 10% level of significance before controlling for observed confounder. Moreover, GAM (MUAC for Age) is 1.28% higher for food insecure households vis-à-vis food secure households at the 5% level of significance.

3.2. Regression analysis

3.2.1. OLS estimates of conditional correlates of COVID-19 at the household level

Table 4. Malnutrition levels by cereal food insecurity status of the household

	Household is food insecure?	Difference [Y – N]			
	Yes [Y]	No [N]			
	Mean	S.D	Mean	S.D	
SAM [MUAC]	0.0051	0.0710	0.0047	0.0688	0.0003
MAM [MUAC]	0.0163	0.1267	0.0142	0.1185	0.0021
SAM [MUAC for Age]	0.0273	0.1630	0.0201	0.1402	0.0072*
GAM [MUAC for Age]	0.0577	0.2332	0.0449	0.2070	0.0128**

Notes: The final column shows the results of two-tailed t-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 percent levels of significance.

Table 4 shows the conditional correlates of COVID-19 at the household level. Column (I) shows that consistent with the descriptive findings in Table 1, households that have household heads that are living apart or divorced/separated are at the 5% level of significance over 13% more likely to be affected by COVID-19 after controlling for observed confounders. Furthermore, income is a positive correlate for the probability of being affected by COVID-19. At the 1% level of significance, an increase in income by 1% from the mean is associated with an increase in the probability of the household being affected by COVID-19 of 0.604%, ceteris paribus. More-over the provincial differences in the potential of the household being affected by COVID-19 persist after controlling for observed confounders. Specifically, save for Mashonaland East and Matebeleland North provinces, all the other provinces have statistically higher potential of a household being affected by COVID-19 in comparison to the base province of Manicaland.

The results in Column (II) of the table 4 indicate that considering only the sub-sample of COVID-19 affected households, ceteris paribus, being married or previously married decreases the severity of the impact of the COVID-19 shock at the 1% level of significance. Furthermore, all things being equal, in comparison to the base province of Manicaland, save for Mashonaland Central, Mashonaland East, and Masvingo provinces, all the other provinces have statistically higher probability of recording severe impact of COVID-19.

Column (III) of the table expectedly show that higher levels of education reduce the probability that the household is unable to cope with the COVID-19 shock after controlling for observed confounders. Specifically, having a Diploma or certificate after secondary reduce the probability that the household is unable to cope with the COVID-19 shock by 26.4% at the 5% level of significance after controlling for observed confounders.

3.2.2. OLS estimates of conditional correlates of malnutrition at the household level .

Table 5. OLS estimates of conditional correlates of COVID-19 at the household level

	Affected by COVID-19 [1 if Yes]	Impact of COVID-19 is severe [1 if Yes]	Unable to cope with COVID-19 shock [1 if Yes]
VARIABLES	(I)	(II)	(III)
Household head age [Years]	-0.000750	0.000725	0.000261
	(0.000462)	(0.00103)	(0.00111)
Married living together	0.0549	-0.292***	0.131
	(0.0537)	(0.0497)	(0.173)
Married living apart	0.133**	-0.289***	0.0719
	(0.0570)	(0.0584)	(0.174)
Divorced/seperated	0.132**	-0.230***	0.143
	(0.0592)	(0.0631)	(0.177)
Widow/widower	0.0717	-0.316***	0.132
	(0.0554)	(0.0609)	(0.175)
Household head is female	-0.0316	0.0279	0.0338
	(0.0212)	(0.0521)	(0.0565)
Primary level	-0.0164	-0.0515	-0.0679
	(0.0208)	(0.0429)	(0.0458)
ZJC level	-0.0187	-0.0433	-0.0146
	(0.0247)	(0.0511)	(0.0556)
O' level	-0.00890	-0.0394	-0.112**
	(0.0231)	(0.0463)	(0.0493)
A' level	0.0966	0.0826	-0.0254
	(0.0633)	(0.0873)	(0.104)
Diploma/Certificate after primary	0.00416	-0.568***	-0.429***
	(0.0966)	(0.163)	(0.152)
Diploma/Certificate after secondary	0.0106	-0.107	-0.264**
	(0.0640)	(0.131)	(0.126)
Graduate/Post-Graduate	0.102	0.119	0.190
	(0.133)	(0.178)	(0.172)
Household size	5.79e-06	-0.00563	-0.00236
	(0.00283)	(0.00635)	(0.00668)
Mentally ill member	-0.00209	0.00558	-0.00190
	(0.0190)	(0.0387)	(0.0410)
Chronically ill member	0.0288*	0.0125	-0.0119
	(0.0160)	(0.0328)	(0.0343)
HIV/AIDS affected	-0.0424*	-0.0243	-0.0779
	(0.0243)	(0.0634)	(0.0653)
ln(Income [ZWL])	0.00604***	-0.00394	0.00114
	(0.00184)	(0.00416)	(0.00450)
Mash Central	0.262***	-0.00387	0.141***
	(0.0233)	(0.0534)	(0.0513)
Mash East	-0.0126	0.0884	0.216***
	(0.0202)	(0.0588)	(0.0587)
Mash West	0.0641***	0.125**	0.151**
	(0.0236)	(0.0594)	(0.0595)

Mat North	0.0173	0.135**	0.297***
	(0.0224)	(0.0620)	(0.0628)
Mat South	0.0955***	0.116*	-0.0136
	(0.0252)	(0.0596)	(0.0595)
Midlands	0.0506**	0.278***	0.333***
	(0.0223)	(0.0536)	(0.0564)
Masvingo	0.0764***	0.0481	0.117*
	(0.0249)	(0.0616)	(0.0605)
Constant	0.136**	0.912***	0.273
	(0.0621)	(0.0982)	(0.193)
Observations	5,404	1,443	1,410
R-squared	0.050	0.051	0.064

Robust standard errors in parentheses. ***, **, and * indicate the 1, 5, and 10 percent levels of significance

Table 5 above shows the OLS estimates of conditional correlates of household level characteristics and malnutrition. Columns (II) and (IV) shows that an increase in the age of the household head reduces the probability that the household has an under 5-year-old child that is malnourished. Specifically, Column (II) shows that ceteris paribus, an increase in the age of the household head by 1 year from the mean was associated with a 0.0291% decrease in the probability that the household has a malnourished child. Moreover, Columns (II) to (IV) show that higher levels of education of the household head reduced the probability that the household had a malnourished child. Specifically, Column (IV) showed that if all things being equal and the household head possessed a diploma or certificate after primary, it was associated with a 6.15% decline in the probability that the household had a malnourished child at the 1% level of significance.

Columns (II) and (IV) also show that an increase in the household size if all things being constant was associated with an increase in the possibility of the household having a malnourished child.

The table further shows that the provincial differences in malnutrition levels are statistically invalid after controlling for observed confounders pointing to association of malnutrition with other household characteristics.

3.3. Treatment effects

3.3.1. PSM estimates of homogenous treatment effects of COVID-19 on malnutrition in the household

Table 6. OLS estimates of conditional correlates of malnutrition at the household level

	SAM [MUAC]	MAM [MUAC]	SAM [MUAC for Age]	GAM [MUAC for Age]
VARIABLES	(I)	(II)	(III)	(IV)
Household head age [Years]	0.000102	-0.000291**	-3.33e-05	-0.000438*
	(7.74e-05)	(0.000148)	(0.000162)	(0.000240)
Married living together	0.00227	-0.0286	-0.00188	0.00190
	(0.00188)	(0.0301)	(0.0221)	(0.0303)
Married living apart	-0.00133	-0.0280	-0.000969	-0.00198
	(0.00136)	(0.0287)	(0.0219)	(0.0296)
Divorced/seperated	0.0136*	-0.0227	0.0103	0.0484
	(0.00730)	(0.0288)	(0.0228)	(0.0324)

Widow/widower	0.000122	-0.0232	0.00634	0.0249
	(0.00342)	(0.0279)	(0.0213)	(0.0292)
Household head is female	-0.000722	-0.00861	-0.00387	-0.0217**
	(0.000973)	(0.00711)	(0.00530)	(0.00956)
Primary level	0.00173	-0.00875	-0.00433	-0.00718
	(0.00332)	(0.00693)	(0.00776)	(0.0111)
ZJC level	0.000276	-0.00952	-0.000301	-0.00751
	(0.00359)	(0.00825)	(0.00928)	(0.0129)
O' level	0.00111	-0.0169**	-0.00535	-0.0111
	(0.00312)	(0.00755)	(0.00806)	(0.0118)
A' level	0.0261	-0.0293***	0.0316	-0.00391
	(0.0202)	(0.00747)	(0.0290)	(0.0300)
Diploma/Certificate after primary	-0.00353	-0.0266***	-0.0288***	-0.0615***
	(0.00331)	(0.00704)	(0.00770)	(0.0114)
Diploma/Certificate after secondary	-0.00256	-0.0293***	0.0461	0.00972
	(0.00313)	(0.00701)	(0.0379)	(0.0389)
Graduate/Post-Graduate	-0.00206	0.0480	-0.0290***	0.00880
	(0.00330)	(0.0752)	(0.00768)	(0.0766)
Household size	1.93e-05	0.00213*	0.00198	0.00506***
	(0.000450)	(0.00110)	(0.00127)	(0.00177)
Mentally ill member	-0.00522	0.00388	-0.00792	-0.00163
	(0.00358)	(0.00609)	(0.00597)	(0.0103)
Chronically ill member	0.0103	0.00814	0.00707	0.0208**
	(0.00698)	(0.00575)	(0.00783)	(0.0105)
HIV/AIDS affected	-0.00106	-0.00501	-0.00343	-0.00264
	(0.00448)	(0.00730)	(0.00885)	(0.0136)
Income [ZWL]	0.000181	0.000525	0.000606	0.00178**
	(0.000255)	(0.000469)	(0.000633)	(0.000883)
Mash Central	0.00260	-0.00530	-0.0127	-0.0144
	(0.00299)	(0.00627)	(0.00809)	(0.0119)
Mash East	0.00139	-0.00228	-0.00877	-0.0231**
	(0.00257)	(0.00627)	(0.00822)	(0.0113)
Mash West	0.00950**	-0.00153	-0.00141	-0.0117
	(0.00468)	(0.00707)	(0.00940)	(0.0128)
Mat North	0.00250	-0.00212	-0.00634	0.000753
	(0.00321)	(0.00749)	(0.00888)	(0.0135)
Mat South	0.00125	0.00124	-0.00961	-0.00217
	(0.00331)	(0.00802)	(0.00904)	(0.0140)
Midlands	0.00346	-0.00290	0.00227	4.17e-05
	(0.00323)	(0.00675)	(0.00933)	(0.0129)
Masvingo	0.00341	-0.00193	-0.000192	-0.000470
	(0.00353)	(0.00723)	(0.00995)	(0.0140)
Constant	-0.00800	0.0553	0.0203	0.0459
	(0.00491)	(0.0357)	(0.0283)	(0.0385)
Observations	5,404	5,404	5,404	5,404
R-squared	0.008	0.006	0.005	0.008

Robust standard errors in parentheses. ***, **, and * indicate the 1, 5, and 10 percent levels of significance

Table 6. above, displays no statistically valid treatment effects of COVID-19 on the levels of malnutrition within the households. Given the dynamic and potentially long term impacts of the disease, the results therefore point to a long term analysis of the impacts of the disease on levels of malnutrition using panel data to unlock statistically valid impacts. One of the reasons for the insignificant treatment effects could be a reorganization of consumption patterns in the short run which would leave short term malnutrition levels constant this may include prioritization of children at the expense of adults when it comes to food rationing in the household.

3.3.2. PSM estimates of food insecurity heterogeneous treatment effects of COVID-19 on malnutrition in the household

Table 7. PSM estimates of homogenous treatment effects of COVID-19 on malnutrition in the household

	Affected by COVID-19 [1 if Yes]	Impact of COVID-19 is severe [1 if Yes]	Unable to cope with COVID-19 shock [1 if Yes]
VARIABLES	(I)	(II)	(III)
SAM [MUAC]	-0.000987	0.00139	0.00001
	(0.00247)	(0.00299)	(0.00527)
MAM [MUAC]	-0.000185	0.00139	0.00674
	(0.00427)	(0.00789)	(0.00730)
SAM [MUAC for Age]	-0.00117	-0.00277	0.00355
	(0.00568)	(0.00862)	(0.00965)
GAM [MUAC for Age]	-0.000524	-0.00301	0.00106
	(0.00862)	(0.0168)	(0.0139)
Observations	5,404	1,443	1,410

Robust standard errors in parentheses. ***, **, and * indicate the 1, 5, and 10 percent levels of significance

Consistent with the results in table 6, table 7 above shows there was no food insecurity heterogeneity in the impacts of COVID-19 on the levels of malnutrition in the household. Again this calls for the analysis of panel data in the long run to unpack the impact of COVID-19 on food(cereal) insecurity amongst households. The reason behind the significant result could be the timing of the survey for rural areas which was soon after harvesting, therefore most households were still cereal secure from current harvest.

4.0 Conclusions

Results from year-on-year analysis indicate a deterioration in feeding practices amongst children indicating the need to invest more in nutrition to protect the gains that have been achieved to date. Descriptive analysis of COVID-19 and livelihoods highlighted a negative effect of COVID-19 shock on sources of income and food for most households. Furthermore, the results showed no significant difference between households COVID-19 status based on food insecurity pointing to the need for a dynamic analysis of the impact of COVID-19 on malnutrition and food security using panel data due to the dynamic nature of the disease

5.0 Possible response strategies that can influence decision and policy makers

A significant deterioration of feeding practices have been observed between 2019 and 2020, this trend has potential to worsen the nutrition status of children in the long run . Increased investments in nutrition is therefore needed in 2021 to correct the risk of reversed gains accrued to date. Possible strategies include:

Dissemination of Infant and Young Child Feeding messages using key community outreach channels so as improve the observed deteriorating feeding practices.

Awareness campaigns through print, radio, tv broadcasts and other electronic platforms like WhatsApp and other social media.

Nutrition screening and treatment of children with severe acute malnutrition in all wards.

The COVID-19 shock has continued to increase exponentially since March 2020 hence the following measures should be a priority:

Continued health education on COVID-19 at all levels.

Prioritization of protective personal equipment (PPE) access for all.

Rehabilitation and drilling of new borehole.

Distribution of IEC material on COVID-19 at shops, clinics, households and community centers

References

COVID-19 impacting the health and wellbeing of children and families in Zimbabwe - SUN (scalingupnutrition.org)

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Remarks by UNICEF Executive Director Henrietta Fore at the Nutrition for Growth (N4G) Kick-Off Event.

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