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Assessment of Factors Influencing Acquisition and Deployment of Technical Facilities in Maternal Healthcare Delivery in Osun State, Nigeria

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Abstract

This study assessed the factors influencing the acquisition and deployment of technical facilities for maternal healthcare delivery in Osun State. A two-stage probability sampling procedure was employed to select two Local Government Areas (LGAs) from each of the three Senatorial districts of the study area. The state hospitals in each of the selected LGAs and all the tertiary hospitals in the study site were selected for the study. A total of 112 respondents (14.3%, 28.6% and 57.1% from Ede, Osun East and Ife/Ijesa senatorial districts respectively) from seven health facilities were surveyed. Data were obtained through primary and secondary sources in both secondary and tertiary health facilities. The study revealed that the factors influencing acquisition include the need and demand for a particular technical facility, increase in the number of equipment, damages to existing ones, availability of funds as well as the disposition of management authority towards the demands. Also, the deployment of these technical facilities in the various maternal healthcare units of the health facility depends on the areas of needs. Therefore, the study concluded that acquisition of technical facilities should be quickly attended to in order to shorten the purchase and installation process. Also a system of preventive maintenance, where maintenance of equipment will be done at a fixed and predetermined interval usually fixed by hours-of-operation was preferable.

Introduction

Maternal and Neonatal deaths are a reflection of the poor status of maternal reproductive health, poor management of pregnancies and deliveries and inadequate care of new born babies (Grange, 2009). Where deaths do not occur, permanent disability resulting from pregnancy complications may occur. Complications of pregnancy include pelvic inflammatory disease, infertility and vesico-vaginal fistulae. Koblinksky *et al.*, (1993) in their study on “The health of women: A global perspective, revealed that about 40% of all pregnant women suffer complications while about 15% of them need obstetric care to

manage these potentially life-threatening complications. Studies have revealed that between 100,000 and 1 million women who survived pregnancy and child birth suffer from obstetric fistula (UNICEF, 2007). An experimental study conducted in Matlab, Bangladesh, comparing the models of obstetric care service provision showed that improving access to essential obstetric care (EOC) was vital in the reduction of maternal mortality (Fauveau *et al.*, 1991; Ronsmans *et al.*, 1997).

The Millennium Development Goal number 5 (MDG5) specifically focuses on maternal health and one of its key indicators is reduction in maternal mortality ratio by three quarters

between 1990 and 2015. Currently, about half a million women die globally from maternal causes, most of which are preventable in nature. Almost all (99%) global maternal deaths occur in developing countries, with the burden highest in sub-Saharan Africa and South-East Asia (WHO, 2007). Nigeria is one of the countries with the highest burden of maternal deaths in the world. According to United Nation sources, Nigeria has a high maternal mortality ratio (MMR) of 840 per 100,000 live births (WHO, 2010). Addressing the unacceptably high maternal figure has been noted to be a major national priority as revealed in critical national policy documents such as the National Policy on Health, National Reproductive Health Policy and Nigeria Health Strategic Development Plan. Government and its development partners have initiated a number of programmes aimed at reducing maternal mortality. Trends in maternal mortality need be monitored in order to ascertain the impact of these programmes and to monitor the degree to which Nigeria is making progress with regards to MDGs (FMOH, 2001).

UNICEF (2007) revealed in a study that poverty, demographic pressures and insufficient investment in public health care inflates the levels and ratios of maternal and neonatal mortality. It further revealed that the 2005 estimates placed the average national maternal mortality ratio at 1,100 deaths per 100,000 live births as well as the life time risk at 1 in 18. The burden of maternal death from global perspective reveals that 1 in every 9 maternal death occur in Nigeria alone. About 53,000 maternal deaths resulting from complications during pregnancy and delivery occur every year which is translated to mean 1 maternal death in every 10 minutes in Nigeria. (FMOH, 2009a).

“For every maternal death, about 30 other women suffer one pregnancy-related ailment or the other. These ailments and disabilities such as anaemia, obstetric fistula, chronic pelvic inflammatory disease and post-partum psychosis (women losing their minds after child birth) afflict the victims for periods ranging

from days to life” (FMOH, 2009b). Also USAID (2011) revealed that between 1,080,000 to 1,620,000 Nigerian women suffer disabilities resulting from complications during pregnancy and child birth.

Complications can occur suddenly even in healthy women who have attended and received good antenatal and/or intrapartum care (Kongnyuy, et al., 2009). Developing countries have been noted to suffer a high maternal mortality ratio of between 100 to 1000 deaths per 100,000 live births. Burkina Faso is one of the countries in the world that suffers high rates of maternal mortality and morbidity. It is on record that for every three hours, a Burkinabe woman dies from pregnancy-related complications and for which maternal death that occurs 20 to 30 women suffer from pregnancy-related complications (Engenhealth, 2011). Poor accessibility to quality health care in Democratic Republic of Congo (DRC) led to high maternal and infant mortality rates (Engenhealth, 2011).

WHO and UNICEF (1996) showed in an earlier study that there were about 595,000 maternal deaths worldwide in 1990. It further revealed that 80% of these deaths occurred in developing countries and most of the deaths were as a result of direct obstetric causes namely hemorrhage, eclamsia, sepsis, obstructed labour and unsafe abortion. The rest 20% were due to pre-existing pregnancy aggravated conditions such as anaemia and malaria. This high ratio places women and children in high-risk group.

The efforts of government and development partners aimed at reducing maternal mortality included the formulation of different policies on reproductive health. The Federal Ministry of Health in 2001 set, as part of its national reproductive health policy, a reduction by half the maternal mortality within ten years. The National study on EOC was put in place in 2003 with specific objectives of determining the availability of EOC services in Nigeria, geographical spread of EOC facilities, and assessment of pattern of utilisation of EOC services. Other objective is to provide

recommendations on policy and programme directions for the reduction of maternal mortality in Nigeria. (Fatusi and Ijadunola, 2003).

Investing in non-depreciating assets such as educational development of human resources in the management of EOC facilities as well as acquisition, deployment and maintenance of technological resources are necessary tools in human development or national development. The second edition of the reviewed Science and Technology (S & T) policy has as one of its objectives that “S & T shall form the basis for national development as well as a tool for influencing Nigerians’ thinking and working processes”. The health policy statement using S & T states that “the nation’s healthcare delivery system shall be enhanced through effective research and development activities in S & T” and has as one of its objectives “to improve the health of the people” (FMOH, 2001).

The EOC has been classified or categorized into two namely: basic emergency obstetric care (BEOC) and comprehensive emergency obstetric care (CEOC). The true capacity of any health facility to perform the signal functions is a function of the availability of key relevant and functional equipment (technological resources) such as vacuum and/or forceps for assisted vaginal delivery) and health personnel (human resources) (Fatusi and Ijadunola (2003).

Facilities with adequate resources must be accessible to pregnant women in order to ensure the provision of emergency obstetric care. Very little research has been published on the management of hospital equipment. A properly functioning equipment is as important as staff readiness, physical facilities and supplies when providing EOC services (Zafarullah, 2000). Management of equipment is considered as an integral part of Health Technology Cycle. Management of equipment includes selection and purchase, distribution and installation, use, repair and maintenance and disposal (Mallouppas, 1986). Mavalankar *et al.* (2004) revealed that 30% - 80% reduction in the useful life of equipment were due to

inexperienced operators and lack of repair or maintenance while 20% - 40% of sophisticated equipment suffered wastage due to under utilization or never used because of lack of operating staff, maintenance staff and medical expertise. Lack of spare parts, repairs and absence of preventive maintenance constituted 25% - 35% of wastage of equipment.

An intervention program which focused on improving hospital management (at a regional hospital in Kigoma, Tanzania) aimed at providing a favourable working environment led to reduction in maternal deaths from 933 to 186 per 100,000 live births between 1984 and 1991. The intervention programs included regular maintenance of equipment using local materials and resources and increased on-the-job training programs (PMM, 1995)

A health facility has technical facilities as an integral part of the physical infrastructure and hence the quality of health services is improved by the availability and utilization of medical equipment (Pardeshi, 2005). For a reduction in maternal deaths resulting from direct death, the proven interventions involve the acquisition and deployment of technical resources. For appropriate interventions towards the reduction of maternal deaths resulting from these direct causes it requires not just technically skilled human resources but also acquisition of adequate, functioning and well deployed technical facilities. The consistent maintenance and replacement plan must also be put in place (WHO, 2000).

Health workers can achieve very little in the management of obstetric emergencies to prevent maternal death without necessary equipment experts. The careful monitoring of the growth and viability of the fetus and the health of the mother, for example, can be better done using technology. An assessment of such technical facilities in the area of acquisition, deployment and maintenance is very essential. Hence this study provides an empirical assessment of the technical resources for EOC services in the secondary and tertiary health facilities.

Essential Obstetric Care (EOC) is an important health service delivery put in place to reduce maternal mortality. The need for EOC as an important and effective package as well as a critical component of health care aimed at reducing maternal mortality cannot be over emphasized. It refers to a package of clinical interventions or signal functions needed to prevent deaths from the main direct obstetric complications, most of which cannot be predicted or prevented. It is also one of the two promoted strategies for maternal mortality reduction in developing countries. The other one is delivery by skilled birth attendant (World Bank, 2003). Studies have also focused more on skilled delivery but there is a dearth of information on the acquisition and deployment of appropriate technical facilities in this part of the world. Hence, this study focuses on assessment of factors affecting acquisition and deployment of technical facilities in Maternal Healthcare delivery in Osun State, Nigeria.

Materials and Methods

The study area, Osun State is located in the southwestern geopolitical zone of Nigeria and on Longitude 4 00' 00"E and 5 04' 00"E; Latitude 6 45' 00"N and 8 07' 00"N with its capital in Osogbo. A two-stage probability sampling procedure was employed in selecting two Local Government Areas (LGAs) from each of the three Senatorial districts of the state. The state hospitals in each of the selected LGAs and all the tertiary hospitals in the study area were selected for the study. Data were obtained from both primary and secondary sources in both secondary and tertiary health facilities. The choice of both levels of health facilities was based on the referral system that should exist between them. The referral system is put in place to complement each other for effective maternal health care delivery.

Using the primary source, information were elicited from healthcare workers such as doctors, nurses and technologists attached to the reproductive units of the health facilities. For the secondary source information from existing hospital records with particular reference to technical facilities were sought. A

Chief Nursing Officer, an experienced staff nurse, a technologist or a biomedical engineer was identified to supply the information needed on acquisition, deployment and maintenance of technical facilities. Two data collection tools were designed for this study, namely: key informant guide and the health records observational checklists. The key informant guide was designed to elicit information on the process of and factors influencing acquisition, deployment and maintenance of technical facilities.

Key informants were interviewed with the aid of a key in-depth interview (KII) guide. The secondary data was basically dependent on the existing records of technical facilities with regards to mode of acquisition, adequacy, functionality, deployment, rate of maintenance and obsolescence of technical facilities. In all, a total of seven health facilities (two tertiary and 4 secondary health facilities) were surveyed and 112 respondents interviewed.

Results

The background characteristic of the respondents is presented in Table 1. The average age of respondents interviewed was 37 years with a standard deviation of 10 years. More than one-third (41.1%) of the respondents were at least 40 years old as at the time of the survey. The study revealed that 84.1% of the respondents were in the reproductive age group (15-49 years). More than two-thirds (83.9%) of the respondents were females. Doctors working in any of the maternal care units accounted for 15.2% of the total number of reproductive health personnel while 47.3% and 36.6% of them were midwives and nurses respectively. There were five maternal health care units of a health facility namely labour ward, antenatal clinic, antenatal ward, gynea theatre and postnatal ward. The labour ward houses 38.4% of the respondents. This is followed by the Antenatal clinic which houses 23.2% of the respondents. In all, the average length of years of work experience as trained reproductive health personnel was about 10 years with 33 years as the maximum. More than one-third

(39.3%) of the respondents had spent at least 10 years as trained reproductive health personnel in all the different maternal health care units of the health facilities. It is also revealed in Table 1 that 55 respondents (49.1%) were attached to

the Federal Government owned health institutions while 57 (50.9%) respondents were attached to state government owned health institutions.

Table 1. Background characteristics of respondents

Variable	Frequency (n=112)	Percentage
Age (years)		
<25	14	13.1
25-29	18	16.8
30-34	16	15.0
36-39	15	14.0
>39	44	41.1
Sex		
Male	18	16.1
Female	94	83.9
Nature of work		
Nurse	53	47.3
Midwife	41	36.6
Doctor	17	15.2
Technologist	1	0.9
Present unit of work		
Antenatal clinic	26	23.2
Antenatal ward	13	11.6
Labour ward	43	38.4
Gynea theatre	15	13.4
Postnatal ward	15	13.4
Length of years working as trained reproductive health worker		
<1	5	4.5
1-9	63	56.3
10-19	24	21.5
20-29	14	12.5
>29	76	5.4
Ownership of Health Facility		
Federal Government	55	49.1
State Government	57	50.9

Source: Field Survey, 2012

The distribution of functioning technical facilities by type of acquisition is presented in Table 2. The categorization of the type of acquisition includes outright purchase and leasehold. Of the total number of functioning technical facilities in secondary level health facilities 96.3% and 95.6% were by outright

purchase and leasehold respectively. Lack of funds has been identified as the primary determinant for acquisition of technical facilities. This is in accordance with the findings of Mavalankar, *et al.* (2004) who revealed that the proportion of funds allocated for repair and maintenance was abysmally low

in developing countries of Asia and Africa. While it is necessary to follow due process in the process of acquisition of technical facilities, consideration should be given to the lead-time required (Mavalankar, *et al.*, 2004). The importance of strategic planning to determine the requirement of technical facilities and also to forecast the probable time of replacement based on the lifespan of each equipment is very important.

A presentation of the distribution of functioning technical facilities at the different levels of health facilities by source is shown in Table 3. The sources of technical facilities have been categorized into local and imported. The Table 3 revealed that 83.2% of the functioning technical facilities in the secondary level of health facility were imported while 26.7% of the functioning technical facilities in tertiary health facilities were sourced locally.

Table 4 revealed that 60% of the technical facilities were regularly maintained at the tertiary level of health facilities while 19.3% of the technical facilities were regularly maintained at the secondary level of health facilities. The maintenance unit of the health facility regarded as a servicing unit is majorly involved in the procurement, installation, maintenance and repair of equipment. A requisition for maintenance (servicing or repair) is sent to the biomedical unit of the health facility through the head of the unit to the biomedical engineer. On the spot assessment of the extent of maintenance is then carried out by the technologist who then determines whether or not the equipment will be repaired at the maternal health care unit or carried to the maintenance office of the biomedical engineer. After the maintenance has been concluded the user is called upon to certify the working condition. It is noted that if the repair work attracts any financial implication, the maternal health care unit will be responsible for the bill.

The challenges in the deployment of technical facilities in the different maternal care units were lack or insufficient technical facilities, obsolescence and irregular maintenance. Pardeshi (2005) opined that careful procurement, incoming inspection, successful installation and synchronisation of qualified trained staff and infrastructure support will ensure timely onset of use of equipment. It is expected that each of the maternal health care units should have its own set of needed and functioning technical facilities in order to make adequate provision for immediate attention to patients. Where a maternal health care unit depends on another maternal health care unit for the provision of an urgently needed functioning technical facility, the releasing maternal health care unit is deprived of such technical facility. Cases of emergency obstetric care services may not be adequately carried out which in turn may lead to further maternal complications.

The KII conducted revealed the following as factors influencing acquisition of technical facilities:

- Release of funds for these facilities from both state and federal governments
- Delay in the compilation of required technical facilities by both users and technologists
- Autonomy of the authority expected in taking a decision for acquisition and
- Allocation of funds by management authority of the health facilities. In spite of the fact that the maternal health care units of the health facilities are regarded as the most income generating unit, availability of technical facilities suffers a setback.

Table 2 **Distribution of functioning technical facilities by level of health facility and type of acquisition**

Technical facilities	Level of facility			
	Secondary		Tertiary	
	Type of acquisition		Type of acquisition	
	Outright purchase	Leasehold	Outright purchase	Leasehold
Laparoscopy set	1			
Ultrasound Machine			1	
Cardiotocograph Machine				
Sonicaide				
Resuscitaire for baby	1		1	
Incubator for baby	1		20	
Hysteroscope				
Angle-poised lamp	7		2	
Gynaecological couch	4			
Gynaecological	4		3	
Operating table/lamp				
Vacuum Extractor with metal cups	3			
Ambubag for adult	6		1	
Ambubag for Paediatrics	3		1	
A set of Paediatric laryngoscope	1		1	
A set of Paediatric endotracheal tube	8		1	
Adult laryngoscope set	2		1	
Hydraulic trolleys	2			
Adult weighing Machine	6			
Sphygmomanometer	16		3	
Bi-aural Stethoscope	17			2
Glucometer	3			
Reagent Kit for Urinalysis	3			
Oxygen Converter	3		1	
Delivery Couch	9	3	4	
Electric Suctioning Machine	3	1	3	
Mechanical Suctioning Machine	1			
Total	104 (96.3)	4 (3.7)	43 (95.6)	2 (4.4)

Table 3 Distribution of functioning technical facilities by level of health facility and source of equipment

Technical facilities	Level of facility			
	Secondary		Tertiary	
	Source of equipment		Source of equipment	
	Local	Imported	Local	Imported
Laparoscopy set		1		
Ultrasound Machine				1
Cardiotocograph Machine				
Sonicaide				
Resuscitaire for baby		1		1
Incubator for baby		1		20
Hysteroscope				
Angle-poised lamp	1	6	2	
Gynaecological couch	6	2		
Gynaecological Operating table/lamp		4		3
Vacuum Extractor with metal cups	1	2		
Ambubag for adult	1	5	1	
Ambubag for Paediatrics		3	1	
A set of Paediatric laryngoscope		1	1	
A set of Paediatric endotracheal tube		8	1	
Adult laryngoscope set		2	1	
Hydraulic trolleys		2		
Adult weighing Machine	1	5		
Sphygmomanometer		16		3
Bi-aural Stethoscope	1	16		2
Glucometer	2	1		
Reagent Kit for Urinalysis		3		
Oxygen Converter		3	1	
Delivery Couch	5	7	4	
Electric Suctioning Machine	1	3		3
Mechanical Suctioning Machine		1		
Total	19 (16.8)	94 (83.2)	12 (26.7)	33 (73.3)

Table 4 Distribution of functioning technical facilities by level of health facility and rate of maintenance

Technical facilities	Level of facility			
	Secondary		Tertiary	
	Rate of maintenance		Rate of maintenance	
	Regular	Not regular	Regular	Not regular
Laparoscopy set		1		
Ultrasound Machine			1	
Cardiotocograph Machine				
Sonicaide Resuscitaire for baby			1	
Incubator for baby	1			20
Hysteroscope				
Angle-poised lamp	5	1		2
Gynaecological couch	8			
Gynaecological Operating table/lamp	2	2	3	
Vacuum Extractor with metal cups	1	2		
Ambubag for adult	4	2	1	
Ambubag for Paediatrics	2	1	1	
A set of Paediatric laryngoscope	1	1	1	
A set of Paediatric endotracheal tube	5	3	1	
Adult laryngoscope set	2		1	
Hydraulic trolleys	1	1		
Adult weighing Machine	4			
Sphygmomanometer	16		3	
Bi-aural Stethoscope	15	2		2
Glucometer	3			
Reagent Kit for Urinalysis	1	2		
Oxygen Converter	3		1	
Delivery Couch	11	1	4	
Electric Suctioning Machine	3	1		3
Mechanical Suctioning Machine		1		
Total	21 (19.3)	88 (80.7)	27 (60.0)	18 40.0)

The process of acquisition involves the identification of needs by the immediate users, preparation of requisition forms, assessment and subsequent endorsement by biomedical engineers, onward processing to management authority for consideration and subsequent

award to suppliers through the Tenders Board. Where the cost of such technical facility is within the monthly allocation given to the department, the head of the maternal care unit contacts the supplier directly (see Figure 1)

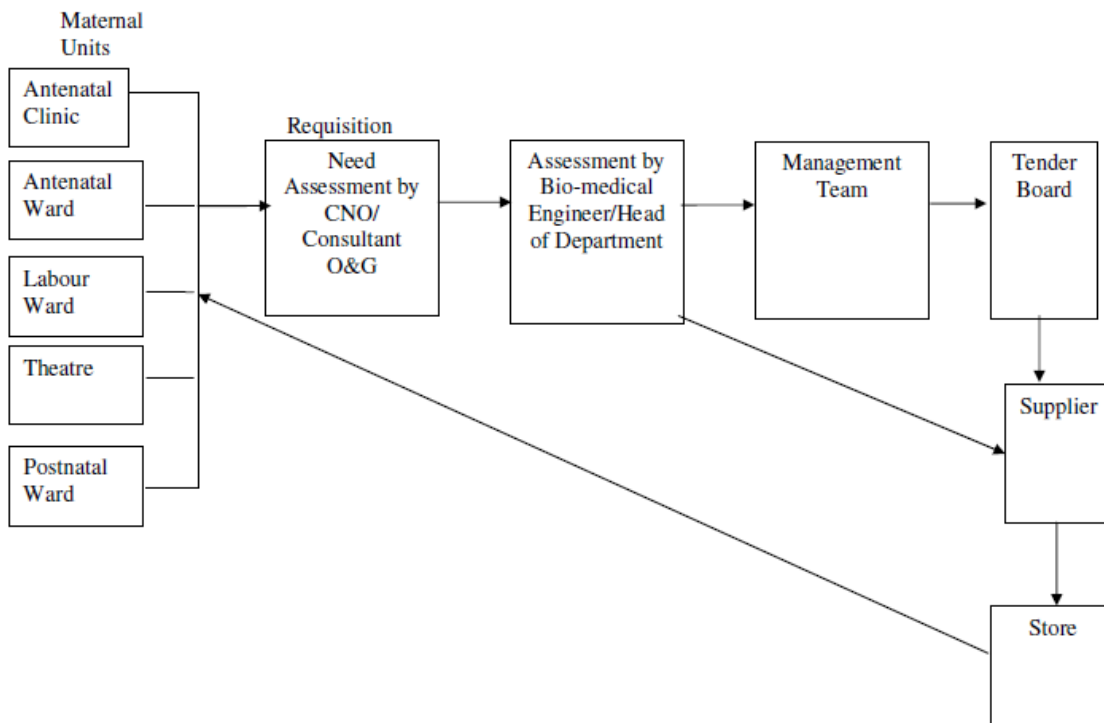


Figure 1 Process of Acquisition of technical facilities

The prompt supply and installation is usually a function of availability and allocation of funds. Availability of funds has been the major determinant in acquiring technical facilities. The KII identified lack of or insufficient funds as the bane of acquisition as well as maintenance. Mavalankar, *et al.* (2004) also revealed that within the meager health budget, the proportion allotted for repair and maintenance is abysmally low which further compounds the management problems.

The appropriate deployment of these technical facilities takes place in each of these maternal care units. The various maternal care units must have separate technical facilities and must be adequate to meet up with the average number of cases on ground at any point in time. Inadequacy of any of the technical facilities in any of the maternal health care units leaves the affected maternal health care unit to be dependent on others. This shortage leads to increase in the admission to treatment interval. This can in turn lead to more

maternal complications and subsequently increase in maternal deaths.

Interviews revealed that the factors influencing the deployment of technical facilities in each of the maternal care units have been identified to be majorly availability of the technical facilities and also the areas of needs in the different units. Obsolescence and maintenance are also factors influencing the deployment of the technical facilities. Regular and adequate supply of electricity is another factor influencing the deployment of some of the technical facilities which require powering through electricity. Maintenance is poor and can be said to be as a result of factors which include the non training of technologists by suppliers and non replacement of spare parts. The effect of the use of these technical facilities towards the treatment of maternal morbidity include the early detection of complications, enhancement of evaluation and diagnosis of patients and provision of information to complement clinical findings. When interventions are done, the incidence of maternal mortality is reduced.

References

Fatusi A.O. and Ijadunola K.T. (2003) "National Study on Essential Obstetric Care Facilities in Nigeria" Federal Ministry of Health, Nigeria-Technical Report. ISBN 978-062-225-X

Fauveau V., Stewart K., Khan S.A., and Chakraborty J. (1991) "Effect on Mortality of Community-based maternity-care programme in rural Bangladesh". *Lancet*; 338(8776): 1183-6

Federal Ministry of Health (FMOH) (2001) "National reproductive health policy and

strategy to achieve quality reproductive and sexual health for all Nigerians" ISBN:978-062-838-X

Conclusion

The study assessed the factors influencing acquisition to be the need and demand for a particular technical facility, the need to increase the number of equipment, damages to existing ones, availability of funds as well as the disposition of management authority towards the demands. The deployment of these technical facilities in the various maternal healthcare units of the health facility depends on the areas of needs. The effects of the deployment of these technical facilities towards the reduction of maternal deaths include enhancement in proper evaluation and diagnosis of the patients and it also provides more information to complement clinical findings. The study concludes that the process of acquisition of technical facilities should be quickly attended to in order to shorten the purchase and installation process. Also a system of preventive maintenance, where maintenance of equipment is done at a fixed and predetermined interval (usually by hours-of-operation) is preferable. It is advantageous in that it improves the availability and functionality of deployed equipment in the various maternal healthcare units.

Federal Ministry of Health (FMOH), Nigeria (2009a) "Maternal health fact sheet: improving maternal and newborn and child health"

Federal Ministry of Health (FMOH), Nigeria (2009b) "Integrated maternal, newborn and child health strategy" http://www.unicef.org/nigeria/ng_publications_I MNCHbrochure.pdf (accessed July 27, 2011)

Grange A. (2009) "Reducing Maternal and Neonatal Mortality in Nigeria:

Assessment of the Needs of the Health Sector" in *Population and Reproductive Health in the Developing World- Challenges for the New Millennium* ed A.O. Dada. 64-71

- Koblinsky M.A., Judith T. and Jill G. (1993) "The Health of Women: A Global Perspective" Westview Press, Oxford 1993
- Kongnyuy E., Hofman, J. and van den Broek N. (2009). "Ensuring effective Essential Obstetric Care in resource poor settings." BJOG: An International Journal of Obstetrics & Gynecology, 116: 41-47. doi: 10.1111/j.1471-0528.2009.02332.x
- Mallouppas Andreas (1986) "WHO programme for support to countries in the field of maintenance and repair of hospital and medical equipment". Background Document. Geneva. WHO
- Mavalanka D., Raman P., Dwivedi H. and Jain M.L. (2004) "Managing equipment for Emergency Obstetric care in rural hospital". International Journal of Gynecology and Obstetrics. 87:88-97
- Osun State Ministry of Health (2009) "Osun State Health Facilities Inventory" Produced by Health Planning, Research and Statistics Department, Ministry of Health, Osogbo.
- Pardeshi G.S. (2005) "Medical equipment in government health facilities: Missed opportunities" Indian J Med Sci (serial online) (cited 2011 Oct 27); 59:1-9. Available from: <http://www.indianjmedsci.org/text.asp?2005/59/1/13/13813>
- Prevention of Maternal Mortality (PMM) Network (1995) "Situation analysis of Emergency Obstetric Care: Examples from Eleven Operations Research projects in West Africa. Social Science and Medicine 40 (5) 657-667
- Rosenfield A. and Maime D. (1985) "Maternal mortality- a neglected tragedy. Where is the M in MCH?" Lancet 2:83-85
- Ronsmans C., Vanneste A.M., Chakraborty J. and van Ginneken J. (1997) "Decline in maternal mortality in Matlab, Bangladesh, a cautionary tale" Lancet 350 (9094):1810-4 sava.aed.org/.../maternal_mortality/html/eoc.Htm
- UNFPA (2004) "Programme of Action adopted at the International Conference on Population and Development, Cairo, 1994" ISBN 0-89714-696-4
- UNICEF (2007) "A strategy to reduce maternal and neonatal deaths in Nigeria" www.unicef.org. update 2009 (accessed June 11, 2011)
- USAID (2011) "Maternal and Child Health Integrated Program (MCHIP)" www.nigeria.usaid.gov (accessed May 23, 2011)
- World Health Organisation (1996) "Revised 1990 Estimates of Maternal Mortality: A New Approach by WHO and UNICEF
- World Health Organisation (2007) "Maternal mortality in 2005 estimates developed by WHO, UNICEF, UNFPA and THE World Bank.
- WHO, UNICEF and UNFPA (2000) "Life Saving Anaesthetic Skills for Emergency Obstetric Care- Guidelines for Trainers www.whoindia.org., (accessed May 23, 2011)
- WHO, UNICEF and UNFPA (2010) "Reproductive health at a glance: Nigeria. UN Estimates <http://siteresources.worldbank.org/INTPRH/Resources/376374-1303736328719/Nigeria42211web.pdf> (accessed November 23,2011)
- World Bank (2003) "Reducing maternal mortality: Learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica and Zimbabwe". Health, Nutrition and Population Series. Washington (DC).
- Zafarullah Gill (2000) "Implementing Emergency Obstetric Care in developing countries" Draft unpublished, AMDD Project, Columbia University, New York