A health technology assessment perspective on communicating local knowledge of Hippolite O. Amadi *et al.'s* neonatal interventions in global health research

Abstract

Background: This study employed a health technology assessment approach to explore the impact of Hippolite O. Amadi*et al.'s* neonatal care interventions.
Method: The research design was a qualitative desk research method. The purposive sampling procedure was adopted focusing on a subset of 10 out of a population of 45 journal articles authored by Amadi and others. Textual analysis was the method of data collection and interpretation analysis was used to analyze the data.
Results: Locally tailored interventions such as the 'handy approach' temperature control, Neonatal Rescue Scheme, PoliteO2blend®, community-integrated neonatal care, Initial-Setpoint-Algorithm, weatherproof nursery designs, and the recycled incubator technique. These health technology interventions, designed to address challenges in low- and middle-income countries like Nigeria, underscored the significance of locally derived solutions in improving neonatal health outcomes.
Conclusion: The study advocated for leveraging scientific journals as a pivotal medium for health technology assessment and science communication, facilitating the seamless exchange of local knowledge and innovations in neonatal care. By highlighting Hippolite Amadi's research publications, the research emphasized the transformative role of journals in disseminating local innovations globally, promoting collaboration, and knowledge exchange beyond geographical boundaries.
Recommendation: This study underscored the importance of active stakeholder involvement in optimizing neonatal outcomes through effective science communication, with a focus on prioritizing journals to facilitate the dissemination of local innovations on a global scale and foster collaboration among healthcare professionals, researchers, and local communities to address unique challenges faced by low- and middle-income countries in neonatal care practices.

Keywords: Health technology assessment, Local knowledge, Neonatal care, Science Communication, Scientific journals

Introduction

In the contemporary era, knowledge has evolved into a crucial asset within healthcare, exerting a profound influence on decision-making, patient care, health outcomes, workforce quality, and organizational dynamics. This paradigm shift from an industrial to a knowledge-based global economy is underscored by the work of Lapaige[5].As a result, science communication emerges as a pivotal factor in the developmental outcomes of Low- and Middle-Income Countries (LMICs). The health sciences are a subset of scientific fields, comprising various disciplines that leverage science, engineering, mathematics, and technology to provide healthcare [28] andscientific endeavors inherently aim to address societal challenges.Therefore, communication of rigorous processes,

experimentation, and results becomes imperative for the application and, in some instances, the technological utilizationof scientific discoveries. Various channels, including science journalism, science museums, science festivals, social media platforms, science blogs, podcasts, science education, and peer-reviewed scientific journals, contribute to this communicative process [7].

This study by Amadi *et al.* is significant to the scientific community as it provides a valuable perspective on communicating local knowledge in global health research. It highlights the significance of incorporating local expertise and cultural context in the development and implementation of neonatal interventions, which is crucial for improving health outcomes and reducing inequities in low-resource settings.

Health Technology Assessment (HTA) is a systematic evaluation process that examines the properties and impacts of new interventions and technologies in healthcare, considering both direct and indirect consequences. It involves a multidisciplinary approach aimed at determining the value of these technologies and informing guidance on their use within health systems globally[29]. HTA serves as a transparent and accountable method used by decision-makers and stakeholders to support policy-level decision-making in healthcare, providing evidence-based information about the effectiveness and implications of specific technologies. Described as a bridge between research and policymaking, HTA plays a crucial role in facilitating informed decisions about the adoption and implementation of health technologies to improve patient outcomes and optimize healthcare delivery [25]. Also, HTA is defined as "a multidisciplinary process that uses explicit methods to determine the value of a health technology at different points in its life cycle. The purpose is to inform decision-making in order to promote an equitable, efficient, and high-quality health system" [26, p1].

The relationship between HTA and science communication lies in HTA's role as a transparent and accountable process that communicates evidence-based information about health technologies to decision-makers and stakeholders, facilitating informed decision-making in healthcare policy. Parsons [27] noted that the realm of health HTA often involves intricate technicalities and complexities, encompassing various factors influencing both clinical and economic evaluations. A crucial responsibility of health technology analysts is discerning the significant findings and effectively conveying them, considering that end users may struggle to absorb extensive technical reports that can span numerous pages. Hence, it is imperative for assessors to adeptly summarize the results with accuracy and conciseness. Within HTA, it is essential to communicate findings encompassing diverse outcomes, weighing the benefits against the drawbacks of an intervention within the specific clinical context proposed, ultimately informing decisions regarding its implementation.

While the Global North traditionally dominates global scientific endeavors, there is a recognition of the noteworthy contributions from the Global South and LMICs [8].The knowledge translation and implementation science of scientific advancements from the Global North to LMICs is exemplified by the pioneering work of South African cardiac surgeon Christiaan Barnard, who conducted the inaugural human-to-human heart transplant in 1967. This example typifies the dynamic of knowledge dissemination and application across geographical boundaries. The discipline of Implementation Science, defined as the study of methods to promote the adoption and integration of evidence-based

practices, interventions, and policies into routine healthcare, assumes significance in this context. The Global South, characterized by its diverse culture, traditions, and norms, consistently integrates local knowledge into scientific and technological pursuits, especially within health research [10].

The global majority, comprising marginalized and disadvantaged groups, faces strategic division and disempowerment due to entrenched racial, ethnic, and financial inequities that drive health inequities, perpetuating structural determinants of health that intersect and compound in the field of global health [32]. Rasheed [31], argued that the effort to decolonize global health must be led by the Global South, rather than the Global North, to effectively address the historic and systemic injustices in the field and avoid perpetuating harmful power dynamics. Additionally, it was noted that Global South's experiences and agency are being overlooked in the discourse on decolonizing global health, which perpetuates harmful stereotypes and oversimplifies the complex power dynamics at play.

Further emphasizing the pivotal role of Global South in shaping global health paradigms and interventions, examples such as Bangladesh's oral rehydration therapy, Brazil's multi-drug therapy for leprosy, India's advancements in rotavirus vaccines and low-cost hearing aids, and South Africa's role in anti-retroviral therapy for HIV/AIDS showcase transformative impacts. Additionally, Bangladesh utilized mobile phone-based systems to deliver healthcare services, focusing on pregnant women and newborns in remote areas. India developed the Jaipur Foot, a low-cost prosthetic limb that addresses the needs of individuals with financial constraints. Ethiopia trained community health workers to provide basic healthcare services in rural regions. Rwanda implemented a community-based health insurance scheme to make healthcare more affordable for the economically disadvantaged. Brazil utilized telemedicine to extend healthcare services to individuals in remote areas. China relies on traditional medicine with a longstanding history of treating various health conditions. Kenya developed healthcare apps to reach residents in remote areas. Rwanda employed medical drones for the efficient transport of medical supplies to remote locations. India introduced low-cost vaccines, such as the rotavirus vaccine, to prevent diarrheal diseases in children. Lastly, Nepal implemented community-based healthcare to cater to the healthcare needs of residents in remote areas [11, 12, 22].These contributions underscore LMICs' capacity to drive innovation, develop cost-effective solutions, and positively impact health outcomes globally.

Several notable Nigerians have significantly impacted global health through their groundbreaking contributions. Dr. Adetokunbo O. Lucas played a pivotal role in onchocerciasis research, contributing to strategies for its control. Professor Oyewale Tomori's work in virology has advanced our understanding of viral diseases. Professor Christian Happi, a genomics expert, has made crucial contributions to infectious disease research, particularly in malaria and viral infections. Professor Abiodun I. Adewuya is recognized for his influential work in mental health research, focusing on depression and anxiety. Additionally, Professor Andrew Nok's groundbreaking work in sickle cell disease research has significantly enhanced diagnostic methods and treatment strategies. These individuals collectively represent Nigeria's impactful presence in the global health arena, addressing a diverse range of health challenges and contributing valuable insights to the international scientific community.

Research in improving neonatal care in LMICs is critical. Peterson et al. [4] noted that the belief in the potential for substantial progress in preventing global maternal and newborn deaths, akin to the

success of the smallpox eradication campaign, has created a crucial window of opportunity, supported by undeniable evidence of notable reductions in both maternal deaths (47% from 1990 to 2010) and neonatal mortality rates (28% from 1990 to 2009), though the pressing need for additional advancements remains evident due to ongoing challenges. Unfortunately, global progress in reducing deaths of pregnant women, mothers, and babies has flatlined for eight years due to decreasing investments in maternal and newborn health. The report showed that over 4.5 million women and babies die every year during pregnancy, childbirth, or the first weeks after birth – equivalent to 1 death happening every 7 seconds – mostly from preventable or treatable causes if proper care was available [2]. Another report also highlighted global progress on maternal mortality, neonatal mortality, and stillbirths, as well as country efforts to meet the global targets for all three of these critical challenges [3].

Integrating local knowledge in global health neonatal care initiatives is crucial for ensuring that the care provided is culturally sensitive and relevant to the local population. This approach helps identify and address the unique challenges faced by the community, such as traditional beliefs and practices and helps to build trust between healthcare providers and the community. It can also help to ensure that the care provided is sustainable and that the community is empowered to take ownership of their own health.

Hippolite Onyejiaka Amadi

Hippolite Onyejiaka Amadi is a renowned Nigerian engineer and medical researcher who made significant contributions to neonatology research. He was celebrated for his innovative contributions to medical technology, including the invention of the Recycled Incubator Technology (RIT) for neonatal incubator interventions in 2003, the Politeheart bubble continuous positive airway pressure (CPAP) device in 2017, and the Polite-One2four oxygen supply splitter system in 2019. He has also made significant contributions to the development of predictive tools for the planning of shoulder surgeries. His current practice focuses on Frugal Medical Technology for low- and middle-income countries, and he is the Principal Consultant at Neonatal Concerns for Africa charity organization. He has published several articles in reputable journals, including the Journal of Neonatal Nursing and Computer Methods in Biomechanics and Biomedical Engineering [1].

The Rationale of the Study

The development and availability of medical devices for neonates in Africa is hindered by several barriers, including limited testing, ethical concerns, lack of understanding of use cases and market dynamics, and logistical and financial challenges in conducting clinical trials in low-resource settings [30].In line with the above, the motivation for the study was extracted from the work of Hippolite O. Amadi and Mohammed B. Kawuwa and their lament about the dire need to reduce early neonatal mortality in Nigeria. The researchers express frustration over the lack of fresh ideas and sustainable solutions from the government, health institutions, or academia to address the country's dire state of neonatal records. The researchers conducted rigorous investigations, validated their unconventional approaches through multicenter studies, and compared them against conventional techniques in

Nigeria. Despite encountering disabling policies and social factors, the study emphasizes the success of their unconventional methods in improving outcomes for extremely premature neonates [6].

The delay in translating these effective ideas into national practice is questioned, emphasizing the economic relevance of these unconventional techniques in Nigeria's struggling economy. Therefore, this study advocates for the incorporation of these locally derived and sustainable solutions, aligning with the principles ofHTA, to address the specific challenges within Nigeria's neonatal healthcare system. Through communication of successful case studies, this research is aimed at promoting the adoption of effective, locally relevant interventions to reduce neonatal mortality rates, ultimately contributing to improved health outcomes in resource-limited settings like Nigeria.

Methodology

The objective of this study was to explore local knowledge integration and innovative approaches in neonatal care, with a focus on interventions led by Hippolite O. Amadi *et al.* in Nigeria. Consequently, the research employed desk research, involving an extensive review of academic journals in Hippolite O. Amadi's Google Scholar (https://scholar.google.com/citations?hl=en&user=ru7Pd6UAAAAJ) from January 4, 2024 to January 10, 2024. Desk research, or secondary research, is a method of compiling existing data from various sources, including internal and external channels, such as government statistics, organizational bodies, and the internet, encompassing formats like published datasets, reports, and survey responses (Qualtrics, 2021). The textual analysis was utilized as a qualitative approach to data collection to examine key themes presented in the literature related to neonatal interventions in Nigeria. Textual analysis involve exploring written text to discern key themes, statistics, and underlying meanings, providing insights into content, structure, and values within the text [23]. The study targeted a population of 45 journal articles on neonatal care interventions in Nigeria available on Google Scholar, authored or co-authored by Hippolite O. Amadi. The sampling procedure involved purposive sampling, focusing on articles referencing his contributions and publications highlighting local knowledge integration and innovative approaches to global health. The purposive sampling approach aimed to ensure the inclusion of key articles that were most pertinent to the research focus. From the identified population, a sample size of 10 journal articles were chosen for in-depth textual analysis. To refine the search, targeted keyword "neonatal care" was employed. The inclusion criteria encompassed publications related to works authored or co-authored by Hippolite O. Amadi's neonatal care interventions in Nigeria. The selection criteria for the sample prioritized articles with diverse perspectives, methodologies, and outcomes to provide a comprehensive understanding of the local knowledge integration landscape in neonatal care. Interpretation analysis was applied to the selected sample to uncover recurring themes, patterns, and insights within the chosen articles as method of data analysis. Ethical considerations, including proper citation and adherence to copyright regulations, were upheld throughout the data collection and analysis process.

Data Presentation

The study titled *Neonatal hyperthermia and thermal stress in low- and middle-income countries: A hidden cause of death in extremely low-birthweight neonates*,[1] implemented a novel temperature control technique, the 'handy approach,' in managing neonates in Nigerian tertiary-care hospitals, aiming to investigate the association between rapid temperature changes and increased mortality in extremely low-birth weight infants, emphasizing the importance of locally tailored interventions considering specific challenges and conditions in low- and middle-income countries like Nigeria.

Frontier Innovations for Efficient LMIC Hinterlands Neonatal Care – The Nigerian Case Study[2], focused on innovating neonatal care in resource-limited settings, particularly Nigeria's hinterlands. The study emphasized the pivotal role of local knowledge and innovation in overcoming challenges related to inadequate infrastructure and government commitment, proposing the Neonatal Rescue Scheme (NRS) as a solution. The NRS incorporates affordable technologies like recycled incubator technology (RIT), adapted for rural villages and powered by sunlight, resulting in a substantial reduction in neonatal mortality from 90% to 4% within five years, highlighting the transformative impact of locally driven, sustainable solutions in neonatal healthcare.

A low-cost oxygen-air mixer device extends the accessibility of safer neonatal respiratory support in a resource-poor setting[3], discussed local knowledge and innovation in the development of the PoliteO2blend®, a low-cost oxygen-air mixer device designed to enhance access to safer neonatal respiratory support in resource-poor settings, particularly in Nigeria. The study addressed the challenge of the limited availability of expensive bubble continuous positive airway pressure (CPAP) machines for neonatal respiratory support in resource-limited facilities, where improvised setups risk exposing neonates to hyperoxia. The PoliteO2blend® provides a cost-effective solution by mixing supplied oxygen with atmospheric air, minimizing hyperoxia risks, and includes microfiltration and humidification features absent in conventional improvised applications, presenting a safer alternative for facilities with limited funds in enhancing neonatal respiratory care.

The Neonatal Rescue Scheme (NRS) concept reduces mortality by over 85% in Niger State Nigeria – A lesson for Nigeria and other LMICs study[4], showed that local knowledge and innovation are exemplified through the development and implementation of the Neonatal Rescue Scheme (NRS) in Niger State, Nigeria, aimed to address the exceptionally high neonatal mortality rates in the country. Faced with the challenges of limited federal government health centers and high neonatal deaths, the state government took an extraordinary step to independently trial the NRS, leveraging frugal neonatal devices and procedures suitable for low- and middle-income countries (LMICs). The Amina Centre, established in 2017, showcased the sustainable use of indigenous basic medical officers and

[1]Hippolite O. Amadi, Eyinade K. Olateju, Peter Alabi, Mohammed B. Kawuwa, Mike O. Ibadin, Akin O. Osibogun (2015)

[2]Hippolite O. Amadi, Eyinade K. Olateju, Amina L. Abubakar, Christiana T. Adesina, Chinwe D. Obu, IfeoluwaAbioye and Jennifer O. Nwaneri

[3]Hippolite O Amadi, Chinwe D Obu, EmekaOnwe-Ogah (2023)

[4]Hippolite O. Amadi, Amina L. Abubakar, Ruqayya A. Abdullahi, Amina G. Abubakar (2023)

nurses who underwent short-term training on NRS applications, leading to a remarkable reduction in facility mortality from 90/100 neonates to 4/100 neonates and a significant increase in neonatal traffic. This local initiative demonstrated the transformative impact of indigenous solutions in addressing complex neonatal healthcare challenges in LMICs.

The study, *Fundamentals of a Safe and Effective Neonatal Building Design in a Tropical LMIC Setting* [5], focused on local knowledge and innovation in the design of neonatal facilities in a tropical Low- and Middle-Income Country (LMIC) setting, particularly in Nigeria. The study underscored the crucial role of building design within the Neonatal Rescue Scheme (NRS) concept and identified practices in tropical Low- and Middle-Income Country (LMIC) settings contributing to adverse neonatal outcomes, emphasizing the impact of poor nursery layouts on facility-based mortality. Recognizing the lack of empirical quantification of negative impacts from building deficiencies in resource-constrained tropical climates, the research explored integrated constraints, concepts, and features in NRS nurseries across different tropical regions of Nigeria, aiming to mitigate climate-related, infrastructure-related, and socioeconomic challenges for improved neonatal survival.

A Community integrated concept that minimizes death of most vulnerable neonates at poor-resource environments[6]focused on local knowledge and innovation to address the challenges of neonatal mortality in hard-to-reach local villages in Nigeria with limited resources. The study proposed a community-integrated concept to address neonatal healthcare challenges in areas without proper intervention devices by bringing neonatal care directly to villages, utilizing solar-based devices and simplified procedures. Introducing an appropriately remanufactured tricycle for ambulatory services facilitates referrals, empowering local healthcare providers to treat uncomplicated neonatal emergencies at primary healthcare centers, potentially reducing neonatal mortality by over 75% in resource-constrained environments.

In this study, *Validation of a Novel Technique that Minimizes Early Neonatal Deaths - a Comparative Study*[7], local knowledge and innovation are evident in the development of a neonatal temperature control protocol called the "initial-setpoint-algorithm (ISA)" as a response to the high first-seven-days (F7D) mortality rate among neonates in Nigeria. The researchers introduce the Initial-Setpoint-Algorithm (ISA) protocol to expedite the attainment of normothermia in extremely low birth weight and preterm neonates, addressing the specific challenge of prolonged postnatal delay in achieving normal body temperature. The study demonstrated the local innovation of ISA, showcasing its effectiveness in reducing first-seven-days (F7D) deaths and improving overall neonatal outcomes, providing valuable insights to address persistently high neonatal mortality rates in Nigeria.

[5]Hippolite O Amadi, Mohammed B Kawuwa, Amina L Abubakar, Stephen K Obaro (2023)
[6]Hippolite O Amadi, Mohammed B Kawuwa, Amina L Abubakar, Christiana T Adesina, Eyinade K Olateju (2022)

[7]Hippolite O Amadi, Temilade C Adesina, EyinadeOlateju, Stella Omokaro, Adaora A Okechukwu, Alabi Peter, Abubakar S Haruna (2017)

In this study, *Challenges and frugal remedies for lowering facility based neonatal mortality and morbidity: a comparative study*[8], local knowledge and innovation are evident in the collaborative efforts to devise frugal measures aimed at reducing neonatal deaths in Nigeria. The researchers acknowledged challenges with poorly executed high-tech ideas and proposed prudent, impactful techniques within the country, including the recycled incubator technology (RIT) for affordable incubator sufficiency, facility-based research groups, training courses, involvement of local artisans, power-banking, apnea-monitoring, and a half-yearly maintenance system. A retrospective analysis of four outreach centers and one control demonstrates a significant reduction in the average neonatal mortality rate in outreach centers, emphasizing the effectiveness of RIT and associated measures in contributing to the achievement of the Millennium Development Goal 4 (MDG4) neonatal component in Nigeria.

In this study, *Synthesis and validation of a weatherproof nursery design that eliminates tropical evening-fever syndrome in neonates*[9], local knowledge and innovation was showcased in addressing the challenge of neonatal thermal stabilization, particularly in the context of hyperthermia caused by high sunlight intensity in tropical countries like Nigeria, leading to the neonatal evening-fever syndrome (EFS). The researchers proposed a controlled weatherproof nursery with Lab-1, an entirely new building idea, outperforming the control ward and Lab-2 in maintaining lower temperatures during hot periods, reducing evening-fever syndrome (EFS)-induced neonatal morbidity. This locally tailored solution minimizes the need for interventions like water sponging, emphasizing its significance in mitigating environmental factors impacting neonatal health in tropical regions.

In this study, *the impact of recycled neonatal incubators in Nigeria: A 6-year follow-up study*[10], local knowledge and innovation was evident in addressing the challenges of high newborn mortality in Nigeria through the application of a novel recycled incubator technique (RIT). The study acknowledged the urgent problem of neonatal mortality in Nigeria, conducting a retrospective assessment across 15 neonatal centers to address the deteriorating delivery system. Results indicated that the application of the RIT not only increased neonatal survival but also boosts nursing enthusiasm and practice confidence, highlighting the local knowledge and ingenuity in developing sustainable and cost-effective interventions for improved neonatal outcomes in resource-constrained settings.

Discussion of Findings

Based on the journal articles analyzed, local knowledge and innovation in neonatal care in Nigeria include the development and implementation of the 'handy approach' temperature control technique in tertiary-care hospitals, the Neonatal Rescue Scheme (NRS) with frugal neonatal devices and procedures, the PoliteO2blend® as a low-cost oxygen-air mixer device, the community-integrated

[8]Hippolite O Amadi, Akin O Osibogun, OlatejuEyinade, Mohammed B Kawuwa, Angela C Uwakwem, Maryann U Ibekwe, Peter Alabi, ChinyereEzeaka, Dada G Eleshin, Mike O Ibadin (2014)

[9]Hippolite O. Amadi, Lawal I. Mohammed, Mohammed B. Kawuwa, AbdulquddusOyedokun, and Hajjah Mohammed (2014)

[10]HippoliteOnyejiakaAmadi, Jonathan C Azubuike, Uriah S Etawo, Uduak R Offiong, ChinyereEzeaka, EyinadeOlateju, Gilbert N Adimora, Akin Osibogun, NgoziIbeziako, Edna O Iroha, Abdulhameed I Dutse, Christian O Chukwu, Eugene E Okpere, Mohammed B Kawuwa, Aliyu U El-Nafaty, Sulyman A Kuranga, OlugbengaAyodejiMokuolu (2010)

concept for bringing neonatal care directly to villages, the Initial-Setpoint-Algorithm (ISA) protocol to expedite normothermia, weatherproof nursery designs, and the recycled incubator technique (RIT) for affordable incubators, along with associated measures to reduce neonatal mortality and improve outcomes. These solutions showcased the importance of locally tailored interventions in addressing challenges specific to low- and middle-income countries like Nigeria.

Just like in Nigeria, other LMICs have devised ways of using local knowledge to improve neonatal care. As Professor Hippolite developed the 'handy approach' temperature control technique, Tisa, Nisha, and Kiber[13] shared knowledge of the design and development of an enhanced temperature control system for an infant incubator, incorporating a combination of pulse width modulation (PWM) and a simple ON-OFF control system using thermistors as temperature sensors. Additionally, the inclusion of a temperature monitor, an alarm circuit for safety, and a battery backup system powered by a solar panel addresses challenges specific to developing countries like Bangladesh with frequent power cuts. The 'handy approach' temperature control technique and the enhanced temperature control system for a neonatal incubator were invented to address the specific challenges of managing neonates in low- and middle-income countries, providing locally tailored solutions to improve neonatal outcomes by addressing issues related to rapid temperature changes and ensuring stable temperature regulation, particularly in resource-constrained settings with frequent power cuts.

The Neonatal Rescue Scheme (NRS) uses frugal neonatal devices and procedures that include cost-effective devices suitable for rural villages to ensure the affordability of incubators, bubble CPAP applications, minor assistive breathing devices, and extended oxygen delivery reach, all powered by low voltages derived from solar energy. NRS implemented trials of various applications, including the recycled incubator technology (RIT), the remedy for evening fever syndrome (EFS), the Handy Approach (HHA), the Initial Setpoint Algorithm (HISA), the politeheartCPAP machine, the politeoxygen splitter system (PSS), the polite light bank (PLB), and other technologies. These affordable solutions, relying on solar-derived energy, are currently utilized in some rural centers in Nigeria, such as the Amina Centre in Minna, contributing to a substantial reduction in neonatal mortality from 90% to 4% within five years of implementation. This aligns with Kirby et al. [14], who noted that in LMICs, neonatal care is often limited by a lack of access to sustainable technologies and equipment. The technologies include devices for neonatal resuscitation, thermoneutral support, respiratory support, infection control, surgical interventions, areas of neonatal nursing, neonatal transport, facility building and infrastructure, parental bonding, medical record and home support, obstetric-neonatal overlap, and transitional management. However, there are several ongoing efforts to develop and implement technologies that can improve neonatal care in LMICs. For instance, the NEST360 Alliance has installed over 2,400 medical devices and diagnostics in 65 hospitals in Nigeria, Tanzania, Kenya, and Malawi. The above shows that LMICs are actively pursuing home-grown technological solutions, such as the Neonatal Rescue Scheme (NRS), which incorporates frugal neonatal devices powered by solar energy, including cost-effective incubators, bubble CPAP applications, and other devices, contributing to a substantial reduction in neonatal mortality rates and aligning with ongoing efforts like the NEST360 Alliance to improve neonatal care in resource-constrained settings.

The PoliteO2blend® is a low-cost oxygen-air mixer device that is a solution to expensive continuous positive airway pressure (CPAP) devices. It is one device with three respiratory support modes.The invention aligns with the position of PATH [15], where the organization noted that there is a clear need for these low-cost oxygen-air mixer devices as respiratory infections are a leading cause of

infant mortality in many of the world's poorest places and claim millions of newborn lives each year. A bubble CPAP device can provide an infant with the air pressure needed to support their breathing, and when combined with an oxygen blender, it can deliver critically needed oxygen at appropriate concentrations. These interventions can mean the difference between life and death and between healthy infant development and lifelong neurological damage or blindness. While bubble CPAP devices and oxygen blenders are standard in American neonatal wards, their high cost puts them beyond the reach of many hospitals, as does their requirement for pressurized oxygen and air, steady power, and access to trained technicians and replacement parts.

The community-integrated concept of bringing neonatal care directly to villages aligns with integrated community case management (iCCM) in Uganda, focusing on community acceptability, perceived quality of care, appropriate treatment, and access to referral care.Community health workers were perceived as acceptable providers of child health services, and communities appreciated the treatment provided. The perceived quality of care was higher for children treated by CHWs compared to those treated by primary health facility workers [16].

The Initial-Setpoint-Algorithm (ISA) protocol is a method designed to quickly achieve and maintain normal body temperature in newborns that are born with very low birth weight or prematurely. The protocol involves specific steps and techniques to ensure that these babies reach a healthy body temperature as soon as possible after birth, contributing to better overall outcomes for these vulnerable infants. Unlike other protocols, such as the servo-control protocol, which relies on a servo-controlled incubator [17], the ISA protocol employs a different method to achieve and maintain a normal body temperature. Other protocols include Kangaroo Mother Care (KMC), where the baby is held against the mother's skin for temperature regulation [18], and the Radiant Warmer protocol, which utilizes a radiant warmer to keep the baby's body temperature within a safe range [19]. Each protocol represents a distinct strategy or technology used to address the crucial aspect of regulating newborns' body temperature.

Weatherproof nursery designs involve architectural and environmental adaptations to create controlled and protected environments for newborns, mitigating the impact of external factors, and ensuring stable conditions for neonatal care in various weather conditions.This innovation solves the dilemma posed by Farré et al. [20], who observed that elevated ambient temperature and humidity significantly elevate the likelihood of hyperthermia and mortality, especially among infants who are particularly susceptible to dehydration, with a notable prevalence in numerous low- and middle-income countries (LMICs) where the majority lack access to air conditioning.

The Recycled Incubator Technique (RIT) refers to an innovative approach involving the use of repurposed or reused materials to create an incubator for neonates, demonstrating a sustainable and cost-effective solution for providing controlled environments to support the health and development of newborns, particularly in resource-constrained settings. According to Crettaz, Maillat, Mermier, and Perruchoud[21], the Recycled Incubator Technique (RIT) stood out as an innovative approach that repurposes materials to create cost-effective incubators for neonates in Cameroun. It addresses the limitations of conventional high-tech solutions criticized for their inefficiency in improving neonatal conditions in resource-constrained settings due to insufficient training, maintenance challenges, and high operational costs. RIT, by recycling and adapting unused incubators, provides a sustainable and affordable solution for supporting newborn health and development, as demonstrated

by a 6-year study in Nigeria, highlighting its potential to significantly increase the availability of functional incubators in medical facilities.

Conclusion

Hippolite Amadi's research publications have been instrumental in advancing local knowledge and innovation in neonatal care, embodying the principles of Health Technology Assessment (HTA). By actively utilizing scientific journals as a primary means of dissemination, Amadi has facilitated the global exchange of invaluable local knowledge. Through his publications, innovative approaches like the 'handy approach' temperature control technique, Neonatal Rescue Scheme (NRS), PoliteO2blend®, community-integrated neonatal care, Initial-Setpoint-Algorithm (ISA) protocol, weatherproof nursery designs, and the Recycled Incubator Technique (RIT) have reached practitioners, researchers, and policymakers worldwide. This dissemination strategy ensures that locally derived solutions, rigorously evaluated through HTA principles, are accessible and actionable on a global scale. Amadi's emphasis on continual collaboration and knowledge exchange through journal publications exemplifies the role of HTA in refining and implementing neonatal care innovations across diverse healthcare settings, particularly in resource-constrained environments. Ultimately, Amadi's research publications serve as a bridge between local knowledge and its global application, contributing significantly to optimizing neonatal outcomes and addressing healthcare challenges worldwide.

Recommendations

To advance the seamless exchange of local knowledge and innovations in neonatal care, Health Technology Assessment (HTA) principles should be infused into the utilization of scientific journals as a paramount and effective medium for scientific communication. The research publications by Hippolite Amadi *et al.* exemplify the transformative influence achieved by using journals to communicate discoveries and insights, aligning with the rigorous evaluation criteria of HTA. Advocating for the pivotal role of journals in global science communication is crucial for facilitating universal access to invaluable local knowledge among practitioners, researchers, and policymakers, adhering to the transparency and accountability standards of HTA. This approach transcends geographical boundaries, promoting collaboration and knowledge exchange that continually refines, adapts, and successfully implements neonatal interventions across diverse healthcare settings, mirroring the multidisciplinary process of HTA. This recommendation underscored the sustained commitment to fostering collaboration between healthcare professionals, researchers, and local communities, emphasizing the role of journal publications as a conduit for evidence-based decision-making in health care policy, in line with the objectives of HTA. By prioritizing journals, stakeholders actively contribute to optimizing neonatal outcomes in resource-constrained environments and addressing the unique challenges faced by low- and middle-income countries, adhering to the principle of evaluating the value of health technologies within specific clinical settings. This holistic approach ensures that local innovations are effectively communicated on a global scale, advancing neonatal care practices and positively impacting healthcare outcomes through evidence-informed science communication, as advocated by HTA.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENTS

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Imperialcollege.ac.uk. Home - professor hippoliteamadi, phd FRSM fimeche [Internet]. www.imperial.ac.uk. 2023. Available from: https://www.imperial.ac.uk/people/h.amadi

2. World Health Organization . Global progress in tackling maternal and newborn deaths stalls since 2015: UN [Internet]. www.who.int. 2023. Available from: https://www.who.int/news/item/09-05-2023-global-progress-in-tackling-maternal-and-newborn-deaths-stalls-since-2015--un

3. World Health Organization. Improving maternal and newborn health and survival and reducing stillbirth - Progress report 2023 [Internet].www.who.int. 2023. Available from: https://www.who.int/publications/i/item/9789240073678

4. Peterson HB, Haidar J, Merialdi M, Say L, Gülmezoglu AM, Fajans PJ, et al. Preventing maternal and newborn deaths globally. Obstetrics & Gynecology [Internet]. 2012 Sep [cited 2023 Feb 16];120(3):636–42. Available from: https://sph.unc.edu/wp-content/uploads/sites/112/2021/01/Preventing_Maternal_and_Newborn_Deaths_Globally_.20.pdf

5. Lapaige V. “Integrated knowledge translation” for globally oriented public health practitioners and scientists: Framing together a sustainable transfrontier knowledge translation vision. Journal of Multidisciplinary Healthcare. 2010 Jun;3(0):33–47.

6. Amadi HO, Kawuwa MB. Reducing early neonatal mortality in nigeria—the solution [Internet]. www.intechopen.com. IntechOpen; 2017 [cited 2024 Jan 2]. Available from: https://www.intechopen.com/chapters/55774

7. Scrutinizing science: Peer review - understanding science [Internet]. Understanding Science 101. 2022. Available from: https://undsci.berkeley.edu/understanding-science-101/how-science-works/scrutinizing-science-peer-review/

8. Abimbola S, Asthana S, Cortes CM, Guinto RR, Jumbam DT, Louskieter L, et al. Addressing power asymmetries in global health: Imperatives in the wake of the COVID-19 pandemic. PLOS Medicine. 2021 Apr 22;18(4):e1003604.

9. Cooper DK. Christiaan Barnard—The surgeon who dared: The story of the first human-to-human heart transplant. Global Cardiology Science and Practice [Internet]. 2018 Jul 23;2018(2). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6062759/

10. Madise N. Level the playing field for science in the global south [Internet]. SciDev.net. 2020 [cited 2024 Jan 2]. Available from: https://www.scidev.net/global/opinions/level-the-playing-field-for-science-in-the-global-south/

11. World Health Organization. 10 key global health moments from 2021 [Internet].www.who.int. 2021. Available from: https://www.who.int/news-room/spotlight/10-key-global-health-moments-from-2021

12. GlobalPost. A simple solution: The history of ORS in Bangladesh [Internet]. The World from PRX. 2013. Available from: https://theworld.org/stories/2013-06-25/simple-solution-history-ors-bangladesh

13. Tisa TA, Nisha ZA, Kiber MA. Design of an enhanced temperature control system for neonatal incubator.Bangladesh Journal of Medical Physics. 2013 Apr 19;5(1):53–61.

14. Kirby RP, Molyneux E, Dube Q, McWhorter C, Bradley B, Gartley M, et al. Target product profiles for neonatal care devices: systematic development and outcomes with NEST360 and UNICEF. BMC Pediatrics. 2023 Nov 15;23(S2).

15. PATH. This oxygen blender could save thousands of newborn babies [Internet]. www.path.org. 2015 [cited 2024 Jan 4]. Available from: https://www.path.org/our-impact/articles/designing-a-device-to-save-newborn-lives-thinking-big-while-thinking-small/

16. Nanyonjo AM. Delivering health services to children through integrated community case management in Uganda : From innovation to institutionalization [Internet]. openarchive.ki.se. Instförfolkhälsovetenskap / Dept of Public Health Sciences; 2014 [cited 2024 Jan 4]. Available from: https://openarchive.ki.se/xmlui/handle/10616/42181

17. Ercolino O, Baccin E, Alfier F, Villani PE, Trevisanuto D, Cavallin F. Thermal servo-controlled systems in the management of VLBW infants at birth: A systematic review. Frontiers in Pediatrics [Internet]. 2022 Aug 1 [cited 2024 Jan 4];10:893431. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9377414/

18. Charpak N, Gabriel Ruiz J, Zupan J, Cattaneo A, Figueroa Z, Tessier R, et al. Kangaroo mother care: 25 years after. ActaPaediatrica. 2007 Jan 2;94(5):514–22.

19. Trevisanuto D, Coretti I, Doglioni N, Udilano A, Cavallin F, Zanardo V. Effective temperature under radiant infant warmer: Does the device make a difference? Resuscitation. 2011 Jun;82(6):720–3.

20. Farré R, Rodríguez-Lázaro MA, Dinh-Xuan AT, Pons-Odena M, Navajas D, Gozal D. A low-cost, easy-to-assemble device to prevent infant hyperthermia under conditions of high thermal stress.International Journal of Environmental Research and Public Health [Internet]. 2021 Dec 19 [cited 2024 Jan 4];18(24):13382. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8703827/

21. Crettaz S, Maillat L, Mermier C, Perruchoud D. Survey on newborn care in Cameroon GlobalNeoNat Project of the EssentialMed Foundation aiming to develop a combined neonatal hypothermia and phototherapy system, affordable and adapted to the context of resource-poor countries [Internet]. Lausanne, Suisse: EssentialMed Foundation; 2012 [cited 2024 Jan 4] p. 1–44. Available from: https://www.essentialmed.org/wp-content/uploads/2022/11/EssentialMEd_GNN_Cameroon2012ReportFINAL.pdf

22. Syed SB, Dadwal V, Rutter P, Storr J, Hightower JD, Gooden R, et al. Developed-developing country partnerships: Benefits to developed countries? Globalization and Health [Internet].2012;8(1):17. Available from: https://globalizationandhealth.biomedcentral.com/articles/10.1186/1744-8603-8-17

23. Caulfield J. A quick guide to textual analysis | 3 common approaches [Internet].Scribbr. 2019. Available from: https://www.scribbr.com/methodology/textual-analysis/

24. Qualtrics. Secondary research: Definition, methods, & examples [Internet]. Qualtrics. 2021. Available from: https://www.qualtrics.com/experience-management/research/secondary-research/

25. WHO. Health technology assessment - Global [Internet].www.who.int. 2024. Available from: https://www.who.int/health-topics/health-technology-assessment#tab=tab_1

26. Trowman R, Powers A, Ollendorf DA. Considering and communicating uncertainty in health technology assessment. International Journal of Technology Assessment in Health Care. 2021;37(1).

27. Parsons JE. Communicating the findings of health technology assessments: Considering uncertainty.Medical Writing [Internet]. 2021 Sep 1 [cited 2024 Feb 19];30(3):56–9. Available from: https://journal.emwa.org/medical-decision-making-and-health-technology-assessment/communicating-the-findings-of-health-technology-assessments-considering-uncertainty/

28. Matyek JG, Maimoko DD, Ochai T. Curbing Health Misinformation with Scientific Journals: A Study of Nigeria's Punch and Tribune Online Newspapers. Academic Journal of Da'wa and Communication [Internet]. 2023 [cited 2024 Jul 12];4(2):115–30. Available from: https://ejournal.uinsaid.ac.id/index.php/ajdc/article/view/760

29. O'Rourke B, Oortwijn W, Schuller T. The New Definition of Health Technology assessment: a Milestone in International Collaboration. International Journal of Technology Assessment in Health Care. 2020 May 13;36(3):187–90.

30. Ginsburg AS, Macharia W, Ansermino JM. Evaluating Neonatal Medical Devices in Africa.The Lancet Digital Health [Internet]. 2021 Apr 1 [cited 2022 Sep 29];3(4):e211–2. Available from: https://www.thelancet.com/journals/landig/article/PIIS2589-7500(21)00025-X/fulltext

31. Rasheed MA. The Case for a Global South Centred Model in Global Health.The BMJ. 2023 Oct 16;p2256–6.

32. Büyüm AM, Kenney C, Koris A, Mkumba L, Raveendran Y. Decolonising Global health: If Not now, when? BMJ Global Health. 2020 Aug;5(8):e003394.