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EDITORIAL

COP27 CLIMATE CHANGE CONFERENCE: URGENT ACTION NEEDED FOR AFRICA AND THE WORLD

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[1]East African Medical Journal, [2] West African Journal of Medicine, [3] Sierra Leone Journal of Biomedical Research, [4] Ethiopian Journal of Health Sciences, [5]Annales Africaines de Medecine, [6]Annals of African Surgery, [7]University of Exeter , [8]African Journal of Primary Health Care & Family Medicine, [9] London School of Medicine and Tropical Hygiene, [10] Curationis; [11]Ghana Medical Journal, [12]African Journal of Reproductive Health, [13]Eastern Mediterranean Health Journal, [14]Mali Médical, [15]Journal de la Faculté de Médecine d'Oran, [16] African Health Sciences, [17]Evidence-Based Nursing Research, [18] East African Medical Journal, [19]La Tunisie Médicale, [20]University of Winchester.

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Wealthy nations must step up support for Africa and vulnerable countries in addressing past, present and future impacts of climate change

The 2022 report of the Intergovernmental Panel on Climate Change (IPCC) paints a dark picture of the future of life on earth, characterised by ecosystem collapse, species extinction, and climate hazards such as heatwaves and floods (1). These are all linked to physical and mental health problems, with direct and indirect consequences of increased morbidity and mortality. To avoid these catastrophic health effects across all regions of the globe, there is broad agreement—as 231 health journals argued together in 2021—that the rise in global temperature must be limited to less than 1.5oC compared with pre-industrial levels.

While the Paris Agreement of 2015 outlines a global action framework that incorporates providing climate finance to developing countries, this support has yet to materialise (2). COP27 is the fifth Conference of the Parties (COP) to be organised in Africa since its inception in 1995. Ahead of this meeting, we—as health journal editors from across the continent—call for urgent

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action to ensure it is the COP that finally delivers climate justice for Africa and vulnerable countries. This is essential not just for the health of those countries, but for the health of the whole world.

Africa has suffered disproportionately although it has done little to cause the crisis

The climate crisis has had an impact on the environmental and social determinants of health across Africa, leading to devastating health effects (3). Impacts on health can result directly from environmental shocks and indirectly through socially mediated effects (4). Climate change -related risks in Africa include flooding, drought, heatwaves, reduced food production, and reduced labour productivity (5).

Droughts in sub-Saharan Africa have tripled between 1970-79 and 2010-2019 (6). In 2018, devastating cyclones impacted 2.2 million people in Malawi, Mozambique and Zimbabwe (6). In west and central Africa, severe flooding resulted in mortality and forced migration from loss of shelter, cultivated land, and livestock (7). Changes in vector ecology brought about by floods and damage to environmental hygiene have led to increases in diseases across sub-Saharan Africa, with rises in malaria, dengue fever, Lassa fever, Rift Valley fever, Lyme disease, Ebola virus, West Nile virus and other infections (8, 9). Rising sea levels reduce water quality, leading to water-borne diseases, including diarrhoeal diseases, a leading cause of mortality in Africa (8). Extreme weather damages water and food supply, increasing food insecurity and malnutrition, which causes 1.7 million deaths annually in Africa (10). According to the Food and Agriculture Organization of the United Nations, malnutrition has increased by almost 50% since 2012, owing to the central role agriculture plays in African economies (11). Environmental shocks and their knock-on effects also cause severe harm to mental health (12). In all, it is estimated that the climate crisis has destroyed a fifth of the gross domestic product (GDP) of the countries most vulnerable to climate shocks (13).

The damage to Africa should be of supreme concern to all nations. This is partly for moral reasons. It is highly unjust that the most impacted nations have contributed the least to global cumulative emissions, which are driving the climate crisis and its increasingly severe effects. North America and Europe have contributed 62% of carbon dioxide emissions since the Industrial Revolution, whereas Africa has contributed only 3% (14).

The fight against the climate crisis needs all hands on deck

Yet it is not just for moral reasons that all nations should be concerned for Africa. The acute and chronic impacts of the climate crisis create problems like poverty, infectious disease, forced migration, and conflict that spread through globalised systems (6, 15). These knock-on impacts

affect all nations. COVID-19 served as a wake-up call to these global dynamics and it is no coincidence that health professionals have been active in identifying and responding to the consequences of growing systemic risks to health. But the lessons of the COVID-19 pandemic should not be limited to pandemic risk (16, 17). Instead, it is imperative that the suffering of frontline nations, including those in Africa, be the core consideration at COP27: in an interconnected world, leaving countries to the mercy of environmental shocks creates instability that has severe consequences for all nations.

The primary focus of climate summits remains to rapidly reduce emissions so that global temperature rises are kept to below 1.5 °C. This will limit the harm. But, for Africa and other vulnerable regions, this harm is already severe. Achieving the promised target of providing $100bn of climate finance a year is now globally critical if we are to forestall the systemic risks of leaving societies in crisis. This can be done by ensuring these resources focus on increasing resilience to the existing and inevitable future impacts of the climate crisis, as well as on supporting vulnerable nations to reduce their greenhouse gas emissions: a parity of esteem between adaptation and mitigation. These resources should come through grants not loans, and be urgently scaled up before the current review period of 2025. They must put health system resilience at the forefront, as the compounding crises caused by the climate crisis often manifest in acute health problems. Financing adaptation will be more cost-effective than relying on disaster relief.

Some progress has been made on adaptation in Africa and around the world, including early warning systems and infrastructure to defend against extremes. But frontline nations are not compensated for impacts from a crisis they did not cause. This is not only unfair, but also drives the spiral of global destabilisation, as nations pour money into responding to disasters, but can no longer afford to pay for greater resilience or to reduce the root problem through emissions reductions. A financing facility for loss and damage must now be introduced, providing additional resources beyond those given for mitigation and adaptation. This must go beyond the failures of COP26 where the suggestion of such a facility was downgraded to “a dialogue” (18).

The climate crisis is a product of global inaction, and comes at great cost not only to disproportionately impacted African countries, but to the whole world. Africa is united with other frontline regions in urging wealthy nations to finally step up, if for no other reason than that the crises in Africa will sooner rather than later spread and engulf all corners of the globe, by which time it may be too late to effectively respond. If so far they have failed to be persuaded by moral arguments, then hopefully their self-interest will now prevail.

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ORIGINAL ARTICLE

REFERRAL PATTERN OF CHILDREN WITH CARDIAC DISEASES: A CROSS-SECTIONAL REVIEW OF REFERRAL DOCUMENTS IN THREE TEACHING HOSPITALS IN ADDIS ABABA

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Abstract

Background: *Patients with hemodynamically significant structural heart lesions often become inoperable if early referral and intervention is not done. Contrarily, referring patients with hemodynamically-insignificant lesions congest the already busy tertiary centers. The study aim was to determine the proportion of hemodynamically significant cases with delayed presentation and their determinant factors.*

Methods: *A cross-sectional study design was used to collect data from 369 referral slips sampled using a single population proportion formula (95% CI, 5% margin of error, and 50% cases coming with a referral paper). Data was analyzed using SPSS software package version 25. Binary logistic regression analysis was done to determine factors associated with referral either to the Tikur Anbessa hospital versus Saint Paul and Yekatit 12 hospitals. Odds ratio with their corresponding confidence interval was used to assess the significance of association and statistically significant associations were declared at p-value < 0.05.*

Result*: The overall magnitude of delayed presentation beyond 1 year of age among patients with hemodynamically-significant lesions was 54%. Saint Paul and Yekatit-12 hospitals combined had higher referral from primary institutions (AOR=2.68 95% CI-1.64-4.38, p<0.001). Tikur Anbessa hospital had higher referral of congenital heart disease and retention of feedback referral slips compared to the two hospitals (AOR=1.86, 95% CI-1.02-3.41, p=0.004) and (AOR=2.78, 95% CI -1.65-4.69, p<0.001). If the referring health worker was a specialist, and initial symptom was chronic and poly, the likely-hood of being referred to Tikur Anbessa Specialized hospital was higher (AOR=10.34, 95% CI-2.20-48.69, p=0.003) and 1.97, 95% CI-1.21-3.22, p=0.007) respectively. The time lapse between referral and reaching at the referral destination was longer in cases referred to TASH (AOR=2.91,95% CI-1.74-4.88), p<0.001). Feedback slips were sent back to the referring health facilities in only 3% of cases.*

Conclusion: *Delayed presentation of patients with hemodynamically significant cardiac lesions was tremendous. and un sent or retained feedback referral slips were significant. Future research should focus on active searching for causes of delayed presentation using a well-designed and validated tool.*

Keywords: Patients, Patients referral, Teaching hospitals, Rheumatic heart disease, Feedback referral

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Background

An early diagnosis and referral of patients is often a problem in low-income countries like Ethiopia and children with structural heart lesions (SHL) like all the other pediatric referrals are victims of an inefficient referral system (1). Delayed care-seeking, missed-diagnosis or late referral in structural heart lesions often results in pulmonary vascular disease (PVD), heart failure (HF), and infective endocarditis (IE)(2). In a study outcome reported from Kenya, the proportion of patients with hemodynamically-significant CHD who were diagnosed beyond one year of age was 60% (3). In the contrary, an innocent cardiac murmur remains a common indication for referring cases to a tertiary level with an unnecessary crowding of settings (4). According to one report, the problem of referring simple cardiac lesions in developing countries is paramount (5). Referral system is designed to optimize the use of the different levels of health services and avoid unnecessary congestion and waste of human and material resources in the specialized levels (6). A standard referral system is effective only if sufficient coordination between different health care levels is available. As a result, referral to the higher level will only be through the lower -level health care systems. Absent or poor feedback is a common problem in the referral system. In a well-organized health system, health workers in the higher levels should report the final diagnosis and treatment of all referred patients to the lower level in a standard form including their follow-up recommendations (7). The aim of the current study was to describe the pattern of referral of children with cardiac disease presented to three teaching hospitals of Addis Ababa.

Methods

Study area and Period: The study was conducted at Tikur Anbessa specialized hospital (TASH), St Paul's Hospital Millennium Medical College (SPHMMC), and Yekatit 12 (YK12) hospitals between January 01 and February 30, 2019. TASH is a well-established referral hospital for chronic and severe health problems. It receives cases from regional hospitals from all parts of the country including Yekati-12 and SPHMMC hospitals. The pediatric cardiology unit at TASH is one of the four cardiology units in the hospital with three pediatric cardiologists and six pediatric cardiology fellows, three nurses, 3 echocardiographic and 2 electrocardiographic machines. The unit works in collaboration with the main cardiac center located in the premises of TASH. SPHMMC is a teaching hospital in Addis Ababa (AA) with a pediatric cardiology unit. Yekatit 12 hospital is one of the public hospitals affiliated with the two hospitals.

Study design: Cardiac referral slips dated back to December 2019 and before were collected retrospectively until the required sample size were obtained.

Study participants: Secondary data of children up to the age of 15 years with structural heart lesions who were referred to one of the three teaching hospitals with referral slip were the source of data. The data were collected in a semi-structured pre-tested questionnaire format.

Inclusion criteria: Children with cardiac symptoms, hemodynamically-significant or not, who for the first time brought with a referral slip were included.

Exclusion criteria: Cases referred for non-structural heart lesions, self-referred or verbally-referred cases and referral slips with grossly incomplete demographic data were excluded

Study variables

Age, sex, address, living area, referral distance, reason for referral, referring health worker, referring health institution, and echocardiographic diagnosis were collected as an-independent variables. Delayed presentation was the primary outcome variable. Secondary outcome variable includes details of the referral slip, time to arrive at the referral site after receiving the referral paper, specialists' recommendation, follow-up, and feedback referral.

Operational definition:

Referral: a process in which a health worker at one level having insufficient resources to manage a clinical condition seeks the assistance of a better facility at the same or higher level.

Referring facility: The health service organization that initiated the referral process.

Receiving facility: A health service facility that received patients or clients from referring facility.

Appropriate referral: defined when the referral is from the appropriate level, appropriate time, and with complete referral information as per the national ministry of health standard.

Patient referral feedback: The act of sending patient referral information back to the referring organization.

Teaching hospital: is a hospital or a medical center that provides medical education and training in addition to medical treatment to future and current health professionals.

Tertiary level specialist: refers to a certified pediatric cardiologist.

Feedback slips: second part of the referral paper. Feedback letters still attached with the incoming referral letter is equivalent with the "*feedback letter that was not sent back to the referring health worker"*. Feedback letter detached from the incoming referral paper was equivalent with the *"feedback letter sent to the referring health worker".* Central referral hospital is referring to TASH for this particular study.

Primary institutions/level

1. Has three kinds of service points – health posts, health centers and primary hospitals. The Health Posts and Health Centers are organized into PHCUs, which is composed of a HC and five satellite HPs. Taken together, the PHCU provides services to a population of about 25,000 persons (8).
2. Hemodynamically-insignificant lesions (HISHL):-examples of HISHL are small ASDs, of patent foramen ovale, small VSDs, small PDAs, patient with innocent murmur, mild PA's. Hemodynamically significant structural heart lesions: -Those children with structural heart diseases in need of pharmacologic and/or surgical based treatment (9).

Ventricular septal defect (VSD), Atrial septal defect (ASD), pulmonary stenosis (PS), patent ductus arteriosus (PDA), aortic stenosis (AS), and coarctation of the aorta (COA) in older children have been defined as simple heart lesions as their post-operative prognosis is excellent. Similarly, all cyanotic-CHD and RVHD cases were defined as complex cardiac lesions since their post-operative prognosis is not as smooth as the simple lesions (10,11).

Delay in arrival to the referral destiny: was defined as the delay in arrival at the referral hospital beyond 72 hours after receiving the referral paper (12).

A "Poor" quality referral paper was defined when less than 50% information's were recorded on the referral slip, a "Fair" quality referral was defined when 51%-75% information's were recorded, and "Good" quality referral was defined if > 75% required information's were recorded on the referral slip (13).

Data collection and procedure: - A half-day training about the purpose of the study and the questionnaires was given to nurses at each study hospital prior to the data collection. The principal investigator monitored the data collection processes daily. The quality of the referral paper was assessed against the 22 items adopted from the referral standard. A score of "1" was given for information properly recorded on each specific item and "0" score was given otherwise. Using the compute function, the average value was calculated and re-categorized in to a different scaled variable as "poor", "Fair" and "Good" (8).

The management and follow up plan were decided by the principal investigator (a certified pediatric cardiologist). Thus, recommendations as Surgery, additional investigations, inpatient management, follow up at the tertiary center, or follow-up at the primary level were the recommendations recorded variables.

Sampling technique

The sample size was calculated using a single population proportion formula assuming a 95% confidence interval, a 5% margin of error, and 50% of cases coming to tertiary hospital with a referral paper. Thus, N= (Zα/2) 2*P(1-P)/D2= (1.96)2*0.5*0.5/(0.05)2=384. Since the total pediatric cardiac referral in the three hospitals is estimated to be less than

10,000 population annually, a finite population formula, SS/[1+{(SS-1)/pop} was used. Thus, the final sample size was 369. The sample size was proportionately allocated to the 3 hospitals based on the case load ratio (199 for TASH, 89 for Saint Paul, and 81 for YK-12) hospitals. Annual estimated case load of structural heart lesions at TASH, SPHMMC and YK-12 hospitals at time of the study were 3,575, 1,947 and 1,608 respectively (from hospital HMIS data). Data were entered in to SPSS software package version 25, IBM USA. Manual proof reading was made to secure the data quality. Categorical data were analyzed and presented in numbers, frequencies, and proportions. Continuous data were presented in the form of mean, median, and standard deviation. Binary logistic regression analysis was made to determine factors affecting referral either to the central referral hospital or to the other teaching hospitals. Statistically significant associations were made at a p-value < 0.05.

Result

Out of the 369 analyzed cases, 207(56.1%) were females. The median referral age was 24 (IQR=100) months. Socio-demographic characteristics of the cases are displayed in Tables 1. The majority of cases were urban dwellers mainly, from surrounding Oromia towns. The overall proportion of delayed presentation beyond 1 year of age among patients with hemodynamically-significant lesions was 54%.

Table 1: Demographic characteristics of children with cardiac referral at three teaching hospitals of Addis Ababa.

Characteristics	Number	Percent
Age (months/years)		
0-3	43	11.7%
4-12	106	28.7%
13-60	95	25.7%
5 -15	125	33.9%
Sex		
Male	162	43.9%
Female	207	56.1%
Referring regions		
Addis Ababa	130	35%
Oromia	144	39%
SNNPR	30	8%
Amhara	38	10%
Tigray	1	0.3%
others	21	6%
MI[§]	5	1%
Referral Hospital		
Tikur Anbessa specialized hospital	199	53.9%
Saint Paul millennium hospital	89	24.1%
Yekatit 12 hospital	81	22.0%
Referral distance		
≤ 25 km	156	42.3%
>25km	213	57.7%
Patient dwelling area		
Urban	211	57.2%
Rural	158	42.8%

[§]MI-missed information

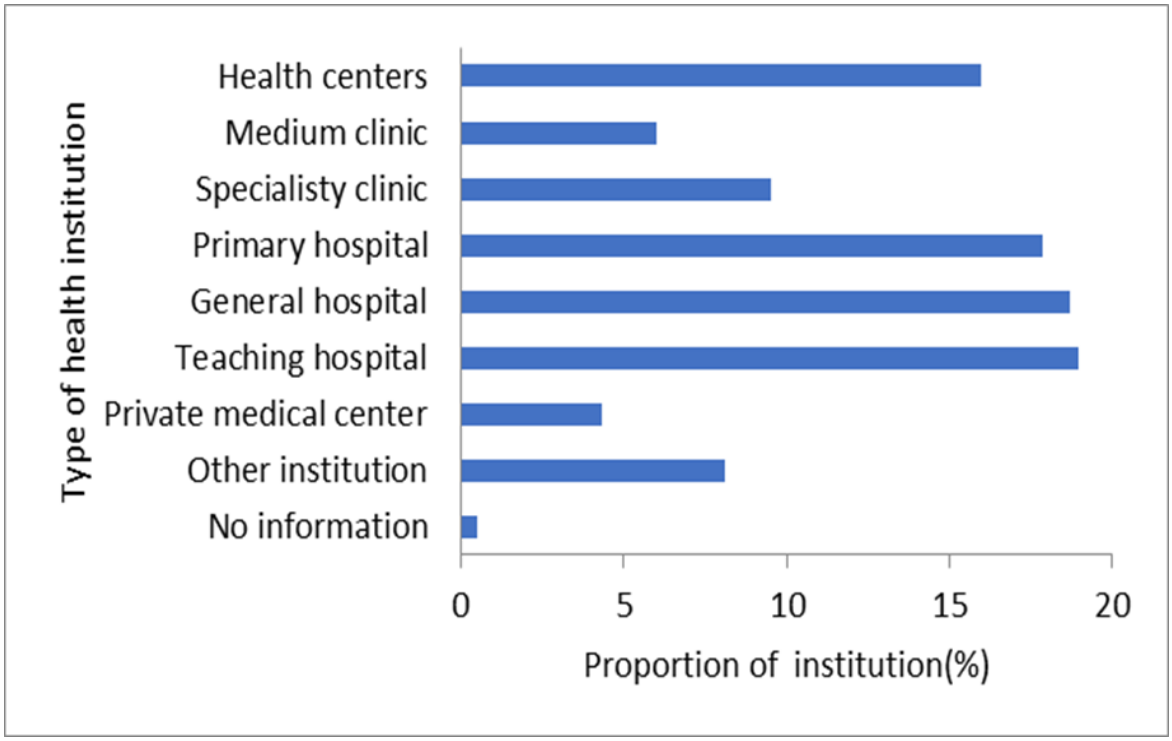

Figure 1- Referring health institutions to the three teaching hospitals of Addis Ababa

Table 2 shows factors determining referral to TASH or the other two teaching hospitals (SPHMMC and Yekatit 12 hospital). It was shown that if the referral were from the primary level institutions, it would less likely be to TASH. On the other hand, if the referring health worker was a specialist, the referral would be more likely to TASH than the other two hospitals. Similarly, if the initial presenting symptoms were chronic and poly symptoms, more likely the patient referral would be to TASH. Hemodynamically-insignificant lesions were equally referred to TASH and the other teaching hospitals. Arrival time to the referral destinations was longer in TASH than the other two hospitals. Similarly, a smaller number of feedback letters were detached from the main referral slips at TASH compared to SPHMMC-YEK-12 hospitals.

Table 2: - Factors affecting cardiac referral in children at three teaching hospitals of Addis Ababa.

Variables	TASH	SP/Y12 hospitals	Crude OR (95% CI)	AOR	p-value
Referral from ≥25km distance	126	87	1.68 (1.11-2.55)	1.59 (0.97-2.62)	0.069
Referral from primary institution	73	109	3.08 (2.02-4.72)	2.68 (1.64-4.38)	<0.001*
Referral by specialist	22	2	10.44 (2.42-45.09)	10.34 (2.195-48.689)	0.003*
Chronic-poly symptom on initial presentation	137	81	2.43 (1.59-3.71)	1.97 (1.21-3.22)	0.007*
Echocardiographic Dx of CHD©	155	87	0.30 (0.19-0.47)	2.78 (1.65-4.69)	<0.001*
Hemodynamic severity	70	64	1.11 (0.73-1.70)	1.062 (0.64-1.76)	0.818
Delayed arrival after being referred	99	36	3.69 (2.32-5.84)	2.91 (1.74-4.88)	<0.001*
Feedback slip attached On the parent referral slip	57	26	2.22 (1.32-3.73)	1.864 (1.02-3.41)	0.044*

*-statistically significant. The reference variable is the outcome variable (the central referral hospital) TASH (code=1),the other outcome variable is SPHMMC-YEK-12(code=0). Missed information cases were not included in the analysis.

SP-Saint Paul hospital, TASH-Tikur Anbessa specialized hospital, YK-12-Yekatit 12 hospital, CHD-congenital heart, RHD-rheumatic heart disease, CHF-congestive heart failure, HW-health worker, Dx-diagnosis, ©-cases with missed data were not included in the bivariate and multivariate analysis

The frequency of referral information on the referral slips is depicted in table 3. The proportion of good, faire and poor quality of the referral slips was 39.3%,42.8% and 17.9% respectively. Hence, referring table 3 of this study, the referral quality for facility name, client's name, age, sex, client history, and reason for referral were graded as "Fair to Good" quality information. Accordingly, the overall proportion of delayed presentation beyond 1 year of age among hemodynamically-significant lesions was 54%. The feedback referral slip (second part of the referral paper) was not detached in 97% of the cases. Details of the referring institutions is displayed in figure 1. The indications for referral were shown in Figure 2 and specialists' recommendation was shown in Figure 3.

Table 3: Referral information contained on the referral slips of referred cases

Referral information	Number	Percent
Referring health worker name	307	68%
Referring health worker position	88	19.6%
Initiating facility name	355	78.9%
Initiating facility address	261	58%
Date of referral	246	54.7%
Telephone arrangement made before referral	14	3.1%
Referring facility telephone number	26	5.8%
Receiving facility name	334	74.2%
Receiving facility address	110	24.4%
Client's name	353	78.4%
Client ID number	198	44%
Client's age	316	70.2%
Client's gender	314	69.8%
Client's address	69	15.3%
Clinical history	345	76.7%
Clinical findings	216	48%
Treatment given	175	38.9%
Reason for referral	343	76.2%
Accompanying document attached	93	20.7%
Name of the referring health worker printed	302	67.1%
Signature of the referring health worker printed	354	78.7%
Date of signature printed	105	23.3%

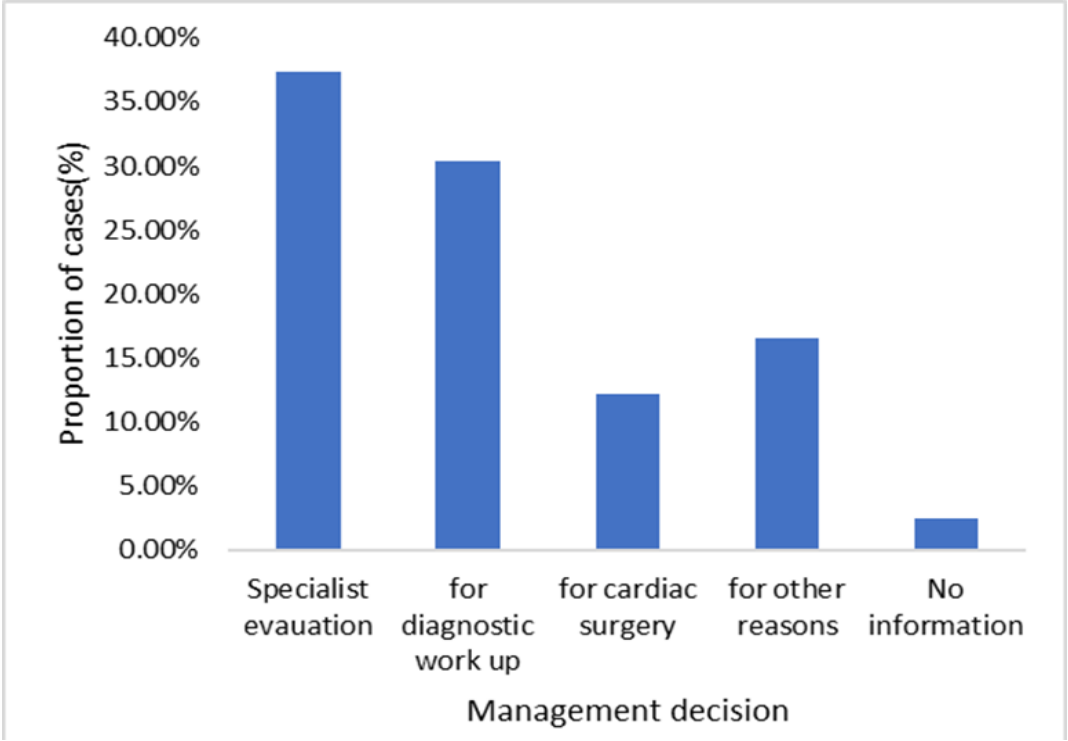

Figure 2: Reasons for referral of children with cardiac problem at three teaching hospitals of Addis Ababa.

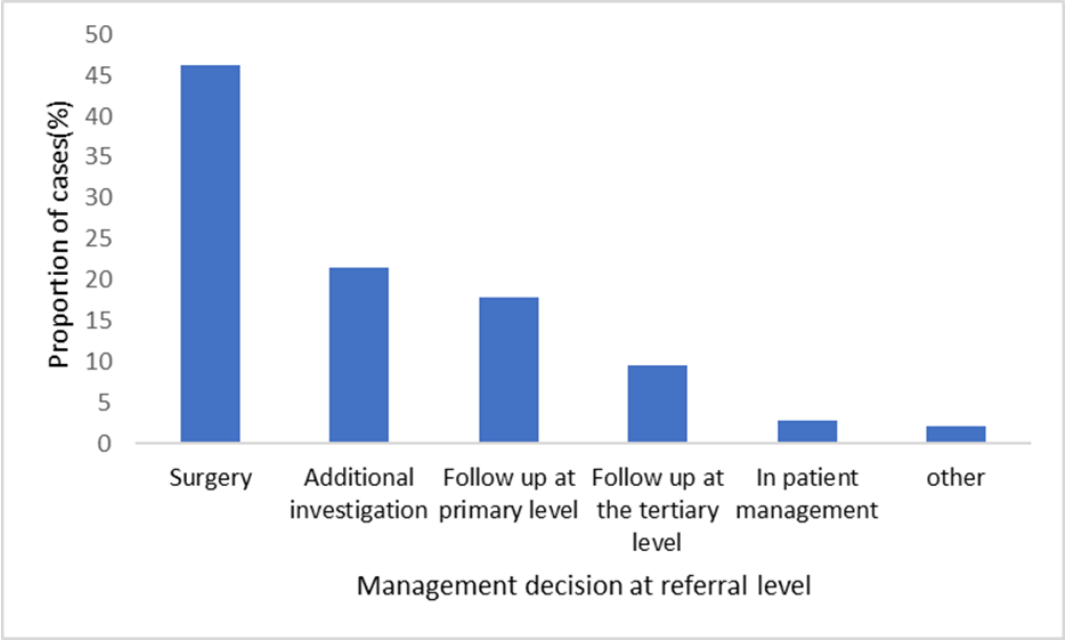

Figure 3: Tertiary level management recommendations to children with cardiac problem at the three teaching hospitals in Addis Ababa.

Discussion

More than half of the hemodynamically significant cases in this study had a delayed presentation. Furthermore, primary and secondary level institutions referred cases to the tertiary hospitals against the standard (8). Arrival time to the referral hospital was significantly delayed in the central referral hospital. Referral information particularly "referring health worker identity", "pre-referral telephone arrangement", "referring facility telephone number", "receiving facility address" and "client identification number" were poorly recorded in the referral slips. The delayed presentation in the current study was assumed to be higher compared to other reports (14). It was reported that heart failure and pulmonary hypertension were associated with a delayed referral in CHD and with inoperability of cases (2).

Furthermore, practitioners were often sued for medical negligence when a patient referral is delayed beyond the expected time (15). Some centers recommend that referral to a pediatric cardiologist should be made in no longer than a week for hemodynamically significant lesions (16). Government facilities were the main referring institutions in this study. This observation may show the referral tier system in Ethiopia is well organized only in the government health facilities compared to the private institutions. Evidences also showed that health care referrals from private health facilities to tertiary public facilities face many challenges at different levels (17). However, a different observation was reported in Nigeria (18).

Though, further study is necessary, it seems likely that the community members use the government institutions more frequently than private institutions for economic reasons. Some private institutions preferred referring economically well-off patients abroad for medical treatment (19). The current observation helps to emphasize the need for appropriate schemes for the private institutions in the referral pathway.

Indications for referral were recorded in two-thirds of the referral slips, a comparable rate of record was reported from Saudi Arabia (20). In the majority of cases, the reasons for referral were "seeking a specialist evaluation" and/or "more laboratory investigations" a finding that commensurate with other report (21). Delayed arrival to TASH compared to the other two hospitals may be due to unseen barrier in the former, a finding that require further clarification.

Our finding showing that patients with chronic and poly-symptoms were referred to TASH was natural since TASH is a central-referral hospital receiving cases from all regions including SPHMMC and Yekatit 12 hospitals. Reports showed that single cardiac symptom was the common presenting symptom to primary care levels (22). The fact that there was no statistically significant difference in the two levels of referring institutions among those with in 25km distance and those from

≥ 25km indicated that even cases from the nearby health institutions were using the tertiary centers as that of far distance comers. This contradicts the referral standard and require verification. Similar observation was reported by others (23).

According to the decision of the pediatric cardiologist, 1 in 5 (20%) of the referred cases required follow-up only at the primary level. Reports showed that more than 50% of the population catered at the tertiary level in developing countries could be treated at the lower facility level (24). Patients seek care directly from hospitals because they perceived the hospitals are providing better quality services, less costly and are better stocked with drugs (25).

Referral information particularly "referring health worker identity", "pre-referral telephone arrangement", "referring facility telephone number", "receiving facility address" and "client identification number" were poorly recorded in the referral slips. A similar information gap was reported by others (13). Telephone arrangement before referring was made only in 3% of the cases in the current study despite it's importance in order to know the exact information needed by the receiving hospital staff. Likewise, very few feedback referral letters were sent to the referring health facility. Writing feedback referral helps to notify the result of the tertiary level management, and confirm the patient's arrival at the referral hospital (22).

Conclusion: The proportion of delayed presentation among children with hemodynamically-significant cardiac lesions was measurably large probably due to delay in care seeking by the parent, or misdiagnosis by the health worker or reluctance to refer timely. Primary institutions using the tertiary hospitals is unnecessary burden to tertiary hospitals and require a solution. The referral information contained in the referral slips were markedly incomplete and feedback referral slips were rarely sent to the referring health facilities. The current finding will serve as a background information for future well designed and validated study on the subject. The importance of telemedicine bridging primary level health workers with the pediatric cardiologists at the tertiary level may help.

Limitation of the Study: This report was based on retrospective data analysis with likely incompleteness. Our operational definitions were not based on standard definitions. In addition, the principal investigator (a pediatric cardiologist) decided whether the proposed management and follow up plan was appropriate which may introduce ascertainment bias.

Declarations

Ethical consideration: -Author had the ethical clearance from the IRB of the three hospitals and the participants' consent was waived.

Consent to publish: -NA

Data availability statement: All the necessary information is included in the manuscript.

Authors contribution: TM had the concept of the research question; He wrote the proposal and mentored the data collection. He was involved also in the data analysis and did the writeup.

Conflict of interest: The author declared no conflict of interest.

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ORIGINAL ARTICLE

COMPARISON OF COMMON ADVERSE NEONATAL OUTCOMES AMONG PRETERM AND TERM INFANTS AT THE NATIONAL REFERRAL HOSPITAL IN TANZANIA: A CASE-CONTROL STUDY

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Abstract

Background: *Neonatal period is a critical period in a child's heath because it is associated with higher risk of adverse health outcomes. The objective of this study was to assess common adverse health outcomes and compare the risk of such outcomes between preterm and term neonates, in Tanzania.*

Methods: *This was a case-control study involving infants admitted at Muhimbili National Hospital between August and October 2020. About 222 pairs of preterm and term infants were followed until discharge. Logistic regression was used to compare risk of health outcomes. Statistical significance was achieved at p–value < 0.05 and 95% confidence interval.*

Result*: Preterm neonates had increased risk of mortality (OR = 7.2, 95% CI: 3.4---- – 15.1), apnea (OR = 4.7, 95% CI: 3.4 – 15.1), respiratory distress syndrome (OR = 10.9, 95% CI: 6.1 – 19.6), necrotizing enterocolitis (OR = 5.5, 95% CI: 1.2 – 25.3), anemia (OR = 4.3, 95% CI: 2.8 – 6.6), pneumonia (OR = 2.7, 95% CI: 1.6 – 4.6) and sepsis (OR = 2.6, 95% CI: 1.7 – 3.9). No difference in risk of intraventricular hemorrhage, patent ductus arteriosus and jaundice was observed.*

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Conclusion: *For promoting neonates' health, prevention and treatment of the higher risk adverse neonatal outcomes should be prioritized.*

Keywords: neonatal outcomes, infants, prematurity, Tanzania

Introduction

Neonatal period is the most critical time in a child's life. This is a time of major and rapid anatomical and physiological changes required for a newborn's adaptation to extra-uterine life. The changes may also be accompanied by adverse outcomes resulting from failure to adapt or a definite high risk of infection. These outcomes put neonates at the highest risk of mortality and morbidity than infants of older age group [1].

Neonatal mortality is responsible for approximately 50% of all deaths in children under five years [2]. Around two-third of these deaths occur in only ten countries, all low or middle-income countries [3]. The predominant causes of adverse neonatal outcomes are preterm birth, infections, intrapartum-related complications and congenital anomalies. According to the World Health Organization (WHO) and the Maternal and Child Epidemiology Estimation group, it was estimated that in 2017 preterm birth, intrapartum-related complications and infections accounted for 35%, 24%, 14% and 73%, respectively, of neonatal deaths worldwide [4].

With an estimated 45,000 neonatal deaths annually and a mortality rate of 32 per 1000 live births, Tanzania ranks number ten among countries with the greatest number of neonatal deaths [5]. Preterm birth accounts for 35% of the neonatal deaths in Tanzania [6]. Nearly one out of two preterm infants experience adverse health outcomes during the neonatal period, making the risk of morbidity five times higher compared to term infants [7,8]. Although most neonatal health problems are preventable, neonatal health complications and mortality remain high in Tanzania [9]. This study aimed to assess common adverse health outcomes and compare the risk of such outcomes between preterm (born at less than 37 weeks gestation) and term infants (born at greater than or at 37 weeks gestation) within the first 28 days of life .

Methods

Study Site

This research was conducted at the Muhimbili National Hospital (MNH). MNH is located in Dar es Salaam-Tanzania (-6.803°S, 39.272°E) on a natural harbor on East Africa's eastern coast. MNH is a national referral and a teaching hospital for medical students, nurses and postgraduates from the Muhimbili University of Health and Allied Sciences (MUHAS). It is also a hospital that attends inpatients, outpatients and referral cases from all over the country. The hospital has a maternity block where reproductive services are offered. After delivery, newborns are admitted in the postnatal ward until discharge or may be moved to the Neonatal Intensive Care Unit (NICU) if

they are born with or develop health complications.

Study Design

A hospital-based case control study was conducted on newborns within the first month of life between August and October 2020. Newborns were defined as preterm or term. Preterm infants were those born at <37 weeks gestation and were regarded as cases. Term infants were those born at ≥37 weeks gestation and were regarded as controls. Gestational age was determined using the first day of last menstrual cycle and/or first trimester ultrasound. Cases were obtained through consecutive enrollement of delivered preterm babies until the desirable sample size was met. Controls were obtained through the identification of a term infant born immediately after a preterm infant was enrolled.

Sample Size Determination

The sample size was calculated using EPI info (7.1.3.10) matched pair formula for case-control studies. The minimum sample size at 95% confidence interval (CI), 80% power and 15% prevalence of preterm birth was 106 pairs. In this study, the sample size was increased to compensate for possible incomplete records.

Inclusion and Exclusion Criteria

Only live and admitted newborns who were inborn of MNH were eligible for the study. A live newborn was defined by presentation of a cry, breathing or movement after delivery and Apgar score of greater than one at one and five minutes. Newborns whose parents did not provide a written informed consent were excluded from the study. Newborns with congenital anomalies were also excluded from the study.

Data Collection

Infants were enrolled in the delivery room then follow up was done in the admission wards (postnatal ward or NICU). Birth details including infant's identification, gestational age, sex, Apgar score, birth weight and admission ward were recorded immediately after birth. Infants were also followed for their health outcomes and the pre-identified adverse neonatal outcomes were recorded in a pre-structured chart. Data was collected from the time of birth to discharge, death or end of the neonatal period. Generally, the allocated minimum and maximum number of days for data collection were one and 28 days, respectively.

Statistical Analysis

Data was recorded in hard copy then transferred and analyzed using Statistical Package for the Social Sciences (SPSS) version 20 (IBM Corp., Armonk, NY, USA) for Windows. Descriptive statistics were used to summarize outcomes as means and proportions. T–test was used to determine the statistical significance of means. For proportions, the fisher's exact test was used. Logistic regression was used to compare the risk of neonatal outcomes between the study groups. A p–value of less than 0.05 at 95% CI was considered statistically significant.

Ethics Approval and Consent to Participate

Neonates were included in the study after obtaining a written informed consent from their

parents. The National Health Research Ethics Committee (NatHREC) of the National Institute of Medical Research (NIMR) approved this study with reference number NIMR/HD/R.8a/Vol.IX/3006.

Operational definitions

IVH: Bleeding inside the ventriles of the brain caused by presence of fragile brain blood vessels and disturbance in the celebral blood flow. Presumptively diagnosed by neurological symptoms such as convulsion and restlessness, decrease in haemoglobin level. Diagnostic investigation was done by ultrasound of the brain.

RDS: A respiratory disease due to immature lungs that was clinically diagnosed by presence of fast breathing (>70 breaths per minute), grunting, severe wall indrawing, intercostal retractions, diminished breath sound and bluish discoloration of membrane and skin.

PDA: Failure of ductus arteriosus to close that was clinically diagnosed by presence of machinery murmur during auscultation of the heart. Diagnostic investigation involved chest x-ray and echocardiography.

NEC: Ischemic and inflammatory necrosis of bowel after initiation of enteral feeding. Clinical presentation included abdominal distantion and tenderness, and vomiting and stool in blood. Diagnostic investigation involved abdominal x-ray or abdominal ultrasound to show inramural gas or free air in the peritoneum.

Jaundice: Yellow discoloration of the skin characterized by high level of unconjugated bilirubin (>18 mg/dL).

Anemia: Low level of hemoglobin characterised by paleness, decreased activities, tachypnea, features of heart failure and low hemoglobin level (<10 g/dL).

Neonatal sepsis: A syndrome with systemic signs and symptoms of bacteremia. Presumptively diagnosed by clinical signs including fast breathing, hyperthermia (T>37.5°C), hypothermia (T<36°C), not feeding well, cyanosis, convulsion and drowsiness. Diagnostic investigation involved full blood picture.

Results

A total of 222 case-control pairs were recruited in this study. Sixteen (7.2%) preterm infants and five (2.3%) term infants, respectively, were excluded from the analysis due to congenital malformations or unsigned parent consent forms. Of the remaining 206 preterm infants, 9 (4.4%) were extreme preterm (less than 28 weeks gestation) who weighed more than 500 g, 63 (30.6%) were very preterm (28 –31 weeks gestation) and 134 (65.0%) were moderate to late preterm (32–36 weeks gestation).

Baseline neonatal characteristics are presented in Table 1. There were more males than females in both case and control groups, although the proportion of male to female was not statistically significantly different. Mean birth weight was 2.0±0.7 kg for preterm infants and 3.1 ± 0.6 kg for term infants. There as a statistically significant difference in the mean birth weight (p–value < 0.001).

The proportion of preterm infants who weighed less than 2,500 g was significantly higher when compared to term infants (p–value < 0.001). There was no significant difference for less than or equal to five Apgar score at one and five minutes between the two groups.

Table 1: Baseline characteristics of preterm and term infants at Muhimbili National Hospital

Characteristics	**N (%)**		**p–value**
	Preterm (n = 206)	Term (n = 217)	
Sex			
Male	110 (53.4)	132 (60.8)	0.140
Female	96 (46.6)	85 (39.2)	
Birth weight (grams)			
≥ 2500	47 (22.8)	192 (88.5)	< 0.001
< 2500	159 (77.2)	25 (11.5)	
Apgar score ≤ 5			
At 1 minute	31 (15.0)	22 (10.1)	0.29
At 5 minute	8 (3.9)	2 (0.9)	

On average, the duration of hospital stay was longer for preterm than term infants (eleven vs. four days), and the difference was statistically significant (p–value < 0.05). Apnea, respiratory distress syndrome (RDS), necrotizing enterocolitis (NEC), pneumonia, anemia and sepsis were significantly common among preterm than term infants (Table 2). No significant differences were observed between the two groups for intraventricular hemorrhage (IVH), patent ductus arteriosus (PDA) and jaundice (p –value = 0.06, 0.11 and 0.20, respectively).

Table 2: Health complications among babies born at <37 (preter) and ≥37 weeks (term)gestation

Complications	**Preterm (N = 206)**		**Term (N = 217)**		**p–value**
	N	%	N	%	
Death	49	23.8	9	4.2	< 0.001
Apnea	149	72.3	78	35.9	< 0.001
IVH	4	1.9	0	0.0	0.055
RDS	92	44.7	15	6.9	< 0.001
PDA	3	1.5	0	0.0	0.115
NEC	10	4.9	2	0.9	0.018
Jaundice	119	57.8	111	53.9	0.200
Anemia	106	51.5	43	19.8	< 0.001
Pneumonia	52	25.2	24	11.1	< 0.001
Sepsis	105	51.0	62	28.6	< 0.001

Abbreviations: IVH, intraventricular hemorrhage; RDS, respiratory distress syndrome; PDA, patent ductus arteriosus; NEC, necrotizing enterocolitis

Generally, 175/206 (85.0%) preterm infants and 94/217 (43.3%) term infants had at least one adverse outcome and the difference was statistically significant (p–value < 0.001). The proportion of infants with at least one outcome increased with lower gestational ages (Figure 1). All infants born at less than 28 weeks had at least one adverse outcome. Also, 93.7% and 79.9% of those born between 28–31 weeks and 32–36 weeks, respectively, had at least adverse outcomes. However, the majority of those born at greater than or equal 37 weeks had no adverse outcome.

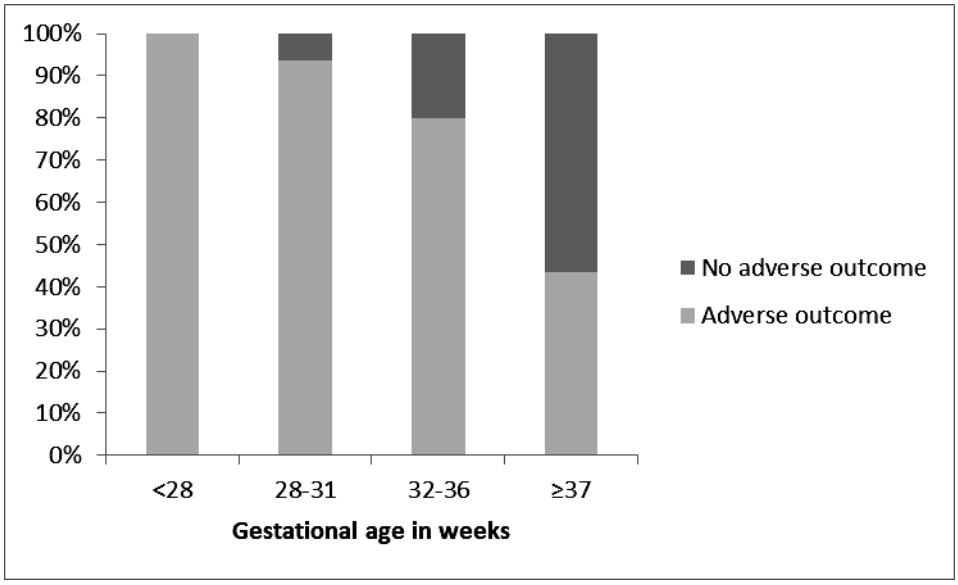

Figure 1- Proportion of infants with and without health complications across gestational age groups

Furthermore, preterm infants had a significantly higher mortality rate than term infants during the neonatal period (p–value < 0.001). There were more deaths in lower gestational ages than in higher gestational ages. Forty-nine out of 206 (23.8%) preterm infants and nine out of 217 (4.1%) term infants died within the neonatal period (Table 2). The number of deaths to the number of births increased substantially with decreasing gestational age group (Figure 2). While only 9/217 infants born at greater than or equal to 37 weeks died, all (9/9) infants born at less than 28 weeks died. For gestational ages of 28–31 and 32–36 weeks, 21/63 and 19/134 infants died, respectively.

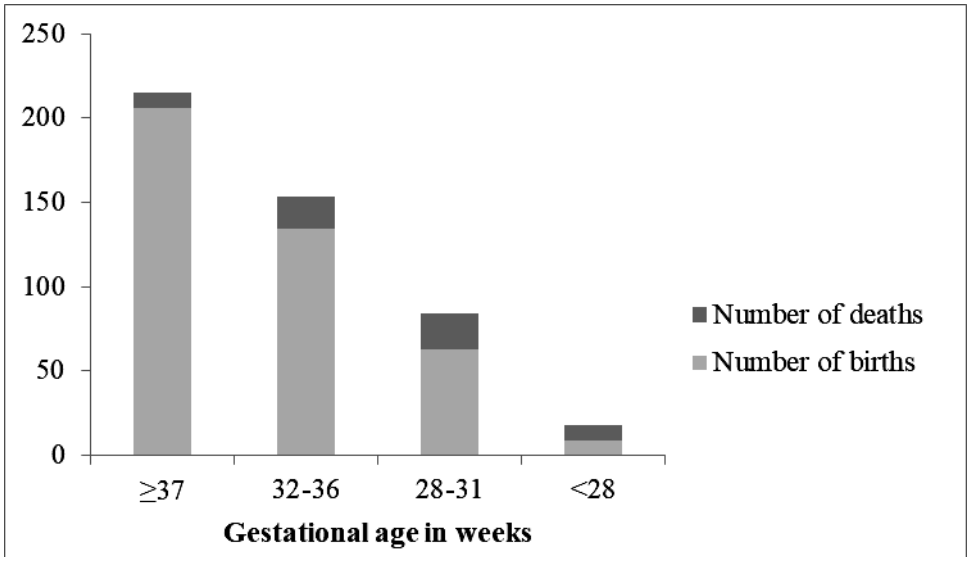

Figure 2: Number of births versus deaths at different gestational ages groups

Table 3 shows the likelihood of the significant adverse outcomes to occur among preterm and term infants. While the risk of RDS was ten times, the risk of apnea and NEC were five times higher among preterm infants than term infants. Preterm infants were four times likely to have anemia than term infants. Similarly, infections like sepsis and pneumonia were nearly three times more common among preterm than term infants. Among the adverse neonatal outcomes with greater odds of occurance. In comparison to term infants, the risk of death was seven-fold higher in preterm infants. The risk of overall morbidity was also higher in preterm infants than term infants by seven-folds.

Table 3: The odds of health complications among preterm and term infants

Outcome	Preterm infants n = 206	Term infants n = 217	OR	95% CI
Mortality‡	49	9	7.2	3.4–15.1
Apnea‡	149	78	4.7	3.1–7.0
RDS‡	92	15	10.9	6.1–19.6
NEC*	10	2	5.5	1.2–25.3
Anemia‡	106	43	4.3	2.8–6.6
Pneumonia†	52	24	2.7	1.6–4.6
Sepsis‡	105	62	2.6	1.7–3.9
Overall morbidity‡	175	94	7.4	4.6–11.8

Abbreviations: OR; odds ratio, CI; confidence interval, RDS; respiratory distress syndrome, NEC; necrotizing enterocolitis
*; < 0.05, †; < 0.01, ‡; < 0.001

Discussion

This study assessed adverse neonatal outcomes and compared the risk between preterm and term infants. The findings indicate that nearly a quarter (23.8%) of preterm infants and only 4.1% of term infants died during the neonatal period. A similar mortality rate of 28% for preterm and 6% for term infants was reported in a study conducted in Bangladesh [10]. Contrary, a lower mortality rate among preterm infants was reported in high-income countries like Australia (7.7%) and the USA (1.4%) [11,12]. These differences show that preterm infants in low and low-middle-income countries are at a greater risk of mortality than those in high-income countries. Mortality risk was seven times higher (OR = 7.21, 95% CI; 3.44–15.12) in preterm infants than term infants. Previous studies have also reported a five to 12 increased risk of mortality in preterm infants [7,13,14].

Number of deaths to live births significantly increased with decreasing gestational age and led to as high as 100% mortality rate among extreme preterm infants. A very high mortality rate among extreme preterm infants is not surprising. In a similar situation in England, a survival rate of only 2% (98% mortality rate) in extreme preterm infants was reported [15]. For moderate and late preterm infants, more than one-third and one-seventh of the infants died, respectively. A higher mortality rate among moderate (54%) than late preterm infants (13.2%) was also reported in a prospective study for causes of death and illnesses in preterm infants in Ethiopia [16].

The current study observed that, on average, preterm infants had a longer duration of hospitalization than term infants (eleven vs. four days). A comparable duration of ten days for preterm and five days for term infants was reported in a previous study comparing short-term neonatal morbidity between preterm and term infants [17]. However, a national-wide survey reported a considerably longer duration of hospitalization for preterm infants that ranged between three to 74 days depending on the degree of prematurity of an infant [11]. Fewer days of hospitalization in the present study may be due to early deaths among preterm infants. Also, in this study, there were only a few extreme preterm infants, that are usually the ones staying longer at the hospital [11].

The present study shows that the proportion of preterm infants with neonatal morbidity was nearly twice that of term infants (84.9% vs. 43.3%). In a study conducted in Bangladesh, similar proportions were observed, whereby 76% of preterm and 28% of term infants had morbidities [10]. The most common morbidity among preterm infants was apnea (72.3%). Similarly, previous studies have reported respiratory complications, including apnea, as the most common complications among preterm infants [18]. For term infants, the most common condition was jaundice (53.9%).

Respiratory complications affected only 7% of the term infants. This propotion aligns with the range 4–7% of RDS prevalence in term infants that was reported from other studies [19]. Unlike term infants, preterm infants had higher prevalence and were at a higher risk of apnea and RDS because they are more likely to have immaturity of the brain and respiratory system that may lead to weakness of the muscles that keep the airway open as well as insufficient amount of surfactant at the time of birth and are likely to have an immature nervous system [20,21].

Among the leading causes of death in children are infections such as sepsis and pneumonia [3]. In sub-Saharan Africa, for instance, pneumonia is the leading cause of mortality in under-five children [2]. In the present study, compared to term infants, preterm infants had a higher risk of both sepsis (51.0% vs. 19.0%) and pneumonia (25.2% vs. 11.1%). It was found that the odds of sepsis and pneumonia were two and three folds higher (OR = 2.60, 95% CI; 1.74–3.88 and OR = 2.72, 95% CI; 1.60–4.60), respectively, in preterm infants. A two-fold increased risk of neonatal infection among preterm infants has also been reported in other studies investigating adverse neonatal outcomes and the epidemiology of neonatal sepsis [22,23]. Immunological deficiencies among preterm infants make them fail to fight early life infections cause of the higher risk of infections [24].

About 51.5% of preterm infants and 19.8% of term infants had anemia resulting in four times increased risk in preterm infants (OR = 4.28, 95% CI; 2.79–6.60). The incidence of 58.2% and 21.0% for preterm and term infants, respectively, were also reported elsewhere [25,26]. Compared to term infants, typically preterm infants have a lower number of red blood cells which also have a short life span, thus exposing them to an increased risk of anemia that may require blood transfusion [27]. NEC, on the other hand, was not as common as other complications. However, the risk was five times higher for preterm infants. Likewise, four times increased risk among preterm infants was observed in a retrospective study conducted in late preterm infants, although only 0.4% of preterm and 0.1% term infants had NEC [28]. Despite the low prevalence reported in different studies, NEC is among the most detrimental neonatal outcomes. It is associated with a high mortality rate among victims, particularly preterm infants and it is the leading cause of death among infants admitted in NICUs [29].

The overall odds of morbidity were seven times higher among preterm infants compared to term infants. Similar odds of morbidity among preterm infants were reported in a study conducted in Switzerland [17]. The proportion of infants with adverse outcomes increased with decreased gestational age. Various studies have documented that the longer the baby stays in the womb, the lower the risk of adverse neonatal outcomes [11,28,30].

This study is not without limitations. Firstly , the assessment of adverse neonatal outcomes

in this study was done between birth and discharge. Adverse outcomes that occurred after discharge were not traced. However, with an adequate number of enrolled participants, we could still establish significant findings that align with similar studies from different parts of the world. Secondly, this assessment addressed only some adverse outcomes but the range of outcomes is wide. Some events such as the need for resuscitation at birth, admission temperature, feeding type were not included in the assessment. We recommend addressing of this shortcoming in other researches. Lastly, this study did not analyze the impact of confounders such as infant age and maternal factors thus interpretation of the findings presented here should be treated with caution.

CONCLUSION AND RECOMMENDATIONS

Preterm infants have an increased risk of mortality, apnea, RDS, NEC, anemia, pneumonia and sepsis in the first month of life compared to term infants. No increased risk was observed for IVH, PDA and jaundice. Following the observed high mortality risk in preterm infants, this research recommends researchers and health workers to continue working to find ways to prevent preterm birth, stop delivery as a result of preterm labor and understand health challenges of preterm infants for the aim of establishing treatment strategies. Pregnant women should also receive adequate prenatal care and education so as to ensure the risk of preterm birth as a result of preventable factors is reduced.

ACRONYMS

IVH	Intraventricular Hemmorhage
MNH	Muhimbili National Hospital
NatHREC	National Health Research Ethics Committee
NEC	Necrotizing Enterocolitis
NICU	Neonatal Intensive Care Unit
NIMR	National Institute for Medical Research
PDA	Patent Ductus Arteriosus
RDS	Respiratory Distress Syndrome

DECLARATIONS

Author's contribution: All authors have equal contribution.

Competing interest: The authors decares no conflict of interest.

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ORIGINAL ARTICLE

RESULTS OF THE PERFORMANCE OF AUTOMATED GENEXPERT IN CHILDHOOD TUBERCULOSIS IN ADDIS ABABA, ETHIOPIA: A RETROSPECTIVE CROSS-SECTIONAL STUDY

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Abstract

Background: *Approximately 81% of all childhood tuberculosis cases occur among 22 high-burden countries and Ethiopia ranks eighth among these high burden countries. The GeneXpert Mycobacterium tuberculosis DNA and resistance to rifampicin (MTB/RIF) test can detect pediatric tuberculosis and its multidrug-resistant form with very high sensitivity and specificity, but limited data exists on its use in our country. We aimed to evaluate the effectiveness of the GeneXpert assay in comparison to children with a clinical diagnosis of Tuberculosis.*

Methods: *A descriptive retrospective study on 144 TB-diagnosed children younger than 15 years was conducted at Tikur-Anbessa specialized hospital and Yekatit 12-referral hospital, pediatrics departments, Addis Ababa, Ethiopia. The performace of the GeneXpert test was evaluated by revising the charts of patients who have begun anti-tuberculosis treatment. We extracted information from the chart review of 144 eligible children who were diagnosed with tuberculosis and began anti-TB treatment from February 2014 to July 2016.*

Result*: In the study, 144 patients with clinical diagnosis of tuberculosis were included, and 23% of them also had concurrent HIV infection. Equal numbers of male and female were present; 48.6% were from Addis Ababa. Thirty-four patients (23.6%) were missing their childhood vaccinations. The GeneXpert assay detected disease in only 24 (16.7%) of clinically diagnosed pediatric tuberculosis patients.*

Citation : Genetu Y., Belay B., Abebe W., Results of the performance of automated Genexpert in childhood tuberculosis in Addis Ababa, Ethiopia: a retrospective cross-sectional study, *Ethiop J of Pediatr Child Health*. 2022;17 (2): 106-117 ***Submission date:*** *28 November 2022* ***Accepted****: 21 December 2022* P***ublished****: 28 December 2022*

Conclusion: *Although the GeneXpert assay is helpful in the diagnosis of pediatric tuberculosis, most patients were still receiving treatment even after a negative GeneXpert test, necessitating the need for a more sensitive test.*

Keywords: GeneXpert MTB/RIF assay, Childhood Tuberculosis, Tuberculosis Diagnosis, Pediatrics, Addis Ababa

Background

Tuberculosis remains a significant health problem in developing countries. Ethiopia is one of the world's 30 countries with the highest Tuberculosis (TB) burdens, with an estimated TB incidence rate of 132/per 100,000 people (151,000 people annually) and 21,500 TB deaths (19/per 100,000 people) in 2020. In 2019, it was projected that 1.1% of newly diagnosed TB cases and 7.5% of previously treated TB cases had multidrug resistant (MDR-TB) (1-3). The WHO 2022 report states children make up at least 11.3% of tuberculosis cases worldwide, but this figure may be understated given how challenging it is to diagnose childhood tuberculosis, emphasizing the need for better diagnosis (4-6). In Sub-Saharan Africa, where tuberculosis is endemic, children under the age of 15 make up 15% to 20% of the disease burden. The 22 countries with the highest-burden account for approximately 81% of all childhood cases. Ethiopia ranks eighth among these high-burden countries (7).

Clinical, radiological, and tuberculin skin-test results have been primarily used to diagnose pulmonary tuberculosis in children. The tuberculin skin test, however, is a marker of exposure rather than disease; clinical diagnosis has low specificity; radiological interpretation is subject to inter-observer variability. The growing drug-resistant tuberculosis epidemic makes microbiological confirmation with drug resistance detection increasingly crucial. This is challenging due to the difficulty in collecting sputum samples, the paucibacillary nature of the illness, and the low sensitivity of AFB microscopy (8). To stop the spread of the disease in the community, it is crucial to diagnose and find active TB and multi-drug-resistant strains of TB. Due to the disease's nonspecific signs and symptoms, paucibacillary nature, challenges in obtaining sufficient sputum samples, and lack of an adequate sensitive diagnostic test, pulmonary tuberculosis (TB) in children remains a diagnostic challenge (9).

A systematic review and meta-analysis of the GeneXpert MTB/RIF assay for pediatric pulmonary tuberculosis showed that culture tests were positive for tuberculosis in 12% and 11% were positive by GeneXpert, showed a sensitivity of 62% for expectorated or induced samples and for samples from gastric lavage, a sensitivity of 66%. Both samples had 98% of their specifications met. GeneXpert sensitivity was 36–44% higher than was sensitivity for microscopy. For the purpose of identifying

rifampicin resistance, GeneXpert's pooled sensitivity and specificity were 86% and 98%, respectively (10). Studies from Ethiopia and other countries have also shown that the GeneXpert MTB/RIF has a sensitivity range of 65–77.3% and a specificity range of 95–99% (11-15).

As Ethiopia is one of the countries with a high TB-burden, early diagnosis and treatment of TB-cases are required. Since 2014, GeneXpert MTB/RIF has been used as the screening test for children with clinical TB. The diagnosis of TB and the beginning of anti-TB treatment primarily depend on clinical presentation, despite the introduction of the GeneXpert MTB/RIF test in various health facilities in Ethiopia. Thus, we aimed to assess this test's performance in identifying and treating pediatric tuberculosis, and the socio-demographic, hematologic and radiologic characteristics of patients with positive GeneXpert MTB/RIF test results.

Method and materials

Study area and period

The study was conducted at Tikur Anbessa Specialized Hospital (TASH) and Yekatit 12 Referral Hospital, Addis Ababa, Ethiopia. TASH is the largest referral hospital in the country, with 800 beds. The TASH pediatrics and child health department was launched in 1964. Children aged 0 to 15 years are treated at the pediatrics unit. It has about 187 beds, excluding the neonatal ward. This includes 42 beds at the emergency inpatient ward (causes ward), 5 beds in the PICU, 32 beds in the orthopedic unit, 26 beds in the oncology ward, and the rest, 68 beds, for surgical and medical admission.

Yekatit-12 referral hospital's pediatric department has both inpatient and outpatient units where children younger than 15 years of age are treated. It has a severe acute malnutrition rehabilitation unit, a burn treatment center, a neonatal ICU, wards, and emergency departments. There is also a TB clinic unit for the follow-up of patients on anti-TB treatment. Data collection from the eligible patients' charts was conducted from July 1 through September 30, 2016.

Study design

Institution based retrospective descriptive study design was employed.

Population

All children under 15 years old with clinical diagnosis of pulmonary or extrapulmonary TB who have been seen as outpatients or inpatients at TASH and Yekatit-12 hospitals over the past 2.5 years from February 2014 to July 2016 (since GeneXpert began in use in these hospitals to the time data collection).

Inclusion and exclusion criteria

Inclusion criteria

- Children < 15 years
- Clinical diagnosis of tuberculosis
- Investigated with GeneXpert MTB/RIF system
- Initiated on anti-TB treatment

Exclusion criteria

- Unknown GeneXpert MTB/RIF status
- Clinical response to treatment of an alternative diagnosis

Sample size determination and sampling technique

A sample size of 139 children was calculated using incidence rate of 132/per 100,000 with a 95% CI. The sample size obtained using the Epitools sample size calculator. The population was drawn from all children who had been diagnosed with TB and had a GeneXpert assay performed within the previous 2.5 years of data collection (from February 2014 to July 2016), where the GeneXpert MTB/RIF assay was performed from pulmonary and extrapulmonary samples.. A total of 144 patients with clinical diagnosis of TB in the age group of 0-15 years were included in the studyè99 patients from Tikur Anbessa Specialized Hospital and 45 patients from Yekatit-12 Hospital were included in the study.

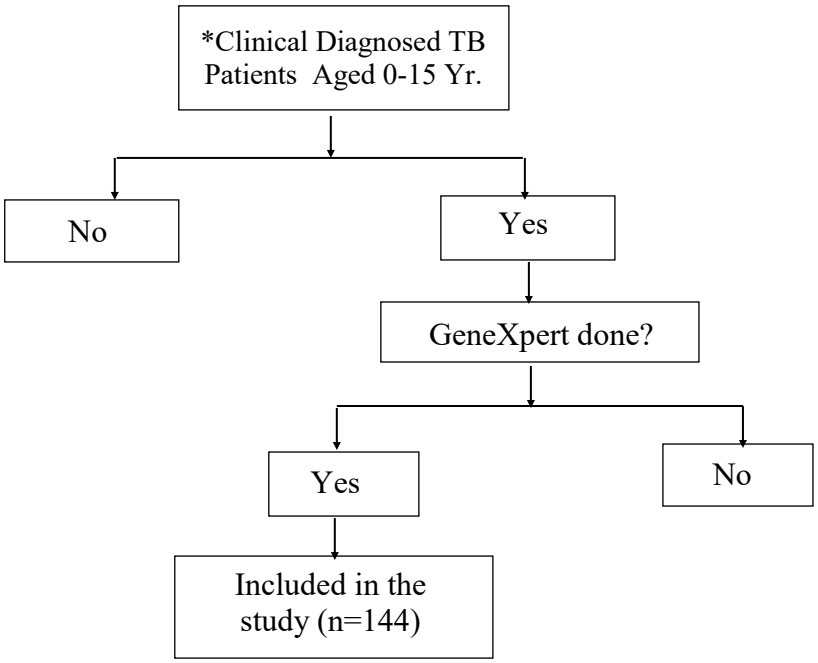

Figure 1: Diagram showing Inclusion criteria of patients with presumptive tuberculosis seen at Tikur-Anbessa specialized hospital and Yekatit-12 referral Hospital from February 2014 to July 2016

* The study collected the retrospective GeneXpert results from patients who were clinically diagnosed with TB and already initiated on anti TB

Study Variables

The study variables are diagnosis by GeneXpert MTB/RIF assay, socio-demographic factors; age, sex, address, contact history, clinical presentation, previous history of tuberculosis, comorbid conditions; HIV infection, immunodeficiency, type of TB and nutritional assessment interpreted based on WHO.

Operational definitions

Contact history with TB patient: contact with a person who has active tuberculosis, particularly sputum smear-positive (open) pulmonary tuberculosis.

Pulmonary TB: is an active mycobacterial infection of the lungs and includes miliary TB.

Extrapulmonary TB: infection of any other organ; this includes the meninges, brain, joints, bones, lymph nodes, kidneys, liver, gastrointestinal (GI) tract, and spleen.

Disseminated TB: is a mycobacterial infection involving both the lungs and other systems.

Severe acute malnutrition: extreme thinness is diagnosed by a weight-for-length (or height) below -3 SD of the WHO Child Growth Standards. In children ages 6–59 months, a mid-upper arm circumference <115 mm or bilateral pitting edema.

Moderate acute malnutrition: is diagnosed by a weight-for-length (or height) between -2 SD and -3 SD of the WHO Child Growth Standards.

Clinical diagnosis of tuberculosis: clinical suspicion of tuberculosis by a health practitioner based on the classic symptoms.

Presumptive diagnosis of TB: a patient who presents with symptoms or signs suggestive of TB (previously known as a TB suspect)

Primary tuberculosis: active tuberculosis infection in an immunologically naive patient.

Post-primary (secondary) tuberculosis is active tuberculosis infection in patients who have been previously exposed to tuberculosis infection.

Data collection procedures, and quality assurance

Structured questionnaires were used in this study to extract data from medical records. First, physician identified the medical records of every child who had been given a TB diagnosis at the two hospitals in the previous two and half years of data collection (form February 2014 to July 2016). A structured questionnaire prepared for the study was used to abstract the data from the cases that met the inclusion criteria. The data abstraction process was under the principal investigator's supervision. Before starting the actual data abstraction to determine the final questionnaires, pretest on 10% of the sample. The pretested surveys were not included.

Before data abstraction, data collectors received a one-day training to ensure data quality. The primary investigator was maintaining a close eye on the accuracy with which all data was being gathered and recorded. The principal investigator verifies the validity, accuracy, and clarity of all collected data at the end of each day.

Data management and analysis

The statistical package for social sciences (SPSS) for Windows version 20 was used to enter, clean, and analyze data. The categorical variables were shown in frequencies and proportions (%) for the description, as well as the appropriate graphs and charts that were also used to summarize the data.

Result

The study consisted of 144 patients with clinical diagnosis of TB who were between the ages of 0 and 15 years. Majority of the children were in the age 6-9 years with mean, and SD of 9.38 and 1.62 respectively. In 24 (16.7%) of the patients with clinically

diagnosed tuberculosis, the GeneXpert MTB/ RIF assay found mycobacteria. The male to female ratio was 1:1, with 70 (48.6%) of them hailing from Addis Ababa, 41 (28.5%) from Oromia, 14 (9.7%) from Amhara, 13 (9.7%) from SNNPR, and 5 (3.5%) from Tigray. Thirty-four patients (23.6%) did not receive their childhood vaccinations. (Table 1)

Table 1: Socio-demographic characteristics of the children on anti-tuberculosis, Tikur Anbessa Specialized and Yekatit 12 Hospital, Addis Ababa, Ethiopia

Variables	**Category**	**n (%)**
Age in years	0-5 year	42 (29.2)
	6-9 year	49 (34.0)
	10-14 years	53 (36.8)
Sex	Male	72 (50.0)
	Female	72 (50.0)
Family size	1-4	39 (27.1)
	5-9	47 (32.6)
	≥10	28 (19.4)
	Unknown	30 (20.8)
Vaccination*	Yes	110 (76.4)
	No	34 (23.6)
Address	Addis Ababa	70 (48.6)
	Oromia	41 (28.5)
	Amhara	14 (9.7)
	Tigray	5 (3.5)
	SNNPR	13 (9.0)
	Others	1 (0.7)

* BCG Vaccine

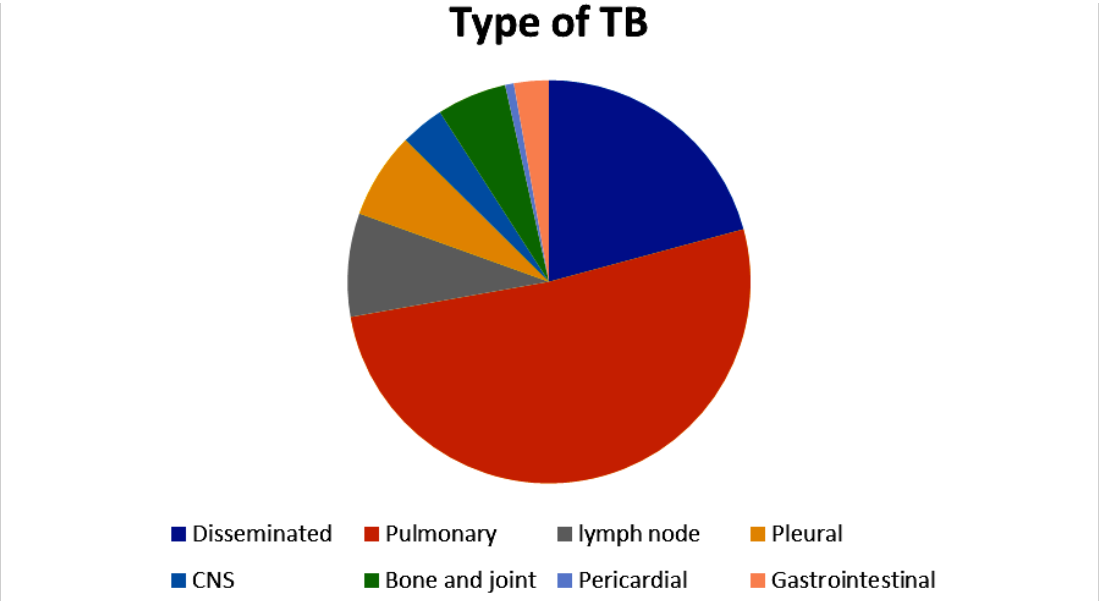

Figure 2: Pie chart depicting the type clinical diagnosis of TB, Tikur Anbessa Specialized and Yekatit 12 Hospital, Addis Ababa, Ethiopia.

Most patients, 74 (51.4%), had pulmonary TB; the remainder had disseminated TB (30.8%); and the rest had extrapulmonary TB (28.7%) (Figure 2). A history of contact with an active tuberculosis patient was reported by 29 individuals (20%). Among all, 33 (23%) had HIV. A prior history of tuberculosis treatment was present in 14 patients (10%). Forty-three (30%) had sever malnutrition and 65 (45%) were moderately malnourished (Table 2)

Table 2: Clinical features of the study population, Tikur Anbessa Specialized and Yekatit 12 Hospital, Addis Ababa, Ethiopia

Contact history			**HIV status**			**Nutritional status /malnutrition**				**Previous TB history**	
No	Yes	N/A	+ve	-ve	Not done	Nor-mal	Mod-erate	Severe	Not Meas-ured	No	Yes
72.2%	20.1%	7.6%	22.9%	54.2%	22.9%	23.6%	45%	29.9%	1.4%	90.3%	9.7%

In terms of the samples sent, 32.6% of the samples came from gastric aspirate, and 48.6% of the samples were taken from sputum. lymph node asp 8 (5.6%), CSF-12 (8.3%), pleural 5 (3.5%), and peritoneal fluid 2 (1.4%) are some additional samples taken from. GeneXpert MTB/RIF assay detected mycobacteria in 24 (16.7%) of patients with clinical diagnosis of tuberculosis (Figure 3). AFB microscopy detected 2 patients with M. Tuberculosis, which were also positive by GeneXpert study. It was not possible to compare the AFB microscopy test with the GeneXpert study because the two tests were not performed simultaneously for all study population.

Laboratory results showed that 14% of patients had leukocytosis, 34.7% of patients had leukopenia, and 50.7% of patients had a normal WBC count. Radiologic TB evidence was present in 72.2% (Table 3).

Table 3: Laboratory findings of the children on anti-tuberculosis, Tikur Anbessa Specialized and Yekatit 12 Hospital, Addis Ababa, Ethiopia.

Variables	**Category**	**n (%)**
WBC count	<4,000 mm3	42 (29.2)
	4,000-12,000 mm3	82 (56.9)
	>12,000 mm3	10 (13.8)
ESR	<20 mm3	24 (16.7)
	20-100 mm3	81 (56.3)
	>100 mm3	38 (26.4)
Lymphocyte %	<25%	50 (34.7)
	25%-33%	73 (50.7)
	>33%	21 (14.6)
Radiologic evidence	Yes	40 (27.8)
	No	104 (72.2

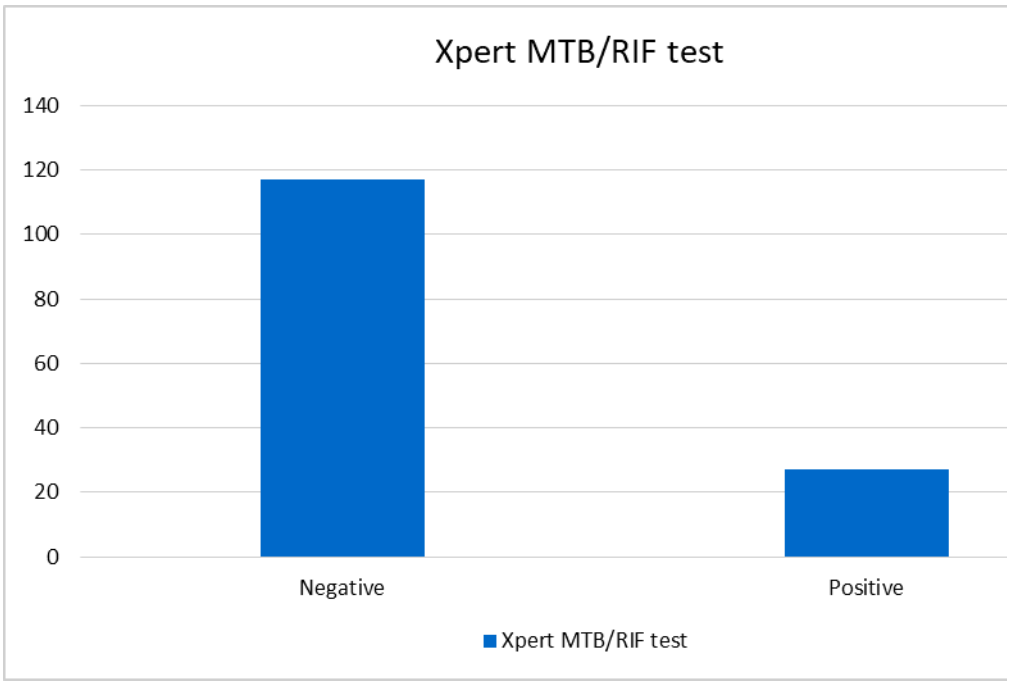

Figure 3. Bar chart showing the number of clinically diagnosed TB patients by GeneXpert MTB/RIF assay, Tikur Anbessa Specialized and Yekatit 12 Hospital, Addis Ababa, Ethiopia.

Discussion

This retrospective study included 144 children ages 0–15 years seen at Tikur Anbessa Specialized Hospital and Yekatit 12 Referral Hospitals, Addis Ababa, Ethiopia, over a period of 2 years and 6 months.. Only 16.7% (24 out of 144) children with a clinical diagnosis were positive for the GeneXpert MTB/RIF assay. The yield of culture in childhood tuberculosis ranges from 20% to 70% depending on factors such as age, disease severity, type and quality of the specimen, and the culture method used. Meta-analysis of the GeneXpert MTB/RIF assay for the diagnosis of pulmonary TB in children showed that 2% of culture-negative children started on anti-TB were detected by the GeneXpert MTB/RIF assay (10). In another meta-analysis, the yield of culture among children with TB diagnoses was found to be 25% (16).

Considering that the GeneXpert MTB/RIF assay has a pooled sensitivity of 62–66% in childhood TB compared with culture, and since culture is positive in only 25% of clinical TB cases, our result of 16.7% falls close to the yield of the previous meta-analysis study (16).

Among children with a positive GeneXpert result, 33.3% are 0–5 years old, 22% are between 6–10 years old, and the remaining 44.4% are between 11–15 years old. Previous studies showed a trend toward increased GeneXpert yield with increasing age (6). In our study, no such trend was present, but compared to younger children, those in the age group of 11–15 years had a higher GeneXpert positivity. This can be due to the difficulty of obtaining proper samples from younger children. There is also a challenge in diagnosing TB in this age group due to a lack of typical presentations, and the risk of overdiagnosis of TB is also high.

Among the children with TB diagnoses, 45% had moderate acute malnutrition, and 30% had severe acute malnutrition. Given that Yekatit 12 Hospital, which is a nutritional rehabilitation facility, provided a third of the sample, the high percentage of severe malnutrition is due to this. In our study, 23% of the children with TB diagnoses also tested HIV-positive. According to the WHO, the HIV prevalence among children with TB ranges from 10 to 60% in nations with moderate to high prevalence, which is comparable to our study. Among the studied children, 51.4% are pulmonary TB cases, 20.8% are disseminated TB cases, and the remaining 27.8% are extrapulmonary TB cases. Sputum from gastric aspirate make up 81.2% of the total samples collected.. This indicates a paucity of GeneXpert MTB/RIF test results from way the sample collected and extrapulmonary samples (lymph node, pleural fluid, peritoneal fluid, CSF, tissue samples), which can lower the yield from GeneXpert MTB/RIF in those patients.

The current study had several limitations. Because it was a retrospective study, it was not possible to oversee the specimen collection, processing, and analysis. It was not also possible to take additional specimens for culture and AFB microscopy studies. Because of this,

the increased sensitivity of molecular study over AFB microscopy was not assessed. Since mycobacterial culture is not routinely done for TB-diagnosed patients, it was only possible to compare the efficacy of the GeneXpert MTB/RIF assay with clinical diagnosis of childhood TB.

Conclusion

In conclusion, our study showed the GeneXpert MTB/RIF assay detected only 16.7% of clinically diagnosed tuberculosis in children. The GeneXpert MTB/RIF assay is beneficial in the diagnosis of childhood TB, but a more sensitive test is required.

Declarations

Ethical consideration: Ethical clearance was obtained from Research and Ethics committee of the department of pediatrics and child health, School of medicine, AAU. On the questionnaires, there was no place for personal information, and all data were treated confidentially over the course of the study.

Author's contribution

YG and WA conceived and designed the study. YG involved in the data collection. WA and BB were actively involved in the data interpretation and writing of the final manuscript. All authors approved the final manuscript.

Competing risk: No competing risk to disclose

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ORIGINAL ARTICLE

PATTERN, OUTCOME, AND ASSOCIATED FACTORS OF RENAL DISEASE AMONG HOSPITALIZED CHILDREN AT PUBLIC HOSPITALS IN BAHIR DAR TOWN, NORTH-WESTERN ETHIOPIA

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Abstract

Background: *Renal diseases are major causes of morbidity and mortality in hospitalized pediatric patients. Data on the spectrum of renal disorders and their outcomes are scarce in Ethiopia, in the Amhara region particularly. Hence, this study aimed to assess the pattern, outcome, and associated factors of renal disease among hospitalized pediatric renal patients in the Amhara region, North-west Ethiopia, 2020.*

Methods: *Institution-based review of medical records of renal disease subjects was conducted from September 1-15, 2020. All (107) pediatric patients who were diagnosed and hospitalized with renal disease from January 1/2019 to August 30/2020 were studied. A checklist was used to review medical records. Analysis was done using the SPSS version 23. Descriptive and summary statistics were carried out. Chi-squared test was used to assess the association between dependent and independent variables.*

Result*: Glomerulonephritis was the common cause of renal admissions (59.8%) and 40% of them had renal failure. Multi-organ failure and sepsis were causes of death for 12.1% of patients. Acute kidney injury (X2=4.484, p <0.05), chronic kidney disease (X2=6.617, p< 0.05), multi-organ failure (X2=48.57, p< 0.05), Sepsis (X2=45.29, p< 0.05), hospital stay >2 weeks (X2=23.2, p<0.05), electrolyte abnormalities (X2=17.87, p<0.05), and seizure (X2=45.15, p<0.05) had statistical associations with poor outcome of renal disease.*

Conclusion: *Glomerulonephritis was the common cause of renal admissions. Sepsis and multi-organ failure were common causes of death. The complications, hospital stay >2 weeks, electrolyte*

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abnormality, and seizure had an association with the outcome of renal disease. Hence, this study suggests that early diagnosis and management of renal failures and complications, and shortening hospital stay enhance the outcome of renal disease.

Keywords: Renal disease, associated factors, Public Hospitals, Bahir Dar, Ethiopia.

Introduction

Pediatric nephrology is very challenging and is not a priority in developing countries contrary unlike developed ones. The burden of kidney disease in children in most developing countries including Sub-Saharan Africa (SSA) is unknown and difficult to estimate due to a lack of data on pediatric kidney disease [1, 2]. In developing countries, the major causes of chronic kidney disease(CKD) in children are chronic glomerulonephritis, urologic malformations (posterior urethral valves), and CKD of unknown etiology, while for Acute kidney injury (AKI) septicemia, diarrhea, malaria, and hemolytic uremic syndrome is the most frequent causes [3, 4].

In developed countries, the causes of renal disease are predominantly due to chronic medical illnesses mainly diabetic nephropathy (>53%) and among none diabetic individuals abnormal albumin excretion and glomerulonephritis due to IGA nephropathy are suggested [2]. The percentage of renal-related admissions to secondary and tertiary hospitals in developing countries varies widely from 3.5 to 8.9% among different centers and countries [7, 8]. The most common cause of renal admission in south Africa is AKI due to dehydration and septic shock syndromes [6, 9]. The spectrum of chronic glomerular diseases varies in the different geographical regions of the continent, with infectious agents implicated in its causation [7, 10].

Worldwide, epidemiological information on the incidence and prevalence of pediatric AKI and CKD is limited, often imprecise, and flawed by methodological differences between the various data sources, although increasing in scope. This is particularly pertinent in Africa, where the focus is on communicable diseases with a lack of proper documentation and renal registries [14, 15]. Pediatric patients with renal disease, especially younger ones may present with nonspecific signs and symptoms unrelated to the urinary tract [16]. Kidney disease often goes undetected in the general population, but children and adolescents are at even greater risk due to the nature of the causes of the disease and the ambiguity of the symptoms. Early diagnosis and management are the cornerstones of renal disorders management. [15, 17, 18, 19]. In Ethiopia, Northwest region, evidence on the spectrum of renal disorders and their outcomes are very scarce.

Methods

Study design, setting, and period:

A Hospital-based cross-sectional study was conducted at selected public hospitals, in the Amhara region, North-west Ethiopia, from

September 1-20, 2020. Two public hospitals were used as study settings, namely, Tibebe-Ghion specialized hospital (TGSH) and Felege -Hiwot comprehensive specialized hospital (FHCSH). Tibebe-Ghion specialized hospital (TGSH) which is one of the teaching hospitals in Ethiopia is found in Bahir Dar city. The pediatrics department at TGSH has outpatient and 6 inpatient service units which include emergency ward, critical ward, stable ward, Neonatal Intensive Care Unit/NICU, Pediatric Intensive Care Unit/ PICU, and maternal side. There are 16 senior pediatricians and one sub-specialist cardiologist, 41 residents, and 50 nurses. In the critical and stable ward, there are 44 beds, There is also PICU which has 3 beds with a mechanical ventilator. It is equipped with MRI, and CT in addition to other laboratory and pharmacy services, but there is no dialysis and renal transplantation service in the hospital. Felege-Hiwot comprehensive specialized hospital (FHCSH) is also found in Bahirdar. The pediatrics and child health department has 8 senior pediatricians and has both outpatient (OPD) and inpatient units, The pediatric ward has a total of 52 beds, The hospital has an adult ICU and adult dialysis service but there is no pediatric ICU and pediatric dialysis and renal transplantation center. It has CT and, EEG services in addition to basic diagnostic, laboratory, and pharmacy services.

Population, sample size determination, and sampling procedure

All admitted patients with renal disease at public hospitals in Bahirdar town were the source population. While all admitted patients with the diagnosis of renal disease at randomly selected public hospitals in Bahirdar town from January 1/2019 to August 30/2020 were the study subjects. All pediatric patients admitted with renal disease and aged 1 month to 14 years were eligible for this study. While patients with incomplete documentation and laboratory results were excluded from the study.

Sampling technique and procedures:

Initially, TGSH and FHCSH were selected randomly by lottery method from the available hospitals in the city. Then, all (107) pediatric patients with renal disease who were admitted from January 1/2019 to August 30/2020 were included in this study.

Variables:

There are dependent and independent variables. The dependent variable is renal disease patient outcome (discharge or death). The Independent variables include; Socio-demographic characteristics (age, sex, and residence), Presence of complications, causes of renal disease, clinical presentation, type of treatments, and need for renal replacement.

Data collection:

Data were collected at TGSH and FHCSH from medical records (log book and patient charts) of patients admitted at the pediatric ward and pediatric intensive care unit (PICU) for in-patient management from January 1/2019 to August 30/2020. Data were collected by four trained medical interns/ Practitioners.

There was daily supervision of the data collection process including its completeness by the two supervisors. A semi-structured checklist that contains demographic data of the children with renal disease, causes, and major outcomes of renal disease were used to collect the data. The checklist was pre-tested before the actual data collection was started.

Measurements:

Renal disease; any disease which affects the renal system structurally or functionally, can be the renal or extra-renal cause [14].

Renal Disease Outcome: hospital discharge condition of study subjects (discharged alive or dead).

Discharge from the hospital: includes (discharge improved, discharge against, referred for dialysis or transplantation, surgical intervention, and further workup).

Acute renal failure: impaired renal function in less than 3 months as defined by PRFILs criteria during the initial visit to the hospital and retrieved from the patient chart

Chronic renal failure: decreased renal function which stays more than 3 months defined by eGFR <60ml/m^2 during the initial visit to the hospital and retrieved from the patient chart

Improved: discharged from the hospital without complication

Complications; the presence of renal failure multi-organ dysfunction i.e (pulmonary edema, heart failure, uremia), electrolyte abnormalities, sepsis**.**

Statistical Analysis:

The collected data were entered and cleaned using SPSS statistical software version 23. Data cleaning by running frequencies of all the variables to check for incorrect coding and missing values. Descriptive and summary statistics were carried out. Bivariate and multivariate analysis was carried to assess associations between dependent and independent variables. A chi-square test was carried out to assess the association between independent and dependent variables (outcomes of renal disease) to ascertain univariate association.

Results

Socio-demographic characteristics of participants

From a total of 135 admitted patients, 107 patients fulfilled the eligibility criteria. Twenty-eight charts were excluded because of incompleteness. From a total of 107 renal patients admitted to the pediatric wards, 59 were males (55.1%) and 48 were females (44.9%), giving a male-to-female ratio of 1.2:1. The age of patients ranges from 46 days to 14 years. Nearly half (46.7%) of the participants were between 5-10 years (Table 1).

Table 1: Socio-demographic characteristics of pediatric renal patients admitted at TGSH and FHCSH (N=107), North-west Ethiopia, 2020.

Variables	Category	Frequency(n)	Percentage (%)
Sex	Female	48	44.9
	Male	59	55.1
Age	<5yrs	24	22.4
	5-10yrs	50	46.7
	11-14yrs	33	30.8
Residence	Rural	89	83.2
	Urban	18	16.8
Hospital	TGSH	47	43.9
	FHCSH	60	56.1

Clinical profile, Clinical features, ultra-sound result of patients with renal disease:

Out of 107 patients with renal disease, glomerulonephritis accounts for 64(59.8%) of patients and 19(30%) patients had evidence of acute post-streptococcal glomerulonephritis and 25 (40%) of patients had renal failure. The 2nd most common renal diagnosis was nephrotic syndrome 9(8.4%). The majority of patients 8 (95%) had proteinuria and edema. The 3rd most common renal disease was a congenital anomaly of kidney and urinary tract (CAKUT) (6.5%); the posterior urethral valve was the commonest accounting 3(49%) of the CAKUT. Chronic kidney disease (CKD) accounted also the 3rd cause of renal disease 7(6.5%) and the most common causes were chronic glomerulonephritis 3(49%); four of CKD patients died because of multi-organ failure and sepsis.

AKI was also responsible for 6 (5.6%) and the most common causes were rapidly progressive glomerulonephritis 4(67%) and 5 of the Acute kidney injury (AKI) patients were referred for dialysis. One patient with Hemolytic Uremic Syndrome/HUS died because of multi-organ failure. Other causes of renal disease accounted for 14(13.1%) study subjects; Urinary tract infection/UTI for 6(43%) study subjects. Other causes were sepsis (4), Hemolytic uremic syndrome (HUS) (1), Henoch Schoenlein purpura (HSP) nephritis (1), and Wilms tumor (2). Regarding the Clinical profile, edema was the commonest 84(78.5%) followed by decreased urine output/UOP in 65(60.7%) of the cases. proteinuria was the most common laboratory abnormality among patients with renal disease 91(85%) followed by hematuria 64 (59.8%) and elevated renal function 54 (49.5%) (Table 2).

Table 2: Causes of renal disease and Clinical feature among pediatric renal patients admitted at TGSH and FHCSH (N=107), North-west Ethiopia, 2020.

Clinical features	**Category**	**Responses**	
		Frequency (No)	Percent of cases
Causes of renal disease	Glomerulonephritis	64	59.8
	Nephrotic syndrome	9	8.4
	CAKUT	7	6.5
	CKD	7	6.5
	AKI	6	5.6
Laboratory finding	Proteinuria	91	85
	Hematuria	64	59.8
	Elevated renal function	54	50.5
	Elevated ASO	19	17.8
	Edema	84	78.5
	Decreased UOP	65	60.7
	HTN	53	49.5
Clinical profile	Associated symptoms	52	48.6
	Body rash	32	29.9
	Urinary symptoms	19	17.8
	Seizure, decreased mentation	13	12.1

Regarding the ultrasound result, from 107 patients 44 (41.1%) of them had abnormal ultrasound result and the most common abnormality was parenchymal renal disease 32(29.9%)

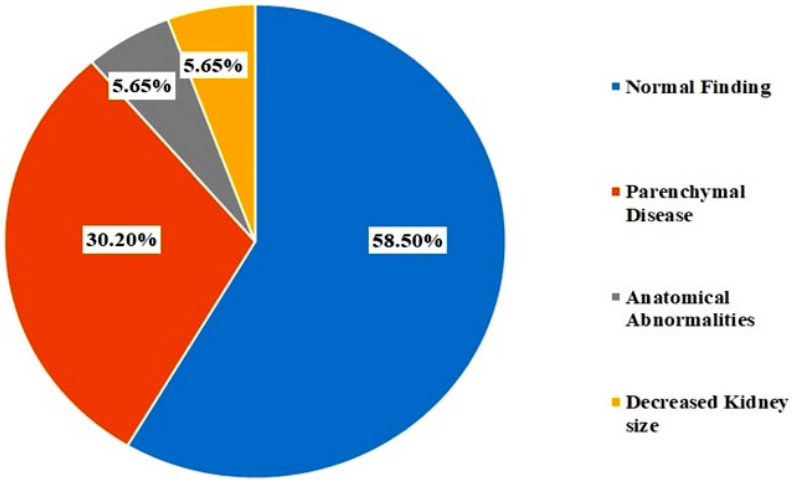

Figure 1: Ultrasound results among pediatric renal patients admitted at TGSH and FHCSH (N=107), North-west Ethiopia, 2020.

Complications, treatments, length of illness, and a hospital stay of pediatric renal patients

Renal failure was the most common complication of renal disease 54(89.5%) followed by electrolyte abnormality 20 (32.8%). Sepsis, heart failure, uremia, multi-organ failure, and pulmonary edema were the other complications. Of 107 patients 79(73.8%) improved and discharged with medical treatment only and 25(23.4%) patients required dialysis and renal transplantation in addition to medical treatments and none of the patients received this treatment. Three(2.8%) of the study subjects required surgical interventions. Sixty-five patients (60.7%) stayed less than one week in the hospital. Fifty-one (47.7%) of patients had a duration of illness of less than one week (Table 3).

Table 3: Complications, treatments, length of illness, and hospital stay among pediatric renal patients admitted at TGSH and FHCSH (N=107), North-west Ethiopia, 2020.

Variables	Category	Responses	
		n	Percent of cases
Complications	Renal failure	54	89.5%
	Electrolyte abnormality	20	32.8%
	Sepsis	19	31.1%
	Heart failure	14	23.0%
	Multi-organ failure	13	21.3%
	Uremia	12	19.7%
	Pulmonary edema	5	8.2%
Treatments provided	Medical only	79	73.8%
	Medical, dialysis, transplantation	25	23.4%
	Surgical intervention	3	2.8%
Length of illness	<1 week	51	47.7%
	1week -3monthss	35	32.7%
	>3months	21	19.6%
Hospital stays	< 1 week	65	60.7%
	1-2 weeks	25	23.4%
	2 weeks	17	15.9%

Treatment outcome of pediatric renal patients

Of the total 107 included subjects, Ninety-four (87.95%) were discharged alive and 13 (12.1%) died. The most common cause of death was a multi-organ failure (6) followed by multi-organ failure and sepsis (5), and sepsis (2). All the deaths needed renal replacement therapy and none of the patients received renal replacement therapy.

Factors associated with the outcome of pediatric patients with renal disease

Pearson's chi-squared test was carried out to assess the presence of an association between different independent variables and renal disease outcomes. There was evidence of a significant association between the presence of AKI (X^2=4.484, p <0.05), the presence of CKD (X^2=6.617, p < 0.05), the presence of complications (X^2=11.15, p <0.05), decreased UOP (X^2 =6.618,p<0.05), electrolyte abnormality (X^2=17.87, p<0.05), multi-organ failure (X^2=48.57, p< 0.05), sepsis (X^2=45.29,p < 0.05), heart failure (X^2=14.23, p< 0.05), uremia (X^2=50.01, p<0.05), seizure or decreased mentation (X^2=45.15, p<0.05), hospital stay> 2weeks (X^2=23.2, p < 0.05). Age, sex, address of patients, and the hospital where patients were treated had no association. Although the most common laboratory finding of pediatric patients with renal disease was proteinuria there was no association with the outcome of renal patients (Table 4).

Table 4: Chi-square (X^2) test showing the association between factors and outcome of pediatric renal patients admitted at TGSH and FHCSH (N=107), North-west Ethiopia, 2020.

Variable		Renal disease outcome		Chi-square	P value
		Death	Discharged		
Age:	less than 5yrs	1	23		
	5-10yrs	8	42		
	11-14yrs	4	29	2.127	.345
Sex	female	4	44		
	Male	9	50	1.188	.276
Residence	rural	11	78		
	Urban	2	16	.0222	.882
Chronic kidney disease	No	10	90		
	Yes	3	4	6.617	.010
Acute renal failure	No	4	58		
	Yes	9	36	4.484	.034
Complication	No	0	46		
	Yes	13	48	11.159	.001
Proteinuria	No	2	14		
	yes	11	80	.002	.963
Multi-organ failure :	No	0	94		
	yes	13	0	48.537	≤ .001
Presence of decreased UOP	No	1	41		
	Yes	12	53	6.181	.013
Seizure and decreased mentation:	No	4	90		
	Yes	9	4	45.173	≤.001
Uremia:	No	4	91		
	yes	9	3	50.012	≤.001
Heart failure:	No	7	86		
	Yes	6	13	14.230	≤.001
Electrolyte abnormality:	No	5	82		
	yes	8	12	17.875	≤.001
Sepsis:	No	2	86		
	Yes	11	8	45.294	≤.001
Hospital stay:	< 1week	4	61		
	1-2 weeks	1	24		
	>2weeks	8	9	23.155	≤.001

Discussion

The study was done to determine patterns, outcomes, and factors associated with pediatric renal disease. The most common renal disease requiring hospital admissions in this study was glomerulonephritis 64 (58.9%) with evidence of acute post-streptococcal glomerulonephritis 19 (30%) of patients and 25(40%) of patients had renal failure. This finding is higher than the report from a study done in Nepal [12]. The high number of these cases may be due to environmental factors, the high number of referrals when patients had complications for ICU, and dialysis treatment need though there was no dialysis service in our study settings.

The second most common renal disease in this study was nephrotic syndrome, which was observed in 9 (8.4%) of the cases. This result is comparable to studies from Latin American studies [19] and Nigerian study [20]. However, lower than a report from Turkey, Addis Ababa Ethiopia, and Bangladesh study [5, 15, 16]. This may be due to the difference in the study period and the improvement of early diagnosis and management of pediatric patients in the late 21st century.

The third causes of renal diseases (chronic renal disease and CAKUT) and fourth causes of renal diseases (acute kidney disease) as an initial diagnosis are responsible for 7(6.5%) and 6(5.6%) of the cases respectively.. The most common cause of AKI was rapidly progressing glomerulonephritis 4(64%) and APSGN. This finding is lower than reports from Tikur Anbesa hospital-Ethiopia, and Latin America [15, 19] but higher than the Zamfaran state study from Nigeria and Nepal study [14, 20]. Three of the CKD subjects had died due to a lack of renal replacement therapy. [10].

PUV was the leading cause of CAKUT accounting for 3(49%) of the cases. This finding is lower than a report from Tikur-Anbessa where it is the most common renal diagnosis This may be because Tikur-Aneesa is the national referral center. Four(64%) of our patients with CAKUT were also referred for further workup and surgical intervention. Other causes were responsible for 14(13%) of the cases and UTI was responsible for the majority.. This finding contradicts the study done in Nigeria's two states [18, 20].

The majority of the patients in this study were males 55.1% from rural areas and aged 5 and 10 years. There was no association between sex, age, address, and e outcome of renal disease. This is comparable to other studies [8, 18]. Proteinuria was the most common laboratory abnormality. . This finding is consistent with the Bangladesh study [5, 18].

This study showed that the presence of complications (sepsis, uremia, heart failure, multiorgan dysfunction), seizure or decreased mentation, decreased UOP, prolonged hospital stay, electrolyte abnormality, AKI, and CKD were associated with the death of patients with renal disease. It is consistent with the study done in Nepal and other developing countries [8, 11, 12]. More than one-tenth of the renal

patients died with the most common cause of death being multi-organ failure and sepsis. This finding is higher than reports from other centers [6, 21, 22]. This might be related to our treatment modalities where all of the deaths needed renal replacement therapy at least temporarily and none of our studies subjects the care.

Conclusion

The most common cause of renal admission in our setup was glomerulonephritis secondary to post-infectious acute glomerulonephritis and renal failure was the most common complication found in this study. Sepsis and multi-organ failure were the most common causes of death. All the deaths had indications for renal replacement therapy and none received the therapy. Acute kidney injury, chronic kidney disease, the presence of complications, decreased UOP, prolonged hospital stay, electrolyte abnormality, seizure, or decreased mentation were associated with the death of patients with the renal disease with a chi-square test.

Declarations

Ethical Consideration:

A letter of Ethical approval was obtained from Bahirdar University Research Ethics Review Committee. Further permission was obtained from the medical director's office and the pediatrics department of the selected hospitals for the utilization of medical records. Confidentiality was maintained by excluding names or other personal identification from the data collection record sheet.

Competing interest

The authors declare that there are no competing interests.

Authors Contribution

YT was involved in conceiving, designing, and implementing the study, designing the questionnaire, data collection, statistical analysis, and manuscript drafting. YA and ZS were taking part in implementing the study, statistical analysis, and manuscript preparation.

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ORIGINAL ARTICLE

ASSESSMENT OF KNOWLEDGE AND PRACTICE OF GYNECOLOGY/OBSTETRICS RESIDENTS AND MIDWIVES TOWARDS ESSENTIAL NEWBORN CARE AT TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA UNIVERSITY, ETHIOPIA

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Abstract

Background: *A time-bound and chronologically ordered series of medical interventions that a baby receives at birth are referred to as the "essential newborn protocol." This period of immediate care is critical for the babies' subsequent well-being and adaptation. However, there are still reports of health workers lacking good knowledge and practice with newborn care, which was not investigated in our hospital.*

Methods: *A hospital-based cross-sectional study was conducted in TASH with 114 selected gynecology and obstetrics residents and midwives. Using the SPSS version 25 software package, continuous data were described using the mean and standard deviation, while categorical data were described using frequency and percentage. To identify factors related to knowledge and practice, multivariable binary logistic regression analyses were used .*

Result*: Eighty-eight residents and 26 midwives were included. Nearly a quarter (24.6%) of participants had good knowledge about essential newborn care. Regarding knowledge level by profession, 31.8% of the residents had good knowledge of essential newborn care, and all the midwives had poor knowledge. The odds of having good knowledge of ENC were 96.3% lower for first-year residents and 90.5% lower for second-year residents as compared to year four. Untrained participants had an 84 percent lower chance of having good knowledge of essential newborn care than trained participants. Regarding practice level by profession, more than two-thirds of 68 (77.3%) residents and 21 (80.8%) midwives had sufficient skill in essential newborn care.*

Conclusion: *A substantial number of healthcare providers lacked essential newborn care knowledge and practice. The availability of service or on-the-job training, as well as the year of*

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residency, were factors influencing newborn care knowledge. In-service training, encouraging supervision, and provisions should be reinforced to improve newborn care activities.

Keywords: Knowledge, Practice, Newborn, Essential newborn care

Introduction

Mortality in the neonatal period continues to be high despite a decreasing proportion of deaths in the under-five population. World Health Organization 2020 estimated neonatal mortality to be around 47% of all death under under-five mortality (1,2). The labor and delivery period are a significant challenge to newborns as it entails negotiating to shift from intrauterine to extrauterine life successfully (3). The early neonatal care period is vital to the newborn for subsequent health and adaptation. Expert care throughout labor and delivery with swift management of complications can avoid around 50% of neonatal mortality. Satisfactory newborn care in the post-delivery period can preclude 75% of current neonatal deaths (2–4).

Essential newborn procedure is a time-bound and chronologically performed series of care that a newborn obtains at birth, with standardized effective procedural steps such as drying and stimulating, evaluating breathing, clean delivery, cord care, keeping the newborn warm (thermoregulation), initiating breastfeeding in the first hour, give eye drops or ointment to prevent eye infection, give vitamin K intramuscularly, put the newborn's identification bands on, weigh the newborn when it is stable and warm, and keep a record of all observations and treatment given, including eye care, immunization, danger signs identification, preterm or low birth weight infant care, and managing newborn illnesses (5).

The United Nations' third sustainable development goal (SDG3) aims to eliminate avoidable neonatal deaths and under five children, with targets for under-five mortality (25 deaths per 1,000 live births, down from 33 deaths per 1,000 live births) and neonatal mortality (12 deaths per 1,000 live births, down from 22 deaths per 1,000 live births) (6,7). In order to achieve this reduction, it is essential for countries to apply efficient intervention policy to save the lives of newborns and avoid deaths more swiftly. The essential newborn protocol is an illustration of how concise and simple interventions can accomplish both immediate and long-term advantages. These interventions are bundled in very cost-effective way and it has the greatest effect on neonatal deaths (2,8–10).

The information health care providers have on essential newborn care has a great impact on the outcome of the neonates. A study done in Uganda showed that the reason of neonatal death in was the low levels of knowledge among health workers regarding newborn care (19). The prevalence of poor knowledge in essential newborn care is consistent in other Afriacan countries as well with a level as high as 56.2% in Ekiti, Nigeria(17) and 65.1% in Rwanda(18).

In Ethiopia studies have shown good knowledge to be found in less than 60% of the health care professionals participating in studies. Good knowledge was seen in only 38.2 % in Bench Sheko (11), 57.9% in Woliyta, (12), 47.8% in Jima zone and 53.8% in Afar (14),

This study aimed to evaluate knowledge, practice and factors associated with knowledge and practice among midwives and Gynecology/ obstetrics residents in Department of Gynecology/obstetrics, Tikur Anbessa Specialized Hospital (TASH), AAU. Although the two groups have different training background, the sequence of essential newborn care are thought (both practically and theoretically) in similar capacity. Furthermore, the training is largely given both groups by pediatricians and neonatologists (where available). This makes the study of the two groups feasible.

The results of the study will be used to produce evidence important in crafting management alternatives and targeted interventions for improving Essential Newborn Care (ENC).

Methods

Study area

The study was conducted in TASH, which is the major referral and teaching hospital in the nation, located in the capital Addis Ababa providing comprehensive healthcare services for over 800,000 patients per year via specialty clinics and inpatient departments. The department of Gynecology/Obstetrics is one of the units in the institute with 99 residents from first to fourth year in training and 26 Midwives currently working in the department.

Study design and period

An institution-based cross-sectional study was carried out from May 1, 2022, to September 30, 2022.

Eligibility criteria

All midwives in labor ward and Gyn/ Obstetrics residents who were working in Tikur Anbessa Specialized Hospital, Gyn/ Obstetrics Department, and who were willing to participate included in the study. Knowledge and practice were the dependent variable, and the independent variables were Sociodemographic factors (age, profession, level of education), training about essential newborn care, total medical work experience, Work experience at NICU/Delivery ward.

Sample size and sampling technique

The sample size was estimated using an average knowledge level of 47.8% from previous studies done in Jima zone (15). A single population proportion formula was used with 95% certainty level and a maximum discrepancy of 5% then population correction formula since the study population is below ten thousand. For possible incompleteness, a 10% non-response rate was considered, and the final sample size estimated at 118.

Data collection and quality assurance

The data was collected from Gynecology/ obstetrics residents and midwives using self-administered questionnaire adopted from previous literature done in our setting (Bench Sheko, Wolaita, Tigray and Afar (11-14)) that encompasses socio demographic

characteristics, knowledge assessing questions and practice assessing questions Using ODK application.

To ensure the quality of data, the structured checklists were tested on 5% of the sample. This group was not included in the study. Problems identified during pre-test were fixed before the initiation of data collection. Every question was coded; nonstop supervision was made throughout the pre-test and data collection period by the principal investigator. Collected data was tested for completeness and dependability on day of data collection.

Data analysis techniques

The data was collected using ODK version 1.25.2, after which every completed form was assessed for completeness. Data was then exported to SPSS version 25 to perform analysis. Incomplete and/or inconsistent data was substituted by another questioner for analysis. Mean and standard deviations were used to explain continuous data. Frequency and percentage were used to explain categorical data. To isolate factors related to knowledge and practice, Bivariable analysis followed by multivariable binary logistic regression analyses was performed. Statistical significance was taken as a level of significance of 5%, while an adjusted odds ratio (AOR) of 95% confidence interval (CI) was taken for the estimates of the association.

Operational Definitions

Neonate: the baby after delivery up to 28 days (3).

Essential newborn care: a sequence of time bound and chronologically assigned care that a newborn obtains at birth (5).

Neonatal resuscitation: a series of care given at the time of delivery to assist the initiation of breathing and circulation.

Good knowledge: for those who replied right at least 21 questions of 25 (score ≥ 80%) (16)

Poor knowledge: for those who correctly replied < 80% (according to 2015 Federal Ministry of Health Essential Baby Training Facilitators Manual accreditation criteria) (16).

Sufficient Skill – if the participants perform ≥ 80% (16).

Insufficient skill – if the participants perform < 80% (16).

Results

Socio-Demographic Characteristics

In this study, a total of 114 respondents participated, making a response rate 96.6%. Among these, 81 (71.1%) were male and 33 (28.9%) were female. 88(77.2 %) were residents; the rest 26(22.8 %) were midwives. Of residents, more than one third 30 (34.1 %) were year I residents. 33.3% had a working experience for 3 to 4 years at NICU. More than half of the residents 64(56.1%) took additional refresher on-job training regarding essential newborn care (Table 1).

Table 1: Socio-demographic characteristics of residents and midwife in Tikur Anbessa specialized hospital October 2022.

Variables		Frequency	Percent
Age	20 to 25 years	6	5.3
	25 to 30 years	77	67.5
	30 to 40 years	30	26.3
	Above 40 years	1	0.9
Gender	Male	81	71.1
	Female	33	28.9
Qualification	Degree and above	114	100.0
Profession	gyn/obs resident	88	77.2
	Midwife	26	22.8
Total Work experience	less than 1 year	12	10.5
	1 to 2 years	37	32.5
	3 to 4 years	48	42.1
	above 5 years	17	14.9
Work experience at NICU	less than 1 year	30	26.3
	1 to 2 years	37	32.5
	3 to 4 years	38	33.3
	above 5 years	9	7.9
Year of residency	year 1	30	34.1
	year 2	26	29.5
	year 3	15	17.0
	year 4	17	19.3
Job training	Yes	64	56.1
	No	50	43.9
Interest in working in the delivery room/ NICU	Yes	108	94.7
	No	6	5.3
Total		114	100.0

Knowledge score and level among midwives and Gynecology/obstetrics residents towards essential newborn care

Knowledge about essential newborn care was measured using the cumulative score of 25 questions. The mean ± SD knowledge score of the total participants were 19.15 (±1.94). Whereas based on profession (residents and midwives) the mean ± SD knowledge score were 19.57± 1.68 and 17.7 ±2.13 respectively. Regarding Average practice score by year of residency, Year four residents had highest mean score 20.7 ± 1.36 followed by Year three 20.2 ±1.37.

Nearly a quarter of the participant (95% CI, 17.0_33.5%) had good knowledge about

essential newborn care. 28(31.8%) of the residents had poor knowledge on essential newborn care. All (100%) of the midwife had poor knowledge. Year four residents 11(64.7%) had good knowledge about essential newborn care, followed by year three 7(46.7%) and year two 6(23.1%) respectively (Table 2).

Table 2: Knowledge score and level of residents and midwife on essential newborn care, in TASH October 2022 .

Study Populations characteristics		N	Mean score	Std. Deviation	Poor Knowledge	Good knowledge	P value
Total population		114	19.15	1.94			
Profession	Gyn/obs resident	88	19.57	1.68	60(68.2%)	28(31.8%)	<0.001
	Midwife	26	17.73	2.13	26(100%)	0(0%)	
Residency year	year 1	30	19.00	1.64	26(86.7%)	4(13.3%)	<0.001
	year 2	26	19.12	1.66	20(76.6%)	6(23.1%)	
	year 3	15	20.20	1.37	8(53.3%)	7(46.7%)	
	year 4	17	20.71	1.36	6(35.3%)	11(64.7%)	

Practice among midwives and Gynecology/ obstetrics residents towards essential newborn care

Practice of essential newborn care was measured using the cumulative score of 12 questions. The mean ± SD practice score of the total participants were 10.3 ±1.19. Whereas in case of residents and midwife the mean ± SD practice score were 10.3± 1.19 and 10.58 ±1.2 respectively.

Ninety-one of participants (95% CI,69.4-85.3) had sufficient skill about essential new bore care and based on profession, more than two third 70(80.7%) of residents, and 21(80.8%) of midwives had sufficient skill toward essential new borne care. Whereas practice level by year of residency, 15(88.2%) of year four residents had sufficient skill towards essential new bore care,12(80%) and 20(78%) year three and years two respectively (Table 3).

Table 3: Practice score and level of residents and midwife on essential newborn care, in TASH October 2022

Population characteristics		N	Mean	Std. Deviation	Insufficient Skill	Sufficient Skill	P value
Total population		114.00	10.39	1.19			
Profession	Gynecology/ obstetrics resident	10.33	1.19	88.00	20(22.7%)	70(80.7%)	
	Midwife	10.58	1.21	26.00	5(19.2%)	21(80.8%)	
Year of residency	year 1	10.47	1.36	30.00	7(23.3%)	23(76.7%)	0.60
	year 2	10.50	1.14	26.00	6(22%)	20(78%)	
	year 3	9.93	1.28	15.00	3(20%)	12(80%)	
	year 4	11.18	1.21	17.00	2(11.8%)	15(88.2%)	

Factors associated with knowledge among midwives and Gynecology/obstetrics residents towards essential newborn care

Profession, year of residency, total work experience, working experience at NICU, and training was analyzed first by bivariable analysis. Since two of the variables, profession and total work of experience, have zero response on their categories only two variables with P-values less than 0.25 were integrated in a multivariable logistic regression model. The odds of good knowledge towards ENC were 96.3% lower in-year one residents as compared to year four (AOR= 0.084; 95% CI: 0.002 – 0.35; p-value: 0.009). The odds of good knowledge towards ENC were 90.5% lower in-year two residents as compared to year four (AOR= 0.164; 95% CI: 0.042 – 0.63, p-value: 0.018). The odds of good knowledge were towards ENC 84 % lower in untrained participants as compared to trained participants (AOR= 0.16; 95% CI: 0.038 – 0.68, p-value: 0.013) (Table 4).

Table 4: Bivariable and Multivariable logistic regression analysis results of factors associated with knowledge level of residents and midwife on essential newborn care in TASH October 2022

Population characteristics		Knowledge level		COR	AOR
		Poor	Good		
Year of residency	year 1	26(86.7%)	4(13.3%)	0.084(0.020-0.35)	0.037(0.003-0.43)
	year 2	20(76.6%)	6(23.1%)	0.164(0.042-0.631)	0.095(0.014-0.66)
	year 3	8(53.3%)	7(46.7%)	0.47(0.115-1.97)	0.44(0.09-2.1)
	year 4	6(35.3%	11(64.7%)	1.00	1.00
NICU working experience	less than 1 year	24(80%)	6(20%)	2(0.2-19.2)	2(0.2-19.2)
	1 to 2 years	31(83.8%)	6(16.2%)	1.5(0.16-14.7)	1.5(0.16-14.7)
	3 to 4 years	23(60.5%)	15(39.5%)	5.2(0.5-46.0)	5.2(0.5-46.0)
	above 5 years	8(88.9%)	1(11.1%)	1.00	1.00
Training	Yes	41(64.1%)	23(35.9%)	1.00	1.00
	No	45(90%)	5(10%)	0.19(0.06-0.56)	0.16(0.038-0.68)

Factors associated with essential newborn care practice among midwives and Gynecology/obstetrics residents towards essential newborn care

Practice level was independent of factors like profession(P=0.7), year of residency(P=0.6), work experience(P=0.5), working in neonatal ICU(NICU)(P=0.9), training(P=0.16) and knowledge level(P=0.13).

Table 5: Bivariable analysis results of factors associated with practice level of residents and midwife on essential newborn care in TASH October 2022.

Variables		Practice level		P-value
		insufficient Skill	Sufficient Skill	
Year of residency	year 1	7(23.3%)	23(76.7%)	0.6
	year 2	4(15.4%)	22(84.6%)	
	year 3	5(33.3%)	10(66.7%)	
	year 4	4(23.5%)	13(76.5%)	
Work experience	less than 1 year	3(25%)	9(75%)	0.5
	1 to 2 years	5(13.5%)	32(86.5%)	
	3 to 4 years	13(27.1%)	35(72.9%)	
	above 5 years	4(23.5%)	13(76.5%)	
NICU Work experience	less than 1 year	6(20.%)	24(80%)	0.9
	1 to 2 years	8(21.6%)	29(78.4%)	
	3 to 4 years	9(23.7%)	29(76.3%)	
	above 5 years	2(22.2%)	7(77.8%)	
Training	Yes	11(17.2%)	53(82.8%)	0.16
	No	14(28%)	36(72%)	
Knowledge level	poor Knowledge	16(18.6%)	70(81.4%)	0.13
	Good knowledge	9(32.1%)	19(67.9%)	

Discussion

The proportion of residents and midwives who had good knowledge about essential newborn care were 24.2 %.This finding was lower than 38.2 % in Bench Sheko (11), 57.9% in Wolaita, 74.7% in Tigray (12)(13), 53.8% in Afar (14), 47.8% in Jima zone (15) Ethiopia, and 56.2% in Ekiti, Nigeria (17),65.1% in Rwanda(18),46.5% in Uganda (19),30% in Pakistan (20). This finding is unexpected as health care professionals working in our study setting have better access to better training and educational material.

The amount of health care professionals having good practices on ENC was 80.7%. Regarding practice level by profession, more than two third 70(80.7 %) of residents, and 21 (80.8%) of midwives had sufficient skill toward essential new borne care. The finding was reasonably higher than 61.8%in Bench Sheko (11),62.7% in Afar (14),51.1% in the Jima zone, Ethiopia (15) and slightly higher than 72.8% in the Tigray, Ethiopia (12), 62.9% in Nigeria (17). This could be attributed to the large amount of patient pool in our study setting giving the healthcare professional more access to improve skill and practice.

Furthermore, the detected incongruity can be attributed to the different operational definitions used (this study takes a threshold of 80 % to dichotomize knowledge and practice of study participants, but the other studies took

mean score value). Moreover, our study participants included Midwives and Gynecolo-obstetrics residents who are primary health workers that give essential newborn care, while others use all health professionals and some others selectively included only midwives and nurses. This can potentially cause a difference in the results of the study since we can expect more accurate replies from midwives and residents compared to different professionals as a result contact with such an intervention. The sample size also has significant difference from other studies.

Regarding factor associated with knowledge variables such as: Profession, Year of residency, working experience, working experience at NICU, and training were used. The result of the multivariable analysis revealed being year one and year two resident as well as Training were significantly associated with knowledge level.

The odds of good knowledge towards ENC were 96.3% lower in-year one residents as compared to year four. The odds of good knowledge towards ENC were 90.5% lower in -year two residents as compared to year four. This indicates that year of clinical practice influences the level knowledge on essential newborn care. The finding was supported by similar studies conducted in Jimma Zone, Bench Sheko and Tigray region, Ethiopia (11,12,15). This can be attributed to the acquisition of progressive knowledge throughout training.

On-the-job training was statistically associated with good knowledge among residents and midwives toward ENC. The odds of good knowledge were 84 % lower in untrained as compared to. This finding is supported by a similar study conducted in Bench Sheko and Jimma, Ethiopia (11, 15). This result shows us that continuous updates and on the job trainings are required to have good quality ENC in an institution.

Practice level was independent of factors like profession (P=0.7), year of residency (P=0.6) ,work experience (P=0.5),working in neonatal ICU(NICU)(P=0.9),training(P=0.16) and knowledge level (P=0.13) unlike the study in Bench Sheko that showed better educational qualification (AOR = 4.12, 95% CI [1.67, 10.18]) and the availability of on-the-job training (AOR = 3.60, 95% CI [1.58, 8.18]) were the factors associated with good practice of ENC (11). The finding on ENC practice in our setting can be attributed to the large pool of patients in the setting and that lower level professionals usually learn their practice from senior personal without a full understanding of the reason behind the performed procedure.

Limitations

As a result of the cross-sectional nature of the study temporal and cause-effect relationships were not identified, and the study was not considering other institutions in Addis Ababa. The fact that the study includes two different professions can be taken as a potential limitation in this study. However, the study tried to account for this by analyzing this subgroup separately. Furthermore, multiple other studies

have used the same multi-professional approach with good outcome.

Conclusion

A significant number of health care professionals lacked essential newborn care knowledge and practice. In this study, the factors influencing the essential newborn care knowledge level of midwives and Gyn/Obs residents were the availability of on-the-job training and profession (being a resident or midwife). Hence, providing in-service training, supportive supervision, and supplies should be strengthened to improve essential newborn care activities. Based on the findings, we recommend strengthening and refreshment of in-service training on immediate newborn care at a regular interval. Follow up assessment, providing health institutions the national guideline of newborn care could also have a paramount importance. Moreover, necessary materials to provide immediate newborn care need to be available. It is also essential to create a space to sharing experience between Hospital staffs and health center staffs working on newborn care through mentoring.

Declarations

Ethical consideration

An ethical clearance and official letter were obtained from the Department of Research and Publication Committee of Addis Ababa university, Department of pediatric and child health. After getting permission from the hospitals to participate in the study, written consent was obtained from each Gynecology/ obstetrics residents and midwife. Confidentiality was maintained at all levels of the study, and the collected information was kept in a secured place.

Authors contribution

All three authors were actively involved in the study from research idea conception to write up of the manuscript.

Competing Interest

The authors assert that the manuscript was accepted by all authors in its present state and no competing interest exists.

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CASE REPORT

A RARE CASE OF HEPATIC SUBCAPSULAR HEMATOMA PRESENTING WITH SEVERE ANEMIA IN A 20-HOUR OLD TERM NEWBORN: CASE REPORT

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Abstract

Hepatic subcapsular hematoma is an extremely rare clinical condition in the neonatal period. Being a life-threatening emergency, it requires prompt diagnosis and management. In a newborn presented with severe anemia, hypovolemic shock, and abdominal distention with hemoperitoneum without any identifiable risk factors hepatic subcapsular hematoma should be considered. Newborns may develop catastrophic acute and long-term complications if the diagnosis is not made timely. Obstetricians, pediatricians, neonatologists and pediatric surgeons should have a high of the index of suspicion of hepatic subcapsular hematoma in newborns to avoid delay in the diagnosis and to reduce neonatal morbidity and mortality.

Here, we report a 20 hour's old male term newborn diagnosed with Hepatic Subcapsular Hematoma after he presented with progressive abdominal distension and severe anemia. Abdominal ultrasound showed a well-defined round heterogenic echogenic liver mass and massive intra-peritoneal fluid collection. The newborn was managed in the Neonatal Intensive Care Unit with Fresh Frozen Plasma transfusion, Whole blood transfusion and vitamin K administration, and discharged improved after a week. A high index of clinical suspicion is necessary to avoid delayed diagnosis and life-threatening complications among health professionals in the neonatal intensive care unit.

Keywords: Newborn, Hepatic Subcapsular Hematoma, NICU, Severe Anemia, APGAR score

Case presentation

The case was a 20-hour-old male term newborn, born to 29 years old para II mother at 40 weeks of gestational age. The mother had a regular Antenatal Care (ANC) follow-up with unremarkable baseline investigations and her blood group was O+. The pregnancy was uneventful and no fetal abnormalities were detected on prenatal obstetric ultrasound evaluation and follow-up. The mother had no known medical illness during pregnancy or before pregnancy.

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The labor started spontaneously and lasted for 04 hours with intrapartum rupture of the membrane. The delivery was via spontaneous vertex delivery, to effect an alive male newborn weighing 3200 grams with an APGAR score of 8 and 9 at the first and 5th minutes respectively. Routine newborn care was given and the newborn was put on the mother's side and sucking well. At the age of 20 hours, the newborn has begun to develop progressive abdominal swelling with pallor. Laboratory examination showed severe neonatal anemia and the newborn was referred to our Neonatal Intensive Care Unit for better investigations and treatment.

Physical examination during admission to our NICU showed an acutely sick-looking newborn with a heart rate was 165 beats per minute, a respiratory rate of 60 breaths per minute, a saturation of oxygen 90 % with atmospheric air and a temperature of 36.6 degrees centigrade.

The newborn had paper white conjunctivae, a distended abdomen with positive shifting dullness and fluid thrill, palmar pallor involving the palmar crease and lethargy on nervous system examination with bilaterally reactive pupils.

Neonatal reflex examination revealed depressed moro reflex, un-sustained suckling reflex and weak grasp reflex. Up on admission the newborn was managed with intranasal oxygen support, resuscitated with bolus normal saline, transfused with whole blood, antibiotics with ampicillin and cefotaxime initiated with a consideration of early onset neonatal sepsis and vitamin k was administered.

Complete blood count panel showed a white blood count of 14,700 with 58% of neutrophils, hemoglobin of 4.6 g/dl with a hematocrit of 16.4 and mean corpuscular volume of 90fl, platelet count was 154,000 and the blood group was O+. Serum electrolytes, coagulation profile, renal function test and bilirubin total and direct were normal. Liver function test showed ALT-183, AST-123, ALP-125. B-HCG and alpha fetoproteins were determined and showed a valve of 1.04 and 76,000ng/ml respectively. Trans-frontal ultrasound was normal.

Greyscale abdominal ultrasound showed ill-defined mixed hypo-echoic and anechoic liver lesion measuring liver mass measuring 5.6cm by 4.7 cm with massive intra peritoneal fluid collection [Figure 1]. In the color Doppler study, there was no significant flow demonstrated.

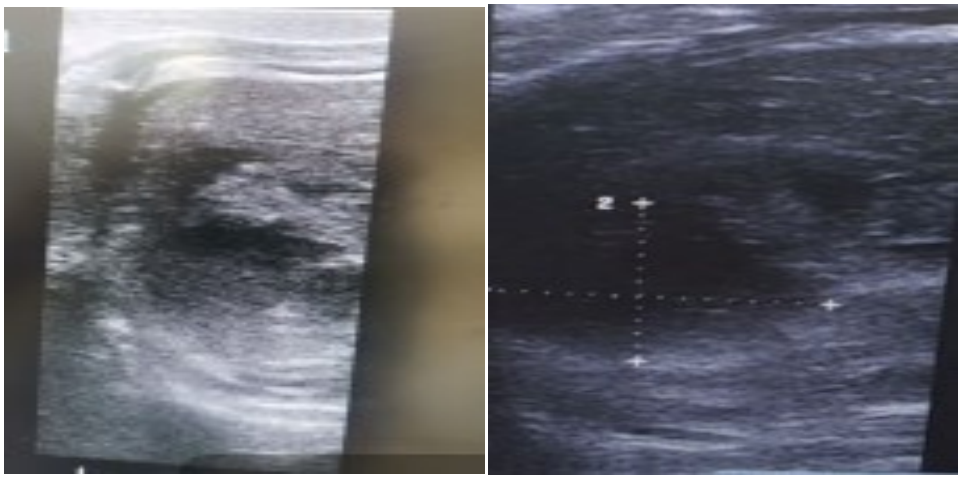


Figure 1- Abdominal ultrasound images showing ill-defined mixed hypo echoic and anechoic liver lesion.

Pre-contrast axial abdominal CT at hepatic level, demonstrated poorly defined mixed heterogeneous lesion at right posterior segment and Post contrast axial, sagittal and coronal CT scan at hepatic level, demonstrating hypo enhancing sub capsular lesion with mild heterogenousity and mass effect. [Figure 2A, 2B].

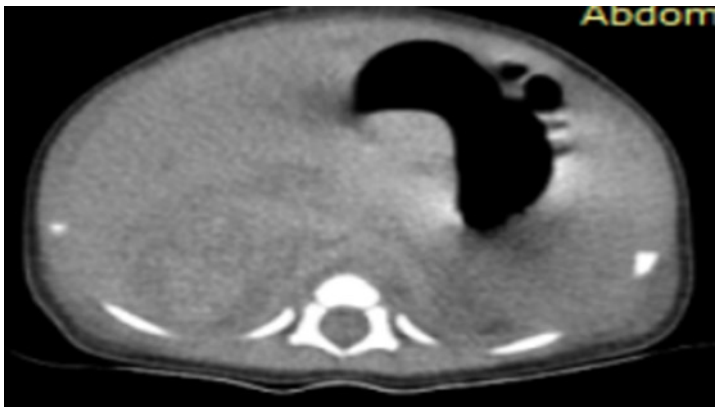
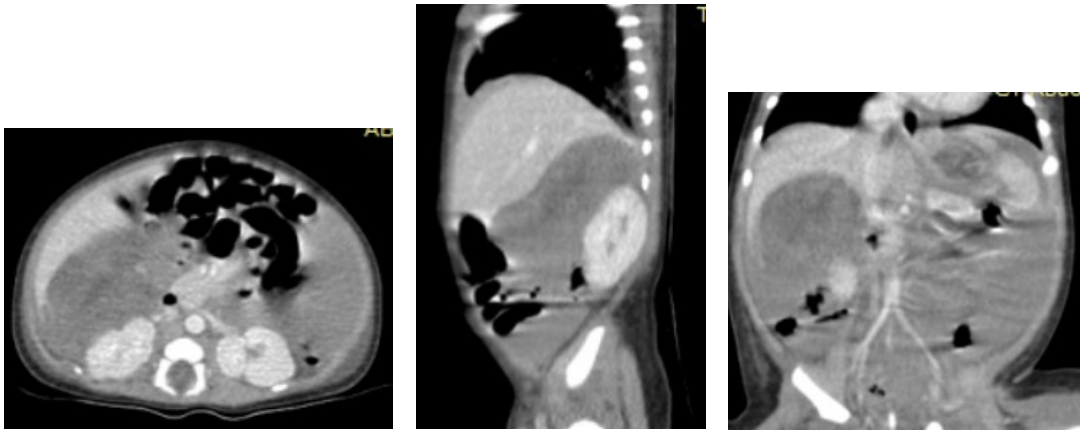


Figure 2A- Pre-contrast axial abdominal CT at hepatic level showing poorly defined mixed heterogeneous lesion at right posterior segment.



2B- Post-contrast axial, sagittal and coronal CT scan at hepatic level, demonstrating hypo enhancing sub-capsular lesion with mild heterogeneity and mass effect.

Based on the presentation, physical findings, laboratory, and imaging findings hepatic subcapsular hematoma with severe anemia was made. The newborn condition improved with supportive medical management and serial abdominal ultrasound showed significant improvement in the free fluid collection and a decrease in the size of the liver collection. The abdominal girth decreases progressively and the newborn was discharged with follow-up arranged at high-risk infant clinic. The infant is now 6months old and subsequent abdominal ultrasounds were unremarkable.

Case discussion

Hepatic subcapsular hematoma is an extremely rare clinical entity in the early newborn period. As it is an uncommon clinical condition infrequently experienced in the newborn practice the diagnosis is usually missed or delayed [1]. Coagulopathies, hypoxia, sepsis, pneumothorax, maternal diseases, placental lesions, and trauma can be the predisposing factors for liver subcapsular hematoma [2].

Hepatic Subcapsular Hematoma in newborns is more common in newborns born with breech presentation and is more common in preterm newborns. And it should be suspected clinically in newborns presented with unexplained hypovolemic shock and neonatal anemia [3].

The non-specific signs and symptoms of hepatic subcapsular hematoma may be progressed and lead to the development of sudden circulatory collapse when the accumulated hematoma in the liver ruptures through the hepatic capsule and blood enters the peritoneal cavity forming hemoperitoneum [3]. The newborn may present with clinical signs of anemia and abdominal distention with signs of peritoneal fluid collection. Abdominal ultrasound helps to establish the diagnosis. As hepatic hematoma in the newborn is most often subcapsular in location, an abdominal ultrasound scan can demonstrate parenchymal hemorrhage appearing hyperechogenic or it may appear cystic with a hyperechogenic part. In newborns diagnosed with hepatic subcapsular hematoma conservative medical therapy is the mainstay of treatment with oxygen support, blood product transfusion, correction of coagulopathies, addressing the risk factors and avoiding excessive handling of the baby. Surgical interventions should be considered for newborns who fail to respond to conservative medical therapy to improve the outcomes of the newborn with ruptured hepatic subcapsular hematoma [4,5,6].

In our case, the initial symptoms and signs were non-specific. The newborn was acutely sick- looking and tachycardic. Physical examinations showed paper white conjunctivae, abdominal distention with signs of fluid collection, palmar pallor and depressed neonatal reflex. Complete blood count panel showed severe neonatal anemia with a hemoglobin of 4.6g/dl and hematocrit of 16.4 %. Abdominal ultrasound showed subcapsular location ill-defined mixed hypoechoic and anechoic liver lesion. The diagnosis of hepatic subcapsular hematoma with severe anemia was made.

The newborn was managed with intranasal oxygen support, resuscitated with bolus normal saline, transfused with whole blood, antibiotics with ampicillin and cefotaxime initiated with a consideration of early-onset neonatal sepsis and vitamin k was administered. On subsequent days the newborn condition got improved with supportive conservative management and serial abdominal ultrasound showed significant improvement in the free fluid collection and decrease in the size of the liver collection. And the newborn discharged improved.

In conclusions, hepatic subcapsular hematoma is an extremely rare clinical entity in newborn period. In a neonate presented with severe neonatal anemia, hypovolemic shock and abdominal distention with hemoperitoneum without any identifiable risk factors hepatic subcapsular hematoma should be considered. Conservative management is the mainstay of treatment in newborn with hepatic subcapsular hematoma and a high index of clinical suspicion is required among health professionals working in the neonatal intensive care unit to avoid catastrophic acute and long-term complications.

Ethical Clearance

Informed consent for publication was obtained from the parents and ethical clearance was obtained from Addis Ababa University institutional review board.

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Conflict of Interest

Nil

Authors' Contribution

The authors confirm contribution to the paper as follows: study conception, write-up and editing the manuscript: GA; data collection, drafting and analysis of the study: YB; Study conception, imaging write-up and revising the manuscript: FO; study design, drafting the manuscript: AD. All authors reviewed the manuscript and approved the final version of the manuscript.

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A PERISPECTIVE

A CRITICAL ANALYSIS INTO THE NATIONAL CHILDREN'S POLICY OF ETHIOPIA VIS-À-VIS THE SITUATION OF VULNERABLE CHILDREN

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Abstract

The problems of children living in difficult circumstances, including street children, can be better addressed when treated under a policy framework with carefully stipulated strategies. Although a separate policy of street children is lacking, Ethiopia has tried to mainstream the issues of vulnerable children under the two relevant policies of National Children's Policy and National Social Protection Policy. Whereas the issue of vulnerable children has been slightly discussed under the umbrella of people in need of social protection, detailed discussion along with clearly stipulated implementation strategies for children in difficult circumstances has been issued in the National Children's Policy of Ethiopia. A critical analysis of the policy has been made in this paper with special focus on policy issues of children in difficult circumstances and implementation strategies designed to improve their situation. The analysis was undertaken using normative policy analysis approach by focusing on the substantive contents of the policy with value neutrality. The paper involves a brief overview of the contents of the policy, and critical examination of the policy from the vantage points of its underlying assumptions, cost-effectiveness, equity, feasibility, acceptability from the public, stakeholders' participation, and consideration of the situation of children living in diverse contexts. In addition, it includes criticism of the policy and its implementation strategies. Ultimately, the paper ends with suggesting substantive recommendations that would assist the policy to better achieve its objectives and become compatible with changing scenarios at local, national, and global levels.

Keywords: Public Policy, Vulnerable Children, Children's Policy, Critical Analysis, Ethiopia

Background

Children are considered to be vulnerable members of a society due to their physical and mental immaturity. This is recognized through the first major international consensus on the fundamental principles of children's rights, the

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Declarations of the Rights of the Child (1) and the United Nations Convention on the Rights of the Child (2). It is a widely accepted value that children should be provided with special protection and care in a stable, secure, and loving family so that they can grow and thrive (3). However, for a variety of reasons, we are not always able to translate this "intention" into a reality, and as a result, considerable proportion of children remain vulnerable, particularly in Africa.

While the literal meaning of the term "vulnerability" is the state or condition of being weak or poorly defended, the concept of "vulnerable children" implies the ones who are more exposed to risks than their peers (4). Children might be subject to deprivation (food, education, and parental care), exploitation, abuse, neglect, violence, and infection with HIV. The World Bank defines vulnerable children as a group of children that experience negative outcomes, such as the loss of access to education, morbidity, and malnutrition, at higher rates than their peers (5). The World Bank (5) further categorized vulnerable children as: (i) street children; (ii) children in the worst forms of child labor; (iii) children affected by armed conflict; (iv) children affected by HIV/AIDS; (v) children living with disabilities; and (vi) local orphans and vulnerable children groups.

An overwhelming body of research suggests that children in poor and vulnerable families have restricted access to fundamental social services such as health and education (6, 7). According to a study conducted by UNICEF (8) undertaken in 11 countries, the majority of which were in Africa, revealed that household wealth, a child's living arrangements, and household adult education were the most powerful and consistent determinants associated with key health and social consequences of child vulnerability. Findings from Australia also indicated that inadequate housing can impact a child's sleeping patterns, overall safety, opportunity to play and have positive developmental outcomes, increase the risk of abuse and/or neglect, and more (9, 10). Orphanhood status and the presence of a chronically ill adult in the household are also significant for some outcomes (8). Moreover, the cultural context and personal relationships are also important influencing factors in determining the level of vulnerability of a child within a family (11); this can include factors such as single parenthood (12), divorce and remarriage, the presence of many children in the household, early or unplanned parenthood, low education levels of parents, lack of parenting skills, lack of support from the extended family, being stigmatized, discriminated against or excluded for any number of reasons, such as being part of a minority group.

Psychological and social factors, including issues such as substance abuse, violence, physical and mental abuse, sexual abuse, exploitation, and neglect, are also important determinants of vulnerability. In the case of sexual abuse, for example, a research in Ethiopia (13) revealed that of the total reported crime

cases committed against children (between July 2005 and December 2006), 23% of them were child sexual victimization. On average, 21 children were reported to have been sexually abused each month, with the majority of the incidents being committed against female children in their own homes by someone they closely knew. Furthermore, children are also more likely to be at risk of losing parental care when they live in regions, countries, or communities where there are contextual factors such as health epidemics, armed conflict, violence, and internal displacement; high levels of unemployment; economic crises and/or stagnating or unequal economic growth; political instability; natural disasters; harmful cultural beliefs and practices; gender discrimination; and when families lack a strong social support network (11). In general, child vulnerability is a downward spiral in which each shock causes a new level of vulnerability, and each new level exposes the child to a slew of new risks. In other words, the probability of a child experiencing a negative outcome rises with each shock (5, 7).

Children living in difficult circumstance, including street children are an alarm signaling the dire need for social development and poverty reduction policies to improve the situation in the community at large, and to prevent more young people from becoming marginalized (14). While context-specific policies and interventions are needed to reduce the growing number of children from joining the street life, those currently encountering the hardships should be given the opportunity for human development interventions. In relation to this, Ethiopia has promulgated the concerns of vulnerable children, including street children, through formulating two related national policies and strategies: National Children's Policy (2017) and National Social Protection Policy (2012). Although a separate national policy of street children has not yet been initiated, the issues of children in difficult circumstances have been widely dealt within the national children's policy and very slightly discussed under the national social security policy.

The purpose of this paper is to make a critical analysis into the National Children's Policy of Ethiopia in which the issue of children living in difficult circumstances in general and street children in particular has been dealt in more detail than that of National Social Protection Policy. The commentary involves normative policy analysis approach (15) where the analyst emphasizes on describing what substantive issues are included the policy and evaluates them against selected criteria on the basis of the principle of value neutrality. Accordingly, it is not politically motivated and hence, doesn't involve examining the policy to support or refute a certain [political] ideological position.

Brief overview of the Policy

Promulgated in 2017, the National Children's Policy of the Federal Democratic Republic of Ethiopia contains six sections: general situation of Ethiopian children and significance of the policy, vision, objective, and principles

of the policy, major policy issues, implementation strategies of the policy, roles and responsibilities, and monitoring and evaluation strategy. The policy has 3 pillars: 1) Children's development and growth, 2) Prevention and protection of children from social, economic and political hardships, and 3) Providing rehabilitation, care and support for children in difficult circumstances. It sets a direction to integrate the efforts of all stakeholders, namely, family, community, government, NGOs, regional and international organizations.

After noting the achievements thus far obtained in most service sectors, the policy admits that much remains to be done in making basic health and education services available and accessible for children. In addition, it stipulates that special attention needs to be given to children living in rural, pastoralist and semi-pastoralist areas that it considers to be vulnerable. Despite children's participation in policy formulation, implementation and evaluation is believed to be necessary, it is admitted that meaningful participation of children has not been realized due to the lack of appropriate attention from implementing organs, negative attitudes, lack of awareness among the community and families, and absence of strong children's structures.

The policy assumes families as the best place for children's overall development. It is stated that families and communities have an irreplaceable role in children's overall development. However, the variation in family and community awareness, understanding and knowledge regarding child rights and protection have made their engagement in ensuring children's rights and welfare less effective. Therefore, to ensure the effectiveness of the efforts to promote and protect children's rights, it is important to increase families' and communities' awareness to play a pivotal role in children's rights and their overall development.

It is also indicated that stressful circumstances on the family such as poverty are causing many children to migrate to distant area where they end up being street children and victims of child labor exploitation. In addition, the policy reiterates the importance of supporting orphan and vulnerable children only through domestic alternative care options instead of pursuing the option of inter-country adoption.

It criticizes housing and infrastructure constructions for not considering the needs of children. The policy noted the expansion of businesses selling drugs, shisha, khat, commercial sex, pornography and soliciting children for sex in residential areas and areas providing services for children having a negative effect on children's proper upbringing.

The policy emphasizes that children living in difficult circumstances undoubtedly require special support and care. Among others, children living with disabilities, juvenile offenders, children of imprisoned parents, children left vulnerable by natural and manmade disaster, and children who live in extreme poverty, and children from pastoralist and semi-pastoralist areas have been identified as

children living in difficult conditions. The vulnerability of street children, especially girls of the street, and children who have lost their parents has been highlighted in the policy. Exposure to difficult situations due to local and transnational child trafficking, including worst forms of child labor, sexual violence, exploitation, theft of internal organs, underdevelopment of infrastructures, and living in hostile environments were discussed as conditions that put such children in vulnerable contexts. Above all, the policy assumes that government's effort of improving the lives of these children has not been successful.

The policy stipulates that the promotion and protection of child rights and welfare demands coordinated effort and collaboration by all stakeholders and this requires the establishment of a system. Women and children organizations have been given the responsibility to follow-up and monitor the mainstreaming of children's issues by all government organs in laws, policies, programs, projects and plans. But, the policy reiterates that the desired result has not been achieved due to the lack of coordination among various actors in promoting and protecting children's rights and because of the absence of accountability. The policy is fundamentally established on the principles of placing responsibility on all entities to respect children's right to life, that the actions of all stakeholders should put the best interest of children in place, that all children should not be discriminated, and the need to ensure the meaningful participation of children on matters that affect their lives.

The policy is inclusive and has been devised with relativistic approach in the sense that the situations of children under varied living situations have been considered. What is more interesting is the fact that the major policy issues on children living in difficult circumstances have been widely discussed in the policy. Beyond stressing the need for creating conducive environment for such group of children, the policy accentuates actions aimed at rehabilitation, reintegration and reunification. Supporting orphan and vulnerable children by expanding domestic alternative care options only by scaling up indigenous practices and values and strengthening them through necessary frameworks has also been emphasized. Furthermore, creating an enabling environment for prevention and controlling of involvement of children in activities harmful to their physical and psychological development, such as armed conflict, drug production, trafficking and other similar illegal activities is the other focus area of the policy. Above all, the policy proposes providing support to orphans and children who cannot live with their parents through community-based care, domestic adoption and foster care programs.

Strategies such as mainstreaming child issues, enhancing the participation of children and other stakeholders, collaboration and coordination with partnering organizations, empowering families and strengthening community structures, encouraging stakeholders to base their actions and decisions on research,

capacity building, resource mobilization, and legal reforms have been stipulated to guide the implementation of the policy. The policy also assigns roles and responsibilities to different bodies that are believed to have stakes in the affairs of children. Accordingly, government bodies, private sector, community structures, family, religious institutions, indigenous charities and societies, regional and international development partners, and the children themselves have been provided different duties and responsibilities in safeguarding the interests and improving the lives of the children. Finally, in order to follow-up its implementation and measure the outcomes, the policy set up monitoring and evaluation mechanisms.

Criteria-based Evaluation of the Policy

In the proceeding sections, the substantive aspects of the policy is critically evaluated on the basis of predetermined criteria set based on review of the works of Robert and Zeckhauser (16) and Holquist (17). Although there are more elements considered as criteria of evaluating a given [public] policy included in the works of these and other authors, this paper is delimited only to the following elements:

1. The Underlying Assumptions

The fundamental assumptions on the basis of which the policy was formulated are more or less constructed based on evidences. Rationales of formulating the policy have been clearly stated along with what it envisions to achieve after the successful implementation of the strategies. Facts and figures regarding the health and education service utilization among children in Ethiopia are clearly indicated along with the gaps observed in the provision and use of these services. The policy admits the presence of variations in access to and patterns of use of social services between children of different group characteristics such as those living in rural and urban areas, children living in pastoralist and semi-pastoralist areas, and those having varied economic backgrounds.

It is also important to pinpoint that the policy considers family networks and community ties as the best place where children's interest and wellbeing can be better served. In addition, it is reflected in the policy document about the need to strengthen family and community structures, especially the empowerment of families. Children's meaningful participation in all stages of policy formulation, implementation, and evaluation endeavors has been given a priority in the policy. Moreover, the necessity of maintaining the best interest of children during the implementation of the policy has also been emphasized.

Street children have been recognized as one category of children living in difficult circumstances in Ethiopia. Stressful conditions, including poverty, faced by families are assumed to be the main cause of streetism and hence, empowerment of the family institution through enhancement of income has been proposed as major policy direction. The policy strategy on addressing the problem of streetism in Ethiopia also includes rehabilitation, reunification, and reintegration activities. Furthermore, collaboration and coordination of

efforts from stakeholders at regional, national and international levels have also been assumed as a suitable policy strategies.

2. Cost Effectiveness

Critical examination into the implementation strategies of the policy signifies that the policy is designed in the way it can be implemented in a cost-effective manner. First, the policy plans to coordinate the efforts of collaborating bodies such as the family, the community, government structures at local, national, and international hierarchies, religious and civil society agencies. In addition, other strategies such as child mainstreaming, awareness and mobilization activities, strengthening structures that have the role of improving the lives of children, and information management tasks can be considered as less costly and if properly implemented, they can help to achieve the intended goal with reduced running cost. Moreover, the monitoring and evaluation mechanisms proposed by the policy can also help to make implementations more cost effective provided that the necessary systems are established to improve operations through monitoring, evaluation, and learning mechanisms.

3. Stakeholders Participation

Both primary (direct beneficiaries) and secondary (those that can directly or indirectly contribute to or influence the policy) stakeholders have been identified in the policy. Starting from the children themselves, government structures at regional and federal levels, international partners, family, community structures, the private sector, religious institutions, and civil societies have been identified as stakeholders with an assignment of expected duties and responsibilities. Moreover, the policy not only encourages the active participation of these stakeholders but also devised strategies of building their capacities and strengthening structures through which they can meaningfully participate in the process. Interestingly, the concept of "meaningful participation" has been repeatedly mentioned in the policy which signals the space given to the importance of stakeholders' active participation in the policy in all processes that start from planning to implementation and impact assessment.

4. Feasibility

In the context of this paper, feasibility is measured in terms of whether the implementation strategies can fit to financial constraints, and can be implemented under the existing social, cultural and political contexts of the country. As discussed above, the policy suggested implementation strategies that can be effectively implemented under the financial constraints of a third world country such as Ethiopia. It is a well-known fact that public policies are promulgated by a ruling party which has established its own system of government. Accordingly, the policy under consideration was not only devised by the EPRDF government but also that it has been implemented (if any) by same government. Furthermore, the current government established by

the prosperity party has repeatedly expressed that it intends to follow a political ideology that is different from its predecessor- the EPRDF. Lived experiences have also witnessed that it has shown no motive and practical activities of changing its political ideology, including its social security policy. Hence, it is less likely that the policy encounters political contestation. Above all, none of the implementation strategies has been found to be incompatible with cultural milieus and social contexts of Ethiopian society.

5. Acceptability from the Public

In addition to the low possibility of facing negative political reaction from the side of the government, its plan of allowing meaningful participation of people at the grass root level and implementing agencies at various hierarchies enables the policy to get acceptability from the side of the public. The policy also envisages to allow not only the voices of the children (primary stakeholders or beneficiaries) to be heard but also encourages them to actively participate in the processes that range from policy formulation to implementation and evaluation. Such good will in getting various stakeholders, especially the community at grass root level, makes everyone to develop sense of belongingness which in turn contributes for the policy to achieve its objectives. Furthermore, the more or less relativistic approach reflected in the policy by taking in to account the existence of diversity in living conditions among children of varied socio-economic characteristics enables almost everyone to find itself within the policy which also creates sense of belongingness. Above all, the policy's likelihood of acceptability by the public can be evaluated on the basis of the cultural sensitivity of the strategies and whether they fit to the context of the society where the policy is going to be implemented. In this regard, none of the contents of the policy has been found to stand against the socio-cultural contexts of the host society.

6. Consideration of Children in Diverse Contexts

The policy seems to have applied a comparative or relativistic approach in understanding the situations of Ethiopian children. In other words, it is not only cognizant of the existence of children living in different circumstances but also that its implementation strategies have been designed in the way the situations and needs of children in varied contexts are addressed. Just to mention the few, the policy addresses the situations of vulnerable children such as those living in pastoralist and semi-pastoralist areas, those susceptible to social problems as a result of living both in urban and rural areas, children living with disabilities, street children, especially female children of the street, and children of incarcerated parents have been discussed. Beyond that, the implementation strategies can be considered as appropriate to the contexts of children under varied living situations. Nevertheless, the policy has not exhaustively mentioned all the

categories of children in difficult circumstances. For instance, children suffering from non-communicable diseases, those living with HIV/AIDS, single-parent children, teenage mothers, child domestic workers, internally displaced children, children of ethnic minorities in the current Ethiopian politics, children of migrant families, children of parents with disabilities, children victimized by and surviving violence of all sorts, and those living in war zones can be mentioned as additional categories of children in difficult circumstances.

7. Ensuring Equity/equality

From the very outset, the policy recognizes the fact that Ethiopian children have varied standards of living depending on variables such as income and educational levels of their parents, the nature of the social groups they are ascribed to such as living in rural, urban or pastoralist areas. Cognizant of this, the policy envisages a society in which the living situations of children living in difficult circumstances, including impoverished children is improved. With all its limitations (discussed below), the policy tries to address the concerns of children living in various circumstances and proposes strategies that can separately fit to the context of differing groups of children in Ethiopia. In addition, it not only leaves a room for the voices of children to be heard but also encourages the active participation of children in the implementation of the policy through strengthening the structures in which children can be represented. Furthermore, the fact that the policy encourages the meaningful participation of all stakeholders that extends from the children, family, local community to the international partners, in the implementation of the strategies can be taken as another measure to ensure equity. Above all, creating access to education and basic healthcare services for all children, especially for those living in difficult situations has got priority in the policy. Such strategic interventions coupled with empowering the family and lower-level community structures are essential to address inter-generational [structural] cycle of poverty and ensure that inequality between children from various socio-economic backgrounds is substantially reduced.

Major Gaps of the Policy

No policy is without limitations. In fact, a policy's relevance may fade over time due to changing circumstances that may differ from the context of which it was formulated. This justifies the reason why public policies should be revised and updated. Accordingly, the following limitations are identified as criticisms of Ethiopian Children's Policy:

a) [Expected] Policy Outcomes not Stated

One of the good qualities of a public policy is that expected policy outcomes after the implementation of the strategy are clearly stated in measurable terms. This is mainly because of the fact that doing so helps not only to track achievement progresses as we implement the policy but also to evaluate the success and failures of the policy. Moreover, stating policy

outcomes in measurable (both quantitatively and qualitatively) terms with defined time frame helps to assess the impact of the policy as far as changing the lives of its target group is concerned. In this regard, looking into the policy document under consideration, one can understand that the policy has not clearly stated its intended outcomes in measurable terms which makes the task of evaluating the impact of the policy difficult.

b) Failure to Address Major Structural Issues

Major structural causes of the problem of children in difficult circumstance have not been sufficiently addressed in the policy. It is clear that the factors that put children in difficult circumstances are not limited only to family's poverty. Other structural variables such as culture, macro-economic issues, and political situations contribute to the problem not less than family stress. Consequently, the strategies to alleviate the problem should go beyond the structure of the family. Although the policy's emphasis on empowering the family should be appreciated, such measures alone cannot be adequate to help resolve the problem of children in difficult circumstances in Ethiopia. Hence, strategies of addressing the cultural, economic, and political causes of the problems should be clearly indicated in the policy.

c) Excessive Reliance on Government Reports

The other gap of the policy is excessive reliance on official or government reports than other published sources produced from empirical data. It is interesting that 'encouraging implementing organizations to base their decisions and activities on research' has been suggested as one of the implementation strategies of the policy. Nevertheless, reliance on credible sources of information could have helped the policy makers to be better informed about the situations of children in Ethiopia, including the causes that put children in difficult circumstances. It is understandable that public policies are more or less politically motivated and the overall processes are influenced by the ruling ideology of the day. Yet, leaving enough space for empirical evidences increases the credibility of the policies and hence, help to get sufficient support from the public and other implementing agencies. Moreover, the policy could have benefited had it base its assumptions, baselines, and goal or vision on evidences provided by relevant regional, continental and global development organizations, including the agencies of the UN.

d) Issues of finance and accountability are missing

Moreover, the source of finance for the implementation of the strategies has not been clearly indicated in the policy. For the policy to be effectively implemented and attain its goal, it requires sustainable source of financial resources. Therefore, the financial sources of the policy and how to secure them should have constituted one of the key elements of the implementation strategy. On the other hand, other than assigning roles and responsibilities to different stakeholders, the policy doesn't place accountability regarding who is to be directly blamed for the failure of the policy.

e) The Proposed Monitoring and Evaluation strategy lacks rigor

Though it is understood that a policy may not necessarily contain every details, the monitoring and evaluation strategy of the policy is not exhaustive at least to the level of clarity for implementers and other stakeholders. For one thing, it doesn't indicate the structures, from bottom to the top level, that are in charge of undertaking the monitoring and evaluation tasks. Except the Ministry of Women and Children and regional bureaus, no other state structures have been mentioned as responsible bodies to carry-out the MERL activities. On the other hand, it doesn't include learning and procedures of taking corrective measures to improve implementation based on lessons learned and to scale up good practices.

Conclusion

The purpose of this paper was to make a critical analysis into the National Children's Policy of Ethiopia, with particular emphasis on examining the relevance of the policy to address the issues of vulnerable children in general and street children in particular. It started with an overview of the major issues and implementation strategies of the policy and then examined the contents of the policy from the vantage points of underlying assumptions, stakeholders' participation, acceptability, ensuring equity, cost effectiveness, consideration of the situation of children in diverse contexts, and feasibility. Accordingly, it is indicated that the policy issues have been detailed in the manner the situations of children living in different contexts is addressed and so does the implementation strategy. In addition, the policy's strength has been identified in terms of allowing space for the voice of children to be heard, encouraging different stakeholders' participation, trying to ensure equity, and its cost effectiveness, among other things. On the other hand, the policy has major gaps from the point of view of its failure to point out the financial source of implementing its strategies, ignoring major structural issues causing the problems of children in difficult circumstances, and weak monitoring, evaluation and learning mechanisms. Given the fact that policies and their strategies formulated at a specific social and periodic context become less relevant in another, it is necessary that they are revised to fit for changing circumstances and the same statement applies to the National Children's Policy of Ethiopia under consideration.

Recommendation

One interesting feature of the policy is the adequate attention given to children living in difficult circumstances. Although the policy should be credited for slightly identifying the types of children under this category, nevertheless, it is found to be not exhaustive, as discussed in the criteria based evaluation section. Though personal and family level factors may contribute a share, the main factors that contribute for the vulnerability of these children are structural and hence, policy responses or strategies should primarily focus on structural

issues. The social structures that are responsible for the situation of such children may differ from one group to another. But, they have a lot to share in common. In this regard, the policy under consideration has failed in terms of trying to figure out these structural factors on the basis of empirical evidences. Instead, it attributed the situation to a single cause-family stress which seems blaming the victim. Therefore, such assumptions regarding the causes of children in difficult circumstances should be based on careful scrutiny of the structural variables and the design of the strategies should be geared towards addressing such causes.

Formulation of a new public policy for all groups of children in difficult circumstances, including that of street children, is a costly undertaking both politically and economically. Hence, with all its gaps identified above, we would suggest that the policy undergoes major revisions in the way it fits to the changing socio-economic and political circumstances in Ethiopia. Among other aspects, the policy should make its basic assumptions and policy issues on the basis of empirical evidences gathered by non-state actors, agencies, and individuals in addition to its reliance on government reports. Basing decisions and plans on primary and secondary sources mostly collected by agencies that have no political motives and interests would assist policy makers to make their assumptions on real facts about the situation of Ethiopian children, the structural factors that put children at risk, and the strategies that can better address the concerns in the policy.

The National Children's Policy of Ethiopia, though good in terms of putting its vision, goal and objectives, should also state its expected outcomes in measurable terms. Doing so would help the policy to easily track its progress and evaluate its impact. In addition, the monitoring and evaluation mechanisms briefly stated at the end of the policy document should be revised in the way it identifies the structures from top to bottom that are responsible for undertaking the task. It is also important that the monitoring and evaluation activities should be participatory of all stakeholders, including the children. Moreover, the financial sources needed to implement the policy should be clearly stated in the policy.

Competing Interests

The authors declare that there is no conflict of interest

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N/A

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Guidelines for Authors

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- Original Articles (vide infra) on experimental and observational studies with clinical relevance.
- Brief Communications
- Case Series
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- Systematic Review
- Teaching Articles
- Editorial
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- Monographs or set of articles on specific themes appearing in Special Issues of the Journal

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E) Discussion: The first paragraph should provide a summary of key finding that will then be discussed one by one in the paragraphs to follow. The discussion should focus on the interpretation and significance of the Results of the study with comments that compare and describe their relation to the work of others (with references) to the topic. Do not repeat information of Results section in this section.

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Articles:

- Gilbert C, Foster A. Childhood blindness in the context of Vision 2020: the right to sight. Bull World Health Org 2001; 79:227-32
- Teklu B. Disease patterns amongst civil servants in Addis Ababa: an analysis of outpatient visits to a Bank employees' clinic. Ethiop. Med J 1980; 18:1-6
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Books and chapters from books:

- Henderson JW. Orbital Tumors, 3rd ed. Raven Press New York, 1994
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http://home.achilles.net/-jtalbot/history/massers.htmAccessed 19/04/2001

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- Minimum of three and maximum of 20 case reports.
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- Statistical statements here are expressed as 5/8 (62.5%)
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