



# Medical Industrialization In Nigeria; A Review Of The Successes, Challenges And Solutions

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## Abstract

Nigerians are known to contribute greatly across various disciplines and continents in the globe with prominent contributions in the provision of skilled healthcare services in the United Kingdom and United States of America. Despite this exploit abroad, the medical industry in Nigeria which was at the transition stage is currently becoming comatose and therefore needs immediate transformation to meet up with the rising population who struggle to access quality healthcare services in the nation. This review provides pertinent information on medical industrialization with emphasis on the successes made, challenges encountered, and solutions needed to improve various specialties in nephrology, cardiology and surgery in the area of renal replacement therapy, open heart surgery, organ transplant, myomectomy, hip and knee replacement and plastic surgery in Nigeria. A review of several articles was done, and findings articulated into major thematic areas. The review showed various successes which include successful conduct of renal transplant in St. Nicholas Hospital, Lagos in 2000 with several government and private renal centres springing up, successful conduct of open heart surgery as far back as 1974 in University of Nigeria Teaching Hospital Enugu with new centres also springing up, routine and successful conduct of myomectomy for fibroid in several teaching hospitals and private health centres across the nation. The challenges encountered include the ongoing brain drain, high cost and lack of some modern medicine for management of transplants, lack of state of art medical equipment, high cost of treatment and care for most Nigerians with diverse conditions and a preference for medical care and treatment abroad by the elites. There is urgent need for government to partner with private individuals including the diaspora community and foreign nationals who are willing to invest into healthcare in Nigeria to scale up efforts needed for medical industrialization in the country. The government need to take proactive measures to convert brain drain to brain gain through appropriate policies, stakeholder engagement, incentives and strong marketing of the successes made in the country which is aimed to promote local contents in the country. A strong political will expressed as government adequate investment into health and subsidy of these procedures for indigent Nigerians will help to bring about the desired medical industrialization in the country.

**Key Words:** Medical Industrialization, Government, Private Sector, Medical Equipment, Brain Drain, Brain Gain, Diaspora.

## Introduction

Even though Nigerian with over 200 million population is blessed with natural resources and human capital, the country has continued to experience mass exodus of its human resource for health with current preference to obtain medical and surgical treatment abroad for a variety of health conditions (Akinwale & George, 2022).

This medical tourism and brain drain have contributed to the crippling of an already weak healthcare system in the country (Ike, 2007). Adejoro (2023) noted that medical tourism gulped \$7.43 million (about 8.3 billion naira) a year. This was the cost for the pay of various healthcare related services to destination countries from June 2022 to June 2023. The impact of this trend is a weakening of the health system in the country as health systems are going to underperform due to lack of investment into health and transfer of funds to other economies who continuously invest into their health system (Orji et al., 2020; Muraina et al., 2012). Medical tourism is also associated with poor patient care and outcomes following lack of adequate government investment into health which results to absence of modern equipment for timely diagnosis of common ailments and the absence of skilled healthcare workers to take care of the patients. The impact of this is high mortality from preventable diseases such as malaria in children and post-partum haemorrhage among women of reproductive age in the country (Muraina et al., 2012). The consistent expenses for medical care abroad is also linked with high unemployment rates and high cost of living in the nation that have plummeted the country into recession (Ike, 2007).

According to the World Health Organization (WHO, 2016) the health work force density in Nigeria is estimated at 1.95 per 1000 population which is more than 50% lower than the WHO recommendation of 4.45 per 1000 population. This shortage in human resources for health has brought about a complication of effort towards Universal Health Coverage (UHC) with those in lower wealth quintile disproportionately affected in accessing quality health care when compared to affluent Nigerians (Abimbola et al., 2016). Nigeria also has one of the worse maternal and child mortality rates with an estimated 1042 maternal deaths per 100,000 live births (WHO, 2023) while under five mortality is 117 per 1000 live births (UNICEF, 2020). These challenges call for immediate and strategic plan to ensure improved access to quality health care in order to achieve the Sustainable Development Goal 3 by 2030.

The World Economic Forum (2019) noted that innovations are highly essential for the transformation of any healthcare system. In Nigeria, the current government have decided to ensure medical industrialization in order to improve access to quality health care among its citizens (Punch, 2023). Szreter (2004) opined that health systems in developed nations are industrialized while developing nations seek to achieve this goal. Key areas in medicine that these developing nations seek to improve upon in order to achieve medical industrialization include renal replacements therapy, open heart surgery, organ transplants, hip and knee replacement surgery, electronic medical records, vaccine and drug design and development and in recent times the incorporation of artificial intelligence (AI) into making evidence based decision and care for patients with rare diseases.

In Nigeria, the current increase in the cost of Seretide inhaler from 8,000 Naira to 25,000 Naira due to the relocation of the company out of Nigeria and increased cost of production following rise in dollar (Obinna, 2023) and the exodus of skilled health workforce from the country to the United Kingdom, United States and Saudi Arabia for greener pastures are drivers to poor healthcare system and outcomes which needs to be addressed (Adejoro, 2023).

The quest to industrialize the medical sector for low- and middle-income countries like Nigeria is overdue. To what extent has Nigeria fair on improving specialty care to drive medical industrialization? This is poorly elucidated, and this review seek to present the successes, challenges, and solutions to medical industrialization in Nigeria.

## Review of Relevant Literatures

### 2.1 Medical Industrialization and its Benefits

The 20th century was a period of technological advancements which has changed the way work was organized, with transformation of systems and processes that paved way for the development and diffusion of new technologies that shaped our daily living (Rastegar, 2004). Medical practice is changing rapidly in most developed nations due to the accumulation of discoveries in biomedical science, advances in medical equipment and artificial intelligence (AI) (World Economic Forum, 2019). Despite the regular desire and use of the term medical industrialization, no single and globally accepted definition exist (World Economic Forum, 2019). It can however be referred to as the fragmentation and standardization of medical services, and the presence of managerial superstructure that promise to provide better quality of healthcare in a more efficient manner which is the goal of every healthcare system (Rastegar, 2004; Sullivan, 2000). Szreter (2004) opined that industrialization is the process which has occurred in the history of all economically 'developed' nations which remains an aspiration for most governments in undeveloped or developing nations. For the healthcare sector, it is a major Agenda for developing nations like Nigeria as contained in the Four Point Agenda of the Coordinating Minister of Health and Social Welfare (Prof. Ali Pate) and the Minister of State (Dr. Tunji Alausa) who unveiled the need for medical industrialization across its value chain in Nigeria during a conference in Abuja that focused on building a resilient health system that is capable of proving increased access to quality health care with financial risk protections to Nigerians (Punch, 2023).

The benefits of Medical Industrialization are well known and include improvement in a physicians' ability to timely diagnose, predict, efficiently and effectively manage medical conditions (World Economic Forum, 2019). In nephrology, the standard care for patients with end stage kidney disease is renal transplant or dialysis in the absence of a donor. Recent innovations such as the implantable bioartificial kidney (BAK) and kidney regeneration technology that are at the preclinical stage can be the future of kidney transplant and avoid the various challenges encountered during kidney dialysis, sourcing for a kidney for kidney transplant and hurdles experienced in post-transplant management of patients (Dominy et al., 2023). This potential clearly highlights the need for government and the private sector to invest in healthcare research especially on technologies and medicines that can save lives as well as into specialties that are core to medical industrialization to any country. In cardiology, many therapeutic approaches such as effective medicine, cardiac assistive devices, heart transplant and the use of AngioVac Systems which could remove 70% -100% thrombus or mass in 73.6% of patients managed with caval thromboemboli method are worthy of further research and adoption into current medical practice (Moriarty et al., 2021). In orthopaedic, navigation systems, reality technologies (virtual, augmented and mixed), three-dimensional (3D) printing and additive manufacturing, assistive technologies (exoskeletons), modeling and simulations, and tissue engineering and regenerative medicine are the current innovations which can be explored for medical industrialization (Fernandes et al., 2022). For plastic surgery, the top five innovations are microsurgery, myocutaneous flaps, craniofacial surgery, negative pressure wound therapy, and organ transplantation (Asghari et al., 2023). These measures have found expression in developed nations which have resulted in medical tourism and associated benefits to these nations where such expertise abounds.

In recent times, Artificial Intelligence (AI) has played key roles in medical practice. For instance, AI enabled devices can mimic human senses and could possibly be deployed for the treatment of certain conditions. The World Economic Forum (2019) noted that virtual impairment can be corrected if AI lenses are developed and administered to a virtually impaired patient who could finally be able to see and respond to their environment. AI enabled diagnosis can increase the precisions in diagnosis of uncommon health conditions based on the use of various existing computer algorithms from several sources on that condition.

The benefits of medical industrialization are enormous and can be actualized through the implementation of an Electronic Medical Record (EMR) system which has been described as the drivers for healthcare transformation (Honavar, 2020). This system can help in timely collection of patient data and sharing information in real time among the various department in a healthcare facility. The deployment of EMR has been shown to improve efficiency and effectiveness in the management of patients. EMR enables physicians to timely share and obtain information about any patient from other members of the health team including the laboratory scientist who does the laboratory investigation and provides timely results to the physician for immediate decision making and plan of action to manage the patient condition. Prescriptions made by physicians are shared to the pharmacist who immediately provide prescribed medications to the patient and reach out to the physician on any issue that could arise from the prescription in a timely manner (Zhang & Zhang, 2016). Automated systems in healthcare can also help to reduce patients' waiting time and operational cost of running a hospital. This is very important for low and middle-income countries like Nigeria where the doctor to patient ratio is very low and time is of great essence in providing quality healthcare services (WHO, 2016; World Economic Forum, 2019). Mapping gene technology can help physicians to timely diagnosis genetic conditions and cancers using data gathered from AI and the linkages of various interfaces across the globe. Algorithms developed from several networks can be used to improve patients diagnosis and treatment for improved outcomes (World Economic Forum, 2019). In specialties such as cardiology, nephrology and oncology, the use of routinely collected health-care data and disease-specific registries to identify and invite potential trial participants for long-term follow-up; prescreening of study participants to facilitate rapid recruitment; use of pre-randomization run-in periods to improve participant adherence and assess responses to study interventions prior to randomization; and appropriate use of data to monitor and evaluate studies are impressive areas of medical research and technology that is poorly explored in most developing nations (Herrington et al., 2020). These innovations that can drive the desired medical industrialization for most developing nations are aspects of use of evidence for improved decision making and management that need to be enshrined in any health system that wants to improve and get to an industrialized status.

## **2.2 Successes and Challenges in Renal Replacement Therapy, Open Heart Surgery, Organ Transplant, Hip and Knee Replacement and Plastic Surgery in Nigeria**

Even before independence of the country in 1960, Nigeria has made strides in medicines and innovations which are key towards improving the management of non-communicable diseases in the country for improved health and wellbeing of populations. An in-depth understanding of these successes could be a catalyst towards the drive to transition and revolutionize medical practice in the country. The key achievements in Nephrology, cardiology, orthopedic and plastic surgery are discussed here in.

### **Successes and Challenges in Nephrology**

In Nigeria, haemodialysis has been the mainstay of renal replacement therapy since its inception in the 1980s (Bamgboye et al., 1993). However, in 6<sup>th</sup> of March 2000, the first case of renal transplant was carried out in St. Nicholas Hospital, Lagos and since then more successful transplants have been carried out with an estimated 80% success rate (Arogundade, 2011; Bamgboye et al., 2023). Following these successes, renal transplants is currently carried out in other private hospitals (Zenith Medical & Kidney Center – Abuja and Primus Kidney Transplant

Center, Abuja) which have proven to be expert in renal replacement therapy including dialysis and renal transplant at relatively affordable cost and government hospitals (Lagos State University Teaching Hospital (LASUTH) and Federal Medical Centre Umuahia, Abia State) which also have the competence to provide quality renal care. Access to renal replacement therapy (RRT) in Nigeria is limited, and mortality rates are very high, ranging between 40 and 50% when key steps to improve success rates are not adhered to (Odubanjo et al., 2011). Important steps towards improving renal disease management outcomes include the development of prevention programmes and increased funding to increase availability of RRT (dialysis) to indigent Nigerians who cannot afford the recommended minimum maintenance dialysis dose of three sessions a week, each for a duration of 3–5 h (National Kidney Foundation, 2015; Chan et al., 2019) or renal transplant donation which is the definitive management for end stage renal failure which may necessitate government subsidization of the procedure for vulnerable populations in the nation (Okafor & Kankam, 2012; Okoye & Manmak, 2022).

The brain drain of specialized workforce has been a challenge, out of 240 nephrologists in the country, 145 have migrated to western countries for greener pastures. This brain drain can be turned to brain gain with effective stakeholder engagement of Nigerians in diaspora in addition to a heart and positive attitude to give back among healthcare workers in Nigeria who travel abroad. The high financial cost of renal replacement averaging ₦3.3 million couple with the low socio economic status of the average Nigerian with a minimum wage ₦65,000 monthly has created a large gap in the optimization of care in these centres (Okoye & Manmak, 2022; Sasu, 2023). Healthcare insurance for at risk individuals and government support in establishment of model centres for kidney care with state of the art equipment managed by experts in medicines and seasoned managers can also contribute to improving kidney care in the country. Another means to achieve this is through public-private partnership to invest adequately into the most current innovations in renal replacement therapy for an estimated more than 17million Nigerians who have chronic kidney disease (Apiyanteide et al., 2023).

### **Successes and Challenges in Cardiology**

In 1974, University of Nigeria Teaching Hospital, Enugu became the first health facility to perform an open-heart surgery, with a total of 102 cases recorded in 2002 before the facility got shut down in 2007. Following its resumption for operations in 2013 about 230 successful open-heart surgeries have been carried out (John & Ndubueze, 2007).

Thus far, Nigeria has about 15 centers for open heart surgery with about 496 cases in 2016 and a success rate of 95.7%. Lagos State University Teaching Hospital recorded about 51 surgeries between 2004 and 2011 with other government and private hospitals carrying out the surgery. In recent times the cardiology in Nigeria has received support from humanitarian organization such as the Kanu Heart Foundation in funding more open-heart surgeries which are setting the pace for medical industrialization in this specialty in Nigeria (Ujunwa et al., 2016; Falase et al., 2016).

Currently, some private hospitals are providing Open Heart Surgeries. Among these hospitals are the Lagoon Hospital Lagos, Nigeria, which was established in 1986 and it is the first hospitals in Sub-Saharan Africa to be accredited and reaccredited by Joint Commission International (JCI), which certify the centre to provide high-quality specialty care. Primus International Super Specialty Hospital, FCT, Nigeria is a reputed tertiary care centre in Nigeria equipped with cutting edge technology and equipment for specialized surgeries in cardiology.

Establishment and sustainability of Open Heart Surgery (OHS) programs requires a lot of investment in material and human resources and government partnerships with private sector for long-term investment into the development a cardiac centre with state-of-art equipment with modern cardiac equipment will help improve access and availability of specialized surgeries such as open heart surgery needed to correct various defects in the heart (Falase et al, 2013). Partnership with experts from foreign countries who are willing to serve humanity and

save lives can also be a means of Nigeria having the potential to transform its health care industry to the desired level of quality.

Cardiology in Nigeria is faced with limited specialized health workforce with a ratio of 1:10,000 cardiologist further worsened by brain drain. The high cost of cardiology services is another challenge with Nigeria currently having 12% of the world's poverty population and majority whose minimum salary is #65,000 cannot afford such operations which cost an estimated (Okoye & Manmak, 2022). The direct cost of OHS in Nigeria currently ranges between \$6,230 and \$11,200. These costs compare favorably with the cost of OHS abroad and can serve as a financial incentive to patients, sponsors and stakeholders to have OHS procedures done in Nigeria (Falase et al, 2013).

### **Successes and Challenges in Orthopedic**

The National Orthopedic Hospital Lagos was the first specialized orthopedic hospital established in 1943 during colonial rule with the purpose of providing orthopedic care to wounded soldiers of the World War II. Currently Nigeria has three national orthopedic hospitals in operation including tertiary health facilities with orthopedic units and private hospitals providing orthopedic surgical services. The National Orthopedic Hospital Enugu is a referral centre for trauma and other conditions including cleft lip cases where plastic surgery is carried out to correct the defect (Oji & Onah, 2006).

Advance knee and hip replacement surgeries are currently taking place in Nigeria with a high satisfaction rate of upto 98% due to the presence of modern equipment in the management of the condition. This area of medical specialization really does not warrant care abroad and as collaboration with foreign experts, more exploits can be done in this specialization (Malizu et al., 2020).

The utilization of traditional born setters is the major challenge in the utilization of orthopedic services as in most cases it appears to be cheaper and more available to individuals at the community level. This trend has been exacerbated by the high poverty rate which makes patients in Nigeria unable to access the care they need (Sasu, 2023).

### **Successes and Challenges in Myomectomy for Fibroid**

Abdominal myomectomy remains the mainstay of surgical management of uterine fibroids in Nigeria (Obed et al., 2011). Successful pregnancy following myomectomy for giant uterine fibroid have been reported in various centres in Nigeria (Ezugwu et al., 2014). The gynecologist and obstetricians that manage these cases have over decades conducted this surgery successfully with high success rates and low complications. This is partly because fibroid is common among blacks and over the years, the health team in Nigeria including in both private and government sectors have perfected the skills for successfully carrying out this procedure.

Ikechebelu et al. (2021) noted that the challenges of conducting myomectomy especially for giant mass include: delays in surgery due to fear of the unknown. No use of anti-adhesion agents due to relatively high cost of the adhesion in low-income settings and non-use of computed tomography (CT) scan or magnetic resonance imaging (MRI) as pre-surgery leiomyosarcoma assessment. This is because the CT or MRI is rarely available, and their cost is very high which the two patients could not afford. Addressing these challenges in government centres with support of private centres to provide these services at a subsidized rate will help to spur medical industrialization for this procedure that Nigerian has great skills and expertise in. Increasing awareness of the successes made in

Nigeria by our Obstetricians and Gynaecologist will place the nation to become a destination for medical tourism at least for this condition (Ezugwu et al., 2014).

## Conclusion

Medical industrialization is a desire for most developing nations which can be addressed following government commitment and adequate investment into health. This review has provided the successes, challenges, and solutions to improve management of specialist care which is needed for medical industrialization in Nigeria. Key challenges observed are the lack of modern medical equipment and expertise which has been worsened by brain drain with a growing population who do not have access to quality health care for the management of non-communicable diseases in the country. Effective stakeholder engagement, government adequate investment in health, public-private partnership and development of policies and relationships that supports a give back mentality from Nigerians in diaspora are needed to catalyze the transformation of the medical sector in the country. The benefits of medical industrialization are health systems being strengthened, improvement in healthcare and health outcomes in the country, Nigeria becoming a destination for medical tourism which can result to economic growth and development and help to address the problem of foreign exchange deficit in the country. Universal Health Coverage is the goal of every government in the world, and this can be actualized through concerted efforts on medical industrialization.

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