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Poverty, practices of mothers and nutritional status of children below five years old in Cebu province, Philippines

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Abstract
Malnutrition is a public health concern in the Philippines that presents a complex issue mainly because of its multi-dimensional origin. Grounded on the UNICEF conceptual framework on the causes of malnutrition, the research investigates the relationship between poverty and practices of mothers with nutritional status of children below five years old in Cebu Province, Philippines. A total of 652 mothers were surveyed in two cohort groups. One group was an implementation site of the ECCD F1K Program while the other is the control group. In processing data, One-way ANOVA was applied to compare the two cohorts in terms of malnutrition while chi square test was done to understand relationships between profile of mothers, poverty, practices and child malnutrition. Level of significance to test differences and relationships among variables was set at $p \leq 0.05$. Findings suggest that short term impact of intensive health and nutrition programs did not reverse malnutrition. The occurrence of chronic malnutrition was significantly linked with practices of mothers ($p=0.009$); while acute malnutrition ($p=0.030$) and overnutrition ($p=0.000$) were significantly associated with poverty. An interplay of predisposing factors were noted to affect both the practices of mothers and poverty. These factors included the mother's age ($p=0.000$) and number of children ($p=0.000$) for practices of mothers, while occupation ($p=0.047$), number of children ($p=0.000$), educational attainment ($p=0.000$) and age of mothers ($p=0.000$) were linked to poverty. In order to address malnutrition in the Philippines, there is a need to prioritize government programs that focused on the First 1000 days of the child with emphasis on adolescent sexual reproductive health, social behavior change communication, and equitable education opportunities for families.

Keywords: malnutrition, poverty, child caring practices, health and nutrition services, first 1000 days

Introduction

Malnutrition refers to any variation from optimal nutritional status including undernutrition and overnutrition [1]. It continues to be a major health burden [2]. and is one of the most important risk factors for the burden of diseases in many developing countries [3] including the Philippines. The severity of undernutrition as a public health concern is alarming, accounting to almost half of child mortality under five-years-old globally [4].

Malnutrition among children below five years old is measured using anthropometric indices like height/length for age, weight for age and weight for height/length [5]. Anthropometric deficits like stunting and wasting are prioritized as nutrition problems due to its significance in development and humanitarian contexts, respectively. Stunting is a sign of chronic malnutrition as evidenced by low linear growth; while wasting is equated with acute malnutrition that results in the loss of both lean and fat mass [5, 6]. While stunting and wasting have been prioritized due to their significance in nutrition studies, growing body of evidence shifts focus to child overnutrition as a public health concern especially in low- and middle-income countries, because of its consequences to the development of non-communicable diseases at a younger age [7]. Current nutrition survey in the Philippines suggests that three out of ten (30.3%) children under five were identified as stunted, 5.6% were classified as wasted, while 4.0% were categorized as overweight-for-height [8].

Addressing malnutrition is complex brought about by its multi-dimensional origin that is increasingly recognized, especially in understanding its determinants at the individual, household and societal levels [9]. A multisectoral, systematic and comprehensive approach to nutrition is essential in addressing malnutrition [10]. More so with global commitments to the United Nation's Sustainable Development Goals that put emphasis on thriving, apart from children surviving, which is crucial for the child's health and overall well-being [11].

Putting focus on the causal determinants of malnutrition below five years old, the UNICEF Conceptual Framework highlights inadequate dietary intake and illness/disease as immediate causes. Household food insecurity, inadequate child care and feeding practices, unhealthy household and surrounding conditions, and inaccessible and frequently inadequate health care are underlying causes; while several factors like household access to adequate quantity and quality of resources, inadequate financial, human, physical and social resources and socio-cultural, economic and political context constitute the basic causes **[12].** These linkages paved way for the development of nutrition interventions and policies that support the reduction of child malnutrition. Recent

progress in nutrition programming identifies two major interventions; namely, nutrition specific and nutrition sensitive interventions. Nutrition specific interventions address the immediate determinants of child undernutrition, while nutrition sensitive interventions target the underlying determinants affecting the poor nutrition status of the child [13].

Recent evidence supports the idea of integrating nutrition specific and nutrition sensitive interventions to deliver a more robust and efficient strategy to impact nutritional outcome than either intervention alone [14]. The Philippine Plan of Action for Nutrition 2017-2022 operationalizes on these two major nutrition interventions in the lens of the First 1000 Days to address the high levels of stunting and wasting among children below five years old, with levels that have remained unchanged over the years. The nutrition blueprint targets to reduce stunting to 21.4 percent from a baseline of 33.4 while bringing wasting at low levels of less than five percent by the end of the program cycle [15].

While relevant studies on the associations of the determinants of malnutrition have been explored, identifying the specific forms of malnutrition it is related with is less investigated. This can result to inefficient and wasteful utilization of resources in addressing malnutrition. Understanding the causality of malnutrition at different levels and how they are interrelated with each other will provide a framework for nutrition managers and policy makers to implement nutrition programs resourcefully and to advance systems that will encourage innovation in the nutrition practice. This study investigated the relationship between poverty and practices of mothers with nutritional status of children below five years old in Cebu Province, Philippines to highlight the determinants of specific forms of malnutrition.

Methodology

The study was conducted in six municipalities of Cebu Province; three of which are pilot areas for the implementation of the Early Childhood Care and Development in the First 1000 Days (ECCD F1K) Program. These areas include Dalaguete, Santa Fe and Tuburan. The areas that are not part of the ECCD F1K Program in Cebu Province include Argao, Madridejos and Asturias. These municipalities were considered as the control group of the study. Descriptive method was utilized using the quantitative approach. The respondents who were mothers with children below five years old were selected from the identified cohort areas (Cohort 1=353; Cohort 2= 299) through convenience sampling due to absence of relevant estimates of data on households with mothers of 0-5 year old children that could be utilized in national and local planning. The researcher initially targeted 915 mothers in all 183 barangays covered by the study, in particular five (5) mothers per barangay to estimate the sample population. Because of security reasons, the Geographically Isolated and Disadvantaged Areas (GIDA) that were not accessed for data collection were replaced by increasing the number of respondents of barangays nearest to the said areas with comparatively the same geographical environment.

The respondents of the study accomplished a survey questionnaire. Prior to data collection, a focus group discussion among selected mothers in Barangay Kasambagan, Cebu City was done to pretest the tool and to validate that there was a common understanding of the questions. Ethical considerations were noted in the conduct of research as this was necessary for the purpose of ensuring the privacy as well as the security of the participants. In addition, each respondent was given a waiver for confidentiality of their identity and of the information they did not want to disclose. On the other hand, nutritional status of children were taken from the 2018 Operation Timbang (OPT) Plus data repository of the barangays identified for the research. Data collection was done from January to February 2018.

The results of the survey were processed accordingly and were examined for correctness and completeness prior to encoding into a database. Percentages presented in the tables were taken from weighted data to compensate for non-responses in specific questions. Descriptive statistics was utilized to present the profile of mothers, poverty, practices, and nutritional status of children. Analysis of variance (ANOVA) was applied to compare the two cohorts in terms of malnutrition. On the other hand, chi square test was done to understand relationships between profile of mothers, poverty, practices and child malnutrition. Level of significance to test differences and relationships among variables was set at $p \leq 0.05$. Relevant literatures and focus group discussions with healthcare implementers were also used to support the findings gathered.

Results and Discussion

A total of 652 mothers in two cohort areas (Cohort 1=353; Cohort 2= 299) were included in the study. The profile of mothers (Table 1) showed that majority of the respondents were 30 years old and above. Their highest educational attainment was secondary education; majority were unemployed and were full time housewives with one to two children.

Table 1: Profile of Mothers in Two Cohort Areas

		Cohort 1		Cohort 2		Total	
		n	%	n	%	n	%
Age of Mother	15 years old and below	0	0.0	1	0.3	1	0.2
	16-19 years old	5	1.4	9	3.0	14	2.2
	20-24 years old	66	18.7	61	20.5	127	19.5

	25-29 years old	92	26.1	90	30.0	182	27.9
	30 years old and above	190	53.7	138	46.1	328	50.2
Educational Attainment	Primary (Elementary) complete	41	11.6	33	11.2	74	11.4
	Primary (Elementary) incomplete	56	15.9	42	13.9	98	15.0
	Secondary (High School) complete	134	38.0	91	30.5	225	34.5
	Secondary (High School) incomplete	74	20.9	61	20.3	134	20.6
	Tertiary (College) complete	17	4.9	26	8.8	44	6.7
	Tertiary (College) incomplete	24	6.7	34	11.5	58	8.9
	Vocational complete	5	1.4	10	3.4	15	2.3
	Vocational incomplete	2	0.6	1	0.3	3	0.5
Occupation	Manager	0	0.0	2	0.7	2	0.3
	Professionals	5	1.4	6	2.0	11	1.7
	Technicians and Associate Professionals	21	6.0	8	2.7	29	4.5
	Clerical Support Workers	1	0.3	4	1.3	5	0.8
	Service and Sales Workers	10	2.9	32	10.8	42	6.5
	Skilled Agricultural, Forestry and Fishery Workers	16	4.6	8	2.7	24	3.7
	Craft and Related Trades Workers	5	1.4	4	1.3	9	1.4
	Plant and Machine Operators and Assemblers	1	0.3	1	0.3	2	0.3
	Elementary Occupations	8	2.3	2	0.7	10	1.5
	Armed Forces Occupation	1	0.3	0	0.0	1	0.2
	Unemployed	284	80.5	232	77.4	516	79.1
Number of Children	One	54	15.2	75	25.0	128	19.7
	Two	89	25.2	71	23.6	160	24.5
	Three	66	18.6	48	16.2	114	17.5
	Four	57	16.0	35	11.8	92	14.1
	Five	34	9.7	30	10.1	65	9.9
	More than Five	54	15.2	39	13.2	93	14.3

Poverty profile (Table 2) suggests that majority of the respondents had a household income of Php 100-250 per day; wherein <25% was allotted for children‘s needs. Half of the respondents were beneficiaries of 1-2 government poverty programs. Most of the respondents attended barangay assemblies and meetings, while majority were not members of barangay associations.

Table 2: Poverty Profile in Two Cohort Areas

		Cohort 1		**Cohort 2**		**Total**	
		n	**%**	**n**	**%**	**n**	**%**
Estimated Daily Family Income	Below Php 100	68	19.3	72	24.0	140	21.5
	Php 100-250	175	49.6	116	38.9	291	44.7
	Php 251-500	95	26.8	83	27.7	177	27.2
	Php 501-1000	5	1.4	16	5.4	21	3.3
	Php 1001 and above	10	2.9	12	4.1	22	3.4
Percentage of income spent on Children	25% and below	171	36.9	228	54.6	399	45.3
	26-50%	181	39.1	110	26.4	292	33.1
	51-75%	70	15.1	60	14.5	130	14.8
	76-100%	42	9.0	19	4.5	60	6.9
Membership in Government Programs on Poverty Alleviation	Yes	237	51.1	175	41.9	412	46.7
	No	227	48.9	243	58.1	470	53.3
Number of Programs Enrolled	1-2 Programs	178	82.5	156	92.7	334	87.0
	3-4 Programs	34	15.6	9	5.5	43	11.1
	5 or more Programs	4	1.9	3	1.8	7	1.9
Attendance in Barangay Assemblies and Meetings	Yes	412	88.8	341	81.6	753	85.4
	No	52	11.2	77	18.4	129	14.6
Membership in Barangay Organizations/Associations	Yes	234	50.4	199	47.7	433	49.1
	No	230	49.6	219	52.3	449	50.9

Caring practices include prenatal care, neonatal care, postnatal care and playing practices. For prenatal care (Table 3) it was observed that majority of the respondents availed of the prenatal services at the first trimester of

their pregnancy. Intake of Iron-Folic Acid and administration of tetanus toxoid vaccine were high but not in full coverage. Most of the mothers were not beneficiaries of the feeding program. Attendance to mothers' class was noted to be high, but not for teenage mothers.

Table 3: Prenatal Caring Practices in Two Cohort Areas

		Cohort 1		Cohort 2		Total	
		n	%	n	%	n	%
Availed of Prenatal Services from the Government Health Centers	Yes	462	99.6	413	98.8	875	99.2
	No	2	0.4	5	1.2	7	0.8
Schedule First Availed of Prenatal Services	1st Trimester	362	79.3	304	73.7	666	76.7
	2nd Trimester	78	17.1	96	23.4	175	20.1
	3rd Trimester	16	3.5	12	2.9	28	3.2
Intake of Iron-Folic Acid Supplements	Yes	461	99.3	416	99.5	877	99.4
	No	3	0.7	2	0.5	5	0.6
Given Tatanus Toxoid Vaccine during Pregnancy	Yes	450	96.9	416	99.5	866	98.2
	No	14	3.1	2	0.5	16	1.8
Beneficiary of Feeding Program during Pregnancy	Yes	173	37.3	194	46.5	367	41.6
	No	291	62.7	224	53.5	515	58.4
Attendance to Mother's Classes during Pregnancy	Yes	313	67.5	308	73.8	622	70.5
	No	151	32.5	110	26.2	260	29.5

For Neonatal caring practices (Table 4), birthing facility that was mostly utilized during labor was the rural health unit birthing center. Among the Newborn care protocols that were highly implemented were drying and stimulation of child, placing child in prone position in the abdomen and provision of breastmilk. However, proper clamping of umbilical cord was not commonly observed.

Table 4: Neonatal Caring Practices in Two Cohort Areas

		Cohort 1		Cohort 2		Total	
		n	%	n	%	n	%
Place given Birth	Hospital	143	30.7	139	33.3	282	32.0
	Rural Health Unit	228	49.1	178	42.6	406	46.1
	Barangay Health Station	68	14.7	82	19.6	150	17.0
	At Home	25	5.4	12	2.9	37	4.2
	Others	0	0.0	6	1.5	6	0.7
Immediate Drying of Child upon Delivery	Yes	434	93.6	398	95.2	832	94.3
	No	30	6.4	20	4.8	50	5.7
Skin-to-skin Contact of Child	Yes	430	92.8	400	95.8	831	94.2
	No	34	7.2	18	4.2	51	5.8
Proper Cord Clamping and Cutting	Yes	302	65.3	266	63.6	568	64.5
	No	161	34.7	152	36.4	313	35.5
Breastfeeding Initiation	Yes	443	95.5	395	94.4	838	95.0
	No	21	4.5	23	5.6	44	5.0

For Postnatal caring practices (Table 5), a number of respondents noted that their child was not administered with the newborn screening test within 72 hours from delivery. However, high compliance to immunization and micronutrient supplementation was observed in the two cohort areas. Majority of the respondents availed of the nutrition counseling services in the barangay. Nevertheless, there were poor infant and young child feeding practices in the two cohort areas despite attendance to nutrition education classes and family development sessions.

Table 5: Postnatal Caring Practices in Two Cohort Areas

		Cohort 1		Cohort 2		Total	
		n	%	n	%	n	%
Newborn Screening	Yes	378	81.4	323	77.4	701	79.5
	No	86	18.6	95	22.6	181	20.5
Immunization	Yes	461	99.3	415	99.3	876	99.3
	No	3	0.7	3	0.7	6	0.7
Vaccines provided (multiple responses)	BCG	410	95.6	389	98	799	22.7
	DPTV	316	73.7	351	88.4	667	19.0
	Oral Polio	293	68.3	346	87.2	639	18.2
	Hepatitis B	293	68.3	339	85.4	632	18.0

	Measles	337	78.6	346	87.2	683	19.4
	PCV	0	0	25	6.3	25	0.7
	MMR	30	7	31	7.8	61	1.7
	IPV	2	0.5	8	2	10	0.3
	FLU/ROTAVIRUS	0	0	1	0.3	1	0.0
Intake of Vitamin and Mineral Supplements	Yes	443	95.4	396	94.8	839	95.1
	No	21	4.6	22	5.2	43	4.9
Vitamin and Mineral Supplements provided (multiple responses)	Vitamin A	421	98.4	364	98.4	785	61.0
	Iron Folic Acid	106	24.8	107	28.9	213	16.6
	Micronutrient Powder	140	32.7	143	38.6	283	22.0
	Vitamin C	0	0	5	1.4	5	0.4
	Multivitamins	1	0.2	0	0	1	0.1
Attendance to Mothers Class Post Pregnancy	Yes	357	77.0	311	74.3	668	75.7
	No	107	23.0	107	25.7	214	24.3
Availed of the Nutrition Counseling Services	Yes	370	79.8	335	80.1	705	79.9
	No	94	20.2	83	19.9	177	20.1
Liquids provided to the Child (multiple responses)	Breastmilk	387	85.1	375	90.4	762	43.5
	Formula Milk	56	12.3	47	11.3	103	5.9
	Water	220	48.4	118	28.4	338	19.3
	Fruit Juice	34	7.5	17	4.1	51	2.9
	Sugar Water	19	4.2	7	1.7	26	1.5
	Washed Rice Water	88	19.3	61	14.7	149	8.5
	Vitamins	178	39.1	136	32.8	314	17.9
	Cerelac	6	1.3	1	0.2	7	0.4
	Medicine	1	0.2	0	0	1	0.1
Child Exclusively breastfed	Yes	411	88.7	387	92.7	799	90.6
	No	53	11.3	31	7.3	83	9.4
Month child started consuming solid foods	Below 4 months	5	1.1	4	1.0	9	1.1
	4 months	16	3.3	10	2.5	26	2.9
	5 months	9	2.0	49	11.7	58	6.6
	6 months	304	65.5	298	71.2	602	68.2
	7 months	47	10.0	48	11.4	94	10.7
	8 months and above	84	18.0	9	2.2	93	10.5
Intake of Solid Foods (multiple responses)	Rice Gruel	415	50.3	404	58.7	819	54.1
	Mashed Tubers	141	17.1	77	11.2	218	14.4
	Vegetables	145	17.6	114	16.6	259	17.1
	Fruits	74	9.0	55	8.0	129	8.5
	Meat	40	4.8	35	5.1	75	5.0
	Gulaman	10	1.2	3	0.4	13	0.9
Ceasation of Breastfeeding	Below 4 months	13	2.7	15	3.7	28	3.2
	Between 4 to 6 months	4	0.9	3	0.7	7	0.8
	6 months	13	2.7	9	2.2	22	2.5
	7 months	2	0.5	5	1.2	7	0.8
	8 months	1	0.2	8	2.0	9	1.1
	Between 9-12 months	32	6.8	53	12.6	84	9.5
	Between 12-24 months	189	40.8	183	43.8	373	42.3
	24 months and above	210	45.4	141	33.7	351	39.9
Attendance to Family Development Sessions	Yes	336	72.4	282	67.4	618	70.0
	No	128	27.6	136	32.6	264	30.0
Child enrolled to Feeding Program	Yes	300	64.6	266	63.7	566	64.1
	No	164	35.4	152	36.3	316	35.9
Alloted Time to Care for the Child in a Day	Below 6 hours	29	6.3	41	9.9	71	8.0
	6-12 hours	56	12.1	40	9.7	96	10.9
	12-18 hours	51	11.0	18	4.3	69	7.8
	18-24 hours	328	70.7	318	76.1	646	73.2

Majority of the respondents played with their children below 4 months old. Common play practice was making faces with the child.

Table 6: Playing Practices in Two Cohort Areas

		Cohort 1		Cohort 2		Total	
		n	%	n	%	n	%
Playing with Child	Yes	458	98.7	416	99.5	874	99.1
	No	6	1.3	2	0.5	8	0.9
Age started Playing with Child	Below 4 months	143	31.8	140	34.6	282	33.1
	Between 4-6 months	130	28.9	100	24.9	230	27.0
	6 months	57	12.8	46	11.4	103	12.1
	7 months	6	1.3	9	2.2	15	1.8
	8 months	23	5.1	26	6.5	49	5.8
	Between 9-12 months	50	11.2	60	14.9	111	13.0
	Between 12-24 months	33	7.4	16	4.0	49	5.8
	24 months and above	7	1.6	6	1.5	13	1.5
Play Activities Done (multiple responses)	Sing a Song	334	27.0	293	29.7	627	28.2
	Tell Stories	141	11.4	122	12.4	263	11.8
	Count with Child	193	15.6	139	14.1	332	14.9
	Read Books	63	5.1	56	5.7	119	5.4
	Make Faces with the Child	260	21.1	177	18.0	437	19.7
	Played with Toys	244	19.8	199	20.2	443	19.9

Nutritional Status of children below five years old (Cohort 1= 464; Cohort 2= 418) were taken from the 2018 Operation Timbang (OPT) Plus data repository of the barangays identified for the research and were further analyzed. Table 7 reveals that the prevalence of underweight, stunting and wasting was higher in Cohort 1, while overnutrition (overweight and obese) was higher in Cohort 2. Results of One way analysis of variance (ANOVA) tests comparing the two cohorts in terms of child malnutrition showed significant differences for underweight and stunting indicators as shown in Table 8.

Table 7: Children's Nutritional Status in Two Cohort Areas

		Cohort 1		Cohort 2		Total	
		n	%	n	%	n	%
Weight for Age	Normal	303	65.3	327	78.2	630	71.4
	Overweight	18	3.9	16	3.8	34	3.9
	Underweight	115	24.8	48	11.5	163	18.5
	Severely Underweight	28	6	27	6.5	55	6.2
Height for Age	Normal	282	60.8	325	77.8	607	68.8
	Tall	8	1.7	6	1.4	14	1.6
	Stunted	121	26.1	52	12.4	173	19.6
	Severely Stunted	53	11.4	35	8.4	88	10.0
Height for Weight	Normal	395	85.1	358	85.6	753	85.4
	Overweight	17	3.7	15	3.6	32	3.6
	Obese	9	1.9	11	2.6	20	2.3
	Wasted	32	6.9	20	4.8	52	5.9
	Severely Wasted	11	2.4	14	3.3	25	2.8

Table 8: Differences of Nutritional Status in Two Cohort Areas

Forms of Malnutrition	F-value	*P*-value
Underweight	19.994	0.000
Stunting	30.332	0.000
Wasting	0.354	0.552
Overnutrition	0.150	0.698

Table 9 summarizes the results on the relationships between profile of mothers, which included age, educational attainment, occupation, number of children and poverty. All variables identified under the profile of mothers were found to be associated with poverty. This finding is comparable with Cohort 1 showing the same implications. However, for Cohort 2, only occupation was noted to have no association with poverty.

Putting into context the UNICEF Conceptual framework on the causes of malnutrition in analyzing the results of the relationship between profile of mothers and poverty, the variables examined were considered as basic causes of malnutrition and their corresponding associations were expected. Moore *et al*. (1993) noted that early childbearing was strongly associated with poverty as a result of larger family sizes [16]. On the other hand, Ferguson *et al*. (2007) puts emphasis on the incidence, depth, duration and timing of poverty as affecting educational attainment [17].

Table 9: Relationship between Profile of Mothers and Poverty

Profile of Mothers	Cohort 1	Cohort 2	Total
	Poverty		
	P-value	*P*-value	*P*-value
Age of Mother	0.000	0.000	0.000
Educational Attainment	0.006	0.000	0.000
Occupation	0.011	0.939	0.047
Number of Children	0.000	0.000	0.000

Relationships between profile of mothers and their practices are presented in Table 10. Both Cohorts 1 and 2 showed that age and number of children were significantly associated with the practices of mothers. However, factors associated with mothers' practices in Cohort 2 were age, educational attainment, and number of children. The study showed that age of mother and number of children were the main predisposing factors affecting caring practices of mothers. Data revealed that 75 percent of mothers in both Cohorts had three or more children, with 50% of respondents from the two Cohorts were relatively mature (aged 30 years old and above). Caring practices are adapted from experiences and sociocultural norms of mothers. Since majority of the mothers were aged 30 years old and above, their knowledge on appropriate caring practices also changed. Validation interview of the health care workers noted that caring practices of young mothers were usually influenced by their neighbors or peers; whereas older mothers were more strongly influenced by health care workers. This can be attributed to the mother‘s consistent attendance in the barangay health and nutrition seminars. However, with increasing number of children, the ability to provide the right care to all children was limited. Mothers with numerous children usually focused on the youngest child, often neglecting the rest of the siblings. The more children the mother had, the harder it gets to care for them. The ability to care was further jeopardized by early pregnancy because of the mother‘s incompetence to give proper care to her children. This is shown in the demographic study of Hobcraft (1998) where poor families were more likely to be headed by a teenage parent and often had many children **[18]**.

Table 10: Relationship between Profile of Mothers and Practices of Mothers

Profile of Mothers	Cohort 1	Cohort 2	Total
	Practices of Mothers		
	P-value	*P*-value	*P*-value
Age of Mother	0.026	0.000	0.000
Educational Attainment	0.598	0.001	0.085
Occupation	0.727	0.443	0.456
Number of Children	0.000	0.032	0.000

Profile of Mothers were analyzed to see possible relationships with child malnutrition (Table 11). Results showed that educational attainment had significant associations with underweight, stunting, and overnutrition. Likewise, the number of children also had significant association with overnutrition. On the other hand, age of mother and occupation did not show significant associations with any child malnutrition indices. A similar finding was noted by Kunwar and Pillai (2002) that a parent's educational attainment is a determinant of their child's nutritional status **[19]**. But a study in Indonesia contradicts this observation because household size and children's nutritional status, particularly stunting and overweight, varies between urban and rural areas **[20]**.

Table 11: Relationship between Profile of Mothers and Children's Nutritional Status

Forms of Malnutrition		Age of Mother	Educational Attainment	Occupation	Number of Children
		P-value	*P*-value	*P*-value	*P*-value
Underweight	Cohort 1	0.202	0.063	0.169	0.229
	Cohort 2	0.549	0.147	0.335	0.575
	Total	0.548	0.003	0.538	0.214
Stunting	Cohort 1	0.604	0.002	0.865	0.698
	Cohort 2	0.614	0.002	0.974	0.986
	Total	0.848	0.000	0.957	0.684

Wasting	Cohort 1	0.163	0.388	0.471	0.647
	Cohort 2	0.847	0.160	0.754	0.790
	Total	0.338	0.068	0.607	0.527
Overnutrition	Cohort 1	0.661	0.001	0.585	0.000
	Cohort 2	0.860	0.196	0.616	0.160
	Total	0.580	0.001	0.360	0.000

Table 12 presents the relationship of poverty and practices of mothers. Poverty, defined as household income and social exclusion status, influenced the practices of mothers, as shown by the significant association of poverty and practices of mothers in both Cohorts 1 and 2. These findings coincide with Cooper's (2021) analysis of parenting behaviors and income whereby an increase in income decreases the probability of doing poor parenting activities [21]. It can be considered that while health and nutrition services are free and available in two Cohorts analyzed, availing such services would require money like transportation expense and cost for the lost time to be at work. Disrupted parenting brought about by poverty appears to be the major factor affecting outcomes for children [22].

Table 12: Relationship between Poverty and Practices of Mothers

	Cohort 1	**Cohort 2**	**Total**
	Poverty		
	P-value	*P*-value	*P*-value
Practices of Mothers	0.001	0.000	0.000

The connection of poverty and nutritional status (shown in Table 13) suggests that poverty has a significant association with wasting and overnutrition. The study of Waibel and Hohfeld (2016) analyzing the link between poverty and nutrition among rural households showed that poverty and income influence nutrition outcomes in Vietnam and Thailand [23]. On the other hand, overnutrition has increasingly affected children as a result of energy-dense but nutrient-poor diets, decreased physical activity and sedentary lifestyles [24]. Tanumihardjo *et al*. (2007) points to food insecurity as a result of poverty that leads to undernutrition, hunger and overnutrition [25]. This agrees with the results of the current study where poverty is significantly associated with wasting and overnutrition.

Table 13: Relationship between Poverty and Children's Nutritional Status

Forms of Malnutrition		**Poverty**
		***P*-value**
Underweight	Cohort 1	0.605
	Cohort 2	0.630
	Total	0.723
Stunting	Cohort 1	1.000
	Cohort 2	0.928
	Total	0.720
Wasting	Cohort 1	0.744
	Cohort 2	0.000
	Total	0.030
Overnutrition	Cohort 1	0.001
	Cohort 2	0.072
	Total	0.000

Table 14 summarizes the results on the relationships between practices of mothers and child malnutrition. Data suggest that practices of mothers have a significant association with underweight and stunting indices. A similar finding was presented by Zikria *et al*. (2018) in Indonesia that caring practices of mothers are associated with stunting and specifically identified feeding, hygiene, health and psychosocial stimulation as indicators linked with stunting [26]. Furthermore, a mother's knowledge about child care influences the amount and type of care that is given to the children (Thuita, 2002). Children who are stunted experienced less time devoted for breastfeeding, food preparation and feeding [27].

Table 14: Relationship between Practices of Mothers and Children's Nutritional Status

Forms of Malnutrition		**Practices of Mothers**
		***P*-value**
Underweight	Cohort 1	0.024
	Cohort 2	0.166
	Total	0.011

Stunting	Cohort 1	0.004
	Cohort 2	0.443
	Total	0.009
Wasting	Cohort 1	0.804
	Cohort 2	0.914
	Total	0.804
Overnutrition	Cohort 1	0.874
	Cohort 2	0.657
	Total	0.665

Summary
The multi-dimensional origin of malnutrition exposes a complex landscape whereby various factors play important roles in its causal relationship. Consideration on poverty and practices of mothers were prioritized as recognized in the UNICEF conceptual framework on the causes of malnutrition. The Early Childhood Care and Development in the First 1000 Days Program of the national government puts emphasis on improving delivery of health and nutrition services in the critical 1000 days of the child's life to progress key outcomes including reduction of malnutrition and improve behaviors to access crucial health services. As such, the study investigated the difference in the nutritional status of two cohort areas wherein Cohort 1 was identified as an experimental group being a recipient of the ECCD F1K Program while Cohort 2 was the control group for the study. Significant difference was noted for underweight and stunting. The difference can be attributed to the practices of mothers, where areas in Cohort 1 have significant associations with underweight and stunting compared to Cohort 2 areas. Cohort 1 areas are more compliant in availing services like prenatal visits and attendance to family development sessions and have better feeding practices like delayed breastfeeding cessation and timely complementary feeding. Mothers in Cohort 1 also spent more time with their children as compared to mothers of the control group.

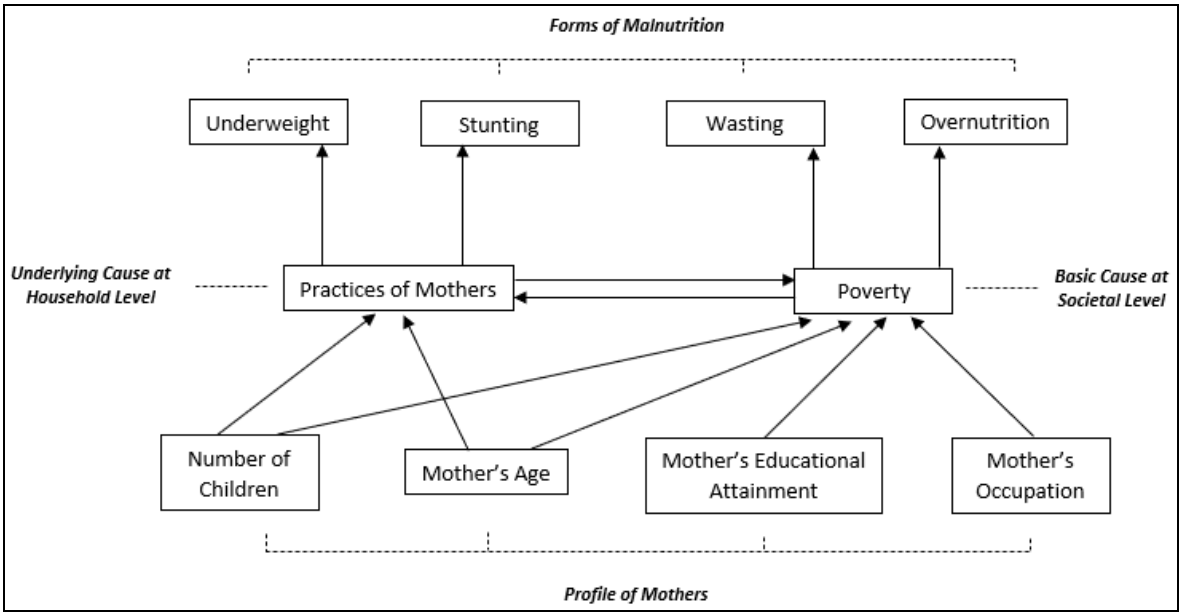

Fig 1: Interrelationship of Mother's Profile, Practices and Poverty

The study further investigated the relationships of poverty, practices, and profiles of mothers to identify the particular variable that influences certain conditions contributing to malnutrition. Overall, poverty impacts acute malnutrition and overnutrition, while practices of mothers influences chronic malnutrition. Consideration on the mother's educational attainment and number of children is an important factor as these variables are associated with malnutrition, particularly chronic malnutrition and overnutrition.

Appreciating poverty beyond its economic connotation provides a unique and deeper interpretation of its implications. Apart from household income, the study took into consideration social exclusion status which seeks to account non-participation of mothers in community level activities that support their overall welfare as an effect of non-equitable opportunities. As a basic cause of malnutrition, poverty can be associated with numerous factors affecting malnutrition. It was observed that all variables identified under the profile of mothers including number of children, occupation, educational attainment and age of mothers were found to be associated with poverty. Likewise, practices of mothers are strongly linked with poverty.

Practices of mothers were analyzed relative to its causality with other variables for possible link with malnutrition. Practices of mothers were defined in the context of the first 1000 days period which considered psychosocial stimulation in the form of play. Practices were grouped accordingly as prenatal, neonatal, postnatal,

and playing practices. Key findings highlight the association of number of children and mother's age with practices of mothers.

Conclusions

Short term impact of intensive health and nutrition programs were observed not to reverse malnutrition in children below five years old in the two cohort areas. Significant difference of the two cohort areas were noted particularly on underweight and stunting prevalence as attributed by practices of mothers where significant associations were established.

An essential finding of the study links chronic malnutrition with practices of mothers, while acute malnutrition and overnutrition are significantly associated with poverty. An interplay of predisposing factors were noted to affect both the practices of mothers and poverty. Lack of knowledge on optimal health and nutrition practices during prenatal and postnatal periods were affected by key indicators like mother's age and number of children. Practices on the other hand is linked with stunting and underweight.

Poverty, when defined in two distinct characteristics such as household income and social exclusion status will have significant associations with wasting and overnutrition. Factors like number of children and educational attainment and age of mothers were noted to affect poverty.

A multisectoral approach in addressing malnutrition is essential. Priority must be given to government programs focused on the first 1000 days with emphasis on adolescent sexual reproductive health, social behavior change communication and equitable education opportunities for families identified to have low income, non-membership to any government poverty programs and non-participation to barangay level organizations and meetings as major beneficiaries since these population groups are more inclined to having malnourished children.

Recommendations

The following actions are recommended in support of the findings of the study to improve programming of key nutrition programs that aim to address all forms of malnutrition in the Philippines, particularly in the Province of Cebu.

1. Strengthen health and nutrition activities that put emphasis on the critical first 1000 days period.
2. Intensify adolescent sexual reproductive health activities in the grassroots level by engaging youth volunteers as peer counselors.
3. Strategize and formulate sustainable social behavior change communication activities for improved health and nutrition outcomes.
4. Ensure equal opportunities for education across various income classification.
5. Prioritize beneficiaries with low income and are perceived to be socially excluded to be primary beneficiaries of nutrition programs.

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