

West African Islamic Civilization: Sokoto Caliphate and Science Education

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Abstract—This study aims at surveying and analyzing the contribution of Sokoto scholars or Sokoto Caliphate in the development of science and technology in West Africa. Today, it is generally accepted that the 19th century Islamic revivalism in Hausaland was a very important revolution in the history of Hausa society and beyond. It is therefore, as a result of this movement or Jihad; the Hausaland (West Africa in general) witnessed several changes and transformations. These changes were in different sectors of life from politics, economy to social and religious aspect. It is these changes especially on religion that will be given considerations in this paper. The jihad resulted is the establishment of an Islamic state of Sokoto Caliphate, the revival Islam and development of learning and scholarship. During the existence of this Caliphate, a great deal of scholarship on Islamic laws were revived, written and documented by mostly, the three Jihad leaders; Usmanu Danfodiyo, his brother Abdullahi Fodiyo and his son Muhammad Bello. The trio had written more than one thousand books and made several verdicts on Islamic medicine. This study therefore, seeks to find out the contributions of these scholars or the Sokoto caliphate in the development of science in West Africa.

Keywords—Sokoto Caliphate, scholarship, science and technology, West Africa.

I. INTRODUCTION

THE 19th century Sokoto Caliphate emerged as a result of the jihad movement that started in Hausaland by 1804 and spread to other part of West Africa under the leadership of Shehu Usmanu Danfodiyo [29]. Following upon such movement West Africa witnessed socio-economic and political transformations including the establishment of the caliphate which led to the development of scholarship system of studies and gave birth to a number of scholars who wrote and documented a number of verdicts and *fatwah*, that come across all sectors of human life.

The scholar's works discussed issues such as politics, economy, education, females' right, medicine, community health and personal hygiene to mention but few. They were stars as well as icons of science and technology. In the field of medicine, they authored several books on various fields such as pharmacology, ophthalmology, community and general medicine [28], [6], [7]. Technically, the caliphate developed technical measures to aid them in the cause of their struggles where they also established new areas to settle corporate professionals, such as *Ribat* and development of fortifications [28].

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It is important to highlight Hausaland before the 1804 movement and briefly discuss the conditions that necessitated the holy war. Though, there were Muslim scholars in Hausaland before the advent of the jihadist, there they aligned themselves with palaces where they engaged in justifying of the wrong practices of the rulers. Therefore, there was prevalent ignorance in the society in pre-jihad period little consciousness was of the original of Islamic teaching. This was attested by Shaykh Abdullahi, during their tours to Zamfara:

We remained there for about five years and it was a land where people's ignorance was supreme; the majority of its people have not smelt the scent of Islam. They used to come to Shaykh's gathering mingling with their women. He segregated them that mixing together was forbidden, after he had taught them the laws of Islam [26].

Moreover, Islam was mixed-up with superstitious believes; sacrifices to objects and spirit worshipping. In the pre-jihad Hausa society, true teaching of Islam could neither be seen in palaces nor could be heard in judicial settings. Societal administration was based upon compulsions and notions of a ruler while the *shari'ah* was highly neglected. Therefore, the level of dishonesty was so high, especially in palaces and courts and there were illegitimate confiscation of properties, unnecessary taxation, indiscriminate imprisonment without trial and misappropriation of public funds, and the extortionist policy of the various governments and rampant maladministration at all level of government [2]. Besides, due to ignorance in the society, there was decay in people's morality and Islamic ethics. Many social drills were not toeing in line with the Islamic principles. The mixing of opposite sexes, nudity, gambling, and alcoholism became the order of the day. Women's rights and laws of inheritance were overshadowed by the societal practices. In general, there was serious imbalance in Hausaland before the jihad. Therefore, the Sokoto *Ulama* decided to revive the society to Islamic standards. By 1817, Sokoto caliphate had been established firmly after the defeat of most Hausa states in West Africa particularly, Kebbi, Gobir, Katsina, Kano and Zazzau [29], [30].

II. DEVELOPMENT OF SCHOLARSHIP IN SOKOTO CALIPHATE

The development of scholarship in Sokoto caliphate was a continuation of the standing tradition in West Africa. They studied different books on different subject by different scholars. These gave them an opportunity and a profound knowledge about the religion, society and provide chance for

them make contribute to the society in various fields of Islamic scholarship. The works cover different aspect of life based on Islamic principle, well documented in Hausa, Arabic and Fulfulde [15]. They addressed issues relevant to their situation and beyond. For instance, Shehu's book *Hisnal-Afham min Juyush al-Awham*, according to Ibrahim:

Is a confirmation of his adherence to the Asha'ari (School of Islamic Theology). The book contains quotations from major Ash'ari scholars such as al-Ghazali and al-Sanusi. Perhaps since before the Jihad systematic theology was not well received by the Ulama of Hausaland [13].

Although it is understood, that the Jihad leaders favored *IlmUsul al-Din* (Knowledge of the fundamentals of the religion) rather than *Ilm al-Kalam* (Science of Theology) [19]. But this was mostly before the jihad, when they spend their time preaching and teaching about the real religion. They took decades inviting people to oneness of Allah, rituals of Islam and the justice inherent in the universality of Islam. As Shehu gave his opinion thus:

In fact, theology is praise-worthy when assessed for its value according to its benefit. It is a knowledge through which we can have the thorough knowledge of Monotheism, (Tauhid) and which can protect Tauhid from misunderstanding, disclosure of facts and through it the conception of Tauhid will remain as it is. On the other hand, theology has been disgraced and has come to dishonor for its harmful teachings; like rousing doubtful thoughts, and stirring up doubt in beliefs [19].

However, after the consolidation of the empire, the leaders based their writings on general aspect of human life and made their interpretations according to contemporary circumstances. Moreover, the pattern of Islamic Education did not change after the Jihad instead the Jihad leaders consolidated and expanded the frontiers of learning.

As mentioned above, Sokoto movement was essentially an intellectual movement which aimed at establishing an Islamic society that is governed by the Quran, *Sunna* and *Ijma*, and which safeguards itself continuously against the inroads of *bida'* or innovations. According to A. Smith;

All ideals are intellectual but the ideals of the Sokoto jihad were also academic; ... in the sense of educational, having to do with what is taught in schools, in academies. ...the Mujahidun in Sokoto drew their ideas from scholarly literatures, from a tradition of learning. They were primarily students and teachers, not politicians or warriors [19].

Evidently, those who pioneered the establishment of the caliphate, namely, Shehu Usmanu Danfodiyo, Sheikh Abdullahi Fodiyo and Muhammadu Bello were better known as scholars and teachers than political leaders or military warriors. These leaders are always remembered mostly because of their intellectual activities and contributions in the propagation of Islamic ethics.

According to Bunza, their writings were mainly intended to address the need of their contemporary situation [19]. Based on their records Shehu was mostly concerned with *Aqeeda*

(faith), which called on the oneness of God and avoidance of *bid'a* (innovations); Abdullahi mainly focused on advance level learner's such as *Tafsir* (exegesis) and *Tajweed* (Science of reciting the holy Qur'an); And Muhammadu Bello was an expert on administrative issues such as land, labor, urbanization, settlements, etc. These trios were very famous in the history of the caliphate. Though there were many other scholars who had made their own contribution for the whole century.

Traditionally, the most important factor in spreading and development of Islam was knowledge; this made the leaders preoccupy themselves with teaching, preaching and writing. As such, the movement was supported principally by masses in the region, scholars and a few of the middle and upper class citizens in the area. The movement was therefore intellectually base, and interestingly enough, those literatures are still very relevant in the contemporary societies.

III. SCIENCE AND TECHNOLOGY IN ISLAM

The word Science comes from Latin word "*scientia*" meaning "to know" or "knowledge". It refers to any logical knowledge-base or prescriptive practice being capable of resulting in prediction [27]. In another pace, Science has long been regarded as a process of discovery that allows us to link isolated facts into coherent and comprehensive understanding of the natural world. According to explorable.com:

In more contemporary terms, science is a system of acquiring knowledge based on scientific (systematic) process or method in order to organize body of knowledge gained through research. Science remains a continuing effort on the part of human being to discover and increase knowledge through research. Scientist make observations, record measureable data related to their observations, analyze the information in hand in order to construct theoretical explanations of phenomenon involved [11].

In other words, modern science deals with the inventions. The knowledge of science involved almost all field of education or cycle the human existence and survival of human race, such as physics, mathematics botany, geology, anatomy, biology, chemistry, zoology mineralogy, economics, law, sociology, philosophy etc. [4].

Islam is a religion that touches on all aspects of human endeavors including the basis for science and technology as detailed in the Qur'an. The very first revelation of Allah to Prophet Muhammad (P.B.U.H) was an injunction to acquire knowledge.

"Read in the name of your Lord who created, Created man, out of a (mere) clot of congealed blood, Read, and your Lord is the most Generous, Who taught by the pen, "Taught man that which he knew not." (Holy Qur'an 96:1-5 [12])

Early Islamic teachings encouraged and promoted the pursuit of scholarship and science. Science therefore is based on knowledge, its bedrock being education. In one of the prophet Mohammed (S.A.W) traditions (Hadith), describe seeking knowledge as obligatory [25] and:

'He who pursues the road of knowledge, Allah will ease to him the road to Paradise' [24]

This is clearly demonstrated by various verses in the holy Qur'an prompting human mind to consider, replicate or ponder, think and make sense of the world. Therefore, studying science is considered an act of worship and obedience to the commandments of God (knowledge and wisdom).

Early Islamic scholars and scientists made great contributions and new discoveries, building on the scholarships of the previous civilizations. The scientific works of these scholars had profoundly influence the modern world and making great stride to scientific renaissance. It made genuine contributions to the world civilization by producing brilliant scientist and Islamic scholars such as *al-Biruni*, *al-Kindi*, *al-Khawarizmi*, *al-Farghani*, *al-Razi*, *Jabir ibn Hayyan*, *al-Idrisi*, *Ibrahim ibn Sinan*, *al-Jazari*, *al-Kashiin* the fields of medicine, astronomy, nursing and many more, whose works were extremely genuine and were hailed as principal references in the West for centuries[3].

IV. SCIENCE IN SOKOTO CALIPHATE

The writings of the scholars were diversified into different fields of scholarships. Importantly, the paper is focusing on the different aspects of medical sciences such as pharmacology, ophthalmology, hygiene and general medicine [1]. The aim of which is to explore the efforts of the jihad scholars in the development of science scholarship and its continuing relevance to the development of science scholarship in the twenty-first century.

The countless scholarly treasures left behind by scholars on different fields of knowledge became the basis of intellectual contributions of the Sokoto Caliphate scholars especially medical sciences. Prominent scholars in the field of medical sciences were Abdullahi Ibn Fodiyo and Muhammadu Bello, though also contributed in other aspects of scholarship. These people actually wrote their books in order to meet the needs and sometime request of the people in the Caliphate [28]. As records or guidance to their people day to day's activities. Some of the most important works for the nineteenth century are; *Masalih al-insan al-muta'alliq bi-l-adyanwal-abdan* (A guidance and teaching on faith) [18] by 'Abdullah ibn Fudi. In this work, divided into two sections, the first was the major ponders the spiritual aspects of Muslim life, while the second was based on medicine. Here, he identifies environment as influential to the health and wellbeing of people. He therefore discusses how the environment affects the people, causing sickness and the widespread of diseases. This was followed by analysis of how preventions will be made against such problems. He further explained that any such imbalance results in bodily malfunction, which in turn leads to illness. He also discusses the ethics of medical practice. In this respect, Abdullahi touches on issues such as respecting patient and his confidentiality.

Another medical treaty by Abdullahi was *Diya' al-umma fiadillat al-a'imma* (Light and Guidance on the rulers and kings) [10], though it precisely discussed about *Ibadat* (acts of

worship) it also provides a chapter on medicine. In this chapter, he explained the fundamental causes of sickness and its remedy. Likewise, he strongly recommends fruits and milk as being part of the diet for everyone wishing to preserve a good health. According to Bunza:

Abdullahi discussed the treatment of poisons from scorpion stings and snakebite; he recommends the use of salt and water. He also provides a verdict (fatwa) prohibiting the use of wine and other unlawful substances in medication [6].

However, as sign of warning, he explains that one must not enter a town or place where there is a plague or similar disease, which in this modern days referred to as quarantine in order to stop the spread of such disease which is the most important and effective method of protection and he also prohibits the use of black magic, divination and charms.

Muhammadu Bello, on the other hand, was considered as the leading figure in terms of medicine and development of medical treaties or solutions in the caliphate. A number of treaties were written by Bello on aspects of spiritual and general medicine. One of his major works is *Kitab al-rahma fi-l-tibbwa-l-hikma* (A book of guidance on medicine [9]), specifically on material medicine, with compilation of more than one hundred medical cases reviewed [6]. Bello compiled personal experimentation and observations on sickness, causations, symptoms and their cure. He tested the materials he recommends, and established their medicinal efficiency. In fact, in every entry, prescription, or treatment he concludes with *mujarrab al-sahih* (tested and found effective). In the book, as with 'Abdullahi's *Masalih al-insan*, Bello provides a chapter on natural sciences, that is *'ilm al-tabi'a*. In its chapter three, he also recommends some precautions that help to maintain one's health.

The work of Muhammadu Bello is titled *Al-mawarid al-nabawiyyafial-masa'ilaltibbiyya and Ujlat al-rakibfiat-tibb al-sa'ib* [6] (A complete guide on Prophetic medicine and also A study of medical science in Islam). In this verdict, Muhammad Bello underlined medical treatments and verdicts reported directly from prophet Muhammad (SAW). The first part of the second book presents the position of the study of medical sciences in Islam. According to Bello, it is compulsory for the Muslim community to train experts in medical sciences who will take charge of health at the individual and communal level. He explained that by studying medicine (Islamically) Muslims *Ummah* (Community) be independent so as not to depend on the non-Muslim practitioners among whom they live. He lamented the neglect of this science by Muslims which led them into superstitions and sorcery to heal certain diseases. *Kitab al-tibb al-nabawi* [16] is another general treatise on prophetic medicine. In these texts, the introductory part is dedicated to examining the position and significance of medicine in human society and it appeals to Muslims to study that science. He regards the study of science as the obligations of individual which he must learn (*fardayn*) which could be open to public i.e. not necessary to all (*fardkifayah*).

The eye for instance due to its importance and relevance attached to it, made the Sokoto scholars to devote certain efforts in its study and cure. In the same aspect, Bello wrote book called, *Kitab al-tibb al-mu'in al-musamma bi-tibbal-'ayn* (A portion on eye treatments), the main central point in this book was how to treat eye diseases [16]. He identifies eye problems including diseases that cause dryness, redness, and discharge from the eye, short-sightedness, night blindness, and also blindness sickness. In this, Bello prescribed certain drugs to be taken by the patient with the full detail on the how to make such medications; such as eye lotion and eye drops [7]. Some of the prescriptions in this text are mentioned in local languages as Fulfulde. *Kitab al-adwiyatilil-'uyun* [21], was an extension of his work on eye treatment, emphasizing the conditions for recovering or nursing the patient suffering the disease where recommended for such person to be feeding protein food; such as milk and egg together with drugs for recovery [6]. For the treatment of eye problem, the preparation of antimony and its application Bello simply made verdict called *Musuj al-lijayn al-musamma bi-tibb al-'ayn*, [20] where he mentioned several ways of treating eye problems. As he pointed that in the case of a person undergoing serious eye treatment, Bello recommends avoidance of hard labor and strong body movement including sexual intercourse.

Muhammadu Bello's *Risalat al-amrad al-kilyahwa'ilajiha* (Massage on the treatment of kidney disease) [23], [22] is another important medical pacts written to guide or response to one of caliphate Emirs who complained of having an illness and highlighted its causes. Quoted from Bunza's work:

Muhammad Bello replied: "From the description and symptoms of your ailment as contained in the letter, I think you suffer from a kidney problem [6]."

He also identifies three main problems associated with the kidney: Wind in the kidney, swelling of the kidney, and blockage in the kidney. In all of these three different illnesses, Bello recommended the medications to be taken and the methods of administration. It was in record the Emir followed the instructions that Bello sent him and appropriately responded to indicate that he was cured of the ailment. In another development, *Al-qawl al-manthur fi adwiyatillatal-bathur* (Standing verdict on the treatment of piles) [17], [5] was produced to deal with the causes and treatments of piles. It details different aspects of treatment such as fumigation, and the diets that the patient should maintain in order to recover. Similarly, Bello identifies some of the causes of liver problems and prescribes medicine with a combination of garlic, honey and other ingredients. The treatise is one of highly scientific texts by Bello [6].

In his *Kitab al-qawl al-sinna* [i.e. *Cassia senna*] [8] *Locust plant*, Muhammad Bello has a section that covers the treatment involving the use of a single plant called *Cassia senna*. He provides the plant's names in Fulfulde, Hausa. He then traces the origin of the plant from the Arabian Peninsula and discusses its medicinal usage and efficacy, identifying six different ways of administering it. The leaves of the plant, according to Bello, can be used in different ways; drying and grinding them to make a powder; boiling the fresh leaves and

grinding them to be administered with honey, tamarind or milk; or adding the leaves to natron or salt. Various methods of administration are described by Bello for the treatment of ailments including excessive phlegm, bile disease, diabetes, constipation, and stomach problems. The scientific nature of this work is further strengthened by his verdict on the mothers who breastfeed. It gave the description and the doses to be taken depending on the time and period [6].

In case of disease associated with worms in human, Bello made contribution by provided a treaty called *al Nubdhafiadwiyat al-didan* (A portion of a guidance concerning worm disease) [7]. This work is basically on the diseases associated with worms in human. In the text, Bello identified different types of worms that are prevalent in human beings. The symptoms associated with diseases caused by worms are mentioned and the author lastly indicated that the diseases are prevalent among children than adults. For the tapeworm, Bello estimated its length at maturity to approximately 35 cm. This work is also highly scientific in its investigation and prescription [17].

Most important is that these intellectual contributions were followed up by observance. They made sure that health became a priority in Sokoto Caliphate during life times. Accordingly, it the first time that medicine was introduced as a subject of concern in Hausaland, after providing necessary material and encouragement. They did well especially in the promotion of public health and commencement sanitation for cleanness the general public to avoid spread of cholera and other water and air borne diseases [14]. Abdullahi in one of his books above said studying the art of medicine is compulsory on Muslims in their community. Though, they always stressed that the origin of knowledge is from Almighty God through his revelation to His prophets. Therefore, medicine in Islam is regarded as collective obligation, aiding the welfare of humanity, assisting those in desperate need (patience) and an act of worship [17].

V. CONCLUSION

The movement made a mark in the 19th century as a turning point in the intellectual history of West Africa where Islamic civilization became widely used in both documentations and practical, such as recordings or development of Islamic education with the establishment of the Sokoto Caliphate, was the golden period for Islamic scholarship in what is today northern Nigeria. As a result of this movement, West African people for centuries produced scholarship in the different aspect of Islamic knowledge. The level of scientific contributions of these scholars cannot be over emphasis. But at the present time their contribution had been neglected to the extent that people do forget their discoveries and contributions. For instance, many people do not know about those medical verdict mentioned above are in existence in the locally made writings or discoveries. So this study of these intellectual writings/verdicts will help to refresh or contribute in medical scholarship in the region. Therefore, people would come to recognize the achievements of earlier generations, rekindling the spirit of scientific and medical Studies.

Likewise, these verdicts were based on Islamic teaching and herbal knowledge. Finally, it contribute and enhance medical research or development of contemporary medicine.

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