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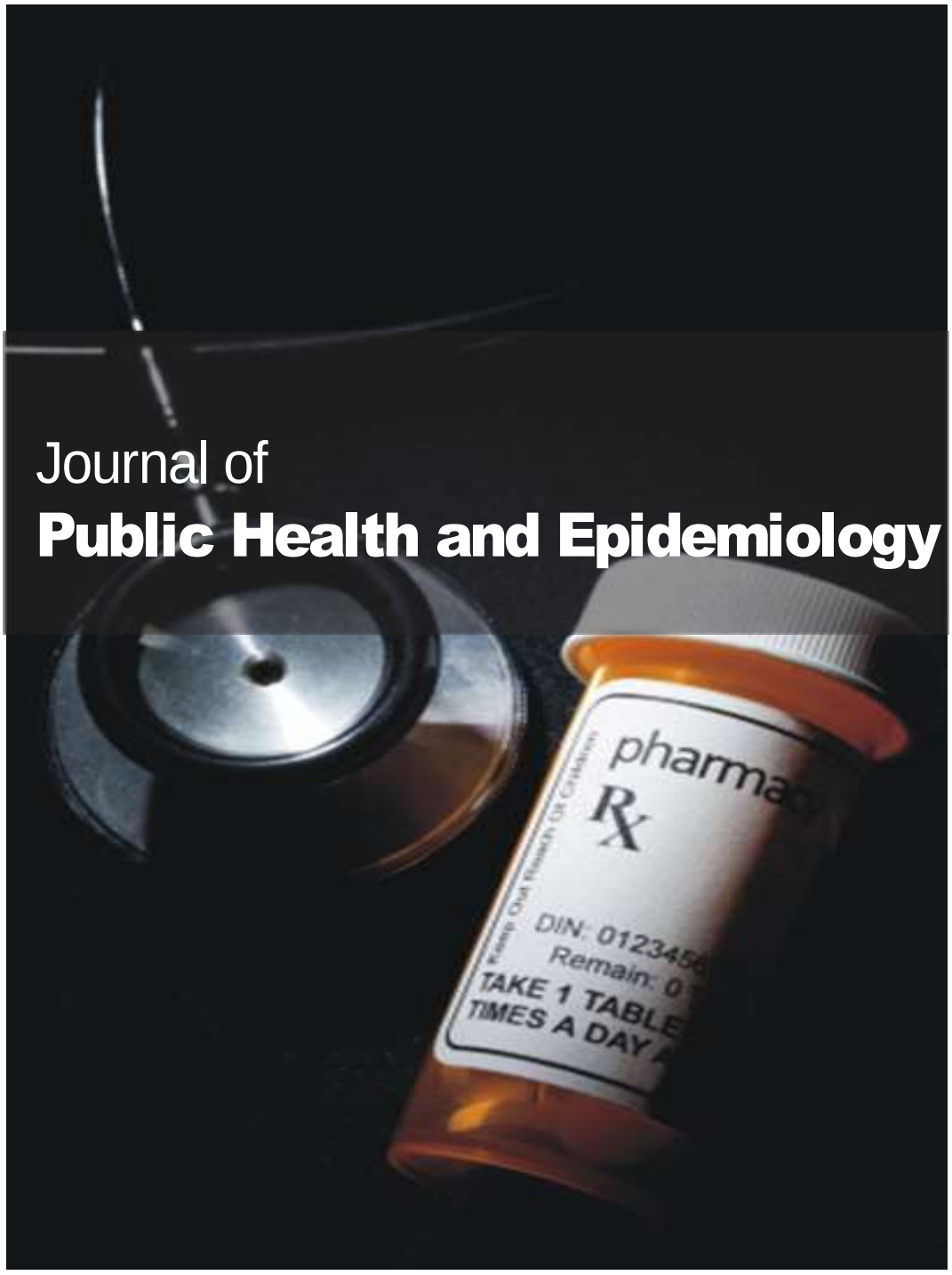

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Journal of Public Health and Epidemiology

Full Length Research Paper

Factors affecting implementation of integrated community case management of childhood illnesses in South West Shoa Zone, Central Ethiopia

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Ethiopia, this proven strategy is being implemented in selected districts of the regions but there are no sufficient evidences to decision-makers for improvement interventions. Cross-sectional study was conducted by including all functional health posts and HEWs from four randomly selected districts. Pre-tested structured questionnaires and observation checklist were used to collect data. Data was entered into Epi data version.3.1 and transported to SPSS v.21.0 for analysis. Bivariate and multiple binary logistic regression analysis were used to identify the determinants. 60 (60.6%) of the Health post were in good implementation category. 24 (15.3%) had only one HEW each, 26.8% had recommended three HEWs and 16 (16.2%) had no. HEWs mentored quarterly had three times better implementation (AOR) 3.14, 95% CI [1.65-6.52]). The services were less likely implemented in kebelles lacking any CHAs (AOR 0.47, 95% CI [0.19-0.83]). Health posts which were serving community for greater than eight hours per day had five times better implementation (AOR 5.33, 95% CI [2.58-9.33]). The study revealed that there is still a long way to go for better implementation of the program. Improving the program implementation needs a coordinated effort of all stakeholders at different levels. Nationally, preparing a system-wide approach towards resolving multifaceted challenges facing the programs will help attain the sectorial mission of reducing child mortality.

Key words: Integrated community case management, health extension workers, community health agents.

INTRODUCTION

Integrated Community Case Management (ICCM) is a community care strategy which seeks to extend case management of childhood illness beyond health facilities to the community level so that more children have access to lifesaving treatments (Unicef, 2012). It is provided by community health workers at the lowest level health units or in the community during home visits. Delivery of care through community health workers (CHWs) can increase

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coverage of specific treatments and lead to substantial reductions in child mortality (Unicef, 2012). The ICCM package can differ based on national contexts, but most commonly includes diarrhea, pneumonia and malaria diagnosis and treatment. For these reasons, various NGOs like UNICEF, WHO, USAID and other partners are funding and technically supporting the ICCM strategy to train, supply and supervise front-line workers to treat children for diarrhea, pneumonia and malaria, using Oral Rehydration Salt (ORS) and zinc, oral antibiotics, and artemisin based combination therapy (ACT), respectively. Their target is mainly toward low income and malaria-affected countries (Unicef Ethiopia, 2011).

In 2010, 12 countries in sub-Saharan Africa were implementing Community Case Management (CCM) of the three illnesses and only 6 of them implemented in at least 50% of their country's districts (Hamer, 2011). Despite the current admirable accomplishment, progress must be accelerated and sustained to meet the Millennium Development Goal (MDG) 4 deadline in all parts of the world. If the current trends continue, the world will not meet the MDG target until 2026. The 2013 data of WHO shows that sub-Saharan Africa shoulders the world's highest under-five mortality rates. All 12 countries with under-five mortality rates of 100 or more deaths per 1,000 live births are in sub-Saharan Africa. On average, 1 out of every 11 children born in sub-Saharan Africa dies before age five. This is nearly 15 times the average rate (1 in 159) in high-income countries (Who-Cherg, 2013).

In 2013, about half of global under-five deaths occurred in sub-Saharan Africa and 32% in South Asia. Among the top 26 countries shouldering the burden of 80% of the world's under-five deaths, 19 are in sub-Saharan Africa (Unicef, 2015). Though annual child deaths from pneumonia decreased by 44% from 2000 to 2013 and from 1.7 million to 940,000; it remained the leading infectious cause of death among children under-five, killing nearly 2,600 children a day (Faijer, 2014). In 2013, it killed about 940,000 children with majority of victims are under two years. Diarrhea next to pneumonia also accounts for 9% of all deaths among children under age 5 worldwide. In 2013, this translated into 1,600 young children dying each day, or about 580,000 children a year, most of them living in South Asia and sub-Saharan Africa (Unicef, 2015). Malaria every day in 2013 killed more than 1,200 children under age 5, a total of over 450,000 children a year. Most of these deaths occurred in sub-Saharan Africa (Unicef, 2015).

Ethiopia is one of the 10 countries with the highest numbers of neonatal deaths; it is currently ranked fifth in the world as having the greatest potential to save maternal, perinatal and neonatal lives by 2025. Despite this, global movements like "A Promise Renewed" (APR) has helped galvanize a national response in Ethiopia to address existing challenges and disparities that threaten the lives of children to reach the most vulnerable and marginalized children with vital life-saving interventions, over 205,000 children still do not reach their fifth birthday (APR, WHO, 2014) . Nearly 43% or 88,000 of the 205,000 children under-five are dying each year mostly from preventable or easily treatable diseases in their first 28 days (Bhutta et al., 2009).

In Ethiopia, of the 34,000 female health extension workers trained and deployed to the community, two were assigned to one kebelle of 5000 residents. In 2010, after the national health policy adopted ICCM, its implementation started in selected areas of four regions (Oromia, Amhara, SNNPR and Tigray) and is currently on the stage of preparation for expansion to other areas.

According to 2012 Unicef and National Report (FMOH, 2012; Unicef Report, 2012), 11,754 HEWs were trained in ICCM and deployed to 66 of 254 districts. The program allowed HEWs not only to manage pneumonia, diarrhea, malaria, malnutrition, measles, ear infection, and anemia but also provided 6-day training on strengthened supervision, improved supply chain management for essential commodities, and enhanced monitoring and evaluation (FMOH, 2012; Unicef, 2012, 2015). Though Ethiopia has reached MDG target of 68 CMR per 1000 live births in 2012, it should sustain the achievements and shift to global future child mortality reduction target of bringing it down to 20 per 1000 live births. With this, strengthening current tools that fueled the achievements like ICCM through scientific investigation of the constraints and sharing best experiences during scale up helps the country deliver accessible, affordable, and quality service. As Ethiopia, there is no research done on factors hindering the implementation of the program at community or health post level by health extension workers that could help identify major challenges and propose for possible obstacles for further expansion in other parts of the country.

Therefore, the objective of the current study was to assess factors affecting the implementation of ICCM at community level in relation to access to service, monitoring and evaluation, reliable supply of ICCM commodities and HEWs related factors. The other possible influencers could be addressed in further studies.

METHODOLOGY

Study area and period

The study was conducted in South West Shoa Zone of Ethiopia, located at 116 km at south west of the capital Addis Ababa from 16/03/2015 to 30/03/2015. It comprises 12 rural districts with a total population of 1,110,011 residing in 268 villages (National Census, 2010). There were two functional hospitals (One non-governmental and one governmental, excluding three under construction) and a total of 54 health centers coordinating 253 health posts under them.

Study design

A cross sectional study design that used a quantitative data collection method was employed.

Source and study population

All ICCM-trained HEWs (157) working, in the four selected districts of the zone were included. The response rate was 96% excluding five (two ill and three on maternity leave) during the study.

Sampling technique

The survey was conducted in four randomly (lottery method) selected districts that had 99 functional health posts and total of 163 health extension workers. All functional health posts and all trained health extension workers (157) were included in the study. Five HEWs were excluded because two were ill and three were on maternity leave during the time of study.

The survey instruments were adapted from the WHO Health Facility Survey tool, a survey of Health Surveillance Assistants in Malawi (Chandani, 2014; Luis et al., 2013) and CCM Global Indicators (WHO, 2014).

This structured questionnaire was translated into a working language 'Afaan Oromoo' and Checklist for availability of ICCM supplies.

Data management and analysis

Eight data collectors who were fluent in Afan Oromo collected the data. Observations of health post were conducted for availability of ICCM supplies by checklist. All sampled health post's supply record, sick baby registration books, annual plan, past one year ICCM reports and supervision feedback were reviewed.

Data was edited, coded and entered into Epinfo data version 3.1 and exported to SPSS 21.0 statistical software for analysis. Descriptive statistics such as mean, median, standard deviation (SD) and percent were used to present the result. Implementation status of ICCM was dichotomized as good for coverage greater than or equal to 35% and poor for lower service coverage. Bivariate binary logistic regression analysis using stepwise elimination approach and variable at p value of less than 0.25 became candidate for multivariate binary logistic regression analysis. Presences of multi-co-linearity were investigated using correlation coefficient between each pair of independent variables and correlated variables were excluded. Conclusions were made using P value < 0.05 and AOR with 95% CI to measure independent effect of factors on the implementation status of ICCM services package. The model was found fit with Hosmer Lemeshow value of 0.71.

Data collectors were trained for two days. The tool was pretested in four health post of neighboring district (Saden Soddo) and little omission were made. Ethical clearance was first obtained from College of Health Sciences, Jimma University, Ethics Clearance Committee, Regional, Zonal and Woreda Health Offices.

Variables

The outcome variables of measurement were implementation status of ICCM of childhood illness services (annual percentage coverage). The independent variables were availability and accessibility of services (power and water source, hours of open health posts, number of CHAs per Kebelle, sessions of community sensitization), monitoring and supervision related variables (HEWs mentored onsite, reporting documentation), supply related variables (availability of ICCM drugs and supplies), health extension workers related factors (socio demography of HEWs, place of residence of HEWs, perceived benefit of ICCM, session of meetings HEWs participate per week, irregular working hours).

RESULTS

Socio-demographic characteristics of the study participants

A total of 157 health extension workers deployed in 99 health posts from four districts were included in the study. Five HEWs were excluded from 163; because two were ill and three were on maternity leave during the time of study. Total of 99 health posts were visited and assessed for supply and record checklist during an interview.

The ages of the respondents ranged from 22 to 32, with a mean age of 26.1 years and SD 2.32. 135 (84.4%) of them were married. The work experience of health extension workers ranged from 2 to 8 years with mean and SD of 4.5 and 1.40 years, respectively. More than 83% of HEWs reside in their respective villages. 44.6% stated that the initiation of the ICCM had increased their acceptance from the community (Table 1).

All health extension workers were asked for any motivation or promotions provided to them from either of community and government. For 16 (16.16%) of health posts, the community constructed shelter to live in the kebelle, for 20 (20.2%) the government in collaboration with Woreda health office built the house for them; but 63 (63.6%) had no residential support with some transport from other kebelles.

Since recent time (two years), there was 11 (7%) health extension workers turnover from the health posts under study. In regard with educational opportunity, 11 HEWs meaning 7% have got educational opportunity by government from the surveyed health posts.

Service access barriers

In 83 (83.8%) of the total health posts, there were two or more HEWs in each, whereas in 16 (16.2%), there was only a single health extension in each.

In addition, only 27 (27.3%) of the health posts had recommended community health army (CHA) of greater than or equal to three persons per kebelles with 26 (26.3%) lacking any assigned CHAs. Concerning infrastructure coverage, 96 (97%) get their water source from protected source (hand pipe 75 (75.8%), pulling wheel 21 (21.2%), and 3 (3%) fetch lake water). Additionally, 17.2% of the total health posts have access to electric power for night time services, while the 82.8% are in use of kerosene or fuel.

Monitoring of ICCM services

The record review result revealed that 66 (66.7%) of health posts had copy of all ICCM reports for the past one year. But amazingly, in all of the available reports, there was no LQAS done. The study reported that 39 (39.4%) of the health posts received supportive

Table 1. Socio-demography characteristics and perceived benefits of HEWs, southwest Shoa Zone, Ethiopia, May 2015.

HEWs related variable	Frequency (n=157)	Percent (n=157)
Age	Min-22 years, Max-32 years, Mean-6.06 years, SD±2.322	
Marital status		
Married	135	84.4
Single	22	15.6
Work experience	Min-2 years, Max-8 years, Mean-4.54 years, SD±1.403	
Place of residence		
Within kebelle	130	83
From other	27	17
Perceived benefit of ICCM		
Professional advance	70	44.6
Community acceptance	74	47.1
No benefit	13	8.3

*within kebelle, *lives where they work, *other *nearby kebelle of town.

supervision on ICCM that included review of registration and observation of case management, while the remaining 60 (60.6%) were not reached by either of the Woreda and Health center ICCM focal persons. Few health extension workers (2.6%) had gone to their catchment health center for professional advices and practical attachment to build their service capacity, while others had no hint for it. All of the health extension workers have participated in review meeting at district level at least twice per the last one year. However, written or documented feedback from their district or health center was found in only 63 (63.6%) of the health posts.

Supply related factors

The supply related factors affecting the implementation of ICCM were identified in three categories as medical and diagnostic supplies, non-medical supplies and storage areas (Table 2).

From the overall 99 health posts observed, 87.93% had medical and diagnostic supplies, 52.5% of them had rodent free store house, 60.6% had adequate space of storage and 61.4% had non-medical supplies including stationary, registration books and forms (Table 3).

All variables showing significant value to affect implementation status of ICCM service delivery up on bivariate binary logistic regression analysis become candidate for multiple binary logistic regression analysis. Thus, number of community health agents per kebelle, average hours the HEWs work per day, documentation of reports and other files, onsite mentoring of HEWs, and community mobilization meetings were statistically significant upon both bivariate and multiple bivariate logistic regression analysis. Summary of the multivariate binary logistic regression analysis is discussed below (Table 4). Implementation of ICCM services were twice more likely implemented (adjusted odd ratio (AOR) 2.21, 95% CI [1.27-5.41]) in kebelles where communities were mobilized or had meeting for at least once per month than those who had not mobilized. The ICCM service coverage was 48% less likely implemented in kebelles possessing less than the standard three CHAs than those possessing greater than or equal to three CHAs (AOR 0.624, 95% CI [0.114-0.8777]). Kebelles lacking any assigned CHAs 53% less likely implemented the program than those possessing the recommended three per kebelle (AOR 0.47, 95% CI [0.19-0.83]). Health posts which were serving community for greater than 8 h per day had five times implementation of ICCM services than those that only open for customary 8 h per day (AOR 5.33, 95% CI [2.58-9.33]).

Health extension workers who were mentored onsite quarterly in the past one year (including register reviews and case observations) three times more likely implemented the services three fold than those who were not mentored in the previous one year (AOR 3.14, 95% CI[1.65-6.52]). Health posts with improper documentation of reports and documents less likely implemented the program (AOR 0.041, 95% CI [0.008-0.216]).

DISCUSSION

The study brought about two major findings. The first was level of ICCM services implementation in the health

Table 2. Availability of ICCM medical and diagnostic supplies in the health posts of south west shoa zone, Ethiopia, May 2015.

S/N	Item	Woredas								Zonal	
		Bacho (n=21)		Goro (n=18)		R/Wolisso (n=36)		Wonchi (n=24)			
		No	%	No	%	No	%	No	%	No	%
Medical supplies	Amoxicillin	14	66.6	12	57.1	23	63.9	11	45.8	60	60.6
	Cotrimoxazole	18	85.6	17	80.9	29	80.6	21	87.5	85	85.9
	Zinc for diarrhoea	13	61.9	13	61.9	22	61.1	13	54.2	61	61.6
	Oral Rehydration Salts	18	85.7	15	71.4	21	58.3	23	95.8	77	77.8
	Artemether-Lumefantrine for malaria	15	71.4	14	66.6	25	69.4	14	58.3	68	68.7
	RDT	20	95.2	16	76.2	27	75.0	19	79.2	82	82.8
	Rectal Artesunate	8	38.1	5	23.8	14	38.9	6	25.0	33	33.3
	Baby Paracetamol	11	52.4	12	57.1	25	69.4	16	66.7	64	64.6

*n, *Total number of health posts in the district, *Artemeter-lumifantrine, *Coartem®.

Table 3. Availability of ICCM and non-medical supplies in the health posts of south west Shoa zone, Ethiopia, May 2015.

Item	Bacho		Goro		R. Wolliso		Wonchi		Zonal	
	No	%	No	%	No	%	No	%	No	%
MUAC tape	14	66.6	18	85.7	31	86.1	21	87.5	84	84.8
Newborn weighing scale	20	95.2	16	76.2	33	91.6	24	100	93	93.9
Functional thermometer	13	61.9	14	66.6	21	58.3	20	83.3	68	68.7
Respiratory counter	3	14.3	7	33.3	12	33.3	15	62.5	37	37.4
Free of Rodents	9	42.9	12	57.1	15	41.7	16	66.7	52	52.5

*MUAC: Mid upper arm circumference tape.

posts; where 60.6% (61) of them were above or mean coverage of 35%. It also extracted factors affecting the implementation status of the program in various aspects which were not addressed and never investigated in the study area. The reason is that the survey of the factors affecting implementation of ICCM was not done in any part of the country and consequently the findings were majorly compared with the neighboring countries with similar implementation and service trend findings. Inadequacy of community health agents (CHAs) had a profound effect on implementation status of the program.

Currently, minimum of three CHAs are expected per every kebelle as policy guide but only 16.2% of kebelle had three and more CHAs and even 26.3% lacking any CHA in their kebelles. Hence, the lower their number in the community the lesser the community sensitized about the services and lower service coverage. This is consistent with the qualitative study conducted in rural Kenya, which also identified CHWs un-availability in the villages together with low community involvement limited provision of the ICCM services (Simon, 2012).

On the other hand, demand generation activities that were measured by session of community mobilization in form of meeting per month had greatly affected the implementation status of the program. Implementation or service coverage

Table 4. Variables found to have independent effect on implementation status of ICCM in health posts of south west Shoa zone, Ethiopia, May 2015.

Variable	Frequency	%	Implementation status		P-value	COR (95% CI)	AOR (95% CI)
			Good	Poor			
Availability of ICCM reports of 1 year back							
Missing reports	25	25.3	3	22	0.00	0.02 [0.006-0.07]	0.041 [0.008-0.22]
All available	74	74.7	69	5	-	1	1
Onsite mentoring of HEWs in previous 3 months							
At least once	66	42	48	18	0.009	5.02 [2.38-10.62]	3.144 [1.65-6.52]
Not mentored at least once	91	58	12	79	-	1	1
Number of CHAs per Kebelle							
Greater or equal to 3 CHAs	16	16.1	11	5	0.03	1	1
Less than 3 CHAs	57	57.7	23	34	0.017	0.71 [0.21-0.965]	0.624 [0.114-0.877]
No CHA	26	26.2	2	22	0.034	0.592 [0.26-0.92]	0.473 [0.19-0.833]
Community mobilization (Meetings)							
At least once per month	62	39.5	64	18	0.021	3.472 [2.69-8.26]	2.21[1.27-5.46]
None	95	60.5	43	42	-	1	1
Average hours HEWs work per day							
Greater or equal 8 h	71	45.2	67	4	0.00	8.97 [3.73-14.49]	5.33 [2.58-9.33]
Less than 8 h	86	54.8	56	30	-	1	1

COR: Crude odd ratio.

were twice more likely higher in kebelles where communities were mobilized for at least once per month. This was also convergent with the study conducted in rural Zambia; which concluded that regular community sensitization was crucial for optimal functioning of ICCM services and health service coverage as a whole (Seidenberg et al., 2012). Additionally, another study conducted in 32 health facilities of Malawi, Mali and Zambia showed that low awareness among the beneficiaries of the service affected the ICCM implementation (Nsona et al., 2012).

This study showed that timely onsite mentoring of health extension workers that included review of registration and observation of case management had greater impact on level of ICCM service coverage. Health posts which received onsite mentoring as per the standard of at least once in a quarter had better implementation of the program which was found significant after multivariate regression analysis (AOR 3.144, 95% CI [1.65-6.52]). The studies done in rural Uganda also found that supervision were less than optimal. Less than 40% of HSAs included in the sample had received an ICCM-specific supervisory visit in the previous 3 months, and only 16% received a visit that included clinical observation of case management (Rutebemberwa et al., 2012). This is almost the same result with this study outcome of 42.04% HEWs mentored, of which only 16.61% were reported as case observation.

Health extension workers participated in the study were all trained on the program and working for at least two years. Few health extension workers (2.6%) had gone to their catchment's health center for professional advices and practical attachment; while others had neither hint for it nor linkage with their health center.

Absence of using report quality assessment techniques like lot quality assurance system (LQAS) at health post were also common problem as observed in UNICEF's 2012 systematic review report of high burden countries including Ethiopia (Unicef, 2012). Consequently, improving quality

of reports and feasible program monitoring become complicated.

The study showed that majority (87.1%) of the health posts had adequate essential medical supplies though it vary within and among woredas but non-medical supplies was scarce in most of them. In contrast, another study conducted in Malawi reported 47% of CHWs had standard essential ICCM commodities (Health et al., 2014). Storage room was commonly not adequate; there was no separation of commodities and rodents sometimes eat up the supplies.

There was limited understanding of forecasting for future demand by HEWs and frequent stock out was common that is linked with untimely requisition of supplies by them and irregular provision of some commodities by health centers and woredas. More than 76% of the health posts receive their supplies from resupply point by their own while others receive through focal persons and commonly assigned professional to the kebelles. The base line study conducted in Rwanda showed that frequent stock out of supplies related with limited capacity of CHWs (Chandani et al., 2011).

Conclusions

Despite the overall coverage, ICCM services in the health posts were above mean of 35%, which reflects there is still long way towards better implementation of the program. Absence of residential house for HEWs in all kebelles minimized the time they spent at health posts to provide services especially to those hard to reach areas. Continuous onsite mentoring of review of registration and observation of case management needs were not accustomed. On the other hand, supervision conducted by health center had no written feedback complicating the follow-up. Inadequacy of standard two HEWs and three CHAs per each kebelle were major obstacle for better functionality of the services and sensitizing community towards the services. Improper documentation of data and absence of monthly assessment of report quality were also tackle of continuous improvement. Unreliable supplies of medical and non-medical supplies were convoluted and forecasting of future demand and safe storage space are underlying cause for service interruption.

Improvement of the ICCM services implementation needs utmost intervention and strive of all stakeholders starting from health extension workers to regional and policy makers. Nationally, preparing a system wise approach towards resolving multifaceted challenges facing the health care programs will help attain the sectorial mission.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Factors associated with sputum conversion in a multinational population of tuberculosis patients

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Various factors had been related with sputum conversion in tuberculosis patients, which constituted an essential indicator of the effectiveness of treatment and the infectivity of patients. The study evaluates the factors related with smear sputum conversion in pulmonary tuberculosis. A retrospective cohort study of newly diagnosed pulmonary tuberculosis was performed from January 2013 to September 2016 in Cuban Hospital (Qatar). The data collected includes: demographics, clinical, laboratory test and chest X ray. The Kaplan Meier method was used to calculate the survival time to sputum conversion. The log-rank or Wilcoxon tests and Cox regression was used to identify the variable related with sputum conversion. In 323 patients, the median time of sputum conversion was 23 days, with sputum conversion at 2 months of treatment in 82.1% of patients. In older patients (39-86 years old), the probability of conversion was 31% lower when compared with patients 16-24 years old (RR 0.69, 95% CI, 0.52-0.90). The low figures of serum albumin (0.71, 0.56-0.90) and absolute lymphocyte count (0.64, 0.48-0.85) were associated with a decreased probability of sputum conversion, and the lower probabilities of conversion were found with the increased number of bacilli; among 1501 to 2000 (0.39, 0.23-0.66), and 2001 to 5000 (0.40, 0.28-0.58). The factors associated with delayed smear sputum conversion in tuberculosis patients were identified. Additional studies are required to evaluate the influence of nutritional status on TB diagnosis and the poor glycemic control in conversion times as well as interventions to modify these factors to improve the patient outcomes.

Key words: Infectious tuberculosis, sputum conversion, factors associated, Qatar.

INTRODUCTION

The incidence of tuberculosis (TB) in Qatar is related to the expatriate population, mainly from countries with high TB burden (Nepal, India, Bangladesh Philippines), with few cases from the native population (Hamad Medical Corporation (HMC), 2012). The national program of TB guides the provision of care in line with the national and regional priority for its prevention and control (Hamad Medical Corporation (HMC), 2011). The sputum smear and culture conversion constitute an essential indicator of the effectiveness of treatment and the infectivity of

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patients. The conversion time has been related with multiple factors including nutritional factors such as anemia, magnesium level, and body mass index (Bhargava et al., 2013; Putri et al., 2014; Agrawal, 2017), history of diabetes mellitus and poor metabolic control (Mi et al., 2013; Nakamura et al., 2014; Sharif, 2015), bacillary load in the diagnosis (D'Souza et al., 2018; Kanda et al., 2015; Gunda, 2017), diagnosis delay and radiological lesions suggestive of extensive damage or cavitation (Mi et al., 2013; Nakamura et al., 2014; Unsematham and Kateruttanakul, 2013; Visser et al., 2012) and drug resistance (Kim et al., 2016; Holtz et al., 2006; Kurbatova et al., 2012). A previously published paper identifies the bacillary load in the diagnosis as the main factor related with sputum conversion in patients attended to in a community hospital in Qatar, but the study is limited by the number of patients studied (64 patients) (Guanche et al., 2016). More than 700 patients are annually reported in the country (WHO, 2017).

The National Program of TB recommends the provision of free healthcare services to all TB patients regardless of nationally, inclusive of diagnosis, treatment and follow-up. Patients with infectious TB are admitted to hospital facilities until 2 consecutive negative results of sputum smear are obtained (Hamad Medical Corporation (HMC), 2011). After hospital discharge, the patients are followed in an infectious disease clinic until completion of treatment. The Cuban Hospital provide secondary healthcare services to a community located in Western Qatar and receive patients with TB from local areas or transfer from other facilities due to beds crisis.

This study was conducted to evaluate the factors related to smear sputum conversion in patients with pulmonary TB attended to in a community hospital in Western Qatar.

METHODS

A retrospective cohort study was performed. All patients admitted to the Cuban Hospital (Qatar) newly diagnosed of pulmonary TB and positive smear sputum, from January 2013 to September 2016, were studied. All data were collected from patients' medical records. The variables were: age, sex, delay in diagnosis (time between first symptoms and diagnosis), active smoking, history of previous TB and diabetes mellitus, and the maximum number of bacilli found at the time of the diagnosis. Laboratory results were classified as "normal" or "low" according to the following reference values: Absolute lymphocyte count 1000-3000 / µl; hemoglobin, men 13 - 17 g/L, women 12 - 15 g/L; platelet count 150 - 400 × 10^3; serum albumin, male 32 - 47 g/L, female 29 - 42 g/L; total proteins 60-80 g/L,; serum creatinine, men 71 - 123 µmol/L, women 53 - 97 µmol/L and serum iron, men 8.1 - 28.6 µmol / L, and women 5.4 - 28.6 µmol/L. The presence of bilateral lesions, pleural effusion, consolidation and cavities were identified with chest X-ray. The body mass index was calculated from the first data recorded at admission, using the formula weight (Kg)) divided by size (m^2).

All patients were treated with a standard regimen of rifampicin, isoniazid, pyrazinamide, and ethambutol, except for patients who had resistance to rifampicin, which was identified through Gene Xpert PCR/RIF. The date of onset of treatment and the dates of sputum collection were recorded. The sputum conversion was considered when two consecutive sputum smears became negative. The date of the first negative result was considered the date of sputum conversion. The time period between initiation of treatment and sputum conversion was the primary response variable (SputumConversion Time). All the information was collected from the patient´s files. The study was approved by the hospital board. This retrospective study meets the criteria for exemption from ethics review.

Statistics

All the information was processed in SPSS version 22.0. The initial descriptions of the demographic and clinical characteristics were calculated by the absolute and relative frequencies (percentages). The Kaplan Meier method was used to calculate the survival time to sputum conversion. The starting date of the TB treatment was considered the beginning of the follow-up in each subject. The date of conversion was taken as the event or terminal condition. Individuals were followed periodically, by performing sputum tests every 2 weeks, and there were no incomplete follow-up times.

Initially, to identify the variables related to sputum conversion, the survival curves obtained were compared between the categories of the variables using log-rank or Wilcoxon tests, depending on the existence of proportionality between them. Subsequently, to evaluate the pure effect of each of the variables in the sputum conversion time, the Cox regression was used. The model included the following variables: Age, history of diabetes mellitus, the maximum number of bacilli, hemoglobin, total serum protein, serum albumin, absolute lymphocyte counts, serum iron, and pulmonary cavitation, as independent variables, and the time to sputum conversion, as the dependent variable. For all hypothesis tests that were performed, a significance level $\alpha = 0.05$ was set.

RESULTS

From January 2013 to September 2016, a total of 323 patients with a diagnosis of pulmonary TB were admitted. Table 1 shows the demographic and clinical characteristics of these patients. As it can be seen, significant percentages (73.1%) were below 39 years of age. The mean age was 32.8 years (standard deviation 11.5 years). Patients were predominantly male (82.7%), non-smokers (86.9%) and without previous history of pulmonary TB (98.1%). In addition, 77 patients (23.9%) had diabetes mellitus and 59.5% had 30 days or more of delay in diagnosis. Figure 1 show the survival time to patient sputum conversion, estimated by the Kaplan Meier method. The median time was 23 days (minimum 3 days; maximum 117 days), with sputum conversion at 2 months of treatment in 82.1% of patients.

When the survival curves were compared to the sputum conversion between the categories of demographic and clinical variables, statistically significant differences were found for age ($p = 0.03$), the presence of diabetes mellitus ($p = 0.03$) and the maximum number of bacilli ($p = 0.00$). For ages, the differences were in the group of 39-86 years of age compared with patients in the 16-24 years of age group ($p = 0.03$) and 25-28 years of age group ($p = 0.01$). For the number of bacilli, the differences were found when comparing the category of smaller number of bacilli (3-500 bacilli), with the remaining

Table 1. Baseline demographic and clinical characteristics of TB patients studied.

Characteristic	Number	Percentage
Age (years)		
16-24	4	24.8
25-28	74	22.9
29-38	82	25.4
39-86	87	26.9
Sex		
Male	267	82.7
Female	56	17.3
Smoking		
Smoker	42	13,1
No smoker	279	86.9
Previous tuberculosis		
Yes	6	1.9
No	316	98.1
Diabetes Mellitus		
Yes	77	23.9
No	245	76.1
Diagnostic delay (days)		
2-14	51	17.3
15-29	68	23.1
30-59	72	24.5
60-365	103	35.0

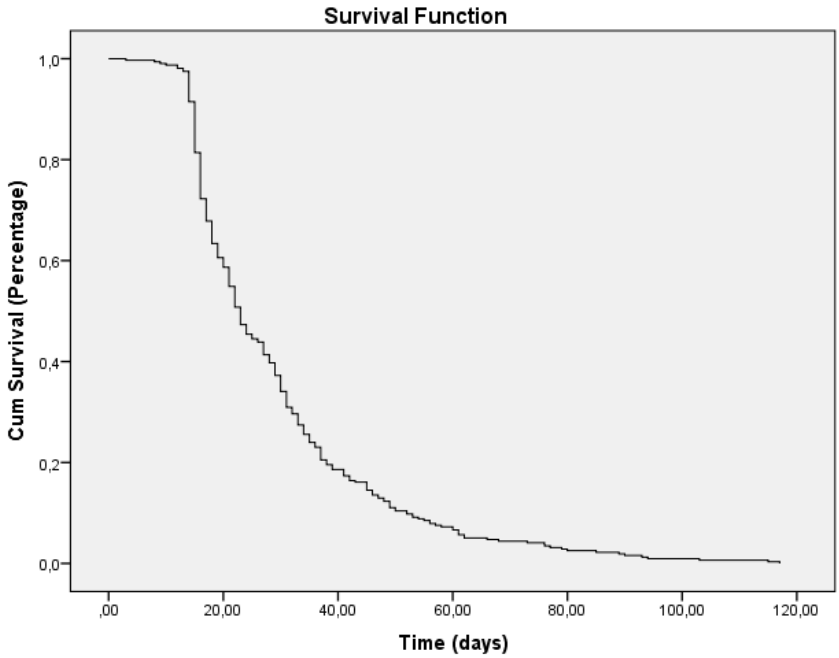

Figure 1. Kaplan-Meier survival curve of time to smear conversion.

Table 2. Survival time to smear conversion according to demographic and clinical characteristics.

Characteristic	n	Time						
		2 Weeks	4 Weeks	6 Weeks	8 Weeks	12 Weeks	18 Weeks	Med*
Age (years)								
16-24	78	97.4 (1.8)	38.5 (5.5)	16.7 (4.2)	9.0 (3.2)	2.6 (1.8)	0.0 (0.0)	19
25-28	73	90.4 (3.4)	34.2 (5.6)	13.7 (4.0)	1.4 (1.4)	0.0 (0.0)	0.0 (0.0)	20
29-38	82	96.3 (2.1)	40.2 (5.4)	15.9 (4.0)	6.1 (2.6)	0.0 (0.0)	0.0 (0.0)	23
39-86	84	92.9 (2.8)	45.2 (5.4)	19.0 (4.3)	14.3 (3.8)	7.1 (2.8)	0.0 (0.0)	27
Sex								
Male	262	93.1 (1.6)	41.6 (3.0)	17.6 (2.4)	8.4 (1.7)	3.1 (1.1)	0.0 (0.0)	23
Female	55	83.6 (5.0)	30.9 (6.2)	27.3 (6.0)	5.5 (3.1)	0.0 (0.0)	0.0 (0.0)	19
Smoking								
Smoker	42	9.29 (4.0)	33.3 (7.3)	16.7 (5.8)	14.3 (5.4)	2.4 (2.4)	0.0 (0.0)	21
No smoker	274	91.2 (1.7)	40.9 (3.0)	16.4 (2.2)	6.9 (1.5)	2.6 (1.0)	0.0 (0.0)	23
Diabetes Mellitus								
Yes	75	94.7 (2.6)	50.7 (5.8)	44.0 (5.7)	25.3 (5.0)	2.7 (1.9)	0.0 (0.0)	29
No	241	90.5 (1.9)	36.5 (3.1)	15.8 (2.3)	8.7 (1.8)	2.5 (1.0)	0.0 (0.0)	22
Diagnostic delay (days)								
2-14	49	91.8 (3.9)	36.7 (6.9)	18.4 (5.5)	6.1 (3.4)	4.1 (2.8)	0.0 (0.0)	23
15-29	66	81.8 (4.7)	33.3 (5.8)	12.1 (4.0)	4.5 (2.6)	0.0 (0.0)	0.0 (0.0)	22
30-59	71	97.2 (2.0)	39.4 (5.8)	12.7 (3.9)	5.6 (2.7)	1.4 (1.4)	0.0 (0.0)	23
60-365	103	92.2 (2.6)	47.6 (4.9)	23.3 (4.2)	14.6 (3.5)	2.9 (1.7)	0.0 (0.0)	27
Bacilli (maximum number)								
3-500	200	88.5 (2.3)	25.5 (3.1)	8.0 (1.9)	2.0 (1.0)	1.0 (0.7)	0.0 (0.0)	19
501-1000	41	95.1 (3.4)	61.0 (7.6)	24.4 (6.7)	9.8 (4.6)	4.9 (3.4)	0.0 (0.0)	31
1001-1500	21	95.2 (4.6)	52.4 (10.9)	28.6 (9.9)	14.3 (7.6)	4.8 (4.6)	0.0 (0.0)	29
1501-2000	16	100 (0.0)	75.0 (10.8)	43.8 (12.4)	25.0 (10.8)	0.0 (0.0)	0.0 (0.0)	41
2001-5000	39	97.4 (2.5)	69.2 (7.4)	33.3 (7.5)	25.6 (7.0)	7.7 (4.3)	0.0 (0.0)	36

Data are survival percentage (standard deviation), unless otherwise indicated. Med*, Median (days).

categories ($p = 0.00$ in all cases). It can be seen from Table 2 that the median bacilli survival time for patients 39-86 years of age (27 days) was higher when compared to patients 25-28 years old (20 days) and patients 16-24 years of age (median of 19 days). The survival time was higher for diabetic patients (29 days vs. 22 days for non-diabetic patients), and lower for patients with 3-500 bacilli (19 days), when compared with the remaining groups of patients according to the maximum bacilli number; the group with the lowest median survival time was observed in patients with 1001-1500 bacilli at the time of diagnosis (29 days).

Among the categories of the variables body mass index ($p = 0.92$), serum creatinine ($p = 0.77$) and platelet count ($p = 0.26$), there were no statistically significant differences when comparing survival curves up to the sputum conversion (Table 3). For the other nutritional indicators, statistically significant differences were found when comparing the survival curves between categories ($p < 0.05$ in all comparisons). The differences between medians of survival time were higher when the nutritional factor was low. The greatest differences were found for serum albumin, absolute lymphocyte counts, and serum iron. In the first and third indicator, when the nutritional indicator was normal, the median survival time was 19 and 29 days when the figures were low. In relation to the lymphocyte count, there was a median survival time of 21 days in patients with normal figures and 31 days when the figures were low.

Regarding the radiological findings, statistically significant differences were found when comparing the survival curves for the variable cavitation ($p = 0.01$). It can be seen that among the median of the survival times for the categories of the consolidation, the differences were similar to those found between the categories of the cavitation, without statistically significant differences ($p = 0.32$). Among the median survival times of the categories for the remaining variables, the differences were much

Table 3. Survival time to smear conversion according to nutritional factors and platelet.

Factors and platelet	n	Time						
		2 Weeks	4 Weeks	6 Weeks	8 Weeks	12 Weeks	18 Weeks	Med*
BMI (Kg/m^2)								
< 18,5	94	89.4 (3.2)	38.3 (5.0)	18.1 (4.0)	11.7 (3.3)	2.1 (1.5)	0.0 (0.0)	22
≥ 18,5	220	92.3 (1.8)	39.5 (3.3)	15.5 (2.4)	6.4 (1.6)	2.7 (1.1)	0.0 (0.0)	23
Haemoglobin level (g/L)								
Low	114	89.5 (2.9)	44.7 (4.7)	21.9 (3.9)	14.9 (3.3)	4.4 (1.9)	0.0 (0.0)	27
Normal	201	92.5 (1.9)	37.3 (3.4)	13.4 (2.4)	4.0 (1.4)	1.5 (0.9)	0.0 (0.0)	22
Serum creatinine (µmol/L)								
Low	120	91.7 (2.5)	40.0 (4.5)	17.5 (3.5)	10.0 (2.7)	2.5 (1.4)	0.0 (0.0)	22
Normal	189	91 (2.1)	39.7 (3.6)	15.9 (2.7)	6.9 (1.8)	2.6 (1.2)	0.0 (0.0)	23
Serum protein (g/L)								
Low	47	93.6 (3.6)	53.2 (7.3)	25.5 (6.4)	10.6 (4.5)	4.3 (2.9)	0.0 (0.0)	30
Normal	255	90.6 (1.8)	36.0 (3.0)	14.5 (2.2)	7.5 (1.6)	2.4 (0.9)	0.0 (0.0)	22
Serum albumin (g/L)								
Low	142	93.7 (2.0)	52.1 (4.2)	21.1 (3.4)	9.9 (2.5)	2.8 (1.4)	0.0 (0.0)	29
Normal	166	89.2 (2.4)	29.5 (3.5)	12.0 (2.5)	7.2 (2.0)	2.4 (1.2)	0.0 (0.0)	19
Absolute count of lymphocytes (10^3/µl)								
Low	66	97.0 (2.1)	57.6 (6.1)	27.3 (5.5)	15.2 (4.4)	4.5 (2.6)	0.0 (0.0)	31
Normal	249	90.0 (1.9)	34.5 (3.0)	13.3 (2.1)	5.6 (1.5)	2.0 (0.9)	0.0 (0.0)	21
Serum Iron (µmol/L)								
Low	77	97.4 (1.8)	51.9 (5.7)	27.3 (5.1)	13.0 (3.8)	3.9 (2.2)	0.0 (0.0)	29
Normal	40	95.0 (3.4)	32.5 (7.4)	12.5 (5.2)	5.0 (3.4)	0.0 (0.0)	0.0 (0.0)	19
Platelet (by 10^3)								
60-276	78	91.0 (3.2)	38.5 (5.5)	15.4 (4.1)	10.3 (3.4)	2.6 (1.8)	0.0 (0.0)	23
277-334	79	94.9 (2.5)	43.0 (5.6)	19.0 (4.4)	2.5 (1.8)	0.0 (0.0)	0.0 (0.0)	22
335-405	80	90.0 (3.4)	32.5 (5.2)	11.3 (3.5)	5.0 (2.4)	2.5 (1.7)	0.0 (0.0)	21
406-947	79	89.9 (3.4)	45.6 (5.6)	20.3 (4.5)	13.9 (3.9)	5.1 (2.5)	0.0 (0.0)	25

Data are survival percentage (standard deviation), unless otherwise indicated. Med*, Median (days).

smaller (Table 4).

Table 5 shows the relative risks of sputum conversion estimated by Cox regression. The model included the variables age, diabetes mellitus, maximum number of bacilli, hemoglobin, total protein, serum albumin, absolute lymphocyte count, serum iron and the radiological finding of cavitation. The table only describes those variables that were found associated with the time of conversion of the sputum once the model has been adjusted. It can be observed that being between the ages of 39- 86 (older ages), the probability of conversion is 31% lower when compared with patients of 16-24 years old (RR 0.69, 95% CI, 0.52-0.90). The other two age groups did not differ from the 16-24 age groups (reference group). The low figures of serum albumin (RR 0.71, 95% CI 0.56-0.90) and absolute lymphocyte count (RR 0.64, 95% CI 0.48-0.85) were also conditions that were independently associated with a decreased probability of sputum conversion, and finally, with the exception of the number of bacilli between 1001 and 1500, in all categories of the variable maximum number of bacilli, the likelihood of conversion was lower when compared to the category of patients who had between 3 and 500 bacilli. The lower probabilities of conversion were found with the increased number of bacilli; among 1501 to 2000 (RR 0.39, 95% CI 0.23-0.66), and 2001 to 5000 (RR 0.40, 95% CI 0.28-

Table 4. Survival time to smear conversion according to radiological findings.

Radiological finding	n	Time						
		2 Weeks	4 Weeks	6 Weeks	8 Weeks	12 Weeks	18 Weeks	Med*
Cavitation								
Yes	158	92.4 (2.1)	48.1 (4.0)	19.6 (3.2)	10.1 (2.4)	1.9 (1.1)	0.0 (0.0)	28
No	157	90.4 (2.3)	31.8 (3.7)	13.4 (2.7)	5.7 (1.9)	3.2 (1.4)	0.0 (0.0)	21
Consolidation								
Yes	279	97.5 (0.9)	38.0 (2.9)	16.5 (2.2)	8.6 (1.7)	2.9 (1.0)	0.0 (0.0)	22
No	36	94.4 (3.8)	55. 6 (8.3)	16.7 (6.2)	2.8 (2.7)	0.0 (0.0)	0.0 (0.0)	29
Pleural effusion								
Yes	19	91.2 (1.6)	40.2 (2.8)	16.2 (2.1)	8.1(1.6)	2.4 (0.9)	0.0 (0.0)	22
No	296	94.7 (5.1)	36.8 (11.1)	21.1 (9.4)	5.3 (5.1)	5.3 (5.1)	0.0 (0.0)	23
Bilateral lesions								
Yes	59	86.4 (4.5)	35.6 (6.2)	18.6 (5.1)	10.2 (3.9)	1.7 (1.7)	0.0 (0.0)	22
No	256	92.6 (1.6)	41.0 (3.1)	16.0 (2.3)	7.4 (1.6)	2.7 (1.0)	0.0 (0.0)	23

Data are survival percentage (standard deviation), unless otherwise indicated. * Median (days).

Table 5. Relative risks of sputum conversion estimated by Cox regression.

Variable	RR**	CI 95%***
Age (years)		
16-24*	1	-
25-28	1.09	0.81-1.46
29-38	0.98	0.71-1.35
39-86	0.69	0.52-0.90
Serum albumin (g/L)		
Low	0.71	0.56-0.90
Normal*	1	-
Absolute count of lymphocytes (10^3/µl)		
Low	0.64	0.48-0.85
Normal*	1	-
Bacilli (maximum number)		
3-500*	1	-
501-1000	0.57	0.40-0.81
1001-1500	0.69	0.42-1.13
1501-2000	0.39	0.23-0.66
2001-5000	0.40	0.28-0.58

*Reference category **Relative risk ***Confidence interval.

0.58).

DISCUSSION

In the present study, the older ages, high bacillary load, low serum albumin and absolute count of lymphocytes were related to sputum conversion time in adults with infectious pulmonary TB. The first two variables (age and bacillary load) could be considered non-modifiable factors while others could be potentially modifiable with targeted interventions. Also, a significant proportion of patients after two months of treatment had positive smear sputum, which could be an evidence of treatment failure.

Various factors have been associated with delayed sputum and culture conversion in pulmonary TB. The association of older age and high sputum grade with delayed conversion was described in a tertiary care facility in Pakistan (D'Souza et al., 2018) and Tanzania (Gunda, 2017). In a large cohort of smear-positive TB cases attended to in Eden Province (South Africa), those with more than 30 years old and high bacillary load had an increased probability for non-conversion (Mlotshwa et al., 2016). It is important to consider the general population dynamics in Qatar with a significative number of young people and non – Qataris, mainly young male workers migrants from Asian, Middle East and North African countries (Al-Thani et al., 2014).

The double effect of smoking behavior, Diabetes mellitus and the nutritional deficiencies as risk factors for TB and delayed conversion have been described (Bhargava et al., 2013; Putri et al., 2014; Agrawal, 2017; Nakamura et al., 2014; Shariff and Safian, 2015; Guanche et al., 2016; Long and Schwartzman, 2013; Cegielski et al., 2012; Magee et al., 2014; Tachouti et al., 2011). The low frequency of active smoker, the mandatory admission for infectious patients and the compliance with the non-smoking policy in healthcare facilities could be related to our results. Similarly, the metabolic control of diabetes mellitus in patients admitted during the intensive phase of treatment could be a factor that contributes to improved sputum conversión (Magee et al., 2014). Alkabab et al. (2017) is a retrospective cohort study of TB patients in Virginia (USA) achieved better outcomes when early interventions in diabetic patients were introduced, including patient education and therapeutic drug monitoring and dose adjustment.

The effect of malnutrition on immunity and susceptibility to infectious diseases play a cardinal role in TB (Cegielski et al., 2012). In our study, in addition to body mass index, we evaluated other indicators of nutritional status. Only, the low serum albumin was identified as a factor related to the conversion. It should be considered the nutritional behavior of the population of migrant workers in Qatar, influenced by their low income and cultural factors (e.g. many patients from Indian subcontinent follow strict vegetarian diets). Further studies will be required to evaluate selected intervention to improve the nutritional status of TB patients and its impact on patient outcomes.

The absolute count of lymphocytes is not primarily a nutritional factor but could be related to the immune status in patients with an infectious process and nutritional deficiencies. The low figures of lymphocytes were related to delayed conversion, which required additional studies to clarify its role in patient recovery and possible interventions to improve it.

We were not able to demonstrate any significant effect of the presence of cavitations in sputum smear conversion. The radiological finding of cavitation is observed in severe cases of the disease and is a well-known factor associated with delayed conversion (Nakamura et al., 2014; Visser et al., 2012; Magee et al., 2014). It is important to consider in the study the following issues. As per national regulations, the patients with infectious TB follow a strictly supervised treatment in in-patient facilities until sputum conversion is achieved, during which period, smoking or drinking alcoholic beverages is not allowed. Also, the frequency of multidrug-resistant Mycobacterium TB and human immunodeficiency virus infections are very low in the patients studied.

The findings of the study are comparable with other studies that describe around 80% of conversion at 2 months of treatment (Hariff, 2015; D'Souza et al., 2018). D'Souza et al. (2018) in Pakistani patients describe conversion of 91.5% in new TB patients[2]. Other studies describe sputum conversion of 91.7% (Rural Tanzania) (Gunda, 2017), 91.9% (Ghana) (Acquah, 2015) and 91.0% (India) (Tahir, 2006).

The study had some limitations as well. First, this is a single center study. Nevertheless, it was considered in this study that there are no significant differences in the population of TB patients attended to in other healthcare facilities in Qatar. Secondly, the glycemic control and the improvement in the nutritional status were not documented on regular basis during the study period, which could provide additional information about its effect in sputum conversion.

In conclusion, the factors associated with delayed smear sputum conversion in TB patients attended to in a community hospital in Western Qatar were identified. Additional studies are required to evaluate the influence of nutritional status on TB diagnosis and the poor glycemic control in conversion times as well as interventions to modify these factors to improve the patient outcomes.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Satisfaction of maternal care among women delivered at Asrade Zewude Memorial Primary Hospital, Bure, West Gojjam, Amhara, Ethiopia: A cross sectional study

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Maternal satisfaction is a means of evaluating quality of maternal health care given in health facilities. The objective was to assess the level of maternal satisfaction and associated factors at Asrade Zewude Memorial Primary Hospital. Cross-sectional study was conducted on 420 clients by systematic sampling method from February 8, 2017 to September 25, 2017. Structured questionnaire that was prepared by Ethiopian Federal Ministry of Health was used. Pre-testing was done prior to the actual data collection process on a sample of 20 respondents and modified accordingly. The study was approved by Asrade Zewude Memorial Primary Hospital Senior Management Committee. The collected data were checked for completeness and consistency before being coded, entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 16. Logistic regression was used to assess the presence of association between dependent and independent variables using SPSS at 95% confidence interval (CI) and 5% margin of error. The study revealed that level of satisfaction among delivering mothers was 88%. Educational level (AOR=2.15, 95% CI=[1.02-3.71]), access to ambulance service (AOR=3.15, 95% CI=[1.02-3.78]), respectful delivery service (AOR=6.85, 95% CI=[4.35-6.95]), welcoming hospital environment (AOR=3.09, 95%CI=[2.30-2.69]), proper labor pain management (AOR=4.51, 95% CI=[3.12-5.01]) and listening to their questions (AOR=3.95, 95% CI=[2.35-4.36]) were independent predictors for maternal satisfaction. Even though most of the participants were satisfied, they still had unmet needs and expectations in the delivery service provider. The identified main determinants were level of education, access to ambulance service, welcoming hospital environment, proper pain management and listening to their questions. Therefore, there is need to improve the care given to maternity and appropriate strategy should be designed to address the unmet needs of mothers delivered in the hospital.

Key words: Maternal satisfaction, associated factors, delivery, West Gojjam Zone, Ethiopia.

INTRODUCTION

Globally, about 800 women die from pregnancy or labor related complications around the world every day. Two hundred and eighty-seven thousand women died during pregnancy and childbirth in 2010; more than half of these deaths occur in Africa. The ratio of maternal mortality in the Sub-Saharan Africa region is one of the highest,

reaching 686 per 100,000 live births (Bongaarts, 2016). In Ethiopia, according to 2016 Ethiopia Demographic and Health Survey (EDHS), the estimated maternal mortality ratio was found to be 412 per 100,000 live births (World Health Organization, 2013). The existence of maternal health service alone does not guarantee their use by women (Ethiopian DHS, 2016). The World Health Organization promotes skilled attendance at every birth to reduce maternal mortality and recommends that women's satisfaction be assessed to improve the quality and effectiveness of health care (World Health Organization (WHO) 2004). Client satisfaction is a subjective and dynamic perception of the extent to which the expected health care is received (Larrabee and Bolden, 2001). It is not important whether the patient is right or wrong, but what is important is how the patient feels (Jatulis et al., 1997).

Studies done in Dhaka, Bangladesh, and South Australia showed that the level of maternal satisfaction with delivery care was 92.3 and 86.1%, respectively (Hasan et al., 2007; Australian Government, 2007). However, the level of satisfaction among laboring mothers in African countries is not enough; only 51.9 and 56% of mothers were satisfied with delivery services in South Africa and Kenya, respectively (Lumadi and Buch, 2011; Eva and Michael, 2009). Ethiopian studies done in Amhara Referral Hospitals and Assela Hospital revealed 61.9 and 80.7% satisfaction of mothers on delivery services, respectively (MesfinTafa, 2014; Tayelgn et al., 2011). Satisfaction with delivery service is a multidimensional construct embracing satisfaction with self (personal control), and with the physical environment of delivery ward and quality of care (Mehata et al., 2017). The mother's satisfaction during the birthing process is the most frequently reported indicators in the evaluation of the quality of maternity services (Goodman et al., 2004). Dimensions of care that may influence client satisfaction includes: Health care provider client interaction, service provision, physical environment, access, bureaucracy and attention to psychosocial problems. Many factors influence women's satisfaction during delivery: certain demographic characteristics have been predominantly studied in relation to satisfaction during delivery services. For example, a study done in Sweden (n=2762) reported that younger women had more negative expectations related to childbirth and they experienced more pain and lack of control during labour compared with older women (Sawyer et al., 2013), while another study done in Brazil (n=15,688) showed no age related difference in women's satisfaction with childbirth services (Bitew et al., 2015). Studies from developing countries show that satisfaction with services had a negative association with the amount of time women spent at the health facility before childbirth (Geerts et al., 2017). The educational level of women in different studies and settings has demonstrated positive, negative or nil association with satisfaction during delivery services (Srivastava et al., 2015; Haile, 2017). Other identified factors that influenced satisfaction with childbirth servicesare: having clean and orderly labour rooms and women-friendly delivery processes, such as having been prepared in advance for what to expect during the labour/postpartum/breast feeding period; involvement in the decision-making process; having a birth plan and being able to follow it; having pain relief during labour; having a birth companion and respectful care providers; receiving help from care providers in performing self and neonate's care; and experiencing less symptoms in the postpartum period (Zasloff et al., 2008; D' Orsi et al., 2014; McKinnon et al., 2014; EChangee et al., 2015; Jafari et al., 2017). A woman's obstetric history, mode of delivery, and her feelings towards recent childbirth can also affect maternal satisfaction. For example, being multiparous, preferring a spontaneous vaginal delivery and being able to have a spontaneous vaginal birth (Karkee et al., 2014; McMahon et al., 2014) enhances the women's satisfaction with giving birth. Qualitative studies on Indian women's experiences and opinions on giving birth at a health facility reveal that they are not fully satisfied during delivery service, primarily due to the long waiting time before they meet a healthcare provider, having few opportunities to communicate with providers, not being involved in decision-making, and having stern care providers (Melese et al., 2014; Christiaens and Bracke, 2017; Camacho et al., 2012; Bhattacharyya et al., 2016; Ferrer et al., 2016). However, they settle for childbirth services perceived as 'essential' for safe childbirth rather than 'desirable' for a pleasant experience (Pal et al., 2010; Sabde, 2014; Mukhopadhyay et al., 2016; Hanefeld et al., 2017). While the community's access to institutional delivery has improved, the assumption that accessibility is synonymous with quality of care, especially among policymakers, gives concern.

This study aimed to assess women's satisfaction with an institutional delivery service using a standardized scale with an intent to potentially use the findings in advocacy for service improvement. Studying the quality of institutional delivery service from client perspective will provide systematic information for service providers, decision makers, local planners and other stakeholders help understand to what extent the service is functioning according to clients' perception, and what changes might be required to meet clients' need as well as to increase utilization of the service by the target population. This study serves both knowledge generation and delivery service quality improvement purpose. The findings of this

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study can be used by local planners and decision makers to improve the quality of institutional delivery service.

MATERIALS AND METHODS

Study design and period

Cross-sectional study was conducted at Asrade Zewude Memorial Primary Hospital, from February 8, 2017 to September 25, 2017.

Study area

Asrade Zewude Memorial Primary Hospital is found in Burecity administration 410 km away from Addis Ababa and 155 km away from Bahir Dar the capital city of Amhara regional state. The hospital primarily serves for four worked as: Bure, Bure city, Shindi and Sekela.

Population

Source population

All mothers delivered at Asrade Zewude Memorial Primary Hospital from February 8, 2017 to September 25, 2017.

Study population

Those systematically selected mothers who delivered at Asrade Zewude Memorial Primary Hospital from February 8, 2017 to September 25, 2017.

Inclusion and exclusion criteria

Inclusion criteria

Mothers who delivered at Asrade Zewude Memorial Primary Hospital from February 8, 2017 to September 25, 2017 before discharge.

Exclusion criteria

Mothers who delivered at Asrade Zewude Memorial Primary Hospital and came for postnatal care were excluded to avoid recall bias.

Variables

The variables used for the study are dependent variable as satisfaction and independent variables as socio demographic characteristics of the respondents, interaction with healthcare provider, physical facilities, and service provision.

Sample size determination and sampling procedure

Targeted groups of clients in this study were delivery attendants. The sample size was determined by using a single population proportion formula, which took the proportion of overall satisfaction at 65.2% (Jatulis et al., 1997), with a margin of error of 0.05 at the95% confidence interval (CI). Adding 10% non-response rate, the final sample size was calculated to be 420 patients. From the hospital pervious report about delivery, average number of clients who delivered in the hospital was 110 per month. Therefore the number of participants who visited the hospital was estimated for the study period; then sampling fraction for selecting the study participants was determined by dividing with the total estimated number of patients during the data collection period to the total sample size which was calculated to be two. The first study participant was selected by lottery method among the list from one to five; the next study participant was identified systematically in every two intervals until the required sample size was achieved.

Data collection procedure and quality assurance

A validated structured questionnaire prepared by the Ethiopian Ministry of Health to assess maternal satisfaction was used according to the objectives of the study and the local situation of the study area in Amharic language. The questionnaire was translated to English to assure consistency of the tool. Pre-testing was conducted on 20 respondents at Bure Health center delivery attendants.

Data management and data analysis

The collected data were checked for completeness and consistency before being coded, entered and analyzed using SPSS version 16. Summary statistics of sociodemographic variables were presented using frequency tables. Bi-variable analysis was done and variables with p-value less than 0.2 were included in the multiple variable analysis of logistic regression. The odds ratio and 95% confidence intervals were also computed at p-value of 0.05.

Ethical consideration

The research was approved by Asrade Zewude Memorial Primary Hospital Senior Management Committee. Permission to conduct the study was also obtained from Asrade Zewude Memorial Hospital maternity case team. During data collection, the purpose of the study was clearly explained to the participants, and informed oral consent was obtained. To ensure confidentiality and privacy no identity was linked to the questionnaire.

RESULTS

Sociodemographic characteristics of the respondents

A total of 420 clients after delivery were involved in this study. As shown in Table 1, 60% of the respondents were between 15 and 24 years of age, 90% were married, 70% of the delivery was spontaneous, 70% of clients came to hospital by ambulance.

Health care provider-client interaction

The majority of participants (Table 2) agree and strongly agree to provider client interaction questionnaires.

Maternal satisfaction with physical facilities

Only 50% strongly agreed and 20% agreed that there was a functional maternity ward toilet, hand washing and shower during their labour and delivery time (Table 3).

Table 1. Socio demographic characteristics of respondents at AsradeZewude Memorial Primary Hospital, Bure, West Gojjam, Amhara, Ethiopia, from February 8,2017 to September 25,2017 (N=420).

Variable	Category	Naira	%
Age	15 - 24	252	60
	25 - 34	84	20
	35 - 44	63	15
	45 - 50	21	5
Marital status	Single	8	2
	Married	378	90
	Widowed	4	1
	Divorced/Separated	29	7
Education	Never attended school	168	40
	Primary and junior education	168	40
	High school education	42	10
	Diploma and above	42	10
Gravid (Pregnancies)	1-3	374	89
	4-6	42	10
	7-9	4	1
	10-12	0	0
Previous Institutional delivery	Yes	126	30
	No	294	70
Means of delivery	Spontaneous vaginal delivery	294	70
	Caeserian section	84	20
	Instrumental	42	10
Referral condition	Self referral	168	40
	Referred from health facility	252	60
Transport type	Ambulance	294	70
	Public transport	84	20
	Private	4	1
	On foot	38	9

Table 2. Maternal Satisfaction with interaction of health care provider at AsradeZewude Memorial Primary Hospital, Bure, West Gojjam, Amhara, Ethiopia, from February 8,2017 to September 25,2017 (N=420).

Variable	Level of agreement				
	5=SAG (%)	4=AG (%)	3=NAG (%)	2=DAG (%)	1=SDAG (%)
The hospital is welcoming, starting from the gate	90	10	0	0	0
The care providers listen and answer all my questions during delivery	50	20	0	10	20
All the care given to me was with my consent during labour	90	10	0	0	0
The care I received was respect full	90	10	0	0	0
I was counseled about breast feeding, vaccination and others after delivery	60	20	10	10	0
The health care providers introduced themselves to me	70	0	20	10	0
During labor and delivery my pain was properly managed	80	14	0	0	6

SAG: Strongly agree, AG: agree, NAG: not agree, DAG: disagree, SDAG: strongly disagree.

Table 3. Maternal Satisfaction with physical facilities at AsradeZewude Memorial Primary Hospital, Bure, West Gojjam, Amhara, Ethiopia, from February 8,2017 to September 25,2017(N=420).

Variable	Level of agreement				
	5=SAG (%)	4=AG (%)	3=NAG (%)	2=DAG (%)	1=SDAG (%)
Getting the maternity unit is easy starting from the gate	90	10	0	0	0
Maternity ward toilets, hand washing and shower were functional during my labour and delivery	50	20	0	10	20
Cleanness of the ward was good during my labour and delivery	90	10	0	0	0
My privacy was secured during my labour and delivery	90	10	0	0	0
I used my preferred position during my labour and delivery	60	20	10	10	0
I was allowed to have my families on my side during my labour and delivery	70	0	20	10	0

Table 4. Maternal Satisfaction with Service provision at AsradZewude Memorial Primary Hospital, Bure, West Gojjam, Amhara, Ethiopia, from February 8,2017 to September 25,2017 (N=420).

Variable	Level of agreement				
	5=SAG (%)	4=AG (%)	3=NAG (%)	2=DAG (%)	1=SDAG (%)
I was directed to the maternity ward immediately without recording and other procedures	90	0	10	0	0
I was seen by the care provider immediately I have got the maternity ward	90	10	0	0	0
I have got a bed immediately	60	40	0	0	0
All those diagnostic tests prescribed for me were available in the hospital	90	10	0	0	0
All those drugs and supplies needed were available in the hospital	90	10	0	0	0

Table 5. Overall Maternal Satisfaction at AsradeZewude Memorial Primary Hospital, Bure, West Gojjam, Amhara, Ethiopia, from February 8,2017 to September 25,2017 (N=420).

Variable	Yes (%)	No (%)
Those satisfied with the overall hospital service	88	12
Those who recommend others to this hospital	87	13

Maternal satisfaction with service provision

The majority of participants (60% strongly agreed and 40% agreed) responds positively to the questionnaire 'I have got a bed immediately' (Table 4).

Overall satisfaction

Overall satisfaction was measured on 10 scales, 1 worst and 10 the best. Those who scored 6 and above was considered 'yes' for satisfaction. Their intention to recommend others to the hospital was measured using Yes (87%) and No (13%) options (Table 5). The regression output of factors for maternal satisfaction showed that mothers who think of the welcoming hospital environment was 3.09 (2.30 to 2.69) times more likely to satisfy than those who perceive the hospital environment was not welcoming (Table 6).

DISCUSSION

In this study, the overall satisfaction of mothers on delivery service was found to be 88%, which was comparable to the study conducted in Wolayita Zone (82.9%), Debremarkos town (81.7%) and Assela Hospital (80.7%) (Lumadi and Buch, 2011; MesfinTafa, 2014; Geerts et al., 2017). However, it was higher than the study, which was conducted in Jimma (77%) (Haile, 2017) and Amhara Referral Hospitals (61.9%) (Tayelgn et al., 2011) in Ethiopia and South Africa (51.9%) and Kenya (56%) in Africa (Lumadi and Buch, 2011; Eva and Michael, 2009). The difference with the above finding may be because of a real difference in the quality of services provided, expectation of mothers or the type of health facilities.

Maternal educational status was significantly and inversely associated with their level of satisfaction with delivery services. Those respondents who were never

Table 6. Maternal Satisfaction and associated factors at AsradeZewude Memorial Primary Hospital, Bure, West Gojjam, Amhara, Ethiopia, from February 8,2017 to September 25,2017 (N=420).

Variable		Maternal satisfaction		COR (95% CI)	AOR (95% CI)
		Satisfied (%)	Not satisfied (%)		
Level of education	Never educated	148 (35)	20 (5)	3.09 (1.34-7.14)	2.15(1.02-3.71)
	First level	148 (35)	20 (5)	2.01(1.00-3.02)	2.01(0.99-3.10)
	High school	37 (9)	5 (1)	1.99(1.00-2.03)	1.56(0.85-2.96)
	Diploma and above	37 (9)	5 (1)	1	1
Means of delivery	Natural	259 (62)	36 (9)	2.60 (1.15–5.89)	-
	C/S	73 (17)	10 (2)	1.29 (0.53–3.10)	-
	Instrumental	37 (9)	5 (1)	1	-
Means of transportation	Ambulance	259 (62)	36 (9)	2.99(2.50-3.66)	3.15(1.02-3.78)
	Public transport	74 (18)	10 (2)	1.40(1.01-1.95)	2.01(0.99-3.19)
	Private or Contract	4 (1)	0	0.21 (0.05–0.90)	1.53(0.81-2.91)
	On foot	32 (7)	5 (1)	1	1
Previous institutional delivery	Yes	111 (26)	15 (4)	2.05(1.02-2.03)	-
	No	259 (62)	35 (8)	1	-
The hospital is welcoming starting from the gate	Yes	328 (78)	45 (11)	3.31(2.32-2.66)	3.09(2.30-2.69)**
	No	41 (10)	6 (1)	1	1
I was directed to the maternity ward immediately without recording and other procedures	Yes	331 (80)	45(11)	1.99(0.99-1.05)	-
	No	39 (8)	5(1)	1	
The care I received was respect full	Yes	328 (78)	45 (11)	6.02(4.01-6.65)	6.85(4.35-6.95)**
	No	41 (10)	6 (1)	1	1
I was allowed to have my families on my side during my labour and delivery	Yes	328 (78)	45 (11)	0.95(0.52-0.99)	-
	No	41 (10%)	6 (1)	1	-
I used my preferred position during my labour and delivery	Yes	328 (78)	45 (11)	0.58(0.15-0.60)	-
	No	41 (10)	6 (1)	1	-
Cleanness of the ward was good during my labour and delivery	Yes	328 (78)	46(11)	4.01(3.02-4.99)	-
	No	41 (10)	6(1)	1	-
Maternity ward toilet, hand washing and shower was functional during my labour and delivery	Yes	207 (49)	28 (7)	3.21(2.20-3.52)	3.21(2.20-3.52)
	No	163 (39)	22 (5)	1	1
During labor and delivery my pain was properly managed	Yes	328 (78)	45 (11)	5.51(3.56-5.91)	4.51(3.12-5.01)**
	No	41 (10)	6 (1)	1	1
I was advised about breast feeding, vaccination and others after delivery	Yes	287 (68)	39 (9)	0.30(0.12-0.25)	-
	No	83 (20)	11 (3)	1	-
The health care providers introduced themselves to me	Yes	127 (30)	17 (4)	0.31(0.25-0.39)	-
	No	242 (58)	34 (8)	1	-
The care providers listen and answer all my questions during delivery	Yes	328 (78)	45 (11)	3.61(2.95-4.62)	3.95(2.35-4.36)
	No	41 (10)	6 (1)	1	1

**p-value less than 0.001.

educated were 2.15 more likely to satisfy with delivery service than whose educational level is diploma and above. This finding supports the study conducted in Assela Hospital and other foreign literatures. The literatures showed that clients had various expectations about hospital delivery that influenced their perception of care (MesfinTafa, 2014; Srivastava et al., 2015). This study revealed that those who came to the hospital by ambulance were 3.15 times more likely to satisfy than those who came on foot. This finding was related to accessibility as explained by other similar studies (Tayelgn et al., 2011; Bohren et al., 2015). Maternal level of satisfaction was also related to creating welcoming environment hospital to laboring mothers. Those clients who consider the hospital as welcoming environment were 3.09 times more likely to satisfy with maternal service.

There was a strong association between maternal levels of satisfaction and respectful delivery care providers. Those participants who thought that care providers were respectful were 6.85 times more likely to satisfy with the delivery service. Perception of respondents of labor pain management was associated with level of maternal satisfaction. Those who answered yes were 4.51 times more likely to satisfy than those who answered no to proper labor pain management, according to their perception. Attention to laboring mother's concern was also related to the maternal level of satisfaction. Those who thought their questions and concerns were answered during labor were 3.61 times more likely to satisfy than those who thought not.

Conclusions

The aim of this study was to assess levels of maternal satisfaction and associated factors with delivery service at the Asrade Zewude Memorial Primary Hospital. The overall maternal satisfaction with the delivery service was found to be 88%. Even though the result was slightly higher than the previous studies conducted in Ethiopia, there are still unmet needs and expectations of mothers during labor and delivery that the hospital should focus on as delivery service quality improvement area. The identified associated factors were access to ambulance service, welcoming hospital environment, proper labor pain management, respectful care and listening to their questions.

RECOMMENDATIONS

Recommendation to Asrade Aewude Memorial Primary Hospital

The hospital shall better consider physical barriers to create a welcoming hospital environment for maternal service. The hospital should facilitate ambulance access for delivering mothers.

Recommendation to health care providers

The care providers should manage labour pain properly. When providing service, it should be with compassionate and respectful. The care provider should meet the social and psychological concerns of the delivering mothers**.**

LIMITATION

The feelings associated with childbirth itself, due to limited opportunities of exploration in quantitative studies, pose some confounders like the ‘halo effect’ a positive attitude towards successfully given birth makes it difficult to separate childbirth satisfaction from satisfaction with childbirth services. Participants’ tendencies to rate services more positive in general is another known confounder. Participants’ subjectivity being pleased with services that are not necessarilly evidence based poses another confounder for quantitative studies measuring satisfaction.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Full Length Research Paper

Maternal dietary and nutritional characteristics as predictor of newborn birth weight in Jimma Town, Southwest Ethiopia, 2017

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Maternal nutrition plays a major role in influencing fetal growth and birth outcomes. It is a modifiable risk factor which drags a significant public health consideration to avert adverse birth outcomes, specially, in low and middle income countries. Suboptimal dietary and nutritional characteristics and low birth weight are prevalent in the present study setting. This study was conducted to assess the association of maternal dietary and nutritional characteristics and newborn birth weight among pregnant mother who delivered in health institutions. Institution based cross sectional study was conducted among 541 pregnant mothers who delivered in Health Institutions of Jimma Town from March 1st, 2017 to April 30th, 2017. Data were entered into EPI data version 3.1 and analyzed using SPSS for windows, version 20.0; SPSS. Bivariate analysis was used to assess the association between birth weight and list of independent variables and to test significance of the association at p-value <0.25 for multivariable linear regression. Multivariable linear regression model was used to recognize the important predictors by controlling for possible confounding variables and statistical significance was measured at p-value <0.05. Majority of newborns had normal birth weight (91.0%). The mean birth weight of the newborns was 3224.6 ± 438.5 grams while low birth weight was 2%. In Multivariable linear regression analyses, birth weight was found to have increased by 13.5 grams (β=13.5, P=0.04), for every centimeter increment in maternal mid-upper arm circumference (MUAC). Similarly, with each increase in parity of the mother an increase in birth weight increased by 96.81 grams (β=96.81, P=0.01) was observed. Wealth index was also found to have a positive association with birth weight (β=49.04, P=0.01). Maternal MUAC, parity and wealth index were found to have a positive association with birth weight. Intervention directed on nutrition of pregnant mothers through nutrition counseling should be the major priority in addition to economic measure.

Key words: Newborn birth weight, nutritional characteristics, mid-upper arm circumference.

INTRODUCTION

Maternal nutrition plays a key function in influencing fetal growth and birth outcomes. It is a changeable risk factor of public health significance in the effort to avert adverse birth outcomes, mostly among low-income populations (Abu-SaadK and Fraser, 2010). During pregnancy a woman wants good nutritional status for a healthy outcome. Women who have a poor nutritional status at conception are at higher risk of disease and death (World Health Organization (WHO) 2012). Optimal nutrition provided to the developing fetus is critical in achieving

appropriate fetal growth and development (Australian Government Department of Health and Ageing, National Health and Medical Research Council (NHMRC) 2013); Kaiser and Allen, 2002). For instance, a systematic review and meta-analysis of 90 dietary studies among pregnant women in low-income countries reported lower energy and fiber intakes than optimal recommendations (Blumfield et al., 2012a). Essential nutrients together with folic acid, iron, zinc, calcium, vitamin D, and essential fatty acids function to support bone development and brain development (Blumfield et al., 2013). It is obvious that intrauterine fetal growth is the placental supply of nutrients to the fetus reliant upon placental size and blood supply (Fowden and Forhead, 2004). Moreover, studies also have revealed direct relationships between placental size and birth weight (Mellor, 1983). Experimental restriction of placental growth (Thureen et al., 1992; Vatnick et al., 1991), food constraint (Lederman and Rosso, 1980), and low protein diets (Jansson et al., 2006; Rutland et al., 2007) resulted in reduced placental weight and distorted placental efficiency, leading to reduced birth weight and intrauterine growth restriction .

The timing of delivery of nutrients through the placenta is also crucial (Belkacemi et al., 2010). In pregnant sheep, severe under nutrition during the peri-conceptual episode led to preterm delivery Fowden and Forhead, 2004). Studies also indicated reduced the placental: fetal weight ratio (Heasman et al., 1998), undernutrition in early to mid-gestation (Faichney and White, 1987; McCrabb et al., 1991) and undernutrition in late gestation (Mellor and Murray, 1981) as an important factor for fetal and birth outcome. Pre-pregnancy body mass index and gestational weight gain are critical for optimal infant health (Kaiser and Allen, 2008; Yan, 2015). Successful weight gain modifications illustrate assure in dropping the risk of large for gestational age (LGA) which has subsequent risk of overweight, obesity, diabetes mellitus, malignancy, and other disorders afterward in life (Jessica et al., 2015) . The most hopeful results come from dietary pattern analysis, in which consumption of whole foods might be advantageous toward producing an infant of right birth weight (Harder et al., 2007).

Assessment of common practices of food intake during pregnancy informs the direction of preventative practice and interventions benefiting populations of pregnant women and their offspring. As a modifiable factor, dietary patterns may be more applicable to clinical and pregnant health interventions (Xuyang et al., 2016). Being born with low birth weight (LBW) is generally recognized as a disadvantage for the infant, increasing the risk of early growth retardation, fast catch up growth, infectious disease, developmental delay, and death during infancy and childhood (Edmund and Bahl, 2006; Marte et al., 2014; Englund et al., 2014; Okubo et al., 2012;). Earlier publications have shown that dietary practices characterized with nutrient-rich foods were linked with bigger birth size outcomes (Englund et al., 2014; Wolff and Wolff, 1995). This shows that proper dietary pattern during pregnancy is crucial for normal pregnancy outcome.

The present study is therefore anticipated to assess maternal dietary and nutritional characteristics as predictor of newborn birth weight among pregnant mother who delivered in health institutions in Jimma Town, South west Ethiopia.

METHODS AND MATERIALS

Study area and period, the study was conducted in the Oromia Region, Jimma Zone, Jimma Town, on all health institutions from March 1st to April 30th, 2017, which is located at 353 km South-West of Addis Ababa. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia, Jimma town has a total population of 120,960, of whom 60,824 are men and 60,136 women. There is 1 referral hospital, 1 district hospital, 4 public health centers, 1 NGO clinic and 2 private clinics providing antenatal care (ANC) and delivery services. Cross sectional study design was used for the study design. The source population was all mothers who delivered live child in all health institutions in Jimma Town during the study period.

Sample size determination and sampling procedure

Sample size was determined by considering the parameters of single population mean formula using standard deviation(σ) of birth weight (587.6gram) (43), n=522. Since the total number of source population from 1 year, Jimma Town Health Bureau report was 8482(<10,000), using a finite population correction formula to calculate the final sample size fn=492. Considering the 10% non-response rate the final sample was 541. The laboring mothers attended labour ward of all health institutions were recruited consecutively until the required sample size was achieved.

Sampling procedure

There are two hospitals (1 referral hospital, 1 district hospital), 4 public health centers, 1 NGO clinic and 2 private clinics are providing antenatal care (ANC) and delivery services. Proportional allocation of the sample to the size of women who gave birth in those public and private health institutions, based on number of deliveries prior to data collection (one year report) was made. Clients who fulfilled the inclusion criteria were recruited consecutively until the required sample size was achieved. Inclusion criteria mother who came with term gestational age (37 to 42 weeks) for delivery during data collection at health institution. Exclusion criteria, those mother who were critically ill or mentally ill or have problems of communication, those mothers with still birth and congenital anomalies, those mothers with multiple births and those mothers who has lost their upper extremities.

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Data collection methods and measurements

Data were collected by trained B.Sc. nurses and mid-wives using pre-tested structured questionnaire from mothers, from mother's cards (for obstetric and medical variables) and measure newborn birth weight and maternal mid-upper arm circumference (MUAC). For data collectors and supervisors were given training for two days about the objectives of the study, data collection instruments, data collection procedures and the ethical considerations by the principal investigator and an additional training for supervisor on data completeness and cross checking. The data collection was supervised by supervisors and by principal investigator daily. Pre-tested questionnaires were used to collect information from each study subject.

Anthropometry measurement

MUAC of the mothers was measured to the nearest centimeter with a non-stretchable tape on the left arm of the mother when right hand dominant. Newborn birth weight was measured to the nearest 10 g in Seca Digital Baby Scale Table. Calibration was done every morning with known objects in all data collection sites.

Household food insecurity measurement

To assess the household food insecurity status, household food insecurity access scale (HFIAS) measurement tool was used (Jennifer et al., 2007).

Food frequency questionnaire

This is used to calculate individual dietary diversity score by extra food group. For data quality management, a pre-test was conducted among 5% of the total sample size in order to assess its clarity, length, completeness and consistency. Before data collection, the questionnaires and consent form originally written in English was translated to the following local languages (Afaan Oromo and Amharic) and then back translated into English language for consistency and to facilitate understanding of the respondents. Data collectors and supervisors underwent training. For data processing and analysis, data were entered into Epidata version 3.1 and exported to SPSS versions 20 for analysis.

Data were presented using frequency tables; mean and standard deviations were presented for continuous variables. Bivariate linear regression model was run to identify independent candidate variables at p-value<0.25 for multivariable linear regression. Multivariable linear regression model was employed to categorize predictors of newborn birth weight at p-value<0.05 measured to be statistically significant. Principal component analyses were done and the household wealth index was ranked into tertiles.

Standard definitions and operational definitions

Term pregnancy

Gestational age at delivery ranging from 37 completed weeks to 42 completed weeks (Cunningham et al., 2014).

Household food insecurity

This is define as the inability to provide enough food for a healthy and active lifestyle for all household members.This was analyzed based on the criteria used in the HFIAS (Jennifer et al., 2007).

Inter-pregnancy interval

The time between the birth of the first born child and the conception of the second born child (Cunningham et al., 2014).

Antenatal care

This is the care received from healthcare professionals during pregnancy (Cunningham et al., 2014).

Parity

This refers to the number of deliveries after 28 completed weeks of gestation (Cunningham et al., 2014)

Under nutrition

This is MUAC of pregnant mother<23 cm.

Normal

This is MUAC of pregnant mother >23 cm.

Dietary practice

This is eating habit of the mothers during the time of their pregnancy.

No formal education

Those that are not going to school for the purpose of education which involves class room and provided by trained teachers.

Ethical consideration

The ethical clearance was taken from Jimma University ethical review committee of institute of health approved this research project. Permission was sought from all health institution administrative office to commence data collection. Written informed consent was obtained from individual mothers. Identifiers of the mothers were not incorporated in questionnaire and the data collected from mothers was used for research purpose only. Mothers were informed that their participation in the study is based on their willingness and refusal has no any health service consequence. For those mothers with low birth weight and high birth weight counseling was given.

RESULTS AND DISCUSSION

Among the total of 541 early postpartum women interviewed during the study period among deliveries in Jimma town health institutions, 10 were excluded as their data was incomplete, and the remaining 531 were analyzed (with response rate of 98.1%).

Socio-demographic characterstics

The mean age of study participants was ranged from 15 to 49 years with a mean (±sd) of 27 (±7) years and 245

Table 1. The socio-demographic characteristic of study among mother who gave birth in health institutions in Jimma Town, Southwest Ethiopia from March1 to April 30, 2017**.**

Variable		Frequency (n=531)	Percent/Mean±SD
Age of mother in years	15-24	195	36.8
	25-34	245	46.1
	35+	91	17.1
Residence	Urban	389	73.3
	Rural	142	26.7
Sex of the household head	Male	512	96.4
	Female	19	3.6
Marital status	Currently married	518	97.6
	Not married	13	2.4
Maternal occupation	Not employee	426	80.2
	Civil servant (employee)	42	7.9
Ethnicity	Oromo	395	74.4
	Amhara	63	11.9
	Others	73	13.7
Religion	Orthodox	111	20.9
	Protestant	48	9.0
	Muslim	372	70.1
Maternal education	No formal education	179	33.7
	Primary	211	39.7
	secondary and above	141	26.6
Paternal education	No formal education	113	21.3
	Primary	202	38.0
	Secondary and above	216	40.7
Wealth index	Low	31	5.8
	Medium	321	60.5
	High	179	33.7
Family size of the respondent	-	-	4.17±1.381

(46.1%) were in the age range of 25 to 34 years. Nearly 98% of women were currently married, 426 (80.2%) not employed, 395 (74.4%) Oromo, 372 (70.1%) Musilims, More than one third of the mothers 179 (33.7%) reported have no formal education and 389 (73.3%) were residing in urban areas. In 96% of the cases the head of the household were males and 216 (40.7%) of the husbands have educational level of secondary and above. The mean (±sd) - family size of the respondents were 4 ± (1) and the mean number of dependent household member is 1.9 ± (1.1). Nearly a third of the households are food insecure and 321 (60.5%) were in the medium wealth index tertile (Table 1).

Obstetric and medical factors

Less than three fourth (72.5%.) had inter-pregrance below 2 years and 146 (51.0%) had four and more antenatal care visits and 303 (57.1%) of women are para 2 to 4 while 205 (38.6%) are para 1. Seventy two percent of women gave birth to their last child with birth interval of less than two years. Regarding medical problems, 41

Table 2. Obstetrics and medical factors among mother who gave birth in health institutions in Jimma Town, Southwest Ethiopia from March 1 to April 30, 2017.

Variable		Frequency(n=531)	Percent
Inter pregnancy interval	<2 years	385	72.5
	≥2years	146	27.5
Number of antenatal visit	≤3	260	49.0
	4+	271	51.0
Parity	1	205	38.6
	2-4	303	57.1
	≥5	23	4.3
Birth order	1	205	38.6
	2	160	30.1
	3+	166	31.3
Hypertension disorders of pregnancy	Yes	41	7.7
	No	490	92.3
Diabetes	Yes	8	1.5
	No	523	98.5

(7.7%), 8 (1.5%) of women had hypertension disorders of pregnancy and diabetes, respectively (Table 2).

Maternal nutrition, newborn related and Women autonomy characteristics

Regarding maternal nutritional status using mid-upper arm circumference (MUAC), 247 (46.5%) of mothers are malnourished with MUAC of <23 and 284 (53.5%) are normal. Majority of women (89.1%) had Iron folate supplementation during antenatal care and 247 (46.5%) have not adhered (took 0 to 3 pills/week) to iron folate supplementation. With regard to the feeding status of the women during pregnancy, 156 (29.4%) had prohibition of some food items, 142 (26.7%) had strong desire to eat (craving), 119 (22.4%) were not taking additional meal, 185(36.1%) had low dietary diversity score, and 162 (30.5%) were food insecure.

Regarding women's freedom of movement, 429 (80.8%) seek permission to go outside home, 340 (64.0%) seek permission to go to market place, 387 (72.9%) permission to go to health institution. Maternal involvement in decision making regarding child sickness was 352 (66.3%), child schooling was 362 (68.2%), and child to whom to marry was 139 (26.2%). On the other hand maternal autonomy in conducting: Food purchase was 448 (84.4%), Big Item purchase was 133 (25.0%) and autonomy regarding family planning service utilization was 208 (39.2%). Nearly 49% of newborns were females and 272 (51.2%) were males. Majority of newborns are of normal weight in 483 (91.0%) with mean birth weight of 3224.6 ± 438.5 g (Table 3).

Predictors of newborn birth weight from multivariable linear regression analysis

All covariate variables with p-value <0.25 were chosen for multivariable linear regression analyses to identify the final predictors of birth weight. Multivariable linear regression analyses showed that after adjusting for dietary diversity score (DDS), age at first marriage and food insecurity, there is a positive association between maternal MUAC and birth weight, parity and birth weight, wealth index and birth weight of the new born. It was observed that for a centimeter increase in maternal MUAC, birth weight increased by 13.5 g (β=13.5, P=0.04). Similarly it has shown that with each increase in parity of the mother, birth weight increased by 96.81 g (β=96.81, P=0.01) and for a unit increase in wealth index birth weight increased by 49 g (β=49.04, P=0.01) (Table 4).

DISCUSSION

Birth weight is the most important indicator of survival of newborns during their early life and has been associated with morbidity and mortality at all ages within the human life span. Drivers of gaining each grams of a newborn weight should be well exploited. Accordingly, we have

Table 3. Maternal nutrition, newborn related and women autonomy among mother who gave birth in health institutions in Jimma Town, Southwest Ethiopia from March 1 to April 30, 2017.

Variable		Frequency(n=531)	Percent/Mean ± Sd
Maternal MUAC	Undernourished(<23cm)	247	46.5
	Normal(≥23cm)	284	53.5
Iron folate supplementation	Yes	473	89.1
	No	58	10.9
Adherence of iron folate supplementation	Not adhered(0-3 pills/week)	247	46.5
	Adhered(4-7 pills/week)	284	53.5
Food prohibition during pregnancy	Yes	156	29.4
	No	375	70.6
Dietary diversity score(DDS)	High Diversity	200	39.0
	Medium Diversity	128	25.0
	Low Diversity	185	36.1
Additional meal	Yes	412	77.6
	No	119	22.4
Hemoglobin level in g/dL	≤11	106	20.0
	>11	425	80.0
Freedom of Movement; seeking permission to go to	Outside home (yes)	429	80.8
	Market place (yes)	340	64.0
	Health institution (yes)	387	72.9
Maternal involvement indecision regarding child	Sickness (yes)	352	66.3
	Schooling (yes)	362	68.2
	To whom to Marry(yes)	139	26.2
Maternal Autonomy in conducting	Food purchase (the mother involved)	448	84.4
	Big Item Purchase (mother is involved	133	25.0
Autonomy regarding Family planning service Utilization	Yes	208	39.2
	No	323	60.8
Food insecurity	Food secure	369	69.5
	Food insecure	162	30.5
Newborn birth weight (Mean birth weight = 3224.61 ± 438.512)	<2500	11	2.0
	2500-3999.9	483	91.0
	4000+	37	7.0
Sex of newborn	Female	259	48.8
	Male	272	51.2

conducted the current study on 531 postpartum mothers attending health service institution in Jimma town. In general, these socioeconomic findings were comparable with studies conducted in Gondor and Wondogenet, and Haramaya District, Ethiopia (Mekonnen et al., 2015; Kuche et al., 2015; Assefa et al., 2012). Similarly the

Table 4. Multivariable linear regression model predicting birth weights among newborns delivered at health institutions of Jimma Town, Southwest Ethiopia March 1 to April 30, 2017.

Model	Unstandardized Coefficients		P	95.0% Confidence Interval	
	B	Std. Error		Lower Bound	Upper Bound
Maternal MUAC	13.498	6.625	0.042	0.483	26.514
Multiparity	96.813	35.479	0.001	27.107	166.518
Primiparous (Referent)	-	-	-	-	-
Wealth index	49.044	18.108	0.001	13.469	84.620
Age at first marriage(mother)	-10.078	6.940	0.147	-23.713	3.557
High_DDS	13.459	41.232	0.744	-67.549	94.468
Medium_DDS	-42.610	44.536	0.339	-130.109	44.890
Low DDS (Referent)	-	-	-	-	-
Food in security	-30.641	18.278	0.094	-66.551	5.269
Food secure (Referent)	-	-	-	-	-

Maximum VIF=1.452.

wealth strata in most of the studied mothers assumed was simillarto a study in eastern Ethiopia where majority are in poor to middle wealth index tertile (63.6%) (Assefa et al., 2012). In resource-poor settings, where individuals tend to have smaller amounts of subcutaneous fat, changes in Mid-upper arm circumference are more likely to reflect changes in muscle mass (Gibson, 2005).There existed alarming level of (46.5%) maternal under nutrition defined as Mid-upper arm circumference of < 23 cm among the study subjects. Though a comparable level of maternal undernutrition were reported from eastern Ethiopia (45%) (Assefa et al., 2012), the current finding is nearly two fold compared to USAID report on Ethiopia nutrition profile (25%) (United States Agency for International Development (USAID) (2016) and tenfold higher compared with the study conducted in Riyadh (4.4%) (Almurshed et al., 2007).

Micronutrients are essential for growth and maternal micronutrient shortage, as regularly observed in low-income countries, may be a significant cause of Intrauterine growth restriction (IUGR). Micronutrient insufficiency, may influence growth, cognition, and reproductive performance (Seshadri, 2001). Optimal nutrition during pregnancy is important for the health of both the mother and the baby. However, in many studies dietary intake during pregnancy is found to be suboptimal (Zakaria and Laribick, 2014; Blumfield et al., 2012b). This is in concord with different studies done in Ethiopia where maternal nutrition during pregnancy is generally poor because of different reasons. Among these are: 1/4 of women of reproductive age in Ethiopia are under-nourished and 17% are anemic, associated low birth weight, short stature, lower resistance to infections, and higher risk of illness and mortality (Central Statistical Agency (CSA), 2012; Ethiopia and ICF Macro., 2012; Ethiopia Demographic and Health Survey, 2011; United States Agency for International Development (USAID), 2016). On the other hand, study showed that good dietary practice was found to be low (40.1%) in Gondar during pregnancy (Mekonnen et al., 2015). In addition energy and most of the nutrients intakes of pregnant mother in Wando Genet district is also reported to be lower than recommended for pregnant mother (Kuche et al., 2015). The inadequate dietary pattern in our study is however by far very high compared to the above studies. This may be because of the seasonal difference in the under taking of the study or the disparity in geographical location.

In this study majority of newborns are of normal weight (91.0%) with mean birth weight of 3224.6 ± 438.5 g and only 2% of new borns are low birth weight. The low birth weight rate in this study is by far low compared to the previous studies in Ethiopia where the prevalence of low birth weight ranges from 15 to 20% of all births worldwide to 17.1% in Gondor to 22.5% in Jimma zone health facilities (Resolution World Health Assembly (WHA), 2012; World Health Organization (WHO) 2014; Berihun et al., 2012). On the other hand the 3224.6 ±438.5 mean birth weight of the newborn in this study is higher compared to previous studies 2976 ± 476 g in Gondor and 3094.9 ± 587.6 g in Tigray (Berihun et al., 2012; Tema, 2006; Meresa et al., 2015) and other african country (Mosha and Philemon, 2010). The reason why the mean birth weight is high and the low birth weight is low in this study might be the research is conducted on term pregnancies compared to the other studies where preterms are also included.

Furthermore, nearly three fourth of the mother are urban residents in this study incontrast to other studies where majority are rural residents which is found to be positively associated with birth weight. This is because urban residents are tought to have better education,

health information and access to health facilities for antenatal care which subsequently promotes birth weight (Kuche et al., 2015; Taddese et al., 2016). It was found that there is a positive association in multivariable linear regression analysis between (maternal MUAC, parity and wealth index) and birth weight after adjusting for dietary diversity score (DDS), age at first marriage and food insecurity. In this study it was observed that for a centimeter increase in maternal MUAC, birth weight increased by 13.5 g (β=13.5, P=0.04). Simillar positive association was observed in a study conducted in Brazil where for each centimeter increase in maternal MUAC, there was 45.52 increased in birth weight (Ricalde et al., 1998). Another study conducted in Ethiopia also showed that maternal MUAC of 23+ was positively associated with birth weight (Wado et al., 2014). This is because maternal MUAC of 23+ show maternal good nutrition during pregnancy which subsequently will contribute to maternal weight gain and increased birth weight. On the contrary women with low MUAC are at high risk of low birth weight.

In this study it is observed that with each increase in a parity of the mother, birth weight increased by 96.81 g (β= 96.81, P=0.01). Different Studies have shown that primiparous mother, gave birth to babies with lower birth weight compared to multiparous women (Muslimatun et al., 2002) and women with parity 2 and parity >3 were 30 and 81 % more likely to have babies weighing ≥2.5 kg compared to those with parity 1 (Alfred et al., 2016). The wealth index in this study is positively associated with birth weight (β=49.04, P=0.01). Study conducted in Bangladesh showed that children born in poor families were more likely to be LBW than children born in middle-class and rich families (Reazul et al., 2016). Further studies have shown that there is strong association between birth weight and socioeconomic status of the family (Alfred et al., 2016), family income was positively associated with birth weight (Muslimatun et al., 2002). This might be because low birth weight might be due to deprived maternal nutritional intake among mothers with lesser socioeconomic rank as created in other studies.

LIMITATION AND STRENGTH OF THE STUDY

Limitation of the study, since the study depends on self report there might be recall bias, especially for food frequency questionarries. Strength of the study inclusion of all health facilities given that delivery services in the town is strength of the study and the study used large sample size with response rate 98.1%.

CONCLUSIONS AND RECOMMENDATION

Majority of newborns are normal birth weight with mean birth weight and the percentage of low birth weight is very low. Maternal nutritional status using mid-upper arm circumference most of mothers are malnourished with MUAC of <23 and more than half of mothers are normal. No association between maternal dietary habit and newborn birth weight in this study, which need further investigation. The predictors of newborn birth weight were maternal MUAC, parity and wealth index.

This is significant because newborn birth weight is important determinant of newborn survival. Recommendations, the following points are recommended for the government, Ministry of health, Ministry of finance, JUMC, College of health sciences, Health office of Jimma Town and other responsible bodies, Nutrition counseling at antenatal care at all levels is essential for both maternal and newborn birth weight, and Improving socio-economic status by creating access to micro financing. Finally for researchers, further studies are highly recommended for the study of maternal dietary by considering biomarker tests to see the association with newborn birth weight and also future studies on underline, basic and immediate causes of maternal malnutrition in the study area.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Socio-demographic determinants of health support services among orphans and vulnerable children in Nigeria

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Worldwide, the population of orphans and vulnerable children is estimated to be around 160 million with sub-Sahara Africa accounting for 80% of these children owing largely to the effect of HIV/AIDS, civil wars, road accidents, sectarian violence, terrorism, and other factors. Efforts have been made over the years by governments and development partners to mitigate the effects of orphanhood, but these efforts have failed to achieve the required objectives because various socio-demographic factors influence receipt of support services provided to OVC. This study therefore, examined the socio-demographic determinants of child health support services provided to OVC in Nigeria by employing a cross sectional research design utilizing secondary data obtained from the household recoded dataset of the 2013 Nigeria Demographic Health Survey (NDHS) and analyzed at univariate, bivariate, and multivariate levels (n=5114). The findings showed that region and age of child influenced receipt of health support at the bivariate level ($p<0.05$). Furthermore, at the multivariate level, only region of residence was significantly associated with the receipt of health support as residence in the North East, North West, and South South regions significantly influenced receipt of health support services by OVC in these regions ($p<0.05$). The study concluded that socio-demographic factors influenced health support services provided to OVC and recommends that interventions should ensure an equity-focused approach based on vulnerability status of children in providing support services. Also, innovative and integrated approaches should be employed in identification, service provision, tracking and monitoring of services provided to OVC in Nigeria.

Key words: Nigeria demographic health survey, sub-Saharan Africa, orphanhood.

INTRODUCTION

In recent times, the definition of orphanhood and vulnerability across the development context has remained the same but with little differences in inclusion criteria. An orphan is defined as a child under the age of 18 who has lost one or both parents. Maternal orphans have lost mothers; paternal orphans lost fathers and double orphans have lost both parents (Skinner et al., 2004; UNICEF, 2006). However, there have been various

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definitions of a “vulnerable child”, including children whose parent(s) or caregivers are ill or deceased, children in poverty or conflict, and children without caregivers. Furthermore, in Nigerian Demographic and Health Survey (NDHS, 2013), an orphan is defined as a child under age 18 with one or both parents deceased while a vulnerable child is defined as a child under age 18 who has a very sick parent (sick for three or more consecutive months during the past 12 months) or who lives in a household where an adult was very sick or died during the 12 months preceding the survey (NPC and ICF International, 2014).

In year 2000, there was an estimated thirty-five million children who had lost one or both parents due to different causes. By 2013, this number has quadrupled to almost 140 million with slightly above 10% of these children estimated to have become orphaned due to HIV/AIDS (UNICEF, 2016). It is also estimated that more than 80% of AIDS orphans live in sub-Saharan Africa (Hong et al., 2010; Bryant et al., 2012) as it is the region affected the most by the HIV/AIDS pandemic with the adult HIV-prevalence six times higher than the global average. The prevalence of orphans and vulnerable children has serious consequences for the well-being of children in any country. They are prone to drop-out from school, lack basic needs such as shoes and clothes and more likely to be underweight or malnourished, while for the ladies, they are at higher risk of early sexual activity which exposes them to serious reproductive health problems including higher risk of pregnancy and diseases (NPC and ICF International, 2014).

In Nigeria, it is reported that more than 12 million out of the Nigeria’s 69 million children are either orphaned or vulnerable. A major contributor to the high rate of vulnerable children include the increased rate of insurgency which have left 2 million children orphaned or vulnerable especially in the North East region of the country and the continued sectarian violence as experienced in the North West and middle belt regions of the country. Presently, almost half of the orphaned and vulnerable children are malnourished, three-quarter have no access to health care services and more than 70% have never attended school (Save the Children, 2016). They would invariably mature into disenfranchised youths facing prospects of a lifetime of insecure employment, marginalization and poverty. The case of child vulnerability in Nigeria is worsened by the generally poor health and nutrition status of the country’s children.

Responding to the needs of Orphans and Vulnerable Children (OVC) remains a public health challenge in Nigeria. Since 2005, the National Priority Agenda (NPA) was developed to assure and improve the quality of services provided for the well-being, protection, and development of the children considered most vulnerable in Nigeria. Also, the Federal Ministry of Women Affairs and Social Development (2007) developed national guidelines and standards of practice for care of vulnerable children. These guidelines and standards focus on seven programme areas, including food and nutrition, shelter and care, child protection, health, psychosocial support, education and skills training; and household economic strengthening with the aim of strengthening existing safety nets and providing additional resources without undermining the capacity of communities and families to care for and protect vulnerable children (Biemba et al., 2009). However, recent estimates from the 2013 NDHS show that a high proportion of OVCs (95%) lived in households that did not receive any type of support whereas 5% of orphans and vulnerable children received at least one type of support.

Presently, various international and local non-governmental organizations are involved in service provision across different program areas for orphans and vulnerable children in Nigeria but with the increasing economic crisis, high rate of insurgency and militancy, the need arises for targeted and strategic programs and interventions aimed at making the most impacts with adequate consideration of factors both socio-demographic and otherwise that influences support services to orphans and vulnerable children; hence the need for this study.

MATERIALS AND METHODS

The data for this study was obtained from the Nigeria Demographic and Health Survey (NDHS) of 2013. A total 5,114 orphaned or vulnerable children met the inclusion criteria of being under age 18 with one or both parents deceased or living with a very sick parent (sick for three or more consecutive months during the past 12 months) or lives in a household where an adult was very sick or died during the 12 months preceding the survey and received a support service for health/medical support. The Data on variables such as father/mother dead or being sick for 3 or more months and socio-demographic characteristics at the individual (age of the child, sex of the child, place of residence, region of residence) was extracted from the people recoded dataset.

Data analysis

The data analysis was carried out using the STATA 13 statistical software. Data processing included exploring the dataset to ‘keep’ or ‘drop’ relevant variables, weight samples and apply the svy commands to correct sampling errors. The data analysis was carried out at three levels. The analysis included the usage of appropriate weighting procedure to handle biases that may result from over or under sampled respondents. Weighting procedure used was v005/1000000 being the weighting number for the Demographic and Health Survey datasets. Analysis at the univariate level entailed simple frequencies and percentages which enabled the understanding of the population characteristics, test of associations were conducted between the dependent and independent variables at the bivariate level while the binary logistic regression was employed to analyze the effect of each individual dependent variable against the outcome variable with the dependent variable indexed into a single categorical variable of two categories (Yes and No), measuring OVC that received or did not receive any medical support.

Table 1. Distribution of respondents' by socio-demographic characteristics.

Variable	Frequency	Percent (N=5114)
Age		
0-4	538	10.5
5-9	1466	28.5
10-13	1596	31.0
14-17	1544	30.0
Mean = 10.5, SD=4.4		10.5
Sex		
Male	2670	51.9
Female	2474	48.1
Region		
North Central	892	17.3
North East	651	12.7
North West	1044	20.3
South East	975	19.0
South South	824	16.0
South West	758	14.7
Place of residence		
Urban	2367	46.0
Rural	2777	54.0

RESULTS AND DISCUSSION

Socio-demographic characteristics of orphans and vulnerable children

Table 1 shows the distribution of the orphans and vulnerable children in the study by their socio-demographics. It was observed that almost equal proportion of respondents belonged to the three highest age groups; with 28% being between ages 5 and 9 years, 31% between ages 10 and 13 years, 30% between ages 14 and 17 years, while only about one-tenth of the respondents were between ages 0 to 4. The mean age of the children was found to be 10 years with a standard deviation of 4.4. Furthermore, a little above half (52%) of the respondents were male as compared to 48% female. Respondents' region revealed that almost an equal proportion of respondents, which accounted for the highest numbers were from the North West and South East with 20 and 19%, respectively while the lowest proportion of respondents was from the North East with 13%. Meanwhile, more than half (54%) of the total respondents are resident in rural areas while 46% reside in urban areas.

Bivariate analyses

An examination of the bivariate relationship showed that region of residence and age of child were associated with receiving health support services while no relationship existed between place of residence of OVC, sex of child and receipt of support services for health (Table 2).

Multivariate analyses

Table 3 shows the odds of predicting the relationship between OVC support services received for health and their socio-demographic characteristics. Result revealed that female OVC is less likely to receive support service for health than their male counterparts (OR=0.98, $p>0.05$). Considering region, the result showed that the OVC in the North East region was 2.09 times more likely to receive health services support than other regions (OR=2.09, $p<0.05$). It was also revealed that those in the North-West region were 89% more likely to receive health services support as compared to other regions (OR=1.89, $p<0.05$). The result further revealed that support services for health were 16, 8 and 57% less likely to be received by orphaned and vulnerable children in the South East, South West and South-South, respectively.

In the examination of place of residence, findings revealed that OVC who resided in rural areas were 7% more likely to receive health support services as compared those in urban areas (OR=1.07, $p>0.05$). Adjusting for other socio-demographic characteristics and

Table 2. Relationship between OVC socio-demographic characteristics and support services for health.

Household characteristics	Chi-square and P-values
Region	
North Central (N=892)	
North East (N=651)	
North West (N=1044)	
South East (N=976)	χ^2= 219, p = 0.00**
South South (N=824)	
South West (N=758)	
Total	
Place of residence	
Urban (N=2367)	χ^2= 1.95, p = 0.45
Rural (N=2778)	
Age of child	
0-4 (N=539)	
5-9 (N=1466)	χ^2= 13.98, p=0.04**
10-13 (N=1596)	
14-17 (N=1543)	
Sex of child	
Male (N=2670)	χ^2= 0.05, p = 0.85
Female (N=2474)	

**p<0.05.

Table 3. Logistic regression of medical support against socio-demographic characteristics.

Medical support	Odds ratio	T	P>|t|	[95% Confidence Interval]	
Sex					
Male	-	-	-	-	-
Female	0.98	-0.17	0.86	0.83	1.17
Region					
North central	1.0	-	-	-	-
North East	2.09**	3.46	0.00	1.38	3.20
North West	1.89**	2.75	0.00	1.18	3.03
South East	0.84	-0.52	0.55	0.49	1.46
South South	0.43**	-3.23	0.00	0.26	0.71
South West	0.92	-0.29	0.74	0.54	1.55
Residence					
Urban	1.0	-	-	-	-
Rural	1.07	-1.09	0.66	0.78	1.48
Age					
0-4	1.0	-	-	-	-
5-9	0.99	-0.02	0.98	0.73	1.36
10-13	0.76	-1.64	0.10	0.55	1.05
14-17	0.98	-0.10	0.92	0.69	1.39

Reference category (1.0). **p<0.05.

considering respondents age, OVC who were between ages 5 and 9 were slightly less likely to receive health support services as compared to those between ages 0 and 4 (OR=0.99, p>0.05). An increment in age reduces the likelihood of receiving health support services but this was inconsistent for children between ages 14 and 17 as it was noticed that they were more likely to receive support services for health in comparison to those in age group 10 to 13.

The purpose of this study was to examine the socio-determinants of health support services among orphans and vulnerable children in Nigeria. The study found that sex of child and region of residence were significantly associated with receiving support services for orphans and vulnerable children. This finding is consistent with the findings of Schenk et al. (2010) and Goodman et al. (2014). who concluded that household characteristics influenced receipt of health support services to orphans and vulnerable children in Kenya. Although, the finding stated that household income was the most important predicting factor as it also affected child health accessibility and receipt of household economic strengthening services. Other studies, including those of Tagurum et al. (2015) and Aspaas (1999) found that region of residence influences OVC support services received. They were also stated to influence the range and value of resource options available to orphans and vulnerable households and has implied consequences on access to services for vulnerable populations.

Furthermore, in other studies, Ainsworth and Filmer (2006), Campbell et al. (2010) and Olanrewaju et al. (2015) who conducted studies on orphans and vulnerable and their access to other support services such as education and psychosocial support, it was found that socio-demographic and household factors also influenced receipt of these support services as it was specifically stated that wealth, gender and regional variation are all more important predictors of receipt of support services. Therefore, this study supports other studies including those of Foster and Germann (2002), Harber (2009) and Datta (2013) that proposed community-based care as viable approach to taking care of orphans and vulnerable children as it places children at the centre of all development programmes, ensures different levels of community ownership and participation (Ansell and Young, 2004; Sanou et al., 2009) and believed to be the most cost-effective strategy for providing care and support to OVC but proposes that interventions on service provision for OVC should be integrated into other programs such as the Hard-to-Reach (HTR) programs and the new Community Health Influencers, Promoters and Services (CHIPS) program Community Health Influencers, Promoters and Services (CHIPS) program (Adebayo, 2017) as this would help improve service provision to households, case management, tracking, monitoring and follow-up of services and militate against the influence of socio-demographic factors such as region of residence.

Conclusion

The study concludes that socio-demographic factors play a major role in receipt of health services by orphans and vulnerable children in Nigeria, although there might be other associated factors. Hence, programs and interventions should consider the dynamics of socio-demographic factors in the design and implementation of orphan and vulnerable children programs and interventions in Nigeria.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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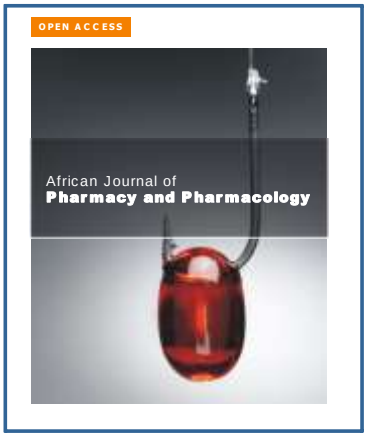

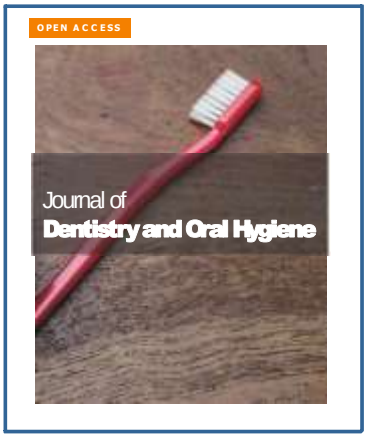

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