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Assessing the Prevalence and Associated Determinants of Prematurity and Pediatric Malnutrition in Lesotho

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Research Question: What is the prevalence of premature birth and pediatric malnutrition in Queen 'Mamohato Memorial Hospital in Lesotho and what are the associated environmental and pathological factors?

BACKGROUND

Preterm birth, defined as birth before 37 weeks gestation, and pediatric malnutrition are major contributors of neonatal and infant morbidity and mortality worldwide. In 2017, Lesotho's leading cause of neonatal death was preterm birth complications and the country's preterm birth rate is 12% (1). Stunting rates (one measure of malnutrition) of children under 5 years of age in Lesotho are also high at 33% (2), and contribute to the poor health outcomes of many of the children hospitalized at Queen 'Mamohato Memorial Hospital.

QUEEN 'MAMOHATO HOSPITAL

Queen 'Mamohato Memorial Hospital, recently opened in 2011, primarily serves the patients from the Maseru district of Lesotho and surrounding areas. Although the hospital has been recording medical data electronically since its inception, there has been no formal analysis of the associated determinants of prematurity and pediatric malnutrition at this hospital. The goal is to provide informed recommendations for how this facility can appropriately address and potentially reduce these outcomes and their negative consequences.

<https://www.netcare.co.za/News-Hub/Articles/queen-visits-the-queen-mamohato-memorial-hospital>

TABLES

Anthropometric measures			Nutritional Screening Questions		Lab Measurements		Miscellaneous
≤2 yo	Length (cm)	PNST	Are you using a malnutrition screening tool?	Anemia	Hemoglobin		Area of residence (rural or urban)?
	Weight (kg)		Has the child unintentionally lost weight lately?		Serum iron		Living situation
	Head circumference (cm)		Has the child had poor weight gain over the last few months?		Ferritin		Parental status
	Weight-for-length		Has the child been eating/feeding less in the last few weeks?		Total iron binding capacity (TIBC)		Is/was the child breast fed or formula fed and for how long?
≥ 3 yo	Height (cm)		Is the child obviously underweight?		MCV		Is the stool measured for parasites?
	Weight (kg)	STRONGkids	Is there an underlying illness with risk for malnutrition or expected major surgery?		Complete blood count		
	BMI (weight (kg)/Height (m)^2		Is the patient in a poor nutritional status?	Biomarkers	Albumin		
all ages	Mid-upper arm circumference (cm)		Is present diarrhea, reduced food intake, pre-existing nutritional intervention, or inability to consume adequate nutritional intake because of pain present?		Prealbumin (PAB)		
	Growth Curves		Is there weight loss and/or no increase in weight/height during the last few week-months?		Transferrin		
		SGNA	Assessment of stunting				
			Appropriateness of current weight for Height				
			Changes in body weight				
			Assessment of dietary intake and changes to dietary intake				
			Gastrointestinal symptoms				
			Functional capacity/patient's energy				
			Metabolic stress of disease				
			Loss of subcutaneous fat				
			Muscle wasting				
			Edema				

Table 1. Measures and factors contributing to nutritional status in children under 5 years of age

City, Country of Hospital	Study Type	Total # Deliveries	Prevalence of Preterm Birth	Significant Associated Factors
Axum and Adwa, Ethiopia[3]	Cross sectional	472	**13.3%**	Rural area, interpregnancy interval <24 mo, history of preterm birth, PROM, multiple pregnancy outcomes, malaria exposure, chronic medical disorders
Enugu, Nigeria[4]	Retrospective review	3,760	**16.9%**	N/A
Gondar town, Ethiopia[5]	Cross sectional	540	**4.4%**	Pregnancy induced hypertension, HIV
Ilorin, Nigeria[6]	Cohort study	2,489	**12.0%**	Low socio-economic class, previous preterm delivery, antepartum hemorrhage, PROM, UTI, pregnancy-induced hypertension, induced labor
Lagos, Nigeria[7]	Cross sectional	4,314	**19.9%**	No antenatal care, HIV, hypertension, antepartum hemorrhage
Lagos, Nigeria[8]	Cross sectional	5,561	**16.8%**	Maternal age >35, hypertension, rupture of membranes
Malawi[9]	Cross sectional	2,149	**16.3%**	History of preterm birth, maternal underweight, anemia, malaria
Nairobi, Kenya[10]	Cross sectional	322	**18.3%**	Pregnancy induced hypertension, antepartum hemorrhage, PROM

Table 2. Prevalence and associated factors of preterm birth as determined by similar, previous studies

METHODS

A review of the literature was performed and experts in the field were consulted to determine the variables needed to assess both prevalence and potential risk factors for malnutrition and preterm birth. We aim to conduct facility-based cross sectional studies that include a retrospective chart review of births and children under 5 admitted at this hospital from 2015 to 2020. For the nutritional assessment, proposed variables for the study include anthropometric measures, biomarkers for blood (e.g. anemia) and stool (parasites), nutrition screening questions, and demographic data. For the prematurity assessment, variables include fetal factors (e.g. intraventricular hemorrhage, retinopathy of prematurity), maternal factors (age, number of antenatal visits, parity, COVID-19 status), and environmental factors (environmental temperature, newborn thermal care practices).

RESULTS

IRB protocols were prepared and submitted and the survey tools that identify pertinent data to be collected were sent to stakeholders in Lesotho for review. Due to the COVID-19 pandemic, data collection has not yet begun.

DISCUSSION

Assessing the prevalence of acute/chronic malnutrition and preterm birth and its determinants may inform future quality improvement programs. One possible program could be the implementation of screening tests for malnutrition at Queen Mamohato Memorial Hospital which may help assess a patient's risk of malnutrition, guide hospital treatments, and plan for follow-up after discharge.

REFERENCES

1. Healthy Newborn Network. Lesotho. https://www.healthynewbornnetwork.org/country/lesotho/. Published 2018. Accessed July 2020.
2. UNICEF. 2013. Lesotho Statistics. [online] Available at: <https://www.unicef.org/infobycountry/lesotho_statistics.html#114> [Accessed 10 August 2020].
3. Aregawi G, Assefa N, Mesfin F, et al. Preterm births and associated factors among mothers who gave birth in Axum and Adwa Town public hospitals, Northern Ethiopia, 2018. *BMC Res Notes*. 2019;12(1):640.
4. Iyoke CA, Lawani OL, Ezugwu EC, et al. Prevalence and perinatal mortality associated with preterm births in a tertiary medical center in South East Nigeria. Int J Womens Health. 2014;6:881-888.
5. Gebreslasie, K. Preterm Birth and Associated Factors among Mothers Who Gave Birth in Gondar Town Health Institutions. *Advances in Nursing*. 2016(6):1-5.
6. Mokuolu OA, Suleiman B, Adesiyun O, Adeniyi A. Prevalence and determinants of pre-term deliveries in the University of Ilorin Teaching Hospital, Ilorin, Nigeria. *Pediatr Rep*. 2010;2(1):e3.
7. Olusanya BO, Ofovwe GE. Predictors of preterm births and low birthweight in an inner-city hospital in sub-Saharan Africa [published correction appears in Matern Child Health J. 2010 Nov;14(6):987]. *Matern Child Health J*. 2010;14(6):978-986.
8. Butali A, Ezeaka C, Ekhaguere O, et al. Characteristics and risk factors of preterm births in a tertiary center in Lagos, Nigeria. *Pan Afr Med J*. 2016;24:1. Published 2016 May 1. doi:10.11604/pamj.2016.24.1.8382
9. van den Broek NR, Jean-Baptiste R, Neilson JP. Factors associated with preterm, early preterm and late preterm birth in Malawi. *PLoS One*. 2014;9(3):e90128.
10. Wagura P, Wasunna A, Laving A, Wamalwa D, Ng'ang'a P. Prevalence and factors associated with preterm birth at kenyatta national hospital. *BMC Pregnancy Childbirth*. 2018;18(1):107.