

Providing neonatal resuscitation training in rural Eastern, Nigeria

Training birth attendants to improve neonatal resuscitation knowledge and skill ability

Uzoma Uwakah, DNP, MSN, RN

School of Nursing
Samuel Merritt University
Oakland, California
uzomauwakah@gmail.com

Nancy Smee, PhD, CNM, MPH

School of Nursing
Samuel Merritt University
Oakland, California
nsmee@samuelmerritt.edu

Abstract—Neonatal mortality is an important global health indicator of a country. Nigeria has one of the highest neonatal mortality rates in the world. Rural portions of the country have higher rates of neonatal mortality, compared to urban areas. Problems related to asphyxiation result because resuscitation training is not targeted to the correct provider. Neonatal resuscitation training was given in three clinical sites in rural Nigeria, from October 23, 2015 to October 28, 2015. Seventy (70) participants aged 19-60 completed a 17-item questionnaire about neonatal knowledge and completed a 38-item hands-on skills checklist to measure their neonatal skill abilities. Training was given to community health extension workers (CHEWs), auxiliary nurses, traditional birth attendants (TBAs), nurse midwives, student nurse midwives, and nursing officers. To compare the mean scores between a pre-test and a post-test for both the knowledge questionnaire and the skills test, a dependent samples t-test was performed. For knowledge, the average score on the pre-test was 12.43 ± 2.98 , $p < .0001$ and the average score on the post-test was 14.74 ± 2.16 , $p < .0001$, meaning that the average knowledge score increased by 2.31 points, after the training. For skill, the average score on the pre-test was 21.87 ± 6.58 , $p < .0001$ and the average score on the post-test was 34.67 ± 4.50 , $p < .0001$, meaning that the average skills score increased by 12.8 points, after the training. The implementation of a neonatal resuscitation training program in rural Nigeria, can improve neonatal resuscitation knowledge and neonatal resuscitation skill ability amongst TBAs and other birth attendants. This has the potential to reduce the high neonatal mortality rates in rural communities.

Keywords- Neonatal resuscitation; neonatal mortality; rural health; international health

I. INTRODUCTION

Neonatal mortality is a global health indicator of the health status of a country [1]. The neonatal mortality rate refers to the number of neonates that die before reaching 28 days of life and is calculated per 1,000 live births in a given year [2]. Globally, 4 million babies die within the first 28 days of life and of these 4 million, 98% occur in developing countries [3]. Global surveillance of neonatal mortality has helped to track the conditions in which high rates occur.

II. BACKGROUND

A. Neonatal Mortality Rates

Nigeria, a country located in West Africa, is the 8th most populated country in the world with an estimated 181,562,056 residents [4]. The population of Nigeria is about half that of the United States and, despite large amounts of natural resources, the economic capital does not trickle down into the healthcare system. According to the World Bank [5], Nigeria is ranked as having one of the highest neonatal mortality rates in the world. In 2015, their neonatal mortality rate was 34/1,000. The countries that border Nigeria have lower neonatal mortality rates, but when compared to developed nations, the rates are still high. In 2015, Benin had a neonatal mortality rate of 32/1,000, Togo 27/1,000, Cameroon 26/1,000, and Niger 27/1,000 [5]. In 2015 the United States neonatal mortality rate was 4/1,000. While U.S. statistics are somewhat higher than most developed countries, they are closer in range with the United Kingdom at 2/1,000, Sweden at 2/1,000, and Singapore at 1/1,000 [5].

Nigeria recognizes the need to reduce its neonatal mortality rate, in order to help meet the United Nation's Millennium Development goal for reducing childhood mortality [6]. The Nigerian Minister of Health has stated that in some regions of Nigeria, over half of newborns die before they are one day old from complications related to pregnancy [7]. Newborn survival continues to be an on-going developmental goal for sustainability of health status in countries like Nigeria [8].

B. Urban vs. Rural

Neonatal mortality disparities persist between urban and rural populations. In Nigeria, rural portions of the country are reported as having higher rates of neonatal mortality, when compared to urban areas [9]. In contrast to the World Bank statistics, data from the Nigeria Demographic and Health Survey (NDHS) found that the mortality rate was higher among newborns that were born in rural parts of Nigeria than for those who were born in urban parts of Nigeria. These statistics show that in rural areas, the mortality rate was

38.9/1000, while in urban areas, the mortality rate was 31.3/1000 [10].

A disparity also exists in the percentage of births that are assisted by birthing personnel between those living in rural versus urban parts of Nigeria. The World Health Organization (WHO) [11] found that those living in urban areas have assistive birth personnel 59.8% of the time, whereas those living in rural areas have assistive birth personnel 23.7% of the time. They also found that the richest citizens of Nigeria have assistive birth personnel 79.3% of the time, whereas the poorest citizens of Nigeria have assistive birth personnel only 6.9% of the time. There are further disparities in equity of care, depending on whether the institution providing the healthcare service is public or private [10].

In rural Nigeria, a majority of neonatal deaths occur during the first week of life (65.6%) [12]. Neonatal death is common in some countries and can result from complicated pregnancies, reduced skills of the birth attendant, and lack of necessary equipment within facilities [13]. Factors that contribute highly to neonatal mortality include asphyxia, low birth weight, neonatal sepsis, and jaundice [14]. Birth asphyxia, a newborn's inability to breathe properly, can lead to death or serious injuries. In Nigeria, birth asphyxiation accounts for 20% of neonatal deaths [15].

In countries like the United States, neonatal resuscitation is taught and implemented as a way to prevent and reverse the effects of asphyxiation. In Nigeria, problems related to asphyxiation result because resuscitation training is not targeted to the correct provider. Further, there is a failure to initiate resuscitative steps quickly enough for it to be effective. [16]. According to the World Bank [17], only 38% of births are attended by skilled healthcare staff. Skilled health staff is defined as "personnel trained to give the necessary supervision, care, and advice to women during pregnancy, labor, and the postpartum period; to conduct deliveries on their own, and to care for newborns" [17].

C. Neonatal Resuscitation

Neonatal resuscitation is an interventional act taken during asphyxiation to increase the oxygen intake ability and heart rate of a neonate. Globally, neonatal asphyxiation occurs in 10% of births [18]. The American Heart Association (AHA) created a Neonatal Resuscitation Program (NRP) to provide guidance in the practice of resuscitating newborns and reduce the occurrence of asphyxiation after birth. Their goal was to have "at least one person trained in neonatal resuscitation in attendance in each of the approximately 5,000 delivery rooms in the United States" [19]. Globally, 92 countries use some variation of the NRP model to teach and/or use neonatal resuscitation.

Federal and local organizations in rural Nigeria have designed programs to address neonatal mortality. Providing neonatal resuscitation training to skilled birth attendants improves neonatal survival outcomes [20]. Understanding this connection, the Nigerian Minister of Health promotes the implementation of neonatal health programs as a targeted strategy for reducing associated high mortality rates [7]. Chukwu [7] reviewed the Nigerian health system and found

that there were outdated policies, limited resources, and low impact interventions that were proven unworkable. The lack of resources and dependence on information that was rooted in primitive healthcare practices, as opposed to evidence-based research, contributed to the high rates of neonatal mortality [7]. Ezugwu, Agu, Nwoke, & Ezugwu [21] found that introducing practice guidelines could help reduce mortality and morbidity. Similarly, initiatives on both the global and national levels need to be implemented in order to reduce high neonatal mortality in rural areas of Nigeria.

D. Change Program

A change program is the implementation of new interventional methods that are tailored to a specific cause, in response to prior poor outcomes [22]. Change programs, like the one presented in this paper, must focus on reconstructing the healthcare framework in rural clinics in Nigeria to reflect frameworks seen internationally. Members of local communities have the highest influence on health infrastructure [23]. The Nigerian Health Ministry is instrumental in developing and implementing policies that strengthen Nigeria's health system [24].

Not only does Nigeria's health system need to be strengthened, but the capacity of their health institution infrastructure does as well. The Nigerian Health Ministry, "proposes a new way of thinking, resourcing, and putting to action a minimum range of evidence-based, high-impact interventions that have been proven to work, [when] embedded within the framework of the National Strategic Health Development Plan of the Country" [7]. Healthcare workers should be trained to be capable of providing effective neonatal resuscitation, when necessary. Implementing change programs addresses healthcare system constraints that, in turn, affect health outcomes. This can occur when monies and training are distributed fairly in rural areas of Nigeria [23].

Researchers [16] implemented a change program called Helping Babies Breathe (HBB) in Tanzania, in order to improve resuscitation abilities and reduce deaths. After implementing HBB into 8 hospitals over a 6-9 month period, they found that early neonatal mortality, due to asphyxiation, decreased from 13.4/1000 to 7.8/1000 after 12 months. It decreased to 7.1/1000 after 24 months. Gill et al., [18] found that when Traditional Birth Attendants (TBAs) were trained in neonatal resuscitation and were the primary attendants for the delivery, asphyxiation was 63% lower than those born by untrained TBAs (7.8/1000 vs. 19.9/1000). Researchers conducted a study that took place in a primary health center in India and found that, after implementing a training program that included specific sections on newborn complications, neonatal mortality was reduced by 62% [25].

Training simulations improve the ability of healthcare workers to effectively apply their skills to real life clinical environments [26]. In countries like Nigeria, TBAs assist in births more often than doctors or midwives do. A trained TBA is more likely to positively influence health outcomes, when compared to an untrained one [27]. Lack of adequate financing of healthcare services in rural Nigeria is directly correlated to high neonatal mortality rates [7]. Training

healthcare providers to administer neonatal resuscitation, along with providing simulation-based methods, reduces neonatal mortality related to asphyxiation [26]. Although there are high indications for the necessity of neonatal resuscitation training, it is not widely implemented within rural clinical settings within Nigeria.

The implementation of a neonatal resuscitation training program helped improve neonatal resuscitation knowledge and neonatal resuscitation skill ability among TBAs and other birth attendants in rural, underserved areas of Nigeria.

III. METHODS

A. Design

This was a single group repeated measures pre-test, post-test study design. The outcomes were knowledge and skills.

B. Setting

The implementation of the project took place in three health facilities: Akoli-Imenyi Health Center, in Akoli-Imenyi, located in Abia State; RISE Clinic in Adazi-Ani, located in Anambra State, and Ezinihitte Iga Itu Local Government Center, in Mbaise, located in Imo State, Nigeria. These three facilities are located in rural Eastern Nigeria. The representatives of these health facilities serve members of rural communities that are culturally homogenous. The health facilities typically consist of 3-7 rooms and are run by a TBA, a nurse, a midwife, or a physician. The associated clinics of the providers represented from these three facilities are predominately resource-limited and are limited in their access to neonatal resuscitation equipment.

C. Subjects

The sample size was 70. The subjects involved in the study included Community Health Extension Workers (CHEWs), TBAs, auxiliary nurses, Nurse Midwives, Student Midwives, Nursing officers (Community Health Officers (CHO), Senior Nursing Sisters, Deputy Director Nursing Services (DDNS), Assistant Chief Nursing Officer (ACNO), Chief Nursing Officer (CNO), and Principal Nursing Officer (PNO)). The subjects are all based in Nigeria and work with the infant and maternal population, as healthcare providers. They speak the same local languages (both English and Igbo), practice the same religion (Christianity), and are of similar socioeconomic levels and backgrounds (rural status). They are all able to read and write in English. Nurse practitioners and physicians were excluded from the study. Individual informed consent was obtained as part of ethical consideration.

D. Procedure

- Phase 1: Identification and planning.

In the identification and planning phase, issues related to neonatal resuscitation skill deficits were identified. Partnerships were created and supported by written partnership agreements between the clinical representatives of each facility and the lead researcher. Role descriptions for the lead researcher, as well as the health workers (participants), were

then established. Next, the lead researcher received training from an internationally recognized training program, created by the American Heart Association (AHA), called Neonatal Resuscitation Program (NRP). Afterwards, there was an adoption of training materials and manual by the researcher. The materials and manual were taken from Helping Babies Breathe © [28]. These materials are culturally sensitive and appropriate; it is indicated for implementation in both already established, as well as stand-alone, programs in resource poor nations [28]. Institutional Review Board (IRB) approval was sought and received, in an effort to ethically implement the study. Phase one occurred between July 2014 and September 2015.

- Phase 2: Implementation.

In the implementation phase, application of the proposed interventions at the facilities in the form of neonatal resuscitation training began. This took place between October 23, 2015 and October 28, 2015. A pre-test assessment was done to measure the participant's baseline knowledge and skill using a knowledge questionnaire and skills checklist. After the training, a post-test was done to measure the participant's neonatal resuscitation knowledge acquisition as well as the participant's ability to physically demonstrate skills successfully. Participants came into the training facility for approximately 7 hours. The materials needed to implement the project included the baby simulation doll, a liter of water, a manual suction device, umbilical cord strings, a neonatal stethoscope, a watch/clock, a baby cap, towels and a cloth, a table, a resuscitation mask, the training manual, the flip board, the exams forms, and pens.

- Phase 3: Evaluation.

During the evaluation phase, data was assessed to determine whether the implementation strategies were effective in influencing knowledge and skill associated with neonatal resuscitation. The goal here was to analyze the effectiveness of the training.

E. Data Collection

A two-part measurement tool was used. The first part was a multiple-choice questionnaire and the second was a skills checklist. The questionnaire was a 17-question test that asked questions such as, "A newborn baby is quiet, limp, and not crying. What should you do next? a. Slap the baby's back, b. Hold the baby upside down, c. Squeeze the baby's ribs, or d. Begin ventilation" [28]. Participants were scored by dividing the total of correctly answered questions by the highest possible score, 17. These questions were taken from the Helping Babies Breathe © knowledge check form [28].

The skills checklist is a 38-item checklist that tests the participant's ability to perform the necessary skills to prepare for, and intervene, during neonatal asphyxiation. It looks to score skills, including whether the birth attendant checks for equipment before delivery, tests the functionality of a resuscitation mask, dries the baby and removes wet towels, and stimulates the baby when he or she is not breathing. This checklist was taken from Helping Babies Breathe © [28]. Helping Babies Breathe © has three skills checklists: Bag and

Mask ventilation Skills Check (7 possible points), Objective Structure Clinical Evaluation (OSCE) A (13 possible points), and Objective Structure Clinical Evaluation (OSCE) B (18 possible points) [28]. For this study, all of the three exams were combined to represent a score for skills. No reliability and validity testing of the instrument has been done, but they have been used routinely with the implementation of the training program. The total cost of the project's implementation came to \$3,108 and was personally financed by the lead researcher.

F. Analysis

SPSS version 22.0 was used to enter, store, and analyze data. For both knowledge and skills, a dependent samples t-test was performed to compare the mean scores for a pre-test and a post-test.

IV. RESULTS

The research training took place on three (3) separate days in three (3) separate states in rural Eastern, Nigeria. The first training took place at RISE Clinic, in Adazi-Ani, located in Anambra State, Nigeria. Nine (9) health workers participated in this training. The second training took place at the Akoli-Imenyi Health Center, in Akoli-Imenyi, located in Abia State, Nigeria. Sixteen (16) health workers participated in this training. The third training took place at the Ezinihitte Iga Itu Local Government Center, in Mbaize, located in Imo State, Nigeria. Forty-five (45) health workers participated in this training. (See Table I). A total of 70 health workers participated in all of the research training sessions and one hundred percent (100%) of the participants were women. Two (2) (2.9%) were widowed, 5 (7.1%) were single, and 63 (90%) were married. (See Table III). The average age of the participants was 42.37 ± 9.01 years old, with the minimum age being 19, and the maximum age being 60. The average yearly income amongst the population is $\$7,389.67 \pm 4936.17$, with a range of $\$0$ - $\$19,950$. The average years worked in a position was 13.89 ± 7.32 years, with 0 years being the minimum and 35 years being the maximum.

Of the participants, 28 (40%) were CHEWs and auxiliary nurses, 7 (10%) were TBAs, 7 (10%) were Nurse Midwives, 4 (5.7%) were Student Midwives, and 24 (34.3%) were nursing officers, including Community Health Officers (CHO), Senior Nursing Sisters, Deputy Director Nursing Services (DDNS), Assistant Chief Nursing Officer (ACNO), Chief Nursing Officer (CNO), and Principal Nursing Officer (PNO). (See Table II).

Three (3) (4.3%) participants had less than 15 years of education (10 years, 12 years, and 13 years). Their levels of education included Standard 6 (the equivalent of 6th grade in the United States), Junior Secondary School 2 (JSS 2) (the equivalent of 8th grade in the United States), and Junior Secondary School 3 (JSS 3) (the equivalent of 9th grade in the United States). Thirteen (13) (18.6%) participants had 15 years of education, which included a West African Examinations Council (WAEC) certification and/or a Senior Secondary Certification of Education (SSCE) (the equivalent

of a high school degree, with a certificate of completion from a state exam.

Sixteen (16) (22.9%) participants had 16 years of education, which included a Health Diploma in either community health or public health. Two (2) (2.9%) participants had 17 years of education, which included a Nursing Certificate or an Ordinary National Diploma (OND) (the equivalent of a 2-year associate degree in the United States).

Two (2) (2.9%) participants had 18 years of education, which included a Certified Nurse Midwife degree. Seventeen (17) (24.3%) participants had 19 years of education, which included a Higher National Degree (HND) (the equivalent of a 4 year Bachelor's degree in the United States), a Bachelor's of Science, and a 4-year Bachelor's degree. Fifteen (15) (21.4%) participants had 20 years of education, which included a Bachelors of Nursing degree. Two (2) (2.9%) participants had 21 years of education, which included a Master's degree in Public Health. (See Table IV).

To compare the mean scores from the knowledge questionnaire between a pre-test ($M=12.43 \pm 2.98$) and a post-test ($M=14.74 \pm 2.14$), a dependent samples t-test was performed. Prior to conducting the analysis, the assumption of normally distributed difference scores was examined. The skew and kurtosis levels were estimated at 1.140 and 1.421, respectively, which is less than the maximum value for a t-test (i.e., skew < 2.0 and kurtosis < 9.0) [29]. The correlation between the two conditions was estimated at $r=.69$, $p=.000$. The difference, -2.31, BCa 95% CI (-2.84, -1.83, $p<.0001$). The effect size was large ($r=0.54$), based on Rosenthal (1991) or medium to large, ($d=0.76$), based on Cohen (1992). A graphical representation of the means and adjusted 95% confidence intervals [30] are displayed in Fig. 1. This was found to be statistically significant.

To compare the mean scores from the skills test between a pre-test ($M=21.87 \pm 6.58$) and a post-test ($M=34.67 \pm 2.79$), dependent samples t-test was performed, as well. The skew and kurtosis levels were estimated at -.009 and .125, respectively, which is less than the maximum value for a t-test (i.e., skew < 2.0 and kurtosis < 9.00) [29]. The correlation between the two conditions was $r=.84$, $p=.000$. The difference, -12.80, BCa 95% CI (-13.90, -11.76, $p<.0001$). The effect size was large ($r=0.89$), based on [31]. A graphical representation of the means and adjusted 95% confidence intervals [30] are displayed in Fig. 2. This was found to be statistically significant.

V. DISCUSSION

This study revealed that, after implementation of a neonatal resuscitation training program in rural, Eastern Nigeria, TBAs and other birth attendants showed improvement in knowledge about neonatal resuscitation, as well as an improvement in neonatal resuscitation skill ability. Knowledge scores improved from 12.43 out of 17 to 14.74 out of 17 and skill scores improved from 21.87 out of 38 to 34.67 out of 38.

This research highlights the importance of culturally and regionally relevant training, in improving the knowledge and skills of healthcare workers in Nigeria. The research identified birth asphyxia as a specific problem and then offered a program to address it. In countries like Nigeria, TBAs and other birth attendants assist in a majority of births, more often than doctors do. This reality reveals the necessity to fill a practice gap and empower health care workers by putting them in positions to focus on this disparity birth asphyxia and its connection to reduced skill of the provider.

VI. CONCLUSION

There are three tiers to the Nigerian healthcare system: primary, secondary, and tertiary. Primary care is run by the local governments, secondary care is run by the state government, and tertiary care is run by the federal government. Traditionally, healthcare funding is shared between all tiers of the system with 50% kept at the federal level, 25% at the state level, and 25% at the local government level [32]. Changes in access to healthcare is an issue that is being attributed to differences in the ownership structure and stakeholders in the Nigerian healthcare system. A majority of the 10,149 primary care institutes in Nigeria are either privately owned or are managed by private-public partnerships [33]. These new ownership structures have influenced the coordination of care between each tier; in many cases it has created a space for the mismanagement of resources and, thus, poor patient outcomes.

The Midwives' Service Scheme (MSS) was formed as a community based intervention to address the high rates of infant and maternal mortality in rural Nigeria. The MSS was established in 2009 through The National Primary Health Care Development Agency as a partnership between local, state, and federal governments in an effort to better define the roles of midwives and support interventions that result in a reduction of infant mortality [34]. The goal of the project was to recruit and deploy qualified midwives to rural and underserved parts of Nigeria and equip clinics with the tools necessary to ensure that basic obstetric care is being made possible [35].

The impact of training a TBA, or other rural birth attendants, is significant in decreasing neonatal mortality in rural settings. This program can be implemented many times over, in other clinical sites in rural Nigeria, with promising results. It has the potential of adding to the reconstruction of the healthcare framework in rural clinics in Nigeria. Furthermore, to ensure sustainability of the program, a “train the trainer” model can be used to enable the birth attendants in these regions to continue training other local healthcare workers. The goal is to eventually inform governmental policies and improve the health status of Nigeria.

VII. LIMITATIONS

While English is the official language of Nigeria (and language was not a true barrier), a communication barrier existed, at times, because of the lead researcher’s American accent. The lead researcher had to be cognizant of her accent and the speed at which she spoke during the training. Literacy level is 61.3% in Nigeria; however, all of the participants were able to read, write, and comprehend in English. Another limiting factor included traveling logistics within the country, because of the conditions of the roads. A further limitation includes the fact that the post-test was given shortly after the intervention bringing in the question of long term retention.

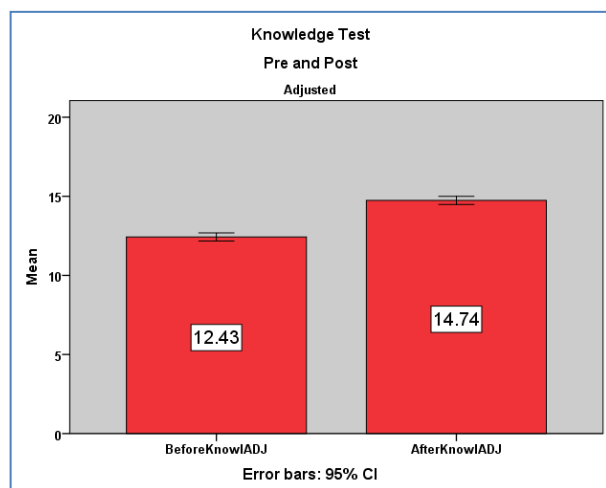


Figure 1. Pre- and post- knowledge test score (knowledge test)

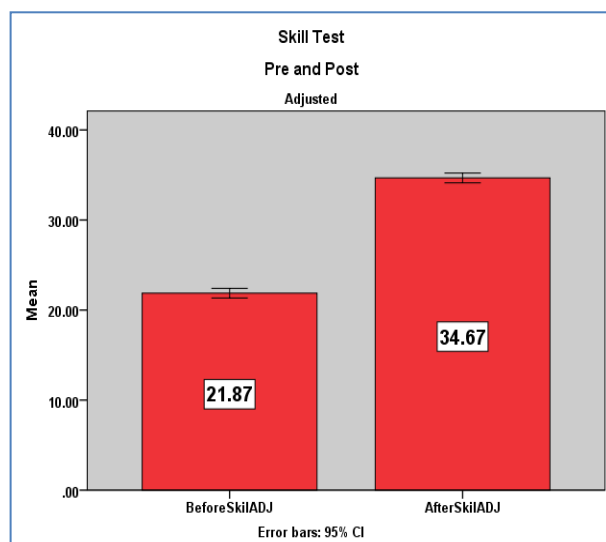


Figure 2. Pre- and post- skill test score (skill test)

This calls into question that possible other influential factors, like education, can be truer indications of knowledge retention

There is a need to measure and evaluate the continuity of the skill and knowledge retention. This is one of the limitations of our intervention. In the future, it would be beneficial to implement this training as a longitudinal study and have it measure knowledge and skill retention at 3, 6, & 12 months after training. One way of evaluating the long term impact of this training is facilitate a train the trainer program where a designated healthcare worker at each facility continues the training and evaluates the knowledge retention and skill abilities of the providers. Further, re-testing of each participant will help monitor the knowledge and skill scores over 3, 6, & 12 month time periods.

VIII. BENEFITS

One factor that facilitated this project's implementation is that the clinic leaders and the birth attendants were ready for change. They were motivated to partner with an organization that could improve the health outcomes related to improving the standards of the clinic. The ultimate benefit of the project is that neonatal resuscitation training helps to reduce neonatal mortality, caused by neonatal asphyxia, which improves the overall health status of rural communities in Eastern Nigeria.

IX. CONFLICT OF INTEREST

The authors declare no financial or other conflicts of interest.

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REFERENCES

- [1] Centers for Disease Control and Prevention (CDC). (2015). Infant mortality. Retrieved from <http://www.cdc.gov/reproductivehealth/maternalinfanthealth/infantmortality.htm>
- [2] United Nations Children's Fund. (2015). Levels and trends in child mortality. Retrieved From http://www.childmortality.org/files_v20/download/IGME%20report%202015%20child%20mortality%20final.pdf
- [3] Oestergaard, M., Inoue, M., Yoshida, S., Mahanani, W., Gore, F., Cousens, S., ... Mathers, C. (2011). Neonatal mortality levels for 193 countries in 2009 with trends since 1990: A systematic analysis of progress, projections, and priorities. *PLOS Med*, 8(8). doi: 10.1371/journal.pmed.1001080
- [4] World Fact Book. (2015). Country comparison: population. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2119rank.html>
- [5] World Bank. (2015). Mortality rate, neonatal (per 1,000 live births). Retrieved from <http://data.worldbank.org/indicator/SH.DYN.NMRT>
- [6] Ajaero, C., & Owoh, O. (2013). The pattern and determinants of infant mortality in rural Nigeria. *Innovare Journal of Social Sciences*, 1(1), 1-5.
- [7] Chukwu, O. (2011). Maternal, newborn, and child health in Nigeria: Where are we now? Retrieved from: http://www.who.int/pmnch/about/steering_committee/B11_11_02_nigeriapresentation.pdf
- [8] United Nations. (2015). Millennium goals. Retrieved from www.un.org/millenniumgoals/childhealth.shtml
- [9] Aigbe, G., & Zannu, A. (2012). Differentials in infant and child mortality rates in Nigeria: Evidence from the six geopolitical zones. *International Journal of Humanities and Social Science*, 2(16), 1-9. Retrieved from http://www.ijhssnet.com/journals/Vol_2_No_16_Special_Issue_August_2012/22.pdf
- [10] Ezeh, O., Agho, K., Dibley, M., Hall, J., & Page, A. (2014). Determinants of neonatal mortality in Nigeria: evidence from the 2008 demographic and health survey. *BMC Public Health*. 14: 521. doi:10.1186/1471-2458-14-521
- [11] World Health Organization (WHO). (2010). Maternal and perinatal health profile: African region. Department of maternal, newborn, child and adolescent Health (MCA/WHO). Retrieved from http://www.who.int/maternal_child_adolescent/epidemiology/profiles/maternal/nga.pdf
- [12] Lawoyin, T., Onadeko, M., & Asekun-Olarinmoye, E. (2010). Neonatal mortality and perinatal risk factors in rural southwestern Nigeria: A community-based prospective study. *West African Journal of Medicine*, 29(1) 19-23.
- [13] March of Dimes. (2015). Neonatal death. Retrieved from <http://www.marchofdimes.org/complications/neonatal-death.aspx>
- [14] Ekwochi, U., Ndu, I., Nwokoye, I., Ezenwosu, O., Amadi, O., & Osuorah, D. (2014). Pattern of morbidity and mortality of newborns admitted into the sick and special care baby unit of Enugu State University Teaching Hospital, Enugu state. *Nigerian Journal of Clinical Practice*, 17(3), 346-351. doi: 10.4103/1119-3077.130238
- [15] Omoigberale, A., Sadoh, W., & Nwaneri, D. (2010). A 4 year review of neonatal outcomes at the university of Benin teaching hospital, Benin City. *Nigerian Journal of Clinical Practice*. 13 (3): 321-325. Retrieved from http://www.njponline.com/temp/NigerJClinPract133321-1308714_033807.pdf
- [16] Msemo, G., Massawe, A., Mmbando, D., Rusibamayila, N., Manji, K., Kidanto, H., ... & Perlman, J. (2013). Newborn mortality and fresh stillbirth rates in Tanzania after helping babies breathe training. *Official Journal of the American Academy of Pediatrics*, 131(2), e353-60. doi: 10.1542/peds.2012-1795
- [17] World Bank. (2015). Births attended by skilled health staff (% of total). Retrieved from <http://data.worldbank.org/indicator/SH.STA.BRTC.ZS>
- [18] Gill, C., Mazala, G., Guerina, N., Kasimba, J., Mulenga, C., Macleod, W., ... Hamer, D. (2011). Effect of training traditional birth attendants on neonatal mortality (Lufwanyama Neonatal Survival Project): Randomised controlled study. *BMJ*. doi: <http://dx.doi.org/10.1136/bmj.d346>
- [19] Kattwinkel, J. (2011). *Neonatal resuscitation*. 6th ed. Elk Grove Village, IL: American Heart Association.
- [20] USAID. (2015). Newborn resuscitation. Retrieved from <http://www.mchip.net/node/35>
- [21] Ezugwu, E., Agu, P., Nwoke, M., & Ezugwu, F. (2014). Reducing maternal deaths in a low resource setting in Nigeria. *Nigerian Journal of Clinical Practice*, 17(1), 1-5. doi: 10.4103/1119-3077.122842.
- [22] Verheijden, M., Jans, M., Hildebrandt, V., & Hopman-Rock, M. (2007). Rates and determinants of repeated participation in a web-based behavior change program for healthy body weight and healthy lifestyle. *Journal of Medical Internet Research*. 9(1). doi: 10.2196/jmir.9.1.e1
- [23] Ademiluyi, I., & Aluko-Arowolo, S. (2009). Infrastructural distribution of healthcare services in Nigeria: an overview. *Journal of Geographical and Regional Planning*. 2(5), 104-110. Retrieved from

http://www.academicjournals.org/article/article1379432402_Ademiluyi%20and%20Aluko-Arowolo.pdf

AUTHORS'PROFILE

- [24] Federal Ministry of Health. (2015). Mission and Vision. Retrieved from <http://www.health.gov.ng/index.php/about-us/mission-and-vision>
- [25] Saravanan, S., Turrell, G., Johnson, H., Fraser, J., & Patterson, C. (2011). Traditional birth attendant training and local birthing practices in India. *Elsevier: Evaluation and Program Planning*, 34(3), 254-254. doi: 10.1016/j.evalproplan.2011.02.012
- [26] Andreatta, P., Gans-Larty, F., Debpuur, D., Ofosu, A., & Perosky, J. (2011). Evaluation of simulation-based training on the ability of birth attendants to correctly perform bimanual compression as obstetric first aid. *International Journal of Nursing Studies*, 48 (2011), 1275–1280. doi: 10.1016/j.ijnurstu.2011.03.006
- [27] Satishchandra, D. M., Naik, V. A., Wantamutte, A. S., & Mallapur, M. D. (2009). Impact of training of traditional birth attendants on the newborn care. *Indian Journal of Pediatrics*, 76(1), 33-36. doi: 10.1007/s12098-008-0229-9
- [28] Helping Babies Breathe (HBB). (2015). Helping Babies Breathe. American Academy of Pediatrics.
- [29] Posten, H. O. (1984). Robustness of the two-sample t-test. In D. Rasch & M. L. Tiku (eds.), *Robustness of Statistical methods and nonparametric Statistics* (p. 92-99). Dordrecht, GDR: D. Reidel Publishing Company.
- [30] Loftus G. R., Masson M. E. J., (1994) *Using confidence intervals in within-subject designs*. *Psychonomic Bulletin and Review*, 1994; 1: 476–490.
- [31] Rosenthal, R. (1991). *Meta-Analytic Procedures for Social Research*. Newbury Park, CA: SAGE publication Ltd.
- [32] Abimbola S, Okoli U, Olubajo O, Abdullahi MJ, Pate MA (2012) The Midwives Service Scheme in Nigeria. *PLoS Med* 9(5): e1001211. doi: 10.1371/journal.pmed.1001211
- [33] Danawi, H., & Ogbonna, F. (2014). Impact of Socioeconomic Status and Household Structure on Infant Mortality Rate in Abia State of Nigeria. *International Journal Of Childbirth Education*, 29(4), 88-94.
- [34] Okeke, E., Glick, P., Abubakar, I., Chari, A., Pitchforth, E., Exley, J., Bashir, U., Setodji, C., Gu, K., Onwujekwe, O. (2015). The Better Obstetrics in Rural Nigeria (BORN) Study: Evaluating the Nigerian
- [35] Midwives Service Scheme. Santa Monica, CA: RAND Corporation, 2015. http://www.rand.org/pubs/research_briefs/RB9857.html.



Uzoma Uwakah is a first generation Nigeria, born in the United States. She received a Bachelors of Arts in Psychology from the University of San Francisco in 2010, a Masters of Science in Nursing from Charles Drew University in 2013, and a Doctorate of Nursing Practice from Samuel Merritt in 2016. She completed a research fellowship at the University of California, Los Angeles in 2013. She works as a registered nurse at San Francisco General Hospital. In 2016, she joined the Department of Nursing at the University of San Francisco as a Clinical Instructor for nursing students at the Masters level. Her and her father, Dr. Onyebuchi Uwakah, cofounded the Uwakah Memorial Medical Foundation (UMMF) (uwakahmmf.org), a 501(c) 3 established to promote a partnership with international clinics that serve members of rural populations as a way to improve community and global health.



Nancy Smeed has worked, for many years, as a nurse-midwife and women's health nurse practitioner. She received her master's degree in family health nursing along with her nurse practitioner and nurse-midwifery certificates from the University of California, San Francisco. During her studies at the University of California, Berkeley for her masters in public health she became interested in the vulnerability of women with HIV. She additionally took 32 graduate units in anthropology at Stanford University. She received her PhD from the University of California, San Francisco doing her research in Zimbabwe and Tanzania on the prevention of mother to child transmission of HIV. She completed a post-doctoral fellowship at the University of California, San Francisco in the prevention and treatment of HIV. Her on-going research is centered on the sexual behaviors and reproductive choices of vulnerable women in both developed and under-developed countries. She is published and has presented her work in professional forums nationally and internationally.