AVAILABILITY AND ADEQUACY OF EQUIPMENT AND SUPPLIES FOR INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESS (IMCI) IN RIVERS STATE, NIGERIA

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Abstract

Nigeria, Rivers State inclusive joined other countries in the world to implement the Integrated Management of Childhood Illness (IMCI) strategy. The strategy was developed to reduce under-five mortality and improve child health and development practices in facilities, communities and health system levels. Understanding the quality of IMCI in Rivers State is crucial to improving child health outcomes in the State. The study utilized the descriptive design to investigate availability and adequacy of equipment and supplies for IMCI in public health facilities in Rivers State. Two research questions and two hypotheses guided the study. Instrument for data collection was a researcher-designed structured questionnaire, administered to 31 Heads of public health facilities. Data analysis utilized Statistical Package for Social Sciences (SPSS) version 21. Research questions were answered using frequencies and percentages while chi-square (x^2) statistics was used to test hypotheses at 0.05 level of significance. Result indicated that equipment and supplies for IMCI was highly available (65.9%) and slightly adequate (42.6%). The study also found that availability of equipment and supplies for IMCI differed according to location but no significant difference was found in adequacy of equipment and supplies for IMCI according to location. The study concludes that quality of IMCI is compromised by inadequacy of vital equipment and supplies; and suggests periodic evaluation of programme for improvement in quality of IMCI.

Keywords: Availability, adequacy, equipment, supplies, integrated management of childhood illness, Rivers State.

Introduction

Global underfive deaths have declined drastically. Under five deaths reduced from 12.6 million in 1990 (United Nations Children's Fund - UNICEF, 2013) to 5.9 million in 2015 worldwide (World Health Organization - WHO, 2017a). This translates to under-five mortality rate 91/1,000 live births in 1990 which reduced to 43/1,000 in 2015 (WHO, 2017a). Despite these declines, developing countries, Nigeria inclusive still account for more of under-five deaths. According to WHO (2011), children in developing countries are ten times more likely to die before the age of five than children in developed countries. The global progress observed in reduction of under-five deaths transcends national levels. Nigeria under-five mortality rate has reduced from 213/1,000 live births in 1990 to 109/1,000 live births in 2015 (Index Mundi, 2015a; UNICEF, 2015). This however, is still high as Nigeria is recorded as the second highest contributor of under-five

mortality worldwide with an estimated 2,300 under-five year old dying daily of preventable or treatable infectious diseases such as malaria; pneumonia, diarrhoea, measles, Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) and malnutrition (UNICEF Nigeria, nd). Another report by Adewemimo, Kalter, Perin, Koffi, Quinley and Black (2017) indicated that sepsis, birth injury/asphyxia and neonatal pneumonia accounted for neonatal deaths while malaria, diarrhoea, and pneumonia were the leading causes of 1 – 59 month mortality in Nigeria.

In response to the challenge of high under-five deaths, integrated management of childhood illness (IMCI) strategy was developed in 1995 by WHO and UNICEF (WHO, 2000); and adopted in Nigeria in 1997 (UNICEF/Federal Ministry of Health, 2005). The strategy aims to improve child health through prevention, early detection and treatment of the main causes of morbidity and mortality in children under five years which include: diarrhoea, pneumonia, malaria, measles and malnutrition (WHO, 2000; WHO, 2003). The IMCI strategy comprises three main components which include, improving health workers' skills; improving health systems; and improving family and community practices (WHO Regional Office for the Eastern Mediterranean, 2014). The present study is focused on health system IMCI. According to the agency, health system IMCI is concerned with policy, planning and management, financing, organization of work and distribution of tasks at health facilities, human resources, availability of drugs and supplies, referral, monitoring and health information system, supervision, evaluation and research.

From the foregoing, availability of drugs and supplies is identified as one of the components of the health system IMCI. Similarly, WHO (2017b) identified the fourth of the six main steps of implementing IMCI to include: making upgraded care possible by ensuring that enough of the right low-cost medicines and simple equipment are available. The emphasis placed on equipment and supplies for IMCI portrays equipment and supplies as vital elements in health system IMCI. It is on this premise that the present study focused on equipment and supplies for health system IMCI as part of quality assessment of IMCI strategy in Rivers State.

A good understanding of the quality of IMCI will necessitate the use of models of quality assessment. The present study anchored on the Donabedian's model to examine the quality of IMCI with regard to equipment and supplies. Donabedian's model of quality recognizes equipment and supplies as part of the structural dimension of quality of care. Donabedian (1980) identified three elements of quality to include: structure, process and outcome. The model holds that outcome of care (effect of care on patient) depends on the structure (physical & organizational aspects of care setting which include: facilities, equipment, personnel, operational and financial processes supporting medical care); and process (the transaction between providers and patients including: diagnosis, treatment, preventive care & patient education). By extension, reduction in under-five mortality due to IMCI strategy is a function of equipment and supplies being provided in the facilities for use by health care providers delivering service.

The study is focused on equipment and supplies for IMCI. Hornby (2013) defined equipment as the things that are needed for a particular purpose or activity. In the context of this study, equipment are non-consumable items or tools used for delivery of IMCI services. Supplies have also been defined by Hornby (2013) as the things such as food, medicine, fuel, etc that are needed by a group of people. By this definition, supplies are seen as consumables such as food, medicines, fuel which could be consumed and replenishment needed. In the context of this study therefore, supplies refer to consumables or consumable items such as drugs, syringes and others used in delivery of IMCI services.

According to Amaral et al. (2004), equipment that are used in the delivery of IMCI services include: essential oral medications including, oral rehydration salts (ORS), recommended antibiotics, Vitamin A supplementation, iron, mebendazole and paracetamol. Others are essential vaccines including (Bacille Calmette Guerin, diphtheria, pertusis, tetanus, polio, measles); equipment to provide full vaccination services including, functioning refrigerators, sterilizer, needles/syringes. Other equipment according to the authors

include, working weighing scales for adults and children, timing device, child health cards, source of clean water as well as jugs, cups and spoons to mix and administer ORS. Other items also included are, pre-referral injectable medications including (benzyl penicillin, gentamicin & chloramphenicol)

For service providers to deliver quality IMCI services, the above-listed equipment and supplies need to be available. Abanobi (2004) defined availability of health services as the level of supply of health care resources in the population. In the context of this study, availability of equipment and supplies refer to the level of supply of equipment and supplies needed to provide IMCI services in the health facilities. For available equipment and supplies to produce expected results, they must be adequate. Mapaderum (2002) views adequacy as a satisfactory condition of resources. In this study, adequacy of equipment and supplies refer to a satisfactory condition of equipment and supplies for IMCI strategy.

Ensuring availability and adequacy of equipment and supplies for IMCI is expected to have a long-run positive impact on child health outcomes. Since the implementation of IMCI, some palpable gains have been observed in literature. A review conducted by Gera, Shah, Garner, Richardson and Sachdev (2016) found that the use of IMCI may lead to fewer deaths among children from birth to five years of age. The authors reported that one trial in Bangladesh estimated that child mortality may be 13 per cent lower with IMCI; and that another in Tanzania gave almost identical estimates. In specific terms, a study in Tanzania, by Armstrong et al. (2004) reported that children in districts where IMCI was implemented received better care than in comparison district. A similar study in Bangladesh by Arifen et al. (2008) reported that child mortality was 13.4 per cent lower in IMCI than in comparison areas and that implementation of IMCI led to improved health workers skills, health system support and family and community practices translating into increased care seeking for illnesses. A recent study in India by Bhandari, Mazumder, Taneja, Sommerfelt and Strand (2012) reported that infant mortality rate and neonatal mortality rate beyond the first 24 hours were significantly lower in the IMCI intervention clusters than in control clusters. Their study also reported that optimal newborn care practices were significantly more common in the intervention clusters. In these three countries, under-five mortality rate reduced to two-digits for instance, reduction in under-five mortality has been observed in Bangladesh from 144/1,000 live births in 1990 to 38/1,000 live births in 2015 (Index Mundi, 2015b), India from 126/1,000 in 1990 to 48/1,000 in 2015 (Index Mundi, 2015c), Tanzania from 165/1,000 live births in 1990 to 49/1,000 in 2015 (Index Mundi, 2015d) and Uganda from 187/1,000 live births in 1990 to 55/1,000 in 2015 (Index Mundi, 2015e). Strange enough, child mortality remains high in Nigeria despite the implementation of IMCI. Nigeria is one of the five countries where half of the under-five deaths occur (WHO, 2013). Ezeonwu, Chima, Ogwuonu, Ikefuna and Nwafor (2014) implicated weak health system in Nigeria especially, the absence of well-equipped facilities as a major contributor to under-five mortalities. This national scenario where health facilities are plagued with absence of equipment may also be found in Rivers State.

Rivers State is one of the thirty-six states of Nigeria with an estimated under-five mortality rate of 90/1,000 live births which is described as higher than average (Rivers State Government, 2010). It comprises 23 Local Government Areas (LGAs) distributed in three senatorial districts of Rivers East, Rivers West and Rivers South East (Nigeria Biography, 2016; & Federal Government of Nigeria, 2017). Of the 23 LGAs, only two – Obio/Akpor and Port Harcourt LGAs are urban; while the rest 21 LGAs are rural (Otto, 2008 & Obio/Akpor Federal Representative, 2016). This implies that Rivers State is largely rural with all the disadvantages of rurality. Rural areas are generally characterized by poorly equipped and staffed health facilities, high level of illiteracy, abject poverty, unemployment and lack of other basic infrastructural facilities including housing, electricity and inadequate communication facilities (Onwasigwe, 2004; Otto, 2014). The disadvantages experienced by rural residents in accessing health care result in higher morbidity and mortality rates compared to those of their urban counterparts (Stanford Medicine, 2017). Literature has also revealed that there are rural disadvantages in provision of health care services. According to WHO (2009), health care services are typically less available and of poorer quality in rural areas than in semi-urban and urban settings.

This disparity also exists in the distribution of equipment and supplies between urban and rural population especially in Nigeria, Rivers State inclusive. Ademuliyi and Aluko-Arowolo (2009) stated that disparity exists in the distribution of health care infrastructure between the urban and rural locations with the rural areas being disadvantaged. Equipments and supplies for IMCI strategy are not immune to this rural/urban disparity. The present study thus investigated availability and adequacy of equipment and supplies in Rivers State especially as a state which is largely rural.

Previous studies have investigated different aspects of IMCI. For instance, a study in Nigeria by Uzochukwu, Onwujekwe, Eziolo, Nwobi and Onoka (2007) focused on performance of health workers. Kiplagat, Musto, Mwizamholya and Morona (2014) carried out another study in Tanzania. Their study investigated factors influencing implementation of IMCI in Tanzania and reported that lack of essential drugs and supplies were among the health systems factors affecting IMCI implementation. Despite the fact that equipment and supplies are vital ingredients for provision of quality IMCI, not much is known about their availability and adequacy for IMCI strategy in Rivers State. To the best knowledge of the researchers, there is no documented evidence of reports on quality of IMCI in Rivers State especially on availability and adequacy of equipment for IMCI. This gap in literature is filled by the present study. The study also considered location in relation to availability and adequacy of equipment for IMCI strategy in Rivers State. Result from this study may serve as a basis for making necessary adjustments that could improve child health outcomes in Rivers State.

The Problem

Drastic global declines have been recorded in under-five deaths from 12.6 million in 1990 to 5.9 million in 2015. Literature also revealed the positive impact of IMCI in countries like Bangladesh, India, Tanzania and Uganda. The progress made in these countries cannot be juxtaposed with that in Nigeria as literature has revealed that Nigeria, Rivers State inclusive is recorded as one of the five countries where half of the under-five deaths occur. While the under-five mortality rate in the above mentioned countries are below 60/100 live births, Nigeria still maintains three digits from 213/1,000 live births in 1990 to 109/1,000 live births in 2015. The under-five mortality of 90/1,000 in Rivers State is even saddening as it is described as above average. This persistent under-five deaths in Nigeria albeit Rivers State, suggest that all is not well in quality of IMCI.

Earlier studies conducted in Nigeria and beyond revealed dearth of documented report on IMCI in Rivers State. More worrisome is the gap created in highlighting quality of IMCI in Rivers State. Since equipment and supplies are vital elements for assessment of quality of care as identified by Donabedian; it may be that health outcomes of under-fives in Rivers State are undermined by quality of IMCI strategy especially as it concerns equipment and supplies for IMCI. This suggests the need to investigate availability and adequacy of equipment and supplies for IMCI, as well as the influence of location on availability and adequacy of equipment and supplies for IMCI.

Purpose of the Study

The purpose of the study was to examine the availability and adequacy of equipment for IMCI in Rivers State. Specifically the study sought to:

i.   ascertain level of availability of equipment and supplies for IMCI in Rivers State;
ii. ascertain the level of adequacy of equipment and supplies for IMCI in Rivers State;

Research questions

The following research questions were answered:

i.   What is the level of availability of equipment and supplies for IMCI in Rivers State?
ii. What is the level of adequacy of equipment and supplies for IMCI in Rivers State according to location?

Hypotheses

The following hypotheses were postulated to guide the study:

i. There is no significant difference in the level of availability of equipment and supplies for IMCI in Rivers State according to location.
ii. There is no significant difference in the level of adequacy of equipment and supplies for IMCI in Rivers State according to location.

Methods

Area of the study: This was a facility-based study conducted in Rivers State, one of the 36 states of Nigeria located in South-South geopolitical zone. Its capital is Port Harcourt. Rivers State is bounded on the South by the Atlantic Ocean, to the North by Imo, Abia and Anambra States, to the East by Akwa-Ibom and to the West by Bayelsa and Delta States. The State is largely rural with only two urban Local Government Areas (LGAs) and 21 rural LGAs. The under-five mortality rate of the state is 90/1,000 live births (Government of Rivers State, 2010). There are 399 operational public health facilities in Rivers State (Okankwu, 2016). This comprised 372 primary and 27 secondary health care facilities. Health needs of underfive children as well as other inhabitants of the state are provided in these facilities and in private health care facilities as well as the Federal Government-owned University of Port Harcourt Teaching Hospital (UPTH). The present study however, is delimited to public health care facilities owned by Rivers State Government.

Research design: Descriptive

Population for the study: Population included 399 Heads of public health facilities in Rivers State.

Sample: Sample for the study consisted of 31 Heads of public health facilities in Rivers State drawn using multistage sampling procedure and guided by WHO, UNFPA, UNICEF and AMDD (2009) recommendation for area and facility selection. This is already explained elsewhere (Okankwu 2016; Okankwu & Samuel, 2017).

Instrument: Structured researcher-designed questionnaire was used for the study. "Yes" and "No" response format was adopted. The questionnaire items comprised equipment used for IMCI as revealed in literature. Face validity of the instrument was established by the judgement of four experts in the Department of Human kinetics and Health Education, University of Nigeria, Nsukka. Reliability of the instrument was determined using Cronbach's Alpha which yielded a reliability index of 0.77. Same was deemed appropriate for the study based on University of Virginia (2016) which recommended Cronbach's Alpha between 0.65 and 0.80 as acceptable.

Data collection: Data collection was by the researchers and six trained research assistants.

Data analysis: Data analysis employed the use of Statistical Package for Social Sciences (SPSS) version 21. Frequencies and percentages were used to answer research questions while chi-square (x^2) test was used to test hypotheses at .05 level of significance. Level of availability and adequacy used a scale adopted from Olaosebikan (2007) and modified to suit the study context. In the scale, percentage score of 70 and above = very highly available, 60-69 = highly available, 50-59 = moderately available, 40-49 = slightly available and below 40 = low in availability. Same was utilized for adequacy. This scale was successfully used by Okankwu (2016) hence deemed appropriate for the study. Hypotheses were tested using chi-square (x^2) statistic at .05 level of significance.

Ethical Consideration

Ethical clearance to conduct this study was obtained from the Rivers State Health Ethics Research Board situated in Rivers State Hospitals Management Board, Port Harcourt. Rivers State Ministry of Health and

Rivers State Primary Health Care Management Board also gave written permission to conduct the study. Verbal permission was also granted by Heads of the health facilities who participated in the study.

Results:

Table 1: Availability of Equipment and Supplies for IMCI (n = 31).

S/N	Items	Availability				
		Available		**Not available**		**Remark**
		f	%	f	%	
1	Functional weighing scale	27	87.1	4	12.9	Very highly available
2	IMCI guideline	11	35.5	20	64.5	Low in availability
3	Measuring tape	24	77.4	7	22.6	Very highly available
4	Immunization/Child health card	27	87.1	4	12.9	Very highly available
5	Essential oral medications	20	64.5	11	35.5	Highly available
6	Essential vaccines	24	77.4	7	22.6	Very highly available
7	Functional refrigerator	23	74.2	8	25.8	Very highly available
8	Sterilizers	26	41.9	18	58.1	Slightly available
9	Needles/syringes	20	83.9	5	16.1	Very highly available
10	Source of clean water	24	77.4	7	22.6	Very highly available
11	Jugs, cups and spoons for ORS	20	64.5	11	35.5	Highly available
12	Pre-referral injectable medication	11	35.5	20	64.5	Low in availability
13	Timing device	19	61.3	12	38.7	Highly available
14	Facilities for referring emergency cases	17	54.8	14	45.2	Moderately available
	Cluster percentage		**65.9**		**34.1**	**Highly available**

Table 1 above shows that on the average, equipment for IMCI were highly available (65.9%). The Table further reveals that functional weighing scale (87.1%), immunization/child health card (87.1%), needles and syringes (83.9%), measuring tape (77.4%) and essential vaccines (77.4%) were very highly available. In addition, the Table reveals that essential oral medication (64.5%), jugs, cups and spoons for ORS (64.5%) and timing device (61.3%) were highly available. The Table also shows that facilities for referring emergency cases (54.8%) were moderately available; while the rest items including, sterilizers (41.9%), IMCI guideline (35.5%), and pre-referral injectable medications (35.5%) were of low availability.

Table 2: Adequacy of Equipment and supplies for IMCI (n = 31).

S/N	Items	Adequacy				
		Adequate		**Not adequate**		**Remark**
		f	%	f	%	
1	Functional weighing scale	13	41.9	18	58.1	Slightly adequate
2	IMCI guideline	6	19.4	25	80.6	Low in adequacy
3	Measuring tape	15	48.4	16	51.6	Slightly adequate
4	Immunization/child health card	17	54.8	14	45.2	Moderately adequate
5	Essential oral medications	14	45.2	17	54.8	Slightly adequate
6	Essential vaccines	18	58.1	13	41.9	Moderately adequate
7	Functional refrigerator	10	32.3	21	67.7	Low in adequacy
8	Sterilizers	7	22.6	24	77.4	Low in adequacy
9	Needles/syringes	19	61.3	12	38.7	Highly adequate
10	Source of clean water	17	54.8	14	43.2	Moderately adequate
11	Jugs, cups and spoons for ORS	13	41.9	18	58.1	Slightly adequate
12	Pre-referral injectable medication	8	25.8	23	74.2	Low in adequacy
13	Timing device	14	45.2	17	54.8	Slightly adequate
14	Facilities for referring emergency cases	14	45.2	17	54.8	Slightly adequate
	Cluster percentage		**42.6**		**57.4**	**Moderately adequate**

Overall, Table 2 shows that equipment and supplies for IMCI are slightly adequate (42.6%). The Table further reveals that needles and syringes (61.3%) were highly adequate. From the Table essential vaccines (58.1%), immunization/child health card (54.8%) and source of clean water (54.8%) were moderately adequate. In addition, measuring tape (48.4%), essential oral medications (45.2%), timing device (45.2%) and facilities for referring emergency cases (45.2%) were slightly adequate; while pre-referral injectable medications (35.5%), functional refrigerator (32.3%), sterilizers (22.6%) and IMCI guideline (19.4%) were low in adequacy.

Table 3: Summary of Chi-Square Analysis of no Significant Difference in the Level of Availability of Equipment and Supplies for IMCI According to Location.

S/N	Item	Urban (n=106)		Rural (n=299)		x^2 Value	d.f	P-value	Decision
		Av	NAv	Av	NAv				
1	Integrated management of childhood illness.	85(74.6)	28(38.4)	202(212.4)	120(109.6)	5.811	1	0.016	rejected

Key: AV = Available; NAV = Not Available. * = Significant, * Figures in bracket are the expected x^2 value, figures outside the brackets are observed values.

Table 3 shows the x^2 calculated values with its corresponding P-value at one degree of freedom for the availability of equipment and materials for IMCI (x^2 = 5.811, P=0.016 < 0.05) which is less than .05 level of significance at one degree of freedom. The null hypothesis of no significant difference was therefore rejected. This implies that availability of IMCI materials differed according to location.

Table 4: Summary of Chi-Square Analysis of no Significant Difference in the Level of Adequacy of Materials for IMCI According to Location.

S/N	Item	Urban (n=106)		Rural (n=299)		x^2 value	d.f	P-valu	Decision
		Ad	NAd	Ad	NAd				
1.	Integrated management of childhood illness.	52(47.7)	60(64.3)	133(137.3)	189(184.7)	184.7	1	.345	Accepted

Key: Ad = Adequate; NAd = Not Adequate, * Figures in bracket are the expected x^2 values, figures outside the brackets are observed values.

Table 4 shows the calculated x^2 value with its corresponding P – value at one degree of freedom for the adequacy of materials for IMCI (x^2 = .892, P = .345 > 0.05), which is greater than 0.05 level of significance at one degree of freedom. The null hypothesis of no significant difference was therefore accepted. This implies that the adequacy of equipment and supplies did not differ according to location.

Discussion

Data contained in Table 1 showed that materials for IMCI were generally highly available (65.9%). While some items such as weighing scale, immunization/child health card, needles and syringes, measuring tape and essential vaccine were highly available, other items such as sterilizers, IMCI guideline, and pre-referral injectable medications were low in availability. The low availability of these items could be explained by the fact that IMCI is not institutionalized like immunization programme.. The finding of this study is expected hence not surprising based on existing literature. Ghana Ministry of Health (2002) had reported availability of

first line drugs and non-availability of second line drugs, vitamin A and pre-referral medications. Table 3 also showed that availability of IMCI equipment and supplies were significantly influenced by location.

Findings in Table 2 revealed that equipment and supplies for IMCI were slightly adequate but level of adequacy did not differ according to location. This finding supports the finding of Titilaye, Jusril, Ariawan, Soeharno, Setiawan and Weber (2014) who reported that only 19 per cent of facilities in Puskesmas had all the essential drugs and equipment for IMCI. This inadequacy of equipment and supplies may hamper quality of care provision for IMCI. The negative trend observed in this study could be explained by the fact that IMCI is poorly visible in the State. A study conducted by Okankwu (2016) reported that IMCI strategy in Rivers State had numerous challenges among which were, inadequate manpower, poor funding, no training and in fact non-functional. The author reported that only 50 health workers representing 8.5 per cent of the heath workers in the state were trained for IMCI; and that this number was by far below the WHO recommendation that 60 per cent of the population of health workers should be trained for IMCI. (Amaral et al., 2014)

Conclusion

Results show that equipment for IMCI were highly available but low in adequacy. While Rivers State Government and responsible agencies are commended for ensuring availability and adequacy of equipment and supplies for IMCI to the extent that were possible; the observed low adequacy of equipment and supplies may have negative impact on the quality of services rendered for IMCI strategy with attendant poor child health outcomes in the state. The study thus concludes that quality of IMCI is compromised by low adequacy of vital equipment and supplies and believes that improvement is possible with improvement in political and financial commitment by the state government.

Recommendations

Based on the findings of the study and the conclusion, the following recommendations are made:

i. IMCI programme managers should make requisition for items necessary for provision of IMCI. These include; items such as IMCI guideline, functional refrigerator, pre-referral injectable medications as these were found to be low in availability in the health facilities.

ii. Heads of health facilities should bring to the knowledge of programme managers and responsible agencies (such as Ministry of Health, Rivers State Primary Health Care Management Board & Rivers State Hospitals Management Board) such items that were found to be inadequate as their adequacy could improve quality of IMCI services provided.

iii. Rivers State Government should show greater commitment to the delivery of IMCI strategy by ensuring that grants are provided for the purpose of conducting research on IMCI. This would to a large extent bring to light strengths, weaknesses and needs of the programme.

iv. Rivers State Government should ensure the monitoring and evaluation of IMCI so as to be abreast with trends on its operation.

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