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Influence of Sanitation and Hygiene Practices on Pregnancy Outcomes Among Postnatal Women with Preterm Babies at New Born Hospital, Lusaka, Zambia

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Abstract

The number of women referred to the Neonatal Intensive Care Unit at the Women and New-borne Hospital (WNBH) has significantly increased. This study aimed to investigate the influence of sanitation and hygiene practices on pregnancy outcomes among women with preterm babies referred to WNBH. Descriptive design and mixed methods were used in this study. The study utilized 384 referral post-natal mothers from Lusaka and other parts of the country. Hence, simple random sampling was the ideal sampling method to select respondents randomly as they were referred to WNBH with the leading complication of preterm birth. Poor sanitation and hygiene with related factors such as low level of education, teenage pregnancy, marital status, unsustainable income, poor environmental conditions, unhealthy lifestyles, inadequate nutrients, and a lack of maternal support system were found to be risk factors and contributors to preterm birth. The study recommended the government to create mobile antenatal clinics and establish home care visits by health workers to assist expectant mothers on issues of sanitation and hygiene practices, selection of nutritious foods, and upholding a healthy lifestyle within 1000 days from conception. Traditional and civic leaders to initiate participatory education to members of their communities to improve environmental hygiene and ensure that safe water is available to all the citizens. Policies such as free education by the government would help retain more girls in schools, peer support among pregnant women, besides family support to encourage better health outcomes.

Keywords: *Hygiene, Sanitation, Preterm Birth, socio-economic, lifestyle, food literacy*

Introduction

Sanitation is the provision of adequate infrastructure and services for the safe disposal of human waste [1]. It also applies maintenance of hygienic conditions, through services such as garbage and waste disposal which entails setting up measures necessary for improving and protecting the health and well-being of the people [2]. The World Health Organization (WHO), describes adequate, accessible, and acceptable basic sanitation as one of the major global issues requiring immediate attention [3]. Developing countries have grappled with access to adequate sanitation for centuries. It was estimated that as of 2006, there were 2.6

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billion people worldwide who did not have access to adequate sanitation [4]. Of this number, 53 percent were from sub-Saharan Africa. Evidently, researchers have shown that lack of adequate sanitation is a challenge [1].

Individual health and hygiene are largely dependent on adequate availability of drinking water, proper sanitation and hygiene facilities. Sanitation and nutrition are closely related together, in the sense that; when sanitation is absent, infections from compromised hygiene, contaminated food, drinking water, as well as utensils can cause frequent diarrhea resulting in the depletion of nutrition stores that may be limited. This can interfere with the normal growth of children especially up to the age of 24 months (1,000 days from conception). This is why the first 1,000 days spanning from conception to age 24 months have been dubbed the 'critical window' for prevention and action [5]. Hence, more additional care in terms of sanitation and feeding is required during the period of conception to the second birthday of an infant to make sure that nutrients are absorbed and retained in the body for optimum health and growth.

Diarrhoea is usually a symptom of an infection in the intestinal tract, which can be caused by a variety of bacterial, viral, and parasitic organisms. A more acute diarrhoeal infection caused by ingestion of food or water contaminated is cholera with the bacterium *Vibrio cholera* which can kill within hours if left untreated. Cholera remains a global threat to public health and an indicator of inequity and lack of social development because it mostly affects people with inadequate access to safe water and basic sanitation. Zambia is among the countries that have severely been affected by cholera. Consumption of unsafe drinking water, improper disposal of human excreta, improper environmental sanitation, and lack of personal and food hygiene are some of the critical determinants of cholera. Most of the infected have no or mild symptoms and can be successfully treated with an oral rehydration solution. However, severe cases need rapid treatment with intravenous fluids and antibiotics [6]. Unplanned urbanization and climate change have increased the risk of cholera. Researchers have estimated that cholera accounts for 1.3 to 4.0 million cases and 21, 000 to 143, 000 deaths worldwide. It is recommended that Oral Cholera vaccines are provided alongside provision and improvements in water and sanitation to succeed with prevention of cholera outbreaks and other waterborne diseases.

A global strategy on cholera control, *Ending cholera: a global roadmap to 2030*, with a target to reduce cholera deaths by 90% was launched in 2017 [7].

Biological Stunting caused by undernutrition accounts for more than one-third of child deaths around the world. Generally, when people are undernourished, they have low resistance to infections and are more likely to die from diarrheal diseases and respiratory infections. Frequent illness also saps the nutritional status of those who survive, locking them into a vicious cycle of recurring sickness. For pregnant women, this can lead to preterm birth [8].

Preterm delivery is defined as the delivery of a baby before the completion of 37 weeks of gestation [9]. This problem is an important subject because it is responsible for fatal neonatal mortality and long-term effects on survivors such as neurological and developmental health issues. Zambia, like many other countries in the African region, endures high maternal and neonatal morbidity and mortality [10]. In working towards several MDGs, namely MDG 4 (child survival) and MDG 5 (maternal health), the Government of the Republic of Zambia (GRZ) has made several policy and planning efforts to prioritize maternal, newborn, and child health (MNCH). Zambia is among 13 African countries on track to attain the MDG 4 goal of reducing the under-five mortality rate by two-thirds [11].

A continuum of care linking maternal, newborn, and child health interventions throughout the lifecycle and among health service delivery levels is the best approach for reducing the neonatal mortality rate. To address this, the Government of the Republic of Zambia (GRZ) through the Ministry of Health and other collaborating partners, put up several evidence-based, cost-effective, feasible interventions for neonatal survival. Among them are that the national, provincial, and district health facilities are providing Essential New-born Care (ENC), as defined and promoted by WHO [12].

The GRZ also developed and implemented a plan to scale up Emergency Obstetric and New-born Care (EmONC) and expanded the number of facilities that were able to provide EmONC services, which increased the availability of new born resuscitation in 41 districts. Additionally, all levels of health care in the country address new born health, starting at the primary health care (PHC) level. The government trained Community-Based Agents (CBAs) who provide ENC and EmONC, include Community Health Assistants (CHAs), Community Health Workers (CHWs), trained Traditional Birth Attendants (TBAs), and trained Safe Motherhood Action (SMA) to reduce neonatal morbidity and mortality by providing key high-impact interventions for newborn health care [12]. Unfortunately, despite significant advancements in medical care afore mentioned, preterm birth continues to pose significant health challenges for mothers and newborns in Zambia [10].

Globally, the greatest burden of mortality and morbidity from preterm births occurs in low- and middle-income countries (LMICs). Of the estimated 14.9 million preterm births recorded each year globally, 13.6 million (91%) occur in LMICs. This means that in European countries, the rate is as low as 5% whilst it's as high as 18% in some African countries. Women giving birth to preterm babies in LMICs tend to be associated with challenges such as poor education, unemployment, shanty compounds, lack of water and sanitation, unacceptable lifestyles and poor nutrition among others [13].

There is broad evidence of knowledge alluding to the fact that many developing countries in Africa including Zambia, face challenges in meeting basic water, sanitation, and hygiene (WASH) requirements [14]. Women and girls are tasked to fetch water from outside the home, which can be physically stressful. This also means that homes also lack private toilet facilities, putting women at risk because they may already have urinary tract infections before getting pregnant. Some defecate, bathe, and manage menstruation in private open places which indirectly affects water meant for sanitation and hygiene. The private places sought may not be well secured, hence may be a source of psychosocial stress [15].

The WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation estimates that, globally, 1.1 billion people defecate in the open, a practice that can expose individuals to contact with human faecal matter containing infectious organisms which can contaminate food and water. Appropriate public health interventions can therefore be designed to reduce the burden of adverse pregnancy outcomes [15]. A study in Cyprus recommended that more studies should investigate more risk factors for adverse pregnancy outcomes and eventually inform local public health authorities towards the development of evidence-based management protocols to limit premature births and subsequent neonatal complications and related healthcare costs [16]. Another study on the Relationship between socioeconomic status, psychosocial factors, and food insecurity with preterm labor conducted at the Ilam University of Medical Sciences concluded that Preterm labor is a relatively common problem in which intermediary social determinants of health can play an important role. Demographic and health surveys conducted from 1986 to 2007 also

showed evidence that water and sanitation affect child health [15].

Optimal foetal development is key to a successful pregnancy. It is an important factor for infant's survival and subsequent social development through the life cycle. In addition, good health and favourable socio-economic environments and income adequacy of pregnant women are also considered essential prerequisites for the mental and physical well-being of the growing infant. Studies have shown that women with high levels of psychological or social stress are at increased risk of preterm birth [17]. Randomized controlled trials of interventions aiming to relieve stress or provide comforting reassurance have not been successful in preventing early birth. This suggests that multiple other confounding factors are contributing to this public health issue 'preterm birth' [18].

Evidence-based research shows that, psychological and social stress factors such as; walking time to the water sources, time spent fetching the water, sanitation access, harassment of the women and girls, local crime, and other community problems were reported in a study carried out in India. The researchers examined the effect of preterm birth in relation to Water Sanitation and Hygiene and other social conditions and characteristics for 7,926 women who gave birth between 2004/2005 and 2011/2012. Of these women, 14.9 percent experienced premature birth and 15.5 percent delivered a low-birth-weight baby. This study underscored that increased time spent daily fetching household water increased women's risk of delivering a low-birth-weight baby. Open defecation and using a shared latrine among many households were also associated with low birth weight and preterm birth. The study accentuated that harassment of women and girls, and crime in the community also was associated with both low birth weight and preterm birth. Furthermore, women in India were found to be ignorant about sanitation practices and their relationship with pregnancy outcomes. And yet, clinical observations have shown that, sanitation is one of the crucial measures that help prevent adverse pregnancy outcomes. The researchers in India recommended that interventions to reduce domestic responsibilities related to water and sanitation would reduce rates of PTB and LBW. Furthermore, it was noted that studies associated with sanitation in were rather scarce in India. [19].

Other writers have also noted relationship between poor sanitation, low-birth-weight babies and preterm deliveries [20]. Consequently, Sustainable Development Goals (SDGs), SDG-6, focus of 1990 to 2015 proposed ensuring environmental sustainability, and 50% commitment to water, sanitation and hygiene issues. The effect of poor water and sanitation on the health of pregnant women and children deserve more attention such as positive attitude by individuals, families and communities starting with proper hand washing [21].

A study on a prospective cohort of pregnant women (n = 670) in their first trimester of pregnancy was enrolled and followed until birth. Socio-demographic, clinical, and anthropometric factors, along with access to toilets and sanitation practices, were recorded at enrolment (12th week of gestation). The study provided further evidence that poor sanitation is associated with preterm birth and/or having a baby with low birth weight. It was recommended that education on sanitation practices is needed more than ever before because nearly two-thirds of the women who practiced open defecation, experienced adverse pregnancy outcomes [22].

A population-based prospective study in two rural areas of Odisha State in India discovered that only 18.2% of households had access to an improved latrine (a facility such as a flush toilet that hygienically prevented human contact with human excreta), hence 75% of households practiced open defecation. This resulted into a high infant death rates (57 deaths per 1,000 live

births). It was concluded that additional studies were required in order to elucidate the socio-behavioural and/or biological basis of this association so that appropriately targeted interventions could be designed to support improved birth outcomes among vulnerable populations [19].

More studies were also recommended to investigate additional risk factors associated with adverse pregnancy outcomes and eventually inform local public health authorities towards the development of evidence-based management protocols to limit premature births and subsequent neonatal complications and related healthcare costs [15]. Moreover, researchers have affirmed that there are limited studies on other factors predisposing women to preterm birth, and not only sanitation and hygiene practices. Limited literature concerning the specific influence of sanitation and hygiene practices on pregnant outcomes in this study context is evident [21].

A comprehensive understanding of the determinants of preterm birth is therefore needed to plan interventions and inform new discovery [13].

Methodology

Description of Study Area

The study was undertaken at the Women and Newborn Hospital, located at the University Teaching Hospitals (UTH), in Lusaka, about 4 km, east of the city centre.

It is a tertiary referral hospital for pregnant women and neonates with complications. It serves Lusaka, surrounding facilities, and the country at large.

Research Design

The study used the descriptive design [23]. The selection was based on the fact that descriptive investigations, unlike other types of investigations, carry out studies without altering or manipulating any of the variables of the phenomenon. The study also used both qualitative and quantitative methods [24].

Sampling

Simple random sampling was used in this study. It is a method of sample selection in which every item of the population has an equal and independent opportunity to be selected [25]. The estimated population was not residents at the study site because they were referral patients. Hence, simple random sampling was the ideal method to select respondents randomly as they were referred to the medical facility with the leading complication of preterm birth.

Study Population and Sample Size

The study's estimated population was composed of all the women referred to the referral facility; Neonatal Intensive Care Unit at the Women and Newborn Hospital. According to the data collected at WNBH Admissions, 2023, a maximum of 454, and a minimum of 344 referrals were recorded with a cumulative total of 4,719. A sample size of 384 provided a 95% of confidence which is a commonly accepted threshold for reliability and 5%, margin of error.

Data Collection

Data collection was sought using questionnaires and interview guides. All 384 respondents either filled in the questionnaires or provided the answers to the research assistant for recording.

Close interaction with respondents and observation provided further understanding of the study context.

Data Analysis

Data analysis is the process of assessing collected data to relate its logic to the research [26]. Raw data was analysed by the Statistical Package for Social Science (SPSS) to obtain frequencies and percentages to clarify information from observed data.

Results

The study aimed to establish the influence of sanitation and hygiene practices on preterm

birth. The increase of preterm birth in Zambia was associated with socio-economic characteristics, lifestyle and food literacy of respondents.

The Socio-economic Characteristics of the Women with Preterm Birth

All the respondents attained some level of education from primary to tertiary level. Results showed that 15.6% (n=60) had no formal education level, 25% (n=96) had up to primary education level, 41.7% (n=160) had up to secondary education level, and 17.7% (n=68) had up to tertiary education level. This meant that the majority of the respondents had up secondary education level, most of them, junior secondary.

The age of respondents ranged from 14 to above 39 years. The findings revealed the prevalence of teen pregnancy. A frequency of 11.5% (n=44) showed 14 to 18 years prevalence, 37% (n=142) were between 19 to 23 years, 28.9% (n=111) were between 24 to 28 years and 10.7% (n=41) were 29 to 33 years, 7.3% (n=28) were 34 to 38 years and 4.7% (n=18) were above 39 years. The data on marital status showed that 24.5% (n=94) were married, 19.3% (n=74) were divorced and 56.3% (n=216) had never been married. This meant that the majority of the respondents were those who had never been married before.

The occupational status of the respondents showed a frequency of 17.4% (n=67) in informal employment, 34.9% (n=134) in business, 31% (n=119) were farmers and 16.4% (n=64) had none of the above-mentioned occupation statuses. This meant that the majority of the respondents were small-scale farmers and were also involved in small-scale businesses. The majority of the women were those from the Shanty compounds and rural areas. Results showed that 27.9% (n=107) were from rural places, 57.3% (n=220) were from shanty Compounds and 14.8% (=57) were from urban residential areas. Among them, 34.6% (n=133) accessed water and sanitation facilities while 65.4% (n=251) had problems with water and sanitation facilities. Therefore, the majority of the respondents did not have good water supply and sanitation facilities. Table 1 below shows results on the socio-economic characteristics of the women in this study.

Table 1. Socio-economic Characteristics of Women with Preterm Birth

	Frequency	**Age**	**Frequency**
Respondents (Female)	384	14-18 Years	44
Education		19-23	142
Primary	96	24-28	111
Secondary	160	29-33	41
Tertiary	68	34-38	28
		≥ 39 years	18
Marital Status			
Married	94	***Occupation Status***	
Divorced	74	Formal	67
Never been Married	216	Business	134
		Farmer	119
Place of Residence		None of the above	64
Rural	107		
Shanty Compounds	220		

Urban	57	
Water Supply and Sanitation		
Available	133	
Not available	251	

Source: Research writing 2024

Life Style of Sampled Women with Preterm Birth Referred to the New-Borne Hospital

The study associated Lifestyle with sanitation and hygiene practices by highlighting habits that compromised the application of cleanliness measures and well-being throughout pregnancy. Study findings revealed that antenatal attendance was not a priority for most of the women. Respectively, results showed that 15.4% (n=59) of the respondents sought antenatal care between 1 to 3 months while 31.5% (n=121) attended antenatal care between 4 to 6 Months and 53.1% (n=204) attended first antenatal care between 5 to 9 months. This meant that most of the respondents had their first antenatal visit during the advanced pregnancy stage, thereby missing out on health education with sanitation and hygiene practices.

Results on check-ups on infectious diseases showed a frequency representation of 32.3% (n=124) of respondents who were checked for infectious diseases during pregnancy and 67.7% (n=260) who were not checked. Therefore, the majority of the respondents did not check for infectious diseases during pregnancy. The frequency representation of 53.1% (n=204) stated that family members and themselves prescribed medication whenever they felt ill, 11.7% (n=45) stated that the medication was prescribed by hospital personnel and 35.2% (n=135) stated that they accessed traditional medication recommended by various sources. It was concluded that the majority of the respondents had self-prescribed medication, and many others used traditional prescribed medication. Urinary tract infections are caused by poor sanitary environments among other things. Medical check-ups are crucial in pregnancy in order to rule out infections that could result in negative pregnancy outcomes. In addition, the women exposed themselves to medication not prescribed by health care practitioners.

Consumption of alcohol and smoking during pregnancy was reported by the respondents, 63.3% (n=243) said ‘Yes’ while a frequency representation of 36.7% (n=141) said ‘No’, meaning that majority of the women drunk beer during the period of pregnancy. The frequency representation of 79.2% (n=304) agreed to exposure to smoking while a frequency representation of 20.8% (n=80) said ‘No’ to smoking. It was concluded that the majority of the respondents smoked in the form of Sniffing (Sunkho) during pregnancy. Moreover, positive peer support was not reported among the majority of the respondents. A frequency representation of 36.2% (n=139) admitted peer support while 63.8% (n=245) denied any peer support. Beer drinking and smoking can be done in unhygienic environments especially since most of the respondents were coming from disadvantaged backgrounds.

Results on the provision of home visits by trained health workers showed that 23.7% (n=91) strongly disagreed experience of home visitations, 53.9% (n=207) disagreed, 7.8% (n=30) were neutral, and 14.6% (n=56) agreed. Church mates and women groups were part of the Home visits for some in this study. Those who were visited had a relationship with those trained health personnel, not an arrangement by the health institutions, implying that primary health care was lacking. The lifestyle of the women with preterm birth compromised their health during pregnancy as shown in table 2 below.

Table 2. Life Style, of the Women with Preterm Birth

	Frequency	**Prescription of Medicine**	**Frequency**
First Antenatal Visit		Self & Family	204
1-3 Months	59	Hospital Prescribed	45
4-6 Months	121	Traditional	135
7-9 Months	204		
		Alcohol Consumption	
Check-up on Infectious Diseases		Yes	243
Checked	124	No	141
Not checked	260		
		Smoking & Sniffing	
Peer Support		Yes	304
Yes	139	No	80
No	245		
Home Visits by Health Staff			
Strongly Disagree	91		
Disagree	207		
Neutral	30		
Agree	56		

Source: Research writing 2024

Food Literacy

Most of the respondents in this study were unaware of the nutritional value of traditional foods such as Pumpkin Seeds and Bambara nuts, hence not including most of these foods in their diet. This inhibited the consumption of valuable nutrition and health benefits. Pumpkin seeds and Bambara nuts are neglected foods rich in iron, protein, and other compounds like selenium needed for a strong immune system.

Results showed that 10.7% (n=41), were very much Aware, 29.9% (n=115) were Aware and 59.4% (n=228) stated that they were not Aware. Apart from not including a variety of foods in their diets, the respondents admitted embracing some beliefs in food taboos. A frequency of 81.3% (n=312) embraced food taboos while 18.8% (n=72) did not. The common foods reported to have been listed as food taboos included red meat with 29.7% (n=114) responses, 33.3% (n=128) eggs, 19% (n=73) milk and dairy products, 10.2% (n=39) spices and 7.8% (n=30) vegetables and fruits. Egg consumption was highly associated with food taboos by most of the respondents. Depletion of nutrients due to diarrhoea-related issues, the stress of lifting water and accessing sanitary facilities coupled with no proper diets and lack of alternative nutritious foods such as Bambara nuts, pumpkin seeds and millet contributed to preterm birth. Table 3 shows the nutrition knowledge and practices of the respondents.

Table 3. Nutrition Knowledge and Practice

	Frequency	*Common Foods Forbidden*	Frequency
Awareness of the Nutrition		***For Pregnant Women***	
Value of Local Indigenous Foods		Red Meat	114
		Eggs	128
Very Much Aware	41	Milk and Dairy Products	73

Aware	115	Spices	39
Not Aware	228	Some Vegetables and	
		Fruits	30
Belief In Food Taboos			
Yes	312		
No	72		

Source: Research writing 2024

Discussion

The study contends that poor sanitation and hygiene practices contribute to adverse pregnancy outcomes by promoting infection as well as stress during pregnancy. Stress is attributed to a lack of proper indoor sanitation facilities and water supply.

Socio-Economic Characteristics of the Women with Preterm Birth

The majority of respondents had up to secondary education level, most of them up to junior secondary. It was therefore concluded that majority of respondents, 256, attained some form of basic education. Poor health at birth is greater among babies of mothers with low education across all cohorts combined from 12 European countries. Inequalities were strongest in the Netherlands, the UK, Sweden, and Spain [26]. The study illustrated the need to improve new-born health and to reduce these inequalities across distinct European populations. This fact responds to the findings of this study because few of the respondents had up to tertiary level education.

Another study showed the trend in preterm birth rate depending on parental educational level from 2000 to 2020 using national data. As a result, it was shown that the preterm birth rate increased as educational level decreased, irrespective of parental gender and age. In addition, slope and relative indexes of inequality for preterm birth showed that a statistically significant inequality by parental educational level also persisted from 2000 to 2020. Both educational level and maternal education are needed and important for girl children to reduce maternal complications related to ignorance of sanitation and hygiene best practices [27]. A study conducted at University of Zambia which involved only female students, revealed that education was not associated with food choices. Students in that study had limited nutrition knowledge which led to poor selection of food despite some of them being in their later years at the university [28]. If these students were exposed to poor sanitation and hygiene environments, the outcome would range from moderate to severe.

With regards to teen pregnancy, the findings of this study showed a prevalence. Results on age of respondents showed that (28.9%) were 19 to 23years old years with another segment of mothers aged 14 to 18 years old (11.5%). There is a need to ensure that the age at which women become pregnant should be that which would not compromise the development of the pregnancy because optimal foetal development is vital for a successful pregnancy [18]. The age of the mother is an important factor for the infant's survival and subsequent social development through the life cycle. Additionally, Studies have confirmed that pregnancy during adolescence as well as in the later stages of the reproductive period are associated with an increased risk of adverse pregnancy outcomes. Mothers in the age group 20 years and less have high chances of adverse pregnancy outcomes as compared to mothers in subsequent age-groups [29]. Moreover, most of the girls in their teens are not mature enough both psychological and physically for pregnancy and child bearing. Factors that help delay or prevent child marriages for both boys and girls include the education level of parents as role models [29]. Access to quality education in all parts of the country and strong community

leadership like Parents Teachers Associations (PTAs) can step in to make sure that both girls and boys are retained in schools. Involvement in income-generating activities, opportunities for personal development and access to safe recreational activities can all be strategies to keep both girls and boys in school.

The study on Child marriages that was conducted in six districts of Eastern province of Zambia, revealed that trends and patterns in child marriage indicated that those more likely to have early marriages included children from poor families or backgrounds, those living in rural areas, and not attending school, orphans and stepchildren, difficult or 'hard to manage' children, as well as children without adequate supervision or support. This study in Eastern Province found significant numbers of boy husbands and fathers [30]. This study showed that sanitation and hygiene practices can be compromised by child marriages and teenage pregnancies.

Sociologists, religious leaders and health professionals have asserted that marriage is a social institution that formalizes a commitment of the well-being of the spouse and child. It was established that the majority (56.3%) of the respondents were those that had never been married, meaning that they never experienced a stable family support in relation to maternal care. There are benefits of having a husband in a marriage institution in order to have a positive pregnancy outcome. The marital partner plays a vital role in sensing danger, depressive or anxiety symptoms. He can therefore quickly seek professional health check-ups which can prevent maternal complications and contribute to the provision of safe water and reduce on the stress associated with long distances to fetch water. The woman will always feel a fence of protection which can stabilize anxiety throughout the pregnancy up to full term [31].

More studies have highlighted the fact that the protective effect of marriage persists beyond socio-economic differences. What really matters is the increased degree of commitment that marriage requires from the father of the baby. Women who reported being unmarried and with no paternity status were many times more likely to have preterm births and low birth weight babies [31]. Health care professionals have a lot of work to make sure that pregnant women without paternal presence and marital status are treated with the care that they deserve.

The current occupation of women with preterm birth showed that (16.4%) were small scale farmers and (31%) were involved in small scale businesses which did not fully support their financial needs. This scenario is supported by more studies that have shown that a number of pregnant women working, either formally or in informal settings have increased globally [32]. In 2020, two-thirds of women participated in the workforce, (66.8%) in the European Union. The Sixth European Working Conditions Survey showed that more than two-fifth of women worked in physically demanding jobs, including those requiring them to adopt painful postures, 21% of the women worked shift work, more than 15% worked more than 41 hours per week, and 14% worked night shifts [32]. More studies confirm that over 61% of women are employed and 76.2% of women work throughout their reproductive age. This pattern has replicated in most high-income countries, showing that many pregnant women engage in physically demanding work, long working hours, shift work, and others exposed to other occupational risk factors such as whole-body vibration. The increasing exposure of reproductive-age women to workplace occupational risks have created concerns about the possible impact on maternal and neonatal health [33].

Furthermore, a recent systematic review and meta- analysis on maternal occupational risk factors and preterm birth confirmed that occupational status among pregnant women can have serious complications. The study highlighted that middle income people and those of low income were prone to experience

preterm birth [21]. This study brought to light that most of the respondents in this study were exposed to stressful work schedules in order to make ends meet as a result of lack of food security. The study revealed that majority of the preterm cases referred to the Women and New-born Hospital were those from the Shanty compounds (57.3%) and rural areas (27.9%). The greatest burden of mortality and morbidity from preterm births was confirmed to be occurring in low- and middle-income countries (LMICs). In addition, good health and favourable socio-economic environments, such as good ventilation, clean facilities and adequate income to support a pregnant woman are also considered essential prerequisites for the mental and physical well-being of the growing infant [22]. Therefore, the availability of decent, safe, and clean working environments can save women from preterm birth risks.

In Zambia, families in shanty and some rural areas face challenges to meet their basic water, sanitation, and hygiene (WASH) requirements [14]. Women and girls tasks include fetching water from outside the home, which can be physically stressful. In places where water is scarce many people vie for the commodity needed for drinking, cooking and sanitation issues. The majority of the respondents in this study (65.4%) did not have good water supply and sanitation facilities which influenced preterm birth.

Lack of water means that, homes also lack private toilet facilities which put pregnant women at risk because they are exposed to urinary tract infections before they could even get pregnant [19]. Sanitation and hygiene status therefore adversely affect the outcome of pregnancy. Appropriate public health interventions can be designed to reduce the burden of adverse pregnancy outcomes among women living in settings where there is limited access to adequate sanitation [14].

Life Style of the Women with Preterm Birth

The women's' responses on when they first attended ante-natal clinics confirmed that most of them (53.1%) did not seek medical attention as early as possible. It was found that the respondents had their first ante-natal visit during their advanced pregnancy development stage with the majority having visited the health facility between 7 months and the actual day of delivery. World Health Organization's ante-natal care guidelines provide important key interventions to help prevent preterm birth. This includes counselling on healthy diet, optimal nutrition, and tobacco and substance use. Failure to attend ante-natal clinic puts the mother and the developing baby at greater risk of optimal development. Important interventions like foetal measurements, including use of early ultrasound to help determine gestational age and detect multiple pregnancies are curried out aimed at safeguarding foetal development. A minimum of 8 contacts with health professionals throughout pregnancy are provided in order to help identify and manage all risk factors [16].

The majority of the respondents (67.7%) had not been checked for infectious diseases during pregnancy. This was because of the obvious reason of not presenting themselves for ante-natal check-ups. Alkaline vaginal PH, could be a result of bacterial vaginosis, and a predictor of Preterm Birth. A more recent study also found that urogenital infections were associated with an increased risk of preterm birth. This shows that check-ups on infections should be prioritized by pregnant women in order to avoid negative birth outcomes. Earlier treatment in pregnancy can be more effective in preventing preterm birth. Lamont and colleagues supported that administration of clindamycin to women with abnormal vaginal flora before 22 weeks gestation may reduce the rate of subsequent preterm birth [34].

This study, confirmed that majority of the respondents (53.1%) had self-prescribed medication, and many others (35.2%) used

traditional prescribed medication, a factor that predisposed them to preterm birth. One study found that maternal reports and prescription redemption data studied were complementary to each other which increased reliability of information on the use of self-medication during pregnancy. It was recommended that future studies would do well to consider assessing such exposure through a self-reported questionnaire rather than maternal reports to verify the findings [35]. Ante-natal check-ups should be encouraged to become part of the routines for the pregnant women in order to promote sanitation and hygienic practices.

Smoking sunko, drinking beer in compromised unsanitary conditions due to stress of being single mothers were revealed in this study. Majority of respondents (63.3%) confirmed drinking beer during pregnancy. Exchange of cups and bottles whilst drinking entails several potential health risks such as transmission of infectious diseases and sharing of allergens or irritants. It was concluded that sanitation and hygiene practices influence preterm birth. World Health Organisation, adds a further consequence of drinking alcohol during pregnancy. Alcohol can cause physical, behavioral, and intellectual disabilities known as ‘’Foetal Alcohol Spectrum Disabilities’’ (FASDs) [36]. A study carried out in Namwala District of Zambia showed that alcohol was among the foods avoided under food taboos during pregnancy. Native science also discourages the consumption of alcohol during pregnancy [37].

The majority of the respondents in this study (79.2%) smoked in the form of Sniffing (Sunkho) during pregnancy meant to warm their bodies and tighten their private parts in order to please their partners. Sniffing was embraced because of its ability to increase libido and sexual pleasure. Respondents did not mind any negative side effects. Most of the women in shanty compounds and rural areas from which the majority of respondents were coming from, tend to please their partners at their own expense. Sniffing substances are kept on plastic, and paper and sometimes tied to dirty rappers compromising Tobacco smoking in pregnancy causes preterm birth and reduction in birth weight [38]. More researchers recommend that a lot more studies should be encouraged in order to find more factors and prevention strategies of preventing preterm birth [38].

The experience of pregnancy comes with a lot of emotional and physical changes. Therefore, having support around can provide help in increasing the motivation and drive to make healthy lifestyle changes. Feeling well supported during pregnancy can offer a sense of connection and belonging, as well as emotional comfort and reassurance. This can help manage worries and concerns that may arise. Majority of the respondents in this study (63.8%) did not have peer support during the period of pregnancy. A study on motherhood, substance use and peer support, stated that providing access to effective treatment programs is crucial to breaking the cycle of addiction. This study demonstrated that peer support groups can play an important role in supporting women to resist negative pressure [39] such as beer drinking and smoking. The women enrolled on this study (53.9%) revealed that there was no provision of home visits by trained health workers as an intervention towards preterm birth.

In Malawi, home visits by community health workers (CHWs) during pregnancy and soon after delivery were recommended to improve newborn survival [40]. However, as the roles of CHWs expand, there are concerns regarding the capacity of community health systems to deliver highly effective coverage of home visits. The WHO’s Rapid Access Expansion (RAcE) program supported the Malawi Ministry of Health in aligning their Community-Based Maternal and New-born Care (CBMNC) package with the latest WHO guidelines, to implement and evaluate the feasibility and coverage of home visits in Ntcheu District. The findings of this study were

that; there was no coverage of home visits during pregnancy and soon after delivery in a well-supported program delivery environment. Most HSAs were conducting home visits, but not at the level needed to reach high coverage. These findings were similar to previous studies, calling into question the feasibility of visitation schedules [40]. Developing countries can do well to increase more staff in the health sector with the aim of providing health education in relation to sanitation and hygiene practices and other aspects of wellness, in order to improve health services for pregnant women.

Food Literacy

This study established that the majority of the respondents (59.4%) were not aware of the nutrition value of tradition foods such as Bambara nuts, pumpkin seeds, millet, sorghum and cassava. Macro and micro nutrients are both important in the maintenance of the brain, muscle, bone, nerves, skin, blood circulation, and immune system. The body requires a steady supply of many different raw materials. Failing to get even those small quantities virtually guarantees disease [28]. Food literacy in the absence of sanitation and hygiene practices can have negative consequences because they are interlinked components of ensuring food safety and prevention of foodborne illnesses. Selection of food, handling and preparation, waste management are all aspects that need attention.

Underutilized tradition crops such as Bambara nuts, pumpkin seeds, millet, sorghum and cassava are usually not part of the best selection of foods in Zambia. Bambara nuts and pumpkin seeds are rich in proteins, fibre, minerals like iron, zinc, calcium, manganese, magnesium, sodium, PUFA (polyunsaturated fatty acids), phytosterol and vitamins. Food industries need to consider the importance of this underutilised food in order to come up with good products with specific health benefits. The seeds from pumpkins are considered as seed, they are cheaper in cost and their utilization in different food products may lead to enhanced nutritional value products at lower cost [41]. Majority of respondents (81.4%) admitted that there were certain foods in their area of residence or in their culture which pregnant women were advised not to eat.

A frequency of (81.3%) respondents believed in Food Taboos during Pregnancy. It is important to note that both rural and urban communities embrace taboos regarding foods to avoid during pregnancy, with different localised explanations [42]. Lack of appropriate knowledge on culturally prescribed nutritional taboos and beliefs have an impact on the outcome of malnutrition relief efforts or prevention campaigns and interventions. Food items within a given ecological zone may be considered inedible due to “nutritional taboos.” Food beliefs and taboos are believed to be a global phenomenon intended to have positive effects on communities that practice them, including the conservation of scarce or sacred resources, as well as protecting both the pregnant woman and the unborn children [42].

The common foods associated to food taboos by respondents in this study were listed from highest to lowest. The highest were eggs, followed by red meat, milk and dairy products, spices and the least being fruits believed to negatively impact on maternal health and development of the foetus. People living in the rural parts of Namwala had a variety of foods that were considered taboo when consumed by a pregnant mother and no adherence would affect the mother and most significantly the unborn child [37].

An adequate food consumption pattern and dietary diversity are critical for the overall growth, development, and health outcomes of both pregnant women, and their infants. The recent Global Nutrition Report 2020 revealed that every third child in low-developed countries is malnourished and expressed concerns regarding achieving the Global Nutrition Targets by 2025 [43]. Africa is

considered a continent of diverse cultures, beliefs, and taboos, Zambia inclusive.

Therefore, paying attention and analysing local pregnancy food taboos is an important public health goal for Public Health workers and Nutritionists in different parts of the country. Compromised sanitation and hygiene practices can increase maternal malnutrition especially with lack of food literacy

Conclusion and Recommendations

Poor sanitation and hygiene is closely related to socio-economic status, life style as well as nutrition knowledge and practice. Sanitation and hygiene status can affect the outcome of pregnancy. Good health and favourable socio-economic environments, such as good ventilation, clean facilities are essential prerequisites for the mental and physical well-being of the growing infant. Shanty compounds experience solid waste blocked drainages leading to flooding, abnormally high populations as an added factor of unhygienic environments creating a situation where women and children swim in the flooding waters, making government efforts futile.

Life style risk factors such as beer drinking and smoking, as opposed to public health guidelines and recommendations can also have adverse pregnancy outcomes.

There is also need to educate populations on the inclusion of indigenous foods and practice of cooking simple but nutritious meals so that unsafe beer drinking and sniffing would be replaced with exploration of food products to replace mealie meal and fatty proteins. Belief in Food Taboos during Pregnancy can further put women at risk of biological stunting during pregnancy.

The results of this study on Influence of sanitation and hygienic practices on preterm birth will contribute to the laying of the foundation for many more studies on different populations in Zambia.

Recommendations

1. The Ministry of Health should organize health campaigns like those for child health to be intensified in order to encourage pregnant women to attend ante-natal clinics as soon as possible.
2. The government should establishment tested mobile antenatal services to provide antenatal services to expectant mothers in remote areas.
3. Traditional leaders to work closely with health workers in disseminating knowledge about nutrition, sanitation and hygiene as well as address harmful food taboos. Teenage pregnancies should also be discouraged through sustenance of free education for all the vulnerable girls up to tertiary level.
4. Government should consider penalties to people who contaminate the environment through smoking, water pollution and harmful garbage disposal in order to encourage clean environments.
5. Health facilities providing antenatal services should consider preparing nutritious snacks like that of SHN in schools which can encourage attendance, especially in shanty and rural areas. The women would also practice cooking simple healthy meals from indigenous crops to support the immune system during pregnancy.

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Conflict of Interest

We declare that we do not have any conflict of interests. Conflict of Interest Statement: The research was conducted impartially and without any external influence.

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