

# Understanding Socioscientific Issues in a Low Literate Society for the Achievement of the Millennium Development Goals

Jamil Mikhail Yahaya, Ahmad Nurulazam Md Zain, and Mageswary Karpudewan

**Abstract**—This paper highlights the controversial socioscientific issues and their misconceptions in Nigeria as well as in some other low literate societies around the world. It states the relevance of the issues or problems in Nigeria, which might be neutral or absent in other countries. The need to understand the issues and how such an understanding can contribute to the achievement of the Millennium Development Goals (MDGs) is also being discussed. The paper concludes by suggesting the responsibilities of science teachers to remove the misconceptions surrounding the socioscientific issues.

**Keywords**—Socioscientific issues, Millennium development goals, Science teachers.

## I. INTRODUCTION

SCIENTIFIC issues are almost every day in the news. The media are in the forefront of information dissemination to the extent that many people rely on them for scientific and everyday news. Of the news in regular broadcast are some controversial issues which are real world issues that are socially significant to people's life. One might have heard of news about scientific issues with controversial perspective [1]. They are issues or problems that have ethical, moral, political, economical and even religious concern but yet have scientific basis and explanation. These issues or problems are called *Socioscientific Issues* (SSIs). Sadler (2004) articulated that socioscientific issues are those issues or problems with two necessary elements: first is the issues' or problems' conception or procedural connection to science and secondly, its social significance to human life [2]. This means that for an issue or problem to be identified as socioscientific, it must have a scientific basis in terms of explanation and approach to resolution. Moreover, it must also be controversial drawing ethical, moral, political, economic, and to some extent, even religious attention.

SSIs are different from other scientific issues because they are interdisciplinary when one is trying a solution. They are open-ended, ill-structured and debatable problems or issues [3]. They are open-ended because they do not have a direct answer or solution and are ill-structured because of the fact

that they are controversial in nature in addition to having explanation from different areas. On the other hand, they are said to be debatable in the sense that they are based on individual's or group of individuals' opinion and understanding taking into consideration ethical, political, economic, cultural and sometimes even religious concerns about the issue. Furthermore, while science-technology-society (STS) focuses on the impact of science and technology on the society, Socioscientific Issues explore the moral and ethical implications that underlie these issues [2],[3].

## II. VARIOUS CONCEPTUALISATION OF SSIS

However, the understanding and identification of SSIs may vary from one country to another and possibly from one culture or tradition to another. That is, the issue that appeared to be socioscientific in one country may be totally absent or neutral in another. However, there is no significant available literature that fully addressed such regional or societal variations in the conceptions of socioscientific issues. For instance *Sexuality Education*. In Nigeria and in many African nations, the need to incorporate Sexuality Education into the national curriculum generated a strong opposition from traditional and religious leaders who are well respected and listened to by the masses.

The controversial nature of the curriculum has met strong opposition in Nigeria, Kenya, Indonesia and India [4],[5] unlike in Estonia and the Netherlands [4]. In Nigeria for example, although many societies and individuals recognise the reproductive threats faced by the active youths particularly sexually transmitted infections such as HIV/AIDS and unwanted pregnancies and high rate of abortion, but still the people are so attached to traditions and beliefs. Consequently, traditional and religious leaders who are well respected in the society and viewed as transmitters of faith, traditional values and beliefs are in the forefront opposing the incorporation of sexuality education in school curriculum and often mobilising parents, teachers and youths as their allies [5]. Sexuality education is generally viewed as a strategy to cut down the population growth. Similarly, it was the case in the Philippines as observed by IRIN (2010) who reported that the curriculum is aimed at cutting the population growth rate which is said to have caused the massive poverty to the country of about 92 million people [6]. It was also narrated by IRIN that talking about sex or reproductive issues remained a taboo in many Philippine societies yet the government went ahead and

Jamil Mikhail Yahaya is a Ph.D student of the School of Educational Studies, University Sains Malaysia, 11800 Penang, Malaysia (e-mail: jamilgombe@yahoo.com).

Ahmad Nurulazam Md Zain is with the School of Educational Studies, University Sains Malaysia, 11800 Penang, Malaysia (e-mail: anmz@usm.my).

Mageswary Karpudewan is with is with the School of Educational Studies, University Sains Malaysia, 11800 Penang, Malaysia (e-mail: kmageswary@usm.my).

introduced such controversial education in school despite the influential Roman Catholic Church demanding the plan be scrapped, but eventually changed the whole situation probably due to increased understanding of the content of the subject matter. Similarly in Thailand where politicians have negative attitudes toward Sexuality Education believing it is inappropriate to teach children about sexuality [7],[4]. Vuttanont [7] also suspected that the sensitivity of the issue and concern about societies' reaction during the need of political support are the contributing factors to the politicians' reluctance. Similarly in Malaysia, despite a nationwide family health education curriculum in place, students learn little or no information because of strong opposition from parents and religious leaders and political leaders are unwilling to risk a strong and negative religious reaction by openly supporting it [8]. These are examples of similar situation to Nigeria.

The people opposing sexuality education in Nigeria also have another point of view that they fear by exposing youths to reproductive or sexual matters will cause them to be sexually active which may lead to sexual initiation, experimentation and general misbehaviour [9]. It is at the midst of these uncertainties that Nigeria like the Philippines implemented the curriculum in some secondary schools in the southern part of the country not in the north. UNESCO (2011) reports the implementation strategy has this to say [4],

The Programme was first introduced in schools in 2004, and was fully scaled up in Lagos State – covering over 300 public junior secondary schools – by 2007. This rapid roll-out followed a four-year planning process that began in 1999, when the National Council on Education approved the integration of the Nigerian Sexuality Education Curriculum into all levels of the school system. The original curriculum, approved in August 2001, was ultimately changed to 'Family Life and HIV Education.' A revised curriculum was approved and implemented, and excludes discussion of condoms, contraception, and sexual behaviour, which parents, politicians and religious leaders found too explicit.

In northern Nigeria, where literacy rate is very low at 33 percent compared to 77 percent in the south [10], it was only after the forceful title was being forced to change to *Family Life and HIV Education* that the subject was introduced in higher education institutions but not in secondary schools. In teacher training colleges, the title of the subject is Family Life and Emerging Health Issues (FLEHIs). Like Nigeria, sexuality education was given different names in different African nations and beyond. This probably helps to ease the implementation of the curriculum. For instance, in Kenya it is called the *World Starts With Me*; *DAKU* in Indonesia; *Adolescent Reproductive and Sexuality Health Curriculum* in India; *Human Studies* in Estonia and *Long Live Love* in the Netherlands [4].

This is just one example of how a particular issue can be characteristically a socioscientific issue in one part of the world and not in another. At this juncture, it is appropriate to understand that the Nigerian low literate societies are at the risk of more misconception of socioscientific issues that are

relevant and significant to their well being and improved living standards. Therefore, there is need for a clearer understanding of scientific concepts relevant to life for the improvement of people's scientific literacy which is very important for coping with science and technology in the twenty first century society [11].

The following Table I describes some common socioscientific issues peculiar to low literate societies. However, some issues might be universally controversial:

TABLE I  
SOCIOSCIENTIFIC ISSUES PECULIAR TO NIGERIAN LOW LITERATE SOCIETIES

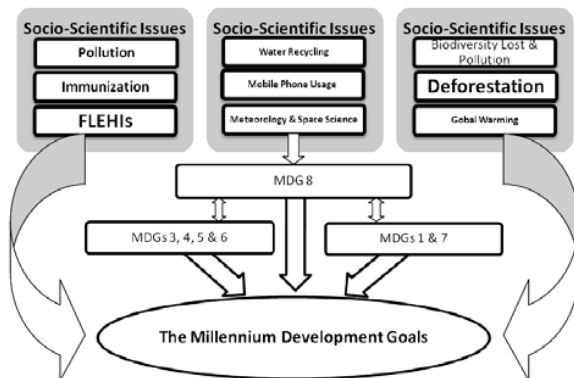
| S/No | Issues             | The Controversy   |
|------|--------------------|---|
| 1    | Global Warming     | Ozone layer damage, green house effect, increasing environmental temperature  |
| 2    | Deforestation      | Fuel wood as the only cheap source of energy, lumbering as a means of income, shifting cultivation, bush burning  |
| 3    | FLEHIs             | Fear of sexual experimentation and general misbehaviour among youths, increased youths freedom leading to disobedience, use of condoms, contraceptives will initiate premarital sexual affairs  |
| 4    | Biodiversity Lost  | Bush burning, use of chemicals such as insecticides, pesticides, herbicides, inorganic fertilizers in the farms   |
| 5    | Water Recycling    | Domestic waste water purification and redistribution for the public use   |
| 6    | Mobile Phone Usage | Youth exposure to bad friends, westernisation of culture, pornography all with great secrecy  |
| 7    | Pollution          | Domestic solid waste disposal, automobiles gas emission, noise pollution,   |
| 8    | Immunization       | General disbelief in the reason for immunization, uncertainty in the quality of the vaccines, general perception of western marginalisation and conspiracy against any Muslim dominated society |
| 9    | Meteorology        | Weather forecast  |
| 10   | Space Science      | Landing on the moon and possibility of living on other planets  |

The table above shows some examples of issues that are controversial in nature despite the scientific inclination of the issues. The controversy surrounding these issues is that either people do not believe in them or it is part of their activities that they cannot change for a better and safer suggested ways. Some are even considered as sins on religious grounds, example weather forecasts. Hence they are considered socioscientific issues because all of them have ethical, moral, political, economic and or religious concern in addition to their scientific basis. Despite the fact that most of them can be found spread in school science curricula for young learners, they are not properly identified as socioscientific issues or problems. For effective and efficient scientific literacy they ought to be taught in such a way that students can make meaningful connection between their content and real life situations. This is because of the fact that scientific literacy is one of the priorities of science education [12],[13], and schools are the main avenue of taught knowledge, skills, ideas, attitudes, and processes of science and other disciplines. Klosterman and Sadler [14] however state that learners often lack interest and motivation in school science and therefore try

hard to make connection between what has been taught to them in the classroom and their everyday life. They also contended that science and technology have a great influence on the everyday living of the people of modern society and the relevance of science to students is also very significant in providing the means to resolve life problems. Therefore, socioscientific issues and or problems must be addressed by science teachers appropriately different from other science contents.

### III. THE MILLENNIUM DEVELOPMENT GOALS

The world has enough for our needs but not our greed. Millions of people especially in developing countries are dying of hunger, curable/preventive diseases and severe poverty. Many programmes and innovations by various governments of nations failed to succeed because of the people's greediness. Considerations of these serious problems facing millions of the inhabitants of the earth gained upper hand even in the United Nation General Assembly. In one of its annual sittings in September 2005, the General Assembly adopted a document – the 2005 World Summit Outcome – in which were outlined many of such problems confronting the inhabitants of the earth in the present century. Out of these issues, eight were considered of paramount importance [15] and are called the Millennium Development Goals (MDGs). The goals are as shown in Fig. 1 below and the SSIs addressing them:



- MDG 1 - eradication of extreme hunger and poverty,
- MDG 2 - achievement of universal primary/basic education,
- MDG 3 - promotion of gender equality and women empowerment,
- MDG 4 - reduction of child mortality,
- MDG 5 - improvement of maternal health,
- MDG 6 - combating the HIV/AIDS, malaria and other diseases,
- MDG 7 - ensure environmental sustainability and
- MDG 8 - develop global partnership for development.

Fig. 1 The Conceptual Framework of the Review

Understanding socioscientific issues is very crucial towards the achievement of most of the above stated eight MDGs. This is because of the following reasons:

(1) Understanding a socioscientific issue such as sexuality education would improve health. Rosen et al. [5] have this to offer,

School-based sexuality and reproductive health education is one of the most important and widespread ways to help young people improve their reproductive health. Countries in every region have organized sexuality education programs of one type or another. Such programs, if thoughtfully designed and well implemented, can provide young people with a solid foundation of knowledge and skills.

This is possible only when the misconception that brought about the controversy on the curriculum is removed and so it is understood well by teachers and also by the general public. Rosen et al added that the world health organisation reviewed 47 sexuality education programme in developed and developing countries while the US National Campaign to Prevent Teen Pregnancies reviewed over 250 similar programmes in US and Canada and both found out that in almost all programmes, the curriculum did not prompt learners to sexual initiation, experimentation or increase in the frequency of sex. This education, if fully understood, will help youths to know much about the occurrence, survival and control/prevention of sexually transmitted infections and similar disease causing germs. This will contribute to the improvisation of maternal health and combating the menace of HIV/AIDS, malaria and other deadly diseases and will thus ensure a reduction of child mortality. This is an effective strategy for the achievement of MDGs 3, 4, 5 and 6 (see Fig. 1).

(2) Socioscientific issues knowledge is also important in conservation and protection of the environment to ensure sustainable environment for national development. Specifically, understanding the dangers of deforestation, biodiversity lost and desert encroachment as a result of human activities in farming, lumbering and bush burning may lead to change in attitude towards the way people view the environment and so agree to suggested strategies for environmental conservation. This will ensure successful utilisation of modern methods of farming and gardening that will contribute to the eradication of extreme hunger and poverty because many would be actively engaged. Furthermore, farm inputs and alternative source of energy that are environmentally friendly can be readily accepted if the socioscientific issues are well understood there by resolving the controversies surrounding them. All these can help in no small measure in the actualisation of MDGs 1 and 7 (see Fig. 1).

(3) Understanding socioscientific issues in a low literate societies will help in the removal of controversies surrounding one issue or the other. This means that policy makers and those in positions of authority would open up the society for global partnership for sustainable development. This is because there are many Non-Governmental Organisations (NGOs), donor agencies and international programmes specifically meant for developing and underdeveloped countries. They include among others the United States Agency for International Development (USAID), World Health Organisation (WHO), United Nation Children Education Fund (UNICEF), Bill and Melinda Gates

Foundation, Carnegie Foundation, United Nation Education, Social and Cultural Organisation (UNESCO), United Nation Population Fund (UNPF), Sassakawa Global, Food and Agricultural Organisation (FAO), Leon Sullivan Foundation etc. All these are international agencies that help in one way or the other in different sectors of the national economies of developing and under-developed countries. Without an effective global partnership it may not be possible for a particular society or nation to gain positively from their services. This will ensure the achievement of MDG 8 as shown in Fig. 1.

#### IV. CONCLUSION

The understanding of socioscientific issues in Nigerian low literate societies is very important in this technology driven society. All efforts by various governments and agencies may not be possible without support from the citizens for whom the benefits are meant. If the prevailing social order continues the way it is, there would be no meaningful development socially and economically. The Nigerian society would remain backward while the rest of the world is far ahead. It must also be noted that time has come when people should open up to modernisation and embrace new discoveries made scientifically. Science and technology breakthrough is not a magic or invisible affair; one can physically see, hear and even touch or manipulate the product of these discoveries. It is noteworthy that such resistance happened in many other parts of the world during the early years of science and technology development but these societies realised the need for development had totally submitted to advancement and today they are well-developed. Thus, socioscientific issues should be well understood especially by science teachers since they are the transmitters of knowledge, attitudes, skills, ideas and experiences in the Nigerian low literate societies. They must understand the approach to teaching the controversial content of their subjects and help learners to make a meaningful connection between the knowledge, ideas and skills learnt with their life. Teachers need to wake up and live up to their expectation so that the intended MDGs to change the lives and living standards of the masses can be actualised within the

#### REFERENCES

- [1] P. Reis & C. Galvão, "Teaching controversial socioscientific issues in biology and geography classes: a case study," *Electronic Journal of Science Education*, vol. 13 (1), 2009.
- [2] T. D. Sadler, "Informal reasoning regarding socioscientific issues: a critical review of research," *Journal of Research in Science Teaching*, vol. 41, pp. 513-536, 2004.
- [3] T. D. Sadler & D. L. Zeidler, "Patterns of informal reasoning in the context of socioscientific decision making," *Journal of Research in Science Teaching*, Vol. 42 (1), pp. 112-138, 2005.
- [4] UNESCO, "School-based sexuality education programme: a Cost and cost effectiveness analyses in six countries," *Executive summary*, 2011, [www.unesco.org/aids](http://www.unesco.org/aids)
- [5] J. E. Rosen, N. J. Murray & S. Moreland, "Sexuality education in schools: the International experience and implication for Nigeria," *Policy working Paper*, series No 12, 2004.
- [6] IRIN, "Philippines: sex education plan sparks furious debate," 2010, accessed on March 26<sup>th</sup>, 2012 from: [www.irinnews.org/reports](http://www.irinnews.org/reports)
- [7] U. Vuttanont, "Smart boys and sweet girls. Sex education needs in Thai teenagers: a mixed mode study," *An unpublished thesis* submitted for the degree of Doctor of Philosophy, University College London, 2010.
- [8] G. Smith, S. Kippax, & P. Anggleton, "HIV and sexual health education in Primary and secondary schools," Findings from selected Asia-Pacific countries, Sydney: Centre in HIV and social research, Faculty of Arts and Social Sciences, the University New South Wales, 2000, Retrieved March 30<sup>th</sup>, 2012 from: <http://www.arts.unsw.edu.au/nchsr/pdf%20reports/asian>
- [9] R. A. Shehu, & B. Sheshi, "Need for sex education in Nigerian secondary schools," *Institute Journal of Studies in Education*. Ilorin, pp. 141-148, 2000.
- [10] M. Joseph, "North in soul search," Economic review, Leadership Newspaper, Wednesday, June 13<sup>th</sup>, 2012.
- [11] R. Hazen, *The joy of science*, 2008, Accessed from: [www.teach2.com/](http://www.teach2.com/)
- [12] L. J. Rennie & D. Goodrum, *Australian school science education: National Action Plan 2008-2012*, vol. 2, Background research and mapping. Canberra: Australian Government Department of Education, Science and training, 2007.
- [13] R. Tyler, "Re-imagining science education: Engaging students in science for Australia's future," Australian Council for Educational Research, 2007, [www.acer.edu.au/documents/AER51](http://www.acer.edu.au/documents/AER51).
- [14] M. Klosterman, & T. D. Sadler, "Information literacy for science education. Evaluating Web-based materials for scientific issues." *Science Scope* (in press).
- [15] A. A. Sambo, "The challenges of teacher education towards the achievement of the Millennium Development Goals in Nigeria," A keynote address at the 1<sup>st</sup> National conference of the North East Zone of the Colleges of Education Academic Staff Union (COEASU), held in Potiskum, Yobe State Nigeria, 6-9 May, 2008.