



Journal of Public Health and Epidemiology

Volume 8 Number 5 May, 2016

ISSN 2141-2316



*Academic
Journals*

ABOUT JPHE

The **Journal of Public Health and Epidemiology (JPHE)** is published monthly (one volume per year) by Academic Journals.

Journal of Public Health and Epidemiology (JPHE) is an open access journal that provides rapid publication (monthly) of articles in all areas of the subject such as health observatory, biostatistics, occupational health, behavioral medicine etc. The Journal welcomes the submission of manuscripts that meet the general criteria of significance and scientific excellence. Papers will be published shortly after acceptance. All articles published in JPHE are peer-reviewed.

Contact Us

Editorial Office: jphe@academicjournals.org

Help Desk: helpdesk@academicjournals.org

Website: <http://www.academicjournals.org/journal/JPHE>

Submit manuscript online <http://ms.academicjournals.me/>

Editors

Professor Mostafa A. Abolfotouh

*Professor of Family & Community Medicine
Head of Medical Team - Biobanking Section.
King Abdullah International Medical Research
Center, King Saud Bin-Abdulaziz University for
Health Sciences, National Guard Health Affairs,
Saudi Arabia*

Editorial Board

Dr. Guolian Kang

*The University of Alabama at Birmingham/1665
University Blvd, Ryals 443
Guolian
USA*

Dr. Mohammed Danlami Salihu

*Public Health Department
Faculty of Veterinary Medicine
Usmanu Danfodiyo University, Sokoto.
Nigeria.*

Prof. Jahanfar Jahanban

*Oral Pathology Dept.Dental faculty of Tehran Islamic
Azad University/
Address:B 107 Pezeshkan-Farabi Build No 67 Javanshir
St. Hosseinabad Pasdaran St.Tehran
Iran*

Okonko, Iheanyi Omezuruike

*University of Ibadan, Ibadan, Nigeria
Nigeria*

Dr. Afroditi K Boutou

*Respiratory Failure Unit, Aristotle University of
Thessaloniki,"G. Papanikolaou", Hospital, 57010,
Exohi.
Greece*

Dr. Anil K. Philip

*Rajiv Academy for Pharmacy/ delhi-Mathura Highway,
NH#2, Mathura-281001, Uttar Pradesh, India
India*

Dr. Bijan Mohammad hosseini

*Ayatollah Kashani Social Security Hospital
P.O Box: 14515 - 799 Tehran - Iran
Iran*

Dr. Brajadulal Chattopadhyay

*Department of Physics, Jadavpur University, Kolkata-
700032, India
India*

Dr. Carlos H Orces

*Laredo Medical Center, 1700 East Saunders, Laredo
Texas 78041
USA*

Mrs Iscah A. Moth

*Ministry of Public Health and Sanitation
P.O. Box 1210-40100 Kisumu
Kenya*

Prof. Tariq Javed

*Department of Pathology, Faculty of Veterinary Science,
University of Agriculture, Faisalabad-38040.
Pakistan.*

Dr. María Elena Dávila L

*Universidad Centroccidental "Lisandro Alvarado".
School of Medicine/ School of Health Science . Av.
Andrés Bello C/ Av. Libertador. Barquisimeto, Lara,
Venezuela, SA*

Dr. Lay Ching Chai

*Centre of Excellence for Food Safety Research, Faculty of
Food Science and Technology, Universiti Putra Malaysia,
43400 UPM Serdang, Selangor,
Malaysia*

Dr. Liting Song

*Appointment pending, Public Health Agency of
Canada/Health Canada
809-50 Riddington Drive,
Toronto, ON M2K 2J8
Canada*

Dr. Joaquim Xavier Sousa Jr

*Laboratory Immunodermatology of Clinics Hospital -
Av Dr Eneas Carvalho Aguiar, 255 3th floor Room 3016
05403-000 Sao Paulo, Brazil
Brazil*

Dr. K.K.I.U. Arunakumara

*Institution/address - Dept. of Crop Science, Faculty of
Agriculture, University of Ruhuna, Mapalana,
Kamburupitiya, Sri Lanka
Sri Lanka*

Dr. Keya Chaudhuri

*Indian Institute of Chemical Biology
Raja S C Mullick Road, Kolkata-700032, India
India*

Belchiolina Beatriz Fonseca

*Universidade Federal de Uberlândia, Rua Ceará s/n,
bloco 2D. saça 43, Campus Umuarama, Uberlândia MG,
Brazil. Brazil*

Dr. Charles R. Doarn

*Associate Professor of Public Health and Biomedical
Engineering
Director, Telemedicine Program
Department of Public Health Sciences
University of Cincinnati
USA*

ARTICLES

- Autism, genetics, and inbreeding: An evolutionary view** 67
Alex S. Prayson
- Breast cancer knowledge and screening practices among female secondary schools teachers in an urban local government area, Ibadan, Nigeria** 72
Ojewusi Ayoola A. and Arulogun Oyedunni S.
- Which suicides increase during the economic crisis? A commentary and a proposal** 82
John E. Berg
- Prevalence of neonatal jaundice in Eku Baptist Community Hospital in Delta State Nigeria** 87
Kolawole S. E., Obueh H. O. and Okandeji-Barry O. R.

Review

Autism, genetics, and inbreeding: An evolutionary view

Alex S. Prayson

National Council on Rehabilitation Education

Received 18 July, 2015; Accepted 22 January, 2016

Recently there have been increased reports of autism, yet the disease is not contagious. Since it is not catching, there must be other forces at work that somehow create or pass on the autistic symptoms. DNA reports show that deviations in the genetic code due to ancient inbreeding can follow a human line for generations. Studies show that inbreeding was widespread until a few hundred years ago and is continued today, but to a lesser degree. After millions of inbreeds, the world population has become so numerous that it is globally sharing ancestors which is producing genetic abnormalities. In other words, autism may be the result of the widespread inbreeding of ancient generations. We are all touched by autism to one degree or another through common ancestors. The DNA of modern Homo sapiens of European and/or Asian descent will show 1 to 4% Neanderthal from 40,000 years ago. With that in mind, today's outbreaks may be due to descendants of ancient inbreeding times surfacing at the same time.

Key words: Autism, genetics, inbreeding, DNA, ancient generations, consanguineous marriage, incest

INTRODUCTION

The world might be smaller than you think

Currently there are increased reports of autism, yet the disease is not contagious. Since it is not catching, other forces must somehow create or transmit the autistic symptoms. Studies indicate that inbreeding will eventually produce autistic symptoms. The one commonality is our ancestors and after millions of inbreeds, the world population has become so numerous that it is now globally sharing ancestors which is producing genetic abnormalities. Autism may be the result of worldwide inbreeding of ancient generations. DNA reports show that once a human's DNA is altered, it will stay altered for generations. A consanguineous marriage does not produce birth defects (Leavitt, 2003), but it increases the

chances of inheriting a bad DNA fit which results in a birth defect. Inbred disorders may cause other abnormalities and autism can also be brought on by other conditions, but the focus of this paper is how autism might be related to huge generations of past world inbreeding.

An estimated number of people on earth by the U.S. Census Bureau, U.S. and World Population Clock (Ross, 2015):

1AD – 300 million
1250 – 400 million
1500 – 500 million
1804 – 1 billion
1927 – 2 billion

E-mail: aprayson@ymail.com.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

1960 – 3 billion
 1974 – 4 billion
 1987 – 5 billion
 1999 – 6 billion
 2011 – 7 billion

The U. S. Census Bureau put the world population in mid-2014 at about 7.2 billion.

A BRIEF HISTORY OF CONTEMPORARY AUTISM

Earliest autism diagnosis

From the early 1940s until the 1960s, Dr. Leo Kanner's premise, although incorrect, was that autism is caused by child neglect, withdrawal of affection, and in general, poor parenting. In his 1943 paper, (Kanner, 1943) Kanner called attention to what he saw as a lack of parental warmth and attachment to their autistic children. In his 1949 paper, he attributed autism to a "genuine lack of maternal warmth" which gave birth to the "Refrigerator Mother" theory. In a 1960 Time Magazine interview with Kanner who described mothers of autistic children as "just happening to defrost enough to produce a child."

In 1964, Bernard Rimland, a psychologist and the father of an autistic child, wrote a book debunking the refrigerator mother hypothesis. He became the spokesman for parents of autistic children and helped found the Autism Society of America (Laidler, 2004).

In the 1970s, researchers determined that autism is not the result of emotional abuse. Abused or neglected children may display similar behavioral problems, but these problems are distinct from autism disorders.

Between 1993 and 2003, American school children diagnosed with autism increased over 800% by some researchers. The medical world is uncertain if this rise is an actual increase in autistic children or the number of children diagnosed with autism. In 2006, the Center of Disease Control and Prevention (CDC) noted a slight leveling in the number of cases reported indicating autism may have been over diagnosed (Rudy, 2013).

Changes in diagnostic criteria

In 1991, an Autism Diagnostic Interview (ADI) first published an accepted way to identify autism. By 1992, the American Psychiatric Association (APA) printed the Diagnostic and Statistical Manual, DSM-IV. In 2014, the APA's DSM-5 revised edition, the committee redefined autism to more accurately reflect clinical cases of autism and help doctors make more accurate diagnoses (Sifferlin, 2014).

Fraudulent autism study

In 1998, Andrew Wakefield, MD published his infamous

study linking autism to childhood measles, mumps, and rubella (MMR) vaccines. His study misrepresented the records used by altering the medical histories of all 12 patients to make it appear as though vaccines were the source of their autism (CNN, 2011).

Pediatrician Dr. Laurel Schultz (Howard, 2015) of San Francisco writes, "Children are exposed to more antigens in our day to day environment than are found in all the vaccinations combined." Vaccine experts at CDC (CDC, 2015) and the American Academy of Pediatrics (AAP), agree that MMR vaccines are not responsible for the recent swell in the number of children diagnosed with autism (Magliaro, 2015).

Scientists have grappled with the sudden increase in autism reports and a recent study now indicates it is not an epidemic at all. In Sweden, over a million children were studied for a period of 10 years, from 1993 to 2002, the number of autism spectrum disorder diagnoses increased significantly, as in the United States, but the number of patients who actually showed symptoms remained fairly constant. It is highly possible that doctors are over misdiagnosing autism (MacDonald, 2015).

CHROMOSOME ANOMALIES MAY ELICIT AUTISM

The genetic blueprint of life

Chromosomes are structures within the nucleus of cells that comprise the genetic blueprint of life. This inherited material is deoxyribonucleic acid (DNA) which contains noticeable sub-units known as genes. A normal cell has 46 chromosomes, 23 from the father's sperm and 23 from the mother's egg. Here is where complications may arise. If the father has the same exact flawed DNA as the mother, they may reproduce a child with issues.

According to the National Institute of Health (NIH), abnormal chromosomes can be divided into two basic groups: (1) numerical abnormalities, when an individual is missing a chromosome from a pair or has more than two of a pair. A numerical abnormality is Down syndrome which has three copies of chromosome 21. (2) Structural abnormalities are when the chromosome itself is altered, such as deletions, duplications, inversions, rings, and translocations. Chromosomes 5, 15, and 16 are suspected participants in autism disorders (NIH, 2014).

ANCESTRAL INBREEDING MAY AFFECT CHROMOSOMES THAT CAUSE AUTISM TODAY

Centuries of inbreeding

Early hominids were not fussy about their sexual partners. Homo sapiens would interbreed with whichever hominid species was nearby, such as the Neanderthals and the mysterious Denisovans (Marshall, 2013). The Neanderthals appeared for a brief time, but eventually

died out from inbreeding causing a reduction in population, thus creating more inbreeding cycle. They did, however, leave a small percent of their DNA in the Homo sapiens' chromosome history. Of course, if the first Homo sapiens had not interbred, the human race, as we know it, may have become extinct (Estes, 2011).

The mechanisms of evolution may be leading to global inbreeding. After generations of consanguineous marriages, it could be that the world's population is so large that it is starting to inbreed with itself. It is becoming more and more difficult finding a mate who does not share a common ancestor of some sort in our contemporary chromosomes. We have all probably inherited genetic changes that were not as common a century ago. For instance, the average height for a human has increased about three inches since the 1700s. These are forced general population mutations due to an improved life style, but even good changes require genetic intervention (Ingliš-Arkell, 2012).

Possible inbred mutations causing autism

Both autism and inbred disorders may have similar abnormalities of the brain structure and/or function. Brain scans of these children show variances in the shape and structure of the brain when compared with the neurotypical or normal brain found in children. Researchers (Wahl, 2014) are exploring a number of theories that led to autism, including links to heredity and genetics.

Inbreeding is considered a problem in humans, because it heightens the chances of receiving a damaged chromosome inherited from a common ancestor (Ochap, 2004). Interbreeding increases the probability of a child being born with a double dosage of one or more recessive genetic problems that can cause congenital birth defects.

40,000 to 30,000 years ago

Autism could be the result of a slight gene mutation inherited thousands of years ago. Skeletal remains found in Northern Italy are from 40,000 to 30,000 years old and "believed to be that of a human/Neanderthal hybrid," according to a paper in PLOS/ONE (Condemi et al., 2013). If this is correct, it is direct evidence that Homo sapiens interbred with Neanderthals. Modern genetic research can determine, after thousands of years, that the DNA of people with European or Asian ancestry are 1 to 4% Neanderthal (Viegas, 2010).

There could be inbreeding disorders found in every human's DNA. Most have no effect until matched up with the same mutant gene, locus or position on paired chromosomes through inbreeding or happenstance. These abnormal alleles (Alleles are pairs or series of genes on a chromosome that determine the hereditary

characteristics, Merriam-Webster's Medical Dictionary) create subtle refined autism symptoms similar to those found in affected consanguineous off springs.

ACTUAL STUDIES SHOWING CONNECTION BETWEEN INBREEDING AND AUTISM

Roughly half of the people who live in Arab countries are inbred. A large percentage of the parents who are blood related come from families where intermarriage has been a tradition for generations (Cook, 2013). In ancient generations, "Pharaohs often married their own sister or half-sister and after a handful of generations the off springs were mentally and physically unfit to rule" (Sennels, 2010).

Two researchers, Walsh and Morrow, recently studied 104 families (Walsh, 2010) from the Arab Middle East, Turkey, and Pakistan. They found that of the 104 parents, "in 88, the parents were cousins. The average family had two autistic children. One Kuwaiti and one Pakistani family, however, each had four."

"Marriage between first cousins doubles the risk of neurological birth defects. Researchers now think that shared ancestry can increase the risk of autism produced by recessive mutations that cause problems only when a child inherits the same defective gene from both parents" (Sennels, 2010). In this analysis of 104 families, approximately 97% had heredity problems.

From as far back

It is conceivable that autism symptoms stem from ancient ancestors from as far back as the migration out of Africa and passed down through the ages randomly. These genetic anomalies may combine with an existing abnormal gene that is inactive or dormant. The combination could produce various intellectual and formational issues spread by the increased chances, in an increasing population. Since autism is considered a social learning type of disorder, it seems to confirm that autism depression follows the same depression steps as inbreeding depression. Genetic studies suggest that inbreeding depression is mainly caused by the increased presence of recessive deleterious mutations found in our modern populations (Charlesworth and Willis, 2009).

Modern human migrations

There were groups of early humans who traversed Africa and went westward across Europe until they ultimately reached the Atlantic Ocean thousands of years later. Explorers eventually took to the seas and sailed to North America and other land masses. There they encountered their distant cousins from Asia who ventured eastward crossing Asia and spanned the Bering Straits when it was still a land bridge about 30,000 to 18,000 years ago.

These sea voyagers sailed across the Atlantic Ocean carrying with them whatever disorders and diseases they had developed in Europe plus any gene changes they may have inherited. As a small example, in 1620, there were 102 English Puritans who landed in Plymouth, MA and many colonized that area by intermarriages because of their small population. Half of these Puritans did not survive the first harsh winter. Today, fifteen generations later, 35 million people claim an ancestral lineage all the way back to the original 24 males. This is about 12 percent of the American population (Galluzzo, 2004).

GENETIC DEFECTS IN CHROMOSOME 16

Researchers find not all mutations are inherited

By applying a very large genome scan, which is a complete set of DNA, researchers have discovered that the genetic abnormalities of a section of chromosome 16, can develop spontaneously while in the embryonic stage of development and not necessarily inherited directly from either parent. A culmination of genetic disorders may enhance or increase the combination so they affect one or more genes. This is an additional method for brain disorders to develop. This shows that some mutations are possible just by the interaction of various other genetic factors inherited from each parent (Amst, 2008).

CONCLUSION AND FUTURE OUTLOOK

Scientists have discovered the strongest link yet between specific chromosomal abnormalities and an increased risk of autism. New studies of families carrying glitches in the region of chromosome 16 have been strongly associated with this condition. Disrupting even a small piece of that region, 16p11.2, can sometimes cause autism. Research has identified numerous reputed areas on specific genes located in this chromosomal region that may play a part in instigating autism (Gusella, 2008). The new chromosome micro-array tests can now predict the probability of recurrence in future pregnancies (Hughes, 2011).

Science has made advances in genetic improvements that will someday reduce or eliminate autism. Progress in discovering which genetic components are involved and the genes that affect environment and learning is a large improvement since these are the most likely genes used when Homo sapiens took their first steps. This also aids in the theory that globally shared ancestors producing genetic abnormalities as a result of widespread inbreeding of ancient generations.

Studies by Guoping Feng, an MIT professor of brain and cognitive sciences, indicates that approximately 1 percent of autistic people are missing a gene called Shank3. Those without the Shank 3 gene develop typical autism symptoms such as repetitive behavior and avoidance of social interactions. Feng claims that some

of the brain defects are reversible and treatment for autism will be developed in the near future (Trafton, 2016).

Conflict of Interests

The author has not declared any conflict of interests.

REFERENCES

- Amst C (2008). Chromosome abnormality linked to autism. Technology. Available at: <http://www.bloomberg.com/bw/stories/2008-01-09/chromosome-abnormality-linked-to-autismbusinessweek-business-news-stock-market-and-financial-advice> Assessed March 30, 2015,
- CDC (2015). Vaccines do not cause autism. Centers for Disease Control and Prevention. Available at: <http://www.cdc.gov/vaccinesafety/concerns/autism/> Assessed March 29, 2015.
- Charlesworth D, Willis JH (2009). The genetics of inbreeding depression. *Nature Reviews Genetics*. Available at: <http://www.nature.com/nrg/journal/v10/n11/full/nrg2664.html> Assessed May 18, 2015,
- CNN (2011). Retracted autism study an 'elaborate fraud.' *Brit. J. Finds*. CNN. Available at: <http://edition.cnn.com/2011/HEALTH/01/05/autism.vaccines/> Assessed February 15, 2015,
- Condemi S, Mounier A, Giunti P, Lari M, Caramelli D, Longo L (2013). Possible Interbreeding in Late Italian Neanderthals? New Data from the Mezzena Jaw (Monti Lessini, Verona, Italy). *PLoS one* 8(3):e59781.
- Cook C (2013). Disturbing: Inbreeding is a huge problem in the Muslim world. *Western Free Press*. Available at: <http://www.westernfreepress.com/2013/06/13/disturbing-inbreeding-is-a-huge-problem-in-the-muslim-world/> Assessed March 20, 2015.
- Estes AC (2011). It wasn't just Neanderthals: Ancient humans had sex with other Hominids. *The Wire*. Available at: <http://www.thewire.com/technology/2011/09/it-wasnt-just-neanderthals-ancient-humans-had-sex-other-hominids/42117/> Assessed May 18, 2015.
- Galluzzo J (2004). How many people are descended from the Mayflower passengers?, *The Kingston Mariner*. Available at: <http://historynewsnetwork.org/blog/7360> Assessed January 13, 2016.
- Gusella JF (2008). A recurrent genetic cause of autism., *Simons Foundation at Massachusetts General Hospital*. Available at: <https://www.simonsfoundation.org/funding/institutions-and-investigators/massachusetts-general-hospital/a-recurrent-genetic-cause-of-autism/> Assessed January 15, 2016,
- Howard J (2015). 6 Dangerous anti-vaccination arguments analyzed, explained, and shut down. *The Huffington Post*. Available at: http://www.huffingtonpost.com/2015/02/05/anti-vaccine-arguments-analyzed-explained_n_6607026.html Assessed March 1, 2015.
- Hughes V (2011). Families hint at diverse effects of chromosome 16p deletion. *Simons Foundation Autism Research Initiative*. Available at: <https://spectrumnews.org/news/families-hint-at-diverse-effects-of-chromosome-16p-deletion/> Assessed April 3, 2015.
- Kanner L (1943). Early infantile autism. *History of Autism Blame*. Available at: <http://www.pbs.org/pov/refrigeratormothers/fridge/> Assessed March 30, 2015.
- Laidler JR (2004). The refrigerator mother hypotheses of autism. *Autism Watch*. Available at: <http://www.autism-watch.org/causes/rm.shtml> Assessed January 13, 2016.
- Leavitt G (2003). Incest/Inbreeding taboos. *International Encyclopedia of Marriage and Family*. Available at: <http://family.jrank.org/pages/854/Incest-Inbreeding-Taboos-Sibling-Marriage-Human-Isolates.html> Assessed March 28, 2015.
- MacDonald F (2015). New study suggests there is no autism epidemic: Maybe we're just over-diagnosing the condition. *Alert*. Available at:

- <http://www.sciencealert.com/new-study-suggests-there-is-no-autism-epidemic> Assessed May 17, 2015.
- Magliaro E (2015). Preventable childhood diseases, the measles outbreak, and anti-vaxxers. Flower for Socrates. Available at: <http://flowersforsocrates.com/2015/02/02/preventable-childhood-diseases-the-measles-outbreak-and-anti-vaxxers/> Assessed February 5, 2015.
- Marshall M (2013). Inbreeding shaped the course of human evolution. New Scientist. <https://www.newscientist.com/article/mg22029453-500-inbreeding-shaped-the-course-of-human-evolution/> Assessed March 27, 2015.
- NIH (2014). Chromosome abnormalities. National Human Genome Research Institute. Available at: <http://www.genome.gov/11508982> Assessed April 4, 2015.
- Ochap E (2004). Inbreeding in humans, Genetics. Available at: http://www.as.wvu.edu/~kgarbutt/QuantGen/Gen535_2_2004/Inbreeding_Humans.htm Assessed March 29, 2015.
- Ross S (2015). The harvest fields – Statistics 2015. Worldwide Missions. Available at: <http://www.wholesomewords.org/missions/greatc.html> Assessed March 4, 2015.
- Rudy LJ (2013). Is there an autism epidemic? About Health. Available at: <http://autism.about.com/od/causesofautism/p/ontherise.htm> Assessed March 24, 2015.
- Sennels N (2010). Muslim Inbreeding: Impacts on intelligence, sanity, health and society. Right Side News. Available at: <http://www.rightsidenews.com/2010081120756/life-and-science/culture-wars/muslim-inbreeding-impacts-on-intelligence-sanity-health-and-society.html#!> Assessed March 20, 2015.
- Sifferlin A (2014). Autism cases may drop under new diagnostic criteria. Time. Available at: <http://healthland.time.com/2014/01/22/autism-cases-may-drop-under-new-diagnostic-criteria/> Assessed April 27, 2015.
- Trafton A (2016). Neuroscientists reverse autism symptoms. MIT News Office, Retrieved February 17, 2016, from <https://bcs.mit.edu/news-events/news/neuroscientists-reverse-autism-symptoms>
- Viegas J (2010). Neanderthals, humans Interbred, DNA proves. Evolution. Available at: <http://news.discovery.com/human/evolution/neanderthal-human-interbreed-dna.htm> Assessed March 22, 2015.
- Wahl M (2014). Molecular and cellular biology. Assessed February 16, 2015. Available at <http://www.quora.com/Why-does-incest-cause-birth-defects>
- Walsh C (2010). Mental activity may affect autism-linked genes. Pakistan News Home. Retrieved March 21, 2015, from <http://paktribune.com/news/Mental-Activity-May-Affect-Autism-Linked-Genes-229538.html>

Full Length Research Paper

Breast cancer knowledge and screening practices among female secondary schools teachers in an urban local government area, Ibadan, Nigeria

Ojewusi Ayoola A.* and Arulogun Oyedunni S.

Department of Health Promotion and Education University of Ibadan Nigeria.

Received 20 October, 2015; Accepted 4 January 2016

Breast cancer a major public health challenge is often associated with high morbidity which often times is not unconnected with poor knowledge and screening practices. Teachers who are seen as role model are the key stakeholders in prevention of breast cancer (BC). However their knowledge and screening practices have not been fully explored. Therefore this study was designed to investigate knowledge of breast cancer and screening practices of female Senior Secondary (SS) school teachers in an urban local government area of Ibadan, Nigeria. The study was cross-sectional in design and it involved all the 411 female teachers in SS school. A semi-structured questionnaire was used to assess breast cancer awareness, knowledge of BC; self reported practice of Self Breast Examination (SBE), Clinical Breast Examination (CBE) and Mammography as well as factors influencing screening practices. Knowledge of BC was measured using a 30-point scale categorized into poor 0-14, fair 15-21, and good 22-30 knowledge respectively. Respondents' mean age and years of service were 39.8 ± 8.5 and 12.0 ± 8.5 years respectively. About two-thirds (79.8%) were married, 70.0% had first degrees and 46.0% masters degrees. Majority (93.2%) had heard of BC and the main sources of information were television (66.4%) and radio (42.0%); 76.2% claimed to have heard about SBE, 10.7% knew the appropriate age for commencing SBE. One hundred and eleven (36.2%) had ever practiced SBE and only 27.6% of these examined their breast monthly. Of the 73 and 163 respondents who have heard of mammography and CBE 1.6 and 4.6% had ever gone for either of the screening respectively. The mean knowledge score of BC was 8.8 ± 4.5 . About 86.3% had poor knowledge, 13.0% had fair knowledge and 0.7% had good knowledge of BC. Some respondents believed that BC could be cured (42.3%) and 64.5% believed that BC was a disease of young girls. Almost thirty five percent (34.8%) did not practice BC screening because they did not know how it is done. There was no statistically significant difference in the knowledge of BC and the age of respondents. Knowledge and screening practice for BC is low among the respondents. There is a need to organize series of health education programmes aimed at improving knowledge of breast cancer and screening practices.

Key words: Breast cancer, secondary school, teachers, breast screening and practices.

INTRODUCTION

Breast cancer is the most common cause of cancer death among women in 140 of 184 countries worldwide and the

most frequently diagnosed cancer among women which now represents one in four of all cancers in women

(GLOBOCAN 2012). Developing countries are going through rapid societal and economic changes, and there is a shift toward western lifestyles with resultant changes in reproductive, dietary, and hormonal risk factors, are contributing to the rising cancer rates. However, even though incidence rates of breast cancer are still highest in more developed nations, mortality is greater in less developed countries, owing to lack of access to treatment as well as early detection of the disease (International Agency for Research on Cancer (IARC), 2012).

There is variation of breast cancer incidence worldwide in which Africa is not excluded. In sub-Saharan Africa the incidence of breast cancer was 15% compare with 27% in North African countries (Algeria and Egypt) (Parkin et al., 2003). In the North-central geopolitical zone in Nigeria, breast cancer constituted 22.41% of new cancer cases registered in 5 years and accounted for 35.41% of all cancers in women (Afolayan et al., 2012). Breast cancer was second to cancer of the cervix in the North-Western geopolitical zone of Nigeria while at University College Hospital (UCH) in Ibadan which is situated in the South-Western geopolitical zone of Nigeria; breast cancer was the leading malignancy among women (Ogunbiyi et al., 2010).

Most of the breast cancer cases in Nigeria are detected late due to poor utilization of screening facilities and lack of awareness (Okobia et al., 2006; Anyanwu, 2008). In many African countries, the true incidence of breast cancer is generally not known (Boulos et al., 2005) however, several publications indicate a trend towards an increasing incidence of the disease in many parts of Africa (Onwere et al., 2009). In Nigeria, the main reasons for high mortality from breast cancer among women include poor knowledge and lack of education (Akinola et al., 2011). Other reasons could be related to lack of culturally sensitive community-based programmes religion, fear, language barriers, persisting breast cancer myths or taboos, and other sociocultural barriers (Renshaw et al., 2010).

Lack of knowledge about breast cancer has also been identified as an important factor preventing women from participating in breast cancer screening (Akpo et al., 2010). It additionally adds to delay in presentation and treatment. Therefore, it is important to understand the factors that influence patients' screening behaviours. Among Nigerian women, the peak age of breast cancer presentation is about 10-15 years later than what is observed in Caucasian women, where it occurs between the ages of 35-45 years and 70% of Nigerian women present with advanced staged disease while the 5-year survival rate is less than 10% compared with over 70% in Western Europe and North America (Okobia et al., 2006).

Breast self-examination, clinical breast examination and mammography are the most commonly known and used breast cancer screening methods in the world (American Cancer Society 2013; Onwere et al., 2009). In Nigeria, about two thirds of women with breast cancer are diagnosed at an advanced stage, with the possibility of metastatic spread (Akarolo-Anthony et al., 2010). Therefore, the purpose of this study was to assess the knowledge of female teachers in public Senior Secondary Schools in Ibadan North Local Government Area of Oyo State, Nigeria.

METHODOLOGY

This study was a descriptive cross-sectional in design. The study population comprised of all female teachers of Senior Secondary Schools in Ibadan North Local Government Area.

Sample size and sampling

Sample size was determined using the formula for sample size determination for a cross-sectional descriptive study (Araoye, 2003) with a 95% confidence interval, a precision of 5%, and using a prevalence of knowledge of breast cancer risk factors among teachers 59% (0.59) (Nur, 2010). The calculated sample size was 372 and by adding 10% non-response rate, the total sample size was found to be 391 out of 411 female teachers at the time of the study. Three hundred and seven 307 (74.7%) female teachers consented to participate in the study.

Study instrument

A pre-tested, self-administered questionnaire was used. Questions were drawn using information on breast cancer from the various literature reviewed. The self-administered semi-structured questionnaire used was divided into 6 sections; Section A: The socio-demographic variables, Section B, Awareness of breast cancer, screening practices and sources of information, Section C, Knowledge of Breast Cancer was assessed by asking questions on breast Cancer Symptoms and Risk Factors, Section D, Previous breast cancer screening practices, Section E, Perceived susceptibility of breast cancer, perceived severity of breast cancer and perceived benefits of early detection and Section F, Factors influencing the practice of BSE, CBE and mammography was assessed. The survey instrument included 25 items.

Method of data collection

Semi-structured questionnaire was used to elicit information from the respondents with the help of two trained research assistants. Permission was first taken from all the principals of each schools enlisted for this research, who later introduce the investigator to the teachers to inform them about the research that was been conducted. The consent of each teacher was also taken before questionnaires were distributed.

*Corresponding author. E-mail: ayoola.ojewusi@yahoo.com. Tel: 234(0)8058045088.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

Ethical consideration

Ethical approval was obtained from the ethics committee of the Ministry of Health in Oyo State Secretariat in the Department of Health Planning, Research and Statistics. Further permission and approval was obtained from principal of each school before the commencement of the study. The respondents were assured of the confidentiality of their answers and that total participation in the study was voluntary.

Data analysis

Knowledge of breast cancer was measured by posing questions on prevention, risk factors and symptoms of breast cancer. A total of thirty questions were asked and one point was allocated to every correct answer thus bringing the total points to thirty. Afterwards the points were categorized between 0-14 as Code 1, 15-20 as Code 2 and 21-30 as Code 3. Participants that score between 0-14=Code 1 was poor knowledge of breast cancer, 15-20=Code 2 was fair knowledge of breast cancer and 20-30=Code 3 was good knowledge of breast cancer. The screening practice was measured by asking the respondents to indicate which of the breast screening have they ever practice. The following was put in place to ensure proper and effective management of data. The questionnaires were serially numbered for control and recall purposes and data collected were checked for completeness and accuracy after which data was sorted, edited and coded manually. The data analysis was being carried out using the SPSS statistical software. A summary measure such as means and standard deviations were used for quantitative variables, while chi square test was used to test for association.

Limitations of the study

The sample included only the teachers that were present at the time of data collection. The study population is a specific group and profession of the country and this may affect the generalization of the findings.

RESULTS

Socio-demographic characteristics

Respondents' age ranged from 22-59 years with a mean age 39.8 ± 8.5 years and the years of service ranged from 2-34 years and the mean years of service was 12.0 ± 8.5 years two hundred and fifty two (82.1%) were Christian and 17.3% were Muslim. Almost all the respondents were Yoruba 288 (93.8%). The majority of the respondents 79.8% ($n=245$) were married, more than half 215 (70.0%) had first degree and 46 (15.0%) had masters (Table 1).

Awareness of breast cancer, screening methods and sources of information

Most of the respondents 286 (93.2%) had heard of breast cancer while 219(71.3%) claimed that someone has ever discussed the harmful effect of breast cancer with them (Figure 1).

Awareness of breast self-examination

Two hundred and thirty four respondents (76.2%) were aware of breast self-examination while 42.7% knew someone who practices BSE (Figure 1). Of those who knew someone who practices BSE, 17.6% were friends, 5.9% were their sisters, and 2.9% were mothers and 1.0% aunts. To the question on what is the recommended age of breast self-examination to start only 33(10.7%) knew the appropriate age of commencing breast self-examination to be 20 years, 55(17.9%) indicated that should be started at all age, 121 (39.4%) once breast formation starts, and 10(3.3%) at the age of 30 and 88(28.7%) did not know when to start.

Awareness of clinical breast examination

One hundred and sixty three (53.1%) were aware of clinical breast examination while 74 (24.1%) knew some who had gone for clinical breast examination before (Figure 1) and thirty eight respondents 12.4% of these were friends, 1.0% were mothers 0.7, 1.3 and 0.7% were their sisters and aunts to the respondents respectively. The response for the question what is the recommended age of CBE examination to start: 39 (12.7%) reported it should be started at all age, 67(21.8%) once breast formation starts, 45(14.7%) at the age of 30, 15 (3.3%) at the age of 40, 3(1.0%) indicated at the age of 50 and 201 (65.5%) did not know when to start.

Awareness of mammography

Seventy three respondents (23.8%) of the respondents had heard of mammography while the same percentage of respondents (23.8%) knew someone who had gone for the mammogram (Figure 1) and out of which 10.4% of them were friends, 2.0% were mothers and 1.6% each was their sisters and aunts respectively. The respondents response for the question what is the recommended age of mammography examination to start: 23 (7.5%) reported it should be started at all age, 33 (10.7%) once breast formation starts, and 31(10.7%) at the age of 30, 16 (5.2%) at the age of 40 and 3(1.0%) at age of 50, 201(65.5%) did not know when to start.

Knowledge of breast cancer

Less than half (42.3%) believed that breast cancer can cured and eighty six percent (86.6%) believed that breast cancer can be cured if discovered early. Sixty nine (22.5%) held the belief that surgery is the only method of treatment for breast cancer and 67.4% for breast cancer is the disease of the white. Sixty five (21.2%) identified bloody nipple as a symptom of breast cancer while 70 (22.8%) recognized inversion, pulling in of the breast as a

Table 1. Socio-demographic characteristics of the respondents.

Variable		Frequency	Percent
Age (years)	20-29	38	12.4
	30-39	112	36.5
	40-49	114	37.1
	50 above	43	14.0
Religion	Christianity	252	82.1
	Muslim	53	17.3
	Traditional	1	0.3
	Others	1	0.3
Ethnicity	Yoruba	288	93.8
	Igbo	1	0.3
	Hausa	11	3.6
	Other	7	2.3
Marital Status	Single	47	15.3
	Married	245	79.8
	Divorce	8	2.6
	Widow	7	2.3
Years of service	1-9	130	42.3
	10-19	115	37.5
	20-29	42	13.7
	30 above	20	6.5
Educational Status	NCE	41	13.4
	Degree	215	70.0
	Master	46	15.0
	M.Phil	3	1.0
	PhD	2	0.7
Present position	Principal	11	3.6
	Vice principal	24	7.8
	Counselor	8	2.6
	Head of department	22	7.2
	Class Teacher	242	78.8
Types of marriage	Monogamy	229	74.6
	Polygamy	28	9.1
	Others	50	16.3

symptom, 71.0% answered correctly the question lump in the breast, 40.1% for lump in the armpit and 56.7% for pain in the breast region. When asked about breast cancer risk factors 9.1% for obesity, 6.2% breast feeding, 47.9% for family history of breast cancer, 20.8% for as age increases, 27.0% for it is caused by the devil, 26.7% for history of benign breast and the least recognized risk factors were 7.5% for early age of menstruation, 6.5% for late age at menopause. The mean knowledge score of BC was 8.8 ± 4.5 with score range of 1-23. About 86.3% had poor knowledge, 13.0% had fair knowledge and

0.7% had good knowledge of BC. There is no significant association between breast cancer knowledge and age (* $p < 0.05$; $X^2 = 4.40$, $df = 6$, $p = 0.623$) (Tables 2 to 4).

Screening practices

Only 111 (36.2%) had ever practiced BSE and of these only 27.6% were doing it monthly. Fourteen (4.6%) respondents reported ever having clinical breast-examination and only 4(1.3%) reported to be doing it

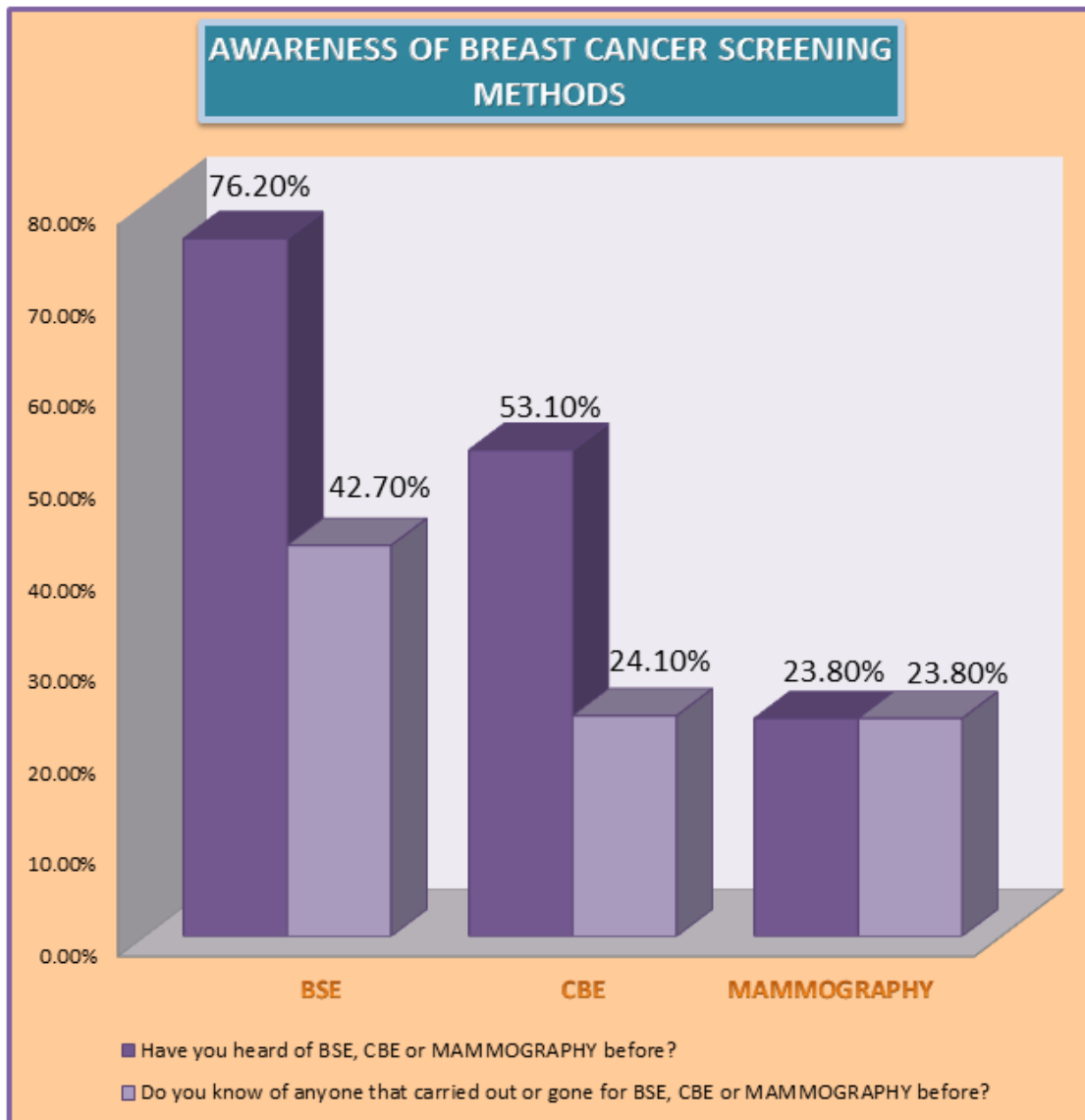


Figure 1. Awareness of screening practices (BSE, CBE and MAMMOGRAPHY).

Table 2. Knowledge of breast cancer.

Variables	Frequency (%)		
	Yes	No	Don't know
Breast cancer cannot be cured	82(26.7%)	130(42.3%)*	95(30.9%)
Breast cancer can be cured if discovered early	266(86.6%)*	14(4.6%)	27(8.8%)
Breast cancer can be cured by surgery only	69(22.5%)*	123(40.1%)	115(37.5%)
Breast cancer is caused by excessive sucking and massage	12 (3.9%)	161(52.4%)*	134(43.6%)
BC is difficult to discover until the symptoms manifest	134(43.6%)	95(30.9%)*	78(25.4)
Breast cancer can be detected by oneself	203(66.1%)*	42(13.7%)	62(20.2%)
Breast cancer is harmful to health	273(88.9%)*	11(3.6%)	23(7.5%)
Breast cancer is the disease of young girls only	198(64.5%)	49(16.0%)*	23(7.5%)
Breast cancer is disease of the white	8(2.6%)*	270(67.4%)	92(30%)
Breast cancer is the disease of old women only	6(2.0%)	231(67.4%)*	60 (19.5%)

*Correct responses.

Table 3. Knowledge of breast cancer symptoms.

Variables	Frequency (%)		
	Yes	No	Don't know
Bloody nipple	65(21.2%)*	55(17.9%)	187(60.9%)
Inversion, pulling in of the breast	70(22.8%)*	55(17.9%)	182(59.3%)
Breast ulceration	50(16.3%)*	47(15.3%)	210(68.4%)
Headache	64(20.8%)	55(17.9%)*	188(61.2%)
Abdominal pain	41(13.4%)	72(23.5%)*	194(63.1%)
Lump in the breast	218(71.0%)*	15(4.9%)	74(24.1)
Lump under the arm pit	123(40.1%)*	52(6.9%)	132(43.0%)
Pain in the breast region	174(56.7%)	26(8.5%)*	107(34.9%)
Scaling, dry skin in the nipple region	92(30.0%)*	35(11.4%)	180(58.6%)
Breast enlargement	116(37.8%)*	53(17.3%)	138(45.0%)

*Correct responses.

Table 4. Knowledge of breast cancer risk factors.

Knowledge of breast cancer risk factors	Frequency (%)		
	Yes	No	Don't know
Putting money between the breast and brassier	147(47.9%)	56(18.2%)*	104(33.9%)
Family history of breast cancer	151(49.2%)*	55(17.9%)	101(32.9%)
Older age	64(20.8%)*	104(33.9%)	139(45.3%)
Obesity	28(9.1%)*	111(36.2%)	168(54.7%)
Breast feeding	19(6.2%)	190(61.9%)*	98(31.9%)
Bruising the breast	47(15.3%)	83(27.0%)*	177(57.7%)
It is caused by the devil	92(30.0%)	94(30.6%)*	121(39.4%)
Previous history of benign breast problems	82(26.7%)*	59(19.2%)	166(54.1%)
Early age of menstruation (age 12 or before)	23(7.5%)*	135(44.0%)	149(48.5%)
Late age at menopause (age 55 or after)	20(6.5%)*	114(37.1%)	173(56.4%)

*Correct responses.

every year and for mammography only 5(1.6%) of the respondents had ever gone for mammography. There is an association between breast self-examination, age and years of service ($p < 0.05$; $X^2 = 11.5$, $df = 3$, $p = 0.018$; $p < 0.05$; $X^2 = 11.7$, $df = 3$, $p = 0.018$). The most frequently endorsed reason for non-performance of breast cancer screening was that people did not like someone touching their breast 111(36.2%) followed by, did not know how the test is done 107(34.9%) and complexity of the hospital registration 94(30.6%) (Table 5 and 6).

DISCUSSION

The age range of the respondents in this study falls within (22-59); this age group belong to reproductive age and what is require of a civil servant. This is related to a study by Kayode et al. (2005) which was carried out in Ilorin and a study by Alice and Okeowo (2014) among female

secondary school teachers. Breast cancer tend to occur in women after the age of 20 years, leveling up to a plateau at the age of 45-55 years, and thereafter increasing to a peak at 50-60 years (Bassey et al., 2011). Most of the respondents (93.2%) in this survey were aware of breast cancer and 71.3% has someone who had discussed the harmful effects of breast cancer with them, this result is contrary to the study conducted in other region of Nigeria where 58.2% of the respondents were aware of breast cancer as a disease entity (Omotara et al., 2012). The major sources of information about breast cancer were television (69.1%) and closely followed by radio (43.6%) in this study. It is similar to other researchers (Iruhe et al., 2011; Bassey et al., 2011) and also Nur (2010) who studied breast cancer knowledge and screening behaviors of the female teachers found that, leading sources of information was television (59.0%). This finding was in contrast to the study of Afaf and Mona (2015) who found that the

Table 5. Socio-demographic characteristics and breast self-examination.

Variables	Breast self-examination		Chi-square tests
	Yes	No	
Age			
20-29	11(28.9%)	27(71.1%)	p=0.018*
30-39	33(29.5%)	79(70.5%)	
40-49	55 (48.2%)	59(51.8%)	
50above	12(27.9%)	31(72.1%)	
Years of service			
1-9	36(27.7%)	94 (72.3%)	p=0.018*
10-19	52(45.2%)	63(54.8%)	
20-29	18(42.9%)	24(57.1%)	
30 above	5(25.0%)	15(75.0%)	
Level of education			
NCE	10(24.4%)	31(75.6%)	p=0.301
Degree	82(38.1%)	133(61.9%)	
Master/ M.Phil/ PhD	18 (37.7%)	33(62.3%)	
	----	-----	
Heard of harmful effect of BC			
Yes	91 (41.4%)	129 (58.6%)	p=0.002*
No	20 (23.0%)	67 (77.0%)	
Knew somebody who had carried out BSE before of BC			
Yes	57 (43.5%)	74 (56.5%)	p=0.014*
No	54 (30.7%)	122 (69.3%)	

Table 6. Socio-demographic characteristics and knowledge of breast cancer.

Variables	Poor knowledge	Good knowledge	Chi-square test
Age			
20-29	33 (86.8%)	5 (13.2%)	p=0.623
30-39	96 (85.7%)	16 (14.30%)	
40-49	97 (85.1%)	17 (14.9%)	
50 above	39 (90.7%)	4 (9.3%)	
Years of Service			
1-9	115 (88.5%)	15(11.60%)	p=0.439
10-19	95 (82.6%)	-	
20-29	35 (83.3%)	7(16.7%)	
30 above	20 (100%)	-	
Level of education			
NCE	34 (82.9%)	7 (17.1%)	p=0.446
Degree	191 (88.8%)	24 (11.2%)	
Master	35 (76.1%)	11 (23.9%)	
M.Phil	3(100.0%)	-	
PhD	2(100.0%)	-	

commonest source of information about BSE was health professionals and teachers (62.8%). The least reported

primary source of information on breast cancer in the study was internet. It may be that teachers do not see the

internet as a useful tool for health information or they may lack computer literacy skills. This should be addressed in any future programs targeted towards health education of educators. Breast self examination, clinical breast examination and mammography are considered as screening methods for early detection breast cancer (Lam et al., 2008). Breast self-examination is one of the essential screening methods for early detection of breast cancer and the procedures are easy, non-invasive and involve little time. In this study more than two-third of the respondents (76.2%) claimed to have heard of BSE, while 42.7% knew someone who practices BSE and only 10.7% knew the appropriate age for performing BSE. Our findings are in concordance to those of other studies (Isara and Ojedokun, 2011; Iruhe et al., 2011; Matalqah et al., 2011). More than half of the respondents (53.1%) have heard of clinical breast examination as one of the breast screening methods and 14.7% knew the appropriate of commencing clinical breast examination. In a study by Parsa et al. (2008), 25% of women have had a CBE. Similarly, Dundar et al. (2006) study found that 18.4% of women in rural areas in Turkey had a CBE (2006). In the study by Ho et al. (2005), the annual CBE percentage was 45% in educated women. Almost twenty four percent (23.8%) of the respondents had heard of mammography and knew someone who had gone for mammogram before respectively and 5.2% knew the appropriate age of commencing mammogram. This study is in tandem with a study by Obajimi et al. (2013) found a low level of awareness of mammography. This figure contrasts with much higher proportions reported from other authors in Nigeria likely due to variability in the characteristics of the study population. Osime et al. (2008) found a prevalence of mammography awareness of about 35% among civil servants while Akinola et al. (2011) reported an awareness level of 40.5% among a hospital sample.

Less than half (42.3%) believed that breast cancer can be cured and eighty six percent (86.6%) believed that breast cancer can be cured if discovered early. Sixty nine (22.5%) held the belief that surgery is the only method of treatment for breast cancer. One of the strongest risk factors of breast cancer is family history of the disease (Tsuchiya et al., 2007) and in this study more than half of the respondents (50.8%) were not aware that family history of breast cancer is a major risk associated with breast cancer and 79.2% did not know that as age increase tendencies of having breast cancer increases and this may be the reasons why some of them thought that breast cancer is the disease of young girls and some believe that breast cancer is the disease of old women. Although women with a strong family history of breast cancer have a higher risk, a larger percentage of cases occur in women without a positive family history (McPherson et al., 2000). In this study less than 10% of teachers knew that obesity, early age of menstruation and late age at menopause are breast cancer risk

factors. Thirty percent believed that breast cancer is caused by the devil. More than half (56.7%) of respondents in this study shared the view that lumps in the breast that are cancerous would be painful. This, as reported by Powe et al. (2005), is a widespread misconception as most people associate pain with the occurrence of cancer. Ukwenya et al. (2008) reported in a study in Nigeria that a majority of breast cancer patients cited ignorance of the seriousness of a painless lump as a reason for prolonged delay before seeking medical advice. Inadequate knowledge about risk factors of breast cancer were also reported by previous researches (Alam, 2006; Amin et al., 2009), female teachers and health providers such as nurses were found to have inadequate knowledge on breast cancer (Parsa et al., 2008; Ahmed et al., 2006). In this study 92(30.0%) belief that breast cancer is caused by the devil and in a study by Mitchell et al. (2002) strong religious beliefs were found to be common among women in Eastern North Carolina in United States of America. Poor knowledge of risk factors and knowledge of their relative risk of developing breast cancer also explains why they do not engage in health promoting behaviour or breast-screening practices.

Of all the teachers (307), only 111 (36.2%) had ever practiced BSE but only 27.6% were doing it monthly and this is less than the figure reported from a study by Mbanaso et al. (2005) found that 84.0% of their study population practiced BSE, however only 47.9% of them performed it monthly. Variables such as higher level of education and years of service were not significant determinants of BSE practice in this study; age was significantly related to BSE practice and practice of BSE increased significantly with age from among those who were 20-29 years to those who were 40 years and above. Our results show that teachers have low rates of CBE as only 14 (4.6%) had ever gone for clinical breast examination before while only 4(1.6%) did it once in a year, which is lower than the report among Nurses in Lagos (7.8%) and an abysmally low rate compared with similar studies in Saudi Arabia (42.7%) and Singapore (35%) (Seah and Tan, 2007). However, this study is at a very low CBE rate compared to the US (78%) and the neighboring country Qatar (23.3%). Among the screening methods mammography is the appropriate tool for screening, diagnosis and examining breast lumps (Mahbubi et al., 2004). Out of seventy three (23.8%) who claimed to had heard of mammography as breast screening method but only 5(1.6%) had ever gone for mammography. Okobia et al. (2006) also reported that none of the participants in a study among semi-urban community-dwelling women in Nigeria ever had mammography screening. With regard to mammography in Dundar et al. (2006) study showed that only 5.5% of women above 40 years had undergone it. One of the well-known educational models in health education is health belief model, which is a psychological pattern

(Fuladi et al., 2012), and it is widely used in the context of research studies concerned with predicting health-related behaviors. In this study 4(1.3%) are those who believe that they are likely to get breast cancer as others and only 5(1.6%) see themselves developing breast cancer in the future. Low level of involvement in screening practices could be attributed to the knowledge level of the respondents, since knowledge and attitudes are stage-setting factors in a health behavior (Ghorchaei et al., 2013). Breast cancer perceived severity has to do with a belief and perception that this ailment is serious and the consequences can be serious or can lead to death (Mishra et al., 2007), this is in conformity with our study in which majority 267(87.0%) agreed with the statement that breast cancer can cause death if untreated, 149 (48.5%) also agreed with the same statement "breast has to be removed". With perceived severity of this study being high among female teachers but this did not translate to the use of screening methods among these professionals. It is essential to address screening tests among these professional, especially use of BSE, CBE and mammography. One hundred and forty three (46.6%) respondents agreed with the statement that one of the benefits of early detection of breast cancer is that it helps in early detection of abnormal mass. In some studies, susceptibility, seriousness and benefits were variables that found no relationship with screening practices performance (Petro-Nustus and Mikhail, 2002; Lee et al., 2004; Secginli and Nahcivan, 2006) while in some studies it was reported that these variables were significant predictors of the breast cancer screening performance (Petro-Nustus et al., 2002; Canbulat and Uzun, 2008). The results in this study clearly demonstrate that improved knowledge would produce a corresponding improvement in screening because, according to the conceptual modeling that guided the study there was high level of perceived benefit which indicate that improved knowledge will affect increase in recommended breast cancer screening practices. However, poor practice of breast cancer screening methods has been reported in many studies in Nigeria (Akhigbe and Omuemu, 2009; Okobia et al., 2006).

RECOMMENDATIONS AND CONCLUSION

Teachers constitute one group of professionals who have regular contact not only with their students in schools but with the community members who look at them as change agents and role models. The importance of secondary education in educational system cannot be overemphasized. Apart from serving as the link between primary and tertiary education, it provides opportunity for a child to acquire additional knowledge, skills, and traits beyond the primary level through their teachers. Teachers are the fulcrum on which the lever of educational system rests (Achimugu, 2005). Periodic

intervention programmes targeting teachers in public schools should be undertaken. This could comprise of talks and demonstrations carried out by interest groups. Relevant nongovernmental organizations (NGOs) can make significant contribution to breast cancer and screening methods education by sponsoring health talks and workshops for teachers to reposition them better to reach out to their students and the community at large. Information, Education and Communication materials (IEC) can be made use of in the school environment and in various educational professional bodies.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

- Achimugu L (2005). The agonies of Nigeria teachers. Ibadan: Heinemann Education Publisher
- Afaf Abd El-Mohsen S, Mona Abd El-Maksoud M (2015). Improve Knowledge, Beliefs and Behavior of Undergraduate Female Nursing Students in Al-Alzhar University toward Breast Self-Examination Practice. *J. Educ. Pract.* 6(8):102-110.
- Afolayan EAO, Ibrahim OOK, Ayilara GT (2012). Cancer Patterns In Ilorin: An Analysis Of Ilorin Cancer Registry Statistics. *Trop. J. Health Sci.* 19(1).
- Ahmed F, Mahmud S, Hatcher J (2006). Breast cancer risk factor knowledge among nurses in teaching hospitals of Karachi, Pakistan: A cross-sectional study. *BMC Nurs.* 19:5-6.
- Akarolo-Anthony SN, Ogundiran TO, Adebamowo CA (2010) Emerging breast cancer epidemic: evidence from Africa. *Breast Cancer Res.* 12, Suppl 4:S8.
- Akhigbe AO, Omuemu VO (2009). Knowledge, attitudes and practice of breast cancer screening among female health workers in a Nigerian urban city. *BMC Cancer*;9:203.
- Akinola R, Wright K, Osunfidiya O, Orogbemi O, Akinola O (2011). Mammography and mammographic screening: are female patients at a teaching hospital in Lagos, Nigeria, aware of these procedures?. *Diagn. Interv. Radiol.* 17(2):125-129.
- Akinola R, Wright K, Osunfidiya O, Orogbemi O, Akinola O (2011). Mammography and mammographic screening: are female patients at a teaching hospital in Lagos, Nigeria, aware of these procedures?. *Diagn. Interv. Radiol.* 17(2):125-129.
- Akpo EE, Akpo MO, Akhator A (2010). Breast cancer knowledge and screening practices among Nigerian medical students. *Internet J. Health* 11(2).
- Alam AA (2006). Knowledge of breast cancer and its risk and protective factors among women in Riyadh. *Ann. Saudi Med. J.* 26:272-7.
- Alice TE, Okeowo PO (2014). Breast self examination among secondary school teachers in South-South, Nigeria: A survey of perception and practice. *J. Public Health Epidemiol.* 6(5):169-173.
- American Cancer Society (2013). Breast cancer facts and figures 2013-2014. American Cancer Society, Inc.
- Amin TT, Al Mulhim ARS, Al Meqihwi A (2009). Breast cancer knowledge, risk factors and screening among adult Saudi women in a primary health care setting. *Asian Pac. J. Cancer Prev.* 10:133-8.
- Anyanwu SN (2008). Temporal trends in breast cancer presentation in the third world. *J. Exp. Clin. Cancer Res.* 27(1):1-6.
- Araoye MO (2003). Research Methodology with statistics for Health and social sciences. Nathadex Puls ushers, Ilorin, Nigeria 118-119.
- Bassey RB, Iruhe NK, Olowoyeye MA, Adeyomoye AA, Onajole AT (2011). Knowledge, attitude and practice of breast self-examination among nursing students in Lagos university teaching hospital, Nigeria. *Int. Res. J.* 2:1232-1236

- Boulos S, Gadallah M, Neguib S, Essam E, Youssef A, Costa A, Mittra I, Miller AB (2005). Breast screening in the emerging world: high prevalence of breast cancer in Cairo. *Breast* 14(5):340-346.
- Canbulat N, Uzun Ö (2008). Health beliefs and breast cancer screening behaviors among female health workers in Turkey. *Eur. J. Oncol. Nurs.* 12:148-56.
- Dundar PE, Ozmen D, Ozturk B, Haspolat G, Akyildiz F, Coban S, Cakirglu G (2006). The knowledge and attitude of breast self examination and mammography in a group of women in a rural area in Turkey. *BMC Cancer* 6:43.
- Fuladi N, Pourfarzi F, Rezaei M (2012). Study of the relationship between individual and social factors of women referred to Ardebil health centers on screening of breast cancer by using health belief model and determining predicting value of model in 2011. *Ardabil University of Medical Sciences. Asian Pac. J. cancer Prev.* 14:6857-62
- Ghorchaei A, Charkazi A, RazaqNejad A (2013). Knowledge, Practice and Perceived Threat toward Breast Cancer in the Women living in gorgan, Iran. *J. Res. Dev. Nurs. Midwifery* 10(1):23-31.
- GLOBOCAN (2012). *Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 11* [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Available from: <http://globocan.iarc.fr>, accessed December 2013.
- Ho V, Yamal JM, Atkinson EN, Basen-Engquist K (2005). Predictors of breast and cervical cancer screening in Vietnamese women in Harries county, Houston Texas. *Cancer Nurs.* 28:119-29
- IARC (International Agency for Research on Cancer) (2012). *Handbook on Cancer Prevention No.7. Breast Cancer Screening*. Lyon, France 2012.
- Irurhe NK, Arogundade RA, Bassey RB, Onajole AT (2011). Knowledge, attitude and practice of Breast- Self Examination among female medical students in the University of Lagos. *Internet J. Health* 12(1).
- Isara AR Ojedokun CI (2011). Knowledge of breast cancer and practice of breast self Examination among female senior secondary school students in Abuja, Nigeria *J. Prev. Med. Hyg. J.* 52:186-190.
- Kayode FO, Akande TM, Osagbemi GK (2005). Knowledge, attitude and practice of breast self examination among female secondary school teachers in Ilorin, Nigeria. *Eur. J. Sci. Res.* 10(3):42-7.
- Lam WW, Chan CP, Chan CF, Mak CC, Chong KW, Leung MH, Tang MH (2008). Factors affecting the palpability of breast lesion by self-examination. *Singapore Med. J.* 49(3):228-232.
- Lee EO, Ahn SH, You C, Lee DS, Han W, Choe KJ, Noh DY (2004). Determining the main risk factors and high-risk groups of breast cancer using a predictive model for breast cancer risk assessment in South Korea. *Cancer Nurs. J.* 27(5):400-6.
- Mahbubi A, Alvandi SH, Alizade Navaei R (2004). Analysis of breast lesions in Mammography. *J. Babol University Med. Sci.* 6(2):52-55.
- Matalqah L, Radaideh K, Yusoff ZM, Awaisu A (2011). Predictors of breast cancer among women in a northern state of Malaysia: a matched case-control study. *Asian Pac. J. Cancer Prev.* 12(6):1549-1553.
- Mbanaso AU, Adisa AC, Onuoha C (2005). Status of Breast Self Examination among health professional of Abia State University Teaching Hospital. *J. Exp. Clin. Anatomy* 4(1):55-57.
- McPherson K, Steel CM, Dixon JM (2000). Breast cancer--epidemiology, risk factors, and genetics. *Br. Med. J.* 321(7261):624-624.
- Mishra SI, Bastani R, Crepsi CM, Luce PH, Baqute CR (2007). Results of randomize trial to increase mammography usage among Samoan women. *Cancer Epidemiol. Biomarker Prev.* 16(2):2594-604
- Mitchell J, Lannin DR, Mathews HF, Swanson MS (2002): Religious beliefs and breast cancer screening. *J. Womens Health (Larchmt)* 11(10):907-915.
- Nur N (2010). Breast cancer knowledge and screening behaviour of the female teachers. *Women Health J.* 50(1):37-52.
- Obajimi MO, Ajayi IO, Oluwasola AO, Adedokun OB, Adeniji-Sofoluwe TA, Mosuro OA, Akingbola ST, Bassey SO, Umeh E, Soyemi OT, Adegoke F, Ogungbade I, Ukaigwe C, Olopade IO (2013). Level of awareness of mammography among women attending outpatient clinics in a teaching hospital in Ibadan, South-West Nigeria. *BMC Public Health* 13:40
- Ogunbiyi JO, Fabowale AO, Ladipo AA (2010). In Cancer incidence and top ten cancers in eleven local government areas in Ibadan, Nigeria and its environs, 2004-2008. *Ibadan M. Alofe (Nig.) enterprises*, 11-17.
- Okobia MN, Bunker CH, Okonofua FE, Osime U (2006). Knowledge, attitude and practice of Nigerian women towards breast cancer: a cross-sectional study. *World J. Surgical Oncol.* 4(1):11.
- Omotara B, Yahya S, Amodu M, Bimba J (2012). Awareness, Attitude and Practice of Rural Women regarding Breast Cancer in Northeast Nigeria. *J. Community Med. Health Educ.* 2:148.
- Onwere S, Okoro O, Chigbu B, Aluka C, Kamanu C, Onwere A (2009). Breast Self-Examination as a method of early detection of breast cancer: knowledge and practice among antenatal clinic attendees in South Eastern Nigeria. *Pak. J. Med. Sci.* 25(1):122-125.
- Osime OC, Okojie O, Aigbekaen ET, Aigbekaen IJ (2008). Knowledge attitude and practice about breast cancer among civil servants in Benin City, Nigeria. *Ann. Afr. Med. J.* 7(4):192-197.
- Parkin DM, Ferlay J, Hamdi-Chérif M, Sitas F, Thomas JO, Wabinga H, Whelan SL (2003). *IARC scientific publication*, 153. Lyon, Kenya; <https://www.iarc.fr/en/publications/pdfs-online/epi/sp153/SP153-1A.pdf>
- Parsa P, Kandiah M, Mohd Zulkefli NA, Rahman HA (2008). Knowledge and behavior regarding breast cancer screening among female teachers in Selangor, Malaysia. *Asian Pac. J. Cancer Prev.* 9(2):221-227.
- Petro-Nustus W, Mikhail BI (2002). Factors associated with breast self-examination among Jordanian women. *Public Health Nurs. J.* 19:263-71.
- Renshaw C, Jack RH, Dixon S, Møller H, Davies EA (2010). Estimating attendance for breast cancer screening in ethnic groups in London. *BMC Public Health* 10(1):157.
- Seah M, Tan SM (2007). Am I breast cancer smart? Assessing breast cancer knowledge among health professionals. *Singapore Med. J.* 48(2):158-162.
- Secginli S, Nahcivan NO (2006). Breast self-examination remains an important component of breast health: a response to Tarrant. *Int. J. Nurs. Stud.* 43:521-523.
- Tsuchiya M, Iwasaki M, Otani T, Nitadori J, Goto K, Nishiwaki Y, Uchitomi Y, Tsugane S (2007). Breast cancer in first-degree relatives and risk of lung cancer: assessment of the existence gene sex interactions. *Jpn. J. Clin. Oncol.* 37:419-423.
- Ukwenya AY, Yusufu LD, Nmadu PD, Garba ES, Ahmed A (2008). Delayed treatment of symptomatic breast cancer: the experience from Kaduna, Nigeria. *South Afr. J. Surgery*, 46(4):106-10.

Full Length Research Paper

Which suicides increase during the economic crisis? A commentary and a proposal

John E. Berg

Faculty of Health Sciences, Oslo and Akershus University College, Pilestredet 48, 0130 Oslo, Norway.

Received 23 October, 2015; Accepted 4 January, 2016

Both suicide and economic crisis as terms are defined differently in scientific studies. Suicides before the crisis have several causes, and the proportion of such suicides during a crisis is unknown. Calculating these suicides as part of the purported economic crisis induced suicides may exaggerate the increase in the suicide rate. Suicide statistics is not reliable in all countries. Several years may pass before the economic crisis to make people conclude with a wish to and an act of committing suicide. People referred to hospitals before the crisis, during the crisis and some years after. The crisis could be characterized and compared according to objective and individually felt relation to deteriorating finances. The aim of the study is to demonstrate the complexity of the concept of suicide related to the economic crisis in Europe in 2007 to 2008 and propose a way to research this complexity.

Key words: Suicide, economic crisis, unemployment.

INTRODUCTION

A committed suicide is seldom a disputed fact. Death is a final end-point. Suicides have intrigued the scientist and common man at least from the seminal works of Emile Durkheim. (Durkheim 1897; Werth 1996) The road to and reason for a suicide is complex and not fully understood, and reporting is unreliable (De Leo 2015). World Health Organisation (WHO) cautions against the validity of direct comparisons of suicide rates from different countries, also outside periods with an economic crisis. While WHO firmly discourages the practice of straight data comparisons between countries, nobody actually seems to care (De Leo 2015). Reasons for this deplorable data insufficiency are many; stigma avoidance, legal or religious pressure against reporting, self-starvation,

voluntary euthanasia, methods of suicide as motor vehicle accidents and opiate overdose, and missing persons. Thus, even before an official statement of death due to suicide on a death certificate form, many factors contribute to uncertainty. Countries have different routines and responsibilities for investigation procedures and issuing of death certificates.

An economic down turn or crisis has an impact on suicide rates, and often also on the unemployment rate. Both terms may interact during a crisis, but empirical studies vary widely. The study proposes that a too simplified notion of suicide and unemployment is used in epidemiological and public health studies of changes in societies. In a study by Laanani et al. unemployment and

E-mail: johnerikberg@gmail.com

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

suicide rates were found to be statistically associated, but very weakly (Laanani et al. 2014). A "crisis effect" was inconsistent across countries and was interpreted as an argument against a causal effect. Impact of unemployment on suicide rates is shown to be offset by the presence of generous state social and unemployment benefit programs (as in Norway), though effects are small or inconclusive (Baumbach and Gulis 2014; Cylus et al. 2014). Reeves et al. found an 0.94% increase in male suicide rates for each percentage point rise in unemployment in 20 European Union (EU) countries with widely varying social welfare programs (Reeves et al. 2014a).

The economic crisis in Europe in 2007 to 2008 has started a renewed interest in a purported effect of an economic downturn on the rates of suicides in society (Chang et al. 2013). Attitudes towards suicide have changed considerably through history from a question of moral sentiment to a medical, psychological or public health problem (Fitzpatrick 2014). Committed suicides have rates that differ with age, sex, work conditions and employment status. Whereas, women in rural India commit suicide out of poverty and harsh family relations using pesticides (Mohanraj et al. 2014), old men in Norway (suicide rate above 70 years 29.8/100000 in one study (Kjølseth et al. 2002)) and other European countries find their lives useless and have a rate higher than in the working age groups. When suicide is not accepted in society, even national statistics may be inaccurate or rather report low suicide rate. An eruption of publications started in the light of the Orthodox Church in Greece stating that suicide is a deplorable moral act, and an ensuing underestimation of suicide cases in the public statistics. This was very prominent when the economic downturn of 2007 made living conditions deteriorate as shown in a study by Kentikelenis et al. 2014.

This study is firmly contested by Konstantinos et al mentioning that suicide rates have increased in countries without crisis Fountoulakis and Theodorakis 2014. Several articles have highlighted the impact of the crisis on mental health, usually through suicide, although mental health problems are not the only reason for a suicide during a crisis. A recent editorial in *Lancet* underscore the ill effect of austerity measures. (Editorial 2015) The imputed increasing suicide rate in Greece after 2008 has been studied extensively. (Stuckler et al., 2009, Kentikelenis et al., 2011, Costa et al., 2012, De Vogli et al., 2013, Fountoulakis et al., 2013, Kondilis et al., 2013, McDaid et al. 2013). On the other hand the total health impact of the economic downturn in the short run has been positive in 23 European countries (Toffolutti and Suhrke 2014). All cause mortality decreased 3.4% at the increase of 1.0% in unemployment rate, even motor vehicle accidents and alcohol related deaths decreased, whereas the suicide rate increased by 34.1%.

The quality of suicide statistics hinges on the quality of

mortality statistics in a country (De Leo 2015). In 2012 in Norway, 530 persons committed suicide and around 240 died after an overdose of a narcotic substance, mainly heroin. A clear distinction between the two ways of dying would be hard to come by, even if every heroin overdose is defined as not a suicide. If on the other hand both ways of dying would be part of the suicide statistic, the suicide rate in Norway would in fact be 50% higher than the published one. On the other end of mortality statistic, observations of artificially low suicide rates in Greece may have a cultural background. Death certificates issued by medical doctors are usually the input to mortality statistic tables. Handling of violent or self-inflicted deaths may be subject to religious or discretionary demands. Even if the statistics are reliable, the relationship between unemployment and suicide is not monolithic (Jalles and Andresen 2014). It may change for different demographic groups, places and sex.

Several reasons for suicide are known. A not comprehensive outline of types of suicides is given in Table 1. The type of suicide varies along cultural, religious and political lines. To the study knowledge the proportions of suicides in a country has not been estimated according to the groups depicted in Table 1. During an economic crisis nearly all suicides are thought to be the result of the crisis. Time lag between an economic crisis and committing suicide is an unknown factor. A suicide during the economic crisis may have its root in events before the crisis. Events during the crisis that could drive people to a suicide may not be judged as related to the crisis because of a long time lag before it happens.

In a study by Reeves et al. of the political economy of austerity and healthcare, the authors used data on health expenditure changes in all 27 EU countries (Reeves et al. 2014b). Reductions in government health expenditure were not significantly associated with magnitude of economic recessions, nor did ideology of governing parties have an effect. Lending from international financial institutions or tax revenue falls correlated more closely than underlying economic conditions with healthcare expenditure change.

Overview of the concept of suicide

Table 1 lists different types of suicides and their purported relationship to an economic crisis. Most types are deemed not related to a crisis, although the numbers would be included in the suicide statistics.

DISCUSSION

An increase in suicide rates during the economic crisis in 2007 and the following years would have to be encompassed by Table 1. Mental illness is known to

Table 1. Suicide types.

Type	Description	Relation to economic crisis
Benevolent suicide	Self-sacrifice for the sake of the greater good	Hardly
Copycat suicide	Werther effect (after J.W. Goethe) + media induced	Hardly
Sokushinbutsu	Buddhist sect practice of self-mummification	Hardly
Shinju	Group suicide out of love, Japanese puppet theatre practice	Hardly
Prisoner suicide	Inmate in prison out of despair or isolation	Hardly
Ritual suicide (Japan)	As part of religious ritual	Hardly
Mass suicide	A group of people commit suicide together out of religious belief or as a result of military defeat. Jauhar practice in medieval India	Hardly
Military suicide	Two types: 1) Suicides after duty because of adjustment problems to non-military life 2) Combat related behaviour of voluntarily seeking out life threatening situations	Type 1 may be related to an economic crisis Type 2 not related to economic crisis
Suicide bombers	An act of suicide drawing innocent others into death out of fanatic or revengeful religious reason	No connection to economic crisis, but to inequality gaps
Voluntary euthanasia	The act of killing someone painlessly to relieve suffering from an incurable illness	Not related to economic crisis
Altruistic suicide	Committed for the benefit of others. Durkheim notes this as a tribal duty for a wife when her man dies	Hardly
Youth suicide	Contagious form of suicide in groups of young. May be related to personal bereavement	Partly related to economic bereavement. Related to the Werther effect
Personal economic bereavement	Sudden change in personal disposable income and wealth	Assumed causal relationship
Group economic bereavement	Sudden change in income or tax burden for a group of citizens	Purported causal relationship
Conspicuous suicide	Committed in public to demonstrate ill effect of crisis. Cases in Greece recently	Causally related to crisis
Crying for help suicide attempt	Unwanted successful suicide	Hardly related to economic crisis

increase the risk of suicide above the risk in the general population. Mental illness is not a uniform entity and the work force participation rate differs greatly, and little is known about whom with a mental illness commit suicide.

1. Persons with a psychotic illness may never have worked. If they commit suicide, the relation to the economic crisis is not straightforward.

2. Persons with a minor mental illness in the work force may have difficulties staying in the job, also in good times. The effect of sudden unemployment may drive some into suicide and this would be a case of crisis-

induced suicide.

Military service men and women commit suicide for reasons related to the military service or the great change in life circumstances after ending military service. The relation to a concomitant economic crisis is uncertain. The road from suicidal ideation to committing suicide may be influenced by increased emphasis on awareness to live and being connected to others as shown in a qualitative paper from Norway (Vatne and Nåden 2014). Data from Greece on suicides are unreliable out of cultural reasons. Thus, the reported increase in Greece

of suicide rates during the last economic downturn may be an artefact of statistical registration.

Sparse social security nets would increase the negative consequences of a recession, as might be the case for Hungary. The substantial decrease in suicide rates, from a very high level over the last 30 years in Hungary, is a counter example of no positive relation between an increase in economic crisis and an increase in suicide rates. As would the steady rate of suicides in Norway be in a period with improved social security net. The unemployment - suicide link was studied in 30 countries spanning the period 1960 to 2012 (Norström and Grönqvist 2014). The possible excess effect of unemployment during the financial crisis was not significant in the fixed effects model of the authors. More generous unemployment protection implied a weaker detrimental impact on suicide of the increasing unemployment during the Great Recession.

Table 1 indicates that the fraction of suicides related to an economic crisis in a country is unknown. The seven first types of suicide are hardly related to the crisis, whereas they may constitute a non-negligible part in some countries. Before the economic crisis we do not register whether a suicide is related to the same economic mechanisms as during the crisis. Suicides do not necessarily occur immediately after the proclamation of an economic crisis. If a suicide occurs some years after the start of an economic downturn there is no agreement as to a purported causal relationship.

Inferences from existing datasets should therefore be more tentative than in some recent publications. The results for Hungary are further explained by a study by Fountoulakis et al 2014b. Using a dataset from 2000 to 2011 they suggest that unemployment might be associated with suicidality in the general population only after 3 to 5 years. It is possible that the distressing environment of the economic crisis increases suicidality in the general population rather than specifically in unemployed people. Spectacular suicides published in media shortly after the start of an economic downturn probably represent a marginal phenomenon, but may increase slightly the numbers of suicides for some days (Ueda et al. 2014). The media coverage rather than the co-occurrence with an economic downturn would explain this short-term rise in suicides.

How could we improve the studies on suicide rates related to economic changes?

Characterizing suicidal events may be achieved by studying persons referred to medical or psychiatric departments before a crisis emanates, during the crisis and some years after. This would not be a cohort study. Data on socio-economic circumstances, concomitant mental problems characterized in some detail and the relation to a crisis cycle must be gathered. Objective economic parameters may be compared to individually

felt economic restrictions. This may be done both by quantitative and qualitative methods, also lagged regression models and relevant psychometric tests.

Conclusion

The fraction of people succeeding in committing suicide without being referred to hospital cannot be characterized by such a study. However, in most cases a suicide outside hospital does leave researchable traces of information. The distinction of military personnel described earlier may very well be studied by the proposed methods. Inaccurate mortality statistics would not pose a problem. Comparisons across countries could be done. Violation of the warnings by WHO would, with the proposed methods, not be relevant.

Conflict of interest

The author has none to declare.

REFERENCES

- Baumbach A, Gulis G (2014). Impact of financial crisis on selected health outcomes in Europe. *Eur. J. Public Health* 24(3):399-403.
- Chang SS, Stuckler D, Yip P (2013). Impact of 2008 global economic crisis on suicide: time trend study in 54 countries. *Br. Med. J* 347.
- Costa G, Marra M, Salmaso S (2012). [Health indicators in the time of crisis in Italy]. *Epidemiol. Prev.* 36(6):337-366.
- Cylus J, Glymour M, Avendano M (2014). Do generous unemployment benefit programs reduce suicide rates? A state fixed-effect analysis covering 1968 - 2008. *Am. J. Epidemiol.* 180(1):45-52.
- De Leo D (2015). Can we rely on suicide mortality data? *Crisis* 36(1):1-3.
- De Vogli R, Marmot M, Stuckler D (2013). Strong evidence that the economic crisis caused a rise in suicides in Europe: the need for social protection. *J. Epidemiol. Comm. Health* 67(4):298-298.
- Durkheim E (1897). *Le Suicide*. (The suicide). Available at: http://classiques.uqac.ca/classiques/Durkheim_emile/suicide/suicide_Livre_1.pdf
- Editorial (2015). The Greek health crisis. *The Lancet* 386 (July 11):104.
- Fitzpatrick SJ (2014). Re-moralizing the suicide debate. *Bioethical Inquiry*. doi: 10.1007/s11673-014-9510-y.
- Fountoulakis K, Gonda X, Dome P, Theodorakis P, Rihmer Z (2014). Possible delayed effect of unemployment on suicidal rates: the case of Hungary. *Ann. Gen. Psychiatry* 13(12).
- Fountoulakis K, Theodorakis P (2014). Austerity and health in Greece. *The Lancet* 383(May 3):1543.
- Fountoulakis KN, Savopoulos C, Siamouli M, Zaggelidou E, Mageiria S, Iacovides A, Hatzitolios AI (2013). Trends in suicidality amid the economic crisis in Greece. *Eur. Arch. Psychiatry Clin. Neurosci.* 263(5):441-444.
- Jalles J, Andresen M (2014). Suicide and unemployment: a panel analysis of Canadian provinces. *Arch. Suicide Res.* 18(1):14-27.
- Kentikelenis A, Karanikolos M, Papanicolas I, Basu S, McKee M, Stuckler D (2011). Health effects of financial crisis: omens of a Greek tragedy. *The Lancet* 378(9801):1457-1458.
- Kentikelenis A, Karanikolos M, Reeves A, McKee M, Stuckler D (2014). Greece's health crisis: from austerity to denialism. *The Lancet* 383(February 22):748-753.
- Kjølseth I, Ekeberg Ø, Teige B (2002). Suicide among the elderly in Norway. *Tidsskr Nor Lægeforen* 122(15):1457-1461.
- Kondilis E, Giannakopoulos S, Gavana M, Ierodiakonou I, Waitzkin H, Benos A (2013). Economic Crisis, Restrictive Policies, and the

- Population's Health and Health Care: The Greek Case. *Am. J. Public Health* 103(6):973-979.
- Laanani M, Ghosn W, Jouglu E, Rey G (2015). Impact of unemployment variations on suicide mortality in Western European countries (200-2010). *J. Epidemiol. Comm. Health* 69 (8):819-20.
- McDaid D, Quaglio G, Correia de Campos A, Dario C, Van Woensel L, Karapiperis T, Reeves A (2013). Health protection in times of economic crisis: challenges and opportunities for Europe. *J. Public Health Policy* 34(4):489-501.
- Mohanraj R, Kumar S, Manikandan S, Kannaiyan V, Vijayakumar L (2014). A public health initiative for reducing access to pesticides as a means to committing suicide: findings from a qualitative study. *Int. Rev. Psychiatry* 26(4):445-452.
- Norström T, Grönqvist H (2014). The Great Recession, unemployment and suicide. *J. Epidemiol. Commun. Health* 69(2):110-6.
- Reeves A, McKee M, Basu S, Stuckler D (2014). The political economy of austerity and healthcare: Cross-national analysis of expenditure changes in 27 European nations 1995-2011. *Health Policy* 115:1-8.
- Reeves A, McKee M, Gunnell D, Chang SS, Basu S, Barr B, Stuckler D (2014). Economic shocks, resilience, and male suicides in the Great Recession: cross-national analysis of 20 EU countries. *Eur. J. Public Health* 25(3):404-9.
- Stuckler D, Basu S, Suhrcke M, Coutts A, McKee M (2009). The public health effect of economic crises and alternative policy responses in Europe: an empirical analysis. *The Lancet* 374(9686):315-323.
- Toffolutti V, Suhrcke M (2014). Assessing the short term health impact of the Great Recession in the European Union: A cross-country panel analysis. *Prev. Med.* 64: 54-62.
- Ueda M, Mori K, Matsubayashi T (2014). The effects of media reports of suicides by well-known figures between 1989 and 2010 in Japan. *Int. J. Epidemiol.* 43(2):623-629.
- Vatne M, Nåden D (2014). Crucial resources to strengthen the desire to live: Experiences of suicidal patients. *Nursing Ethics* Dec 24. pii: 09697330145629901-14.
- Werth JL (1996). *Rational suicide? Implications for mental health professionals.* Taylor & Francis.

Full Length Research Paper

Prevalence of neonatal jaundice in Eku Baptist Community Hospital in Delta State Nigeria

Kolawole S. E.^{1*}, Obueh H. O.² and Okandeji-Barry O. R.³

¹National Open University of Nigeria, Benin City Study Centre, Benin City, Edo State, Nigeria.

²Biology Department, College of Education, P.M.B 1144, Ekiadolor, Benin City, Edo State, Nigeria.

³Faculty of Health Sciences, Novena University, Ogume, Delta State, Nigeria.

Received 26 September, 2015; Accepted 11 December, 2015

The prevalence of neonatal jaundice among newborn babies in Eku Baptist Community Hospital in Delta State was studied between January 2007 and May 2013. A total of 2,509 neonatal case folders were reviewed to determine the prevalence, pattern of occurrence, and associated risk factors of neonatal jaundice among the newborn babies aged between 1 and 28 days. Neonatal jaundice accounted for a total prevalence of 52.6 in 1000 of the total number of cases reviewed. There was significant prevalence ($p \leq 0.05$) of neonatal jaundice in males (67.4) than in females (43.6). The risk factors of neonatal jaundice identified were sepsis (66.7%), prematurity (15.2%), lack of breast feeding (9.0%), ABO incompatibility (5.2%), and anaemia (3.8%). Two deaths were recorded from neonatal jaundice due to sepsis. Although the prevalence of neonatal jaundice was low, there is need to educate women on regular antenatal checks and delivery in appropriate health care facility in order to curb the incidence of neonatal jaundice.

Key words: Prevalence, neonatal jaundice, newborn babies, Eku Baptist Community Hospital.

INTRODUCTION

Jaundice is the most common condition that requires medical attention in newborns. It appears as a result of the imbalance between bilirubin production and excretion (Dennery et al., 2001). During pregnancy, mother's body discards foetus's bilirubin through placenta. After birth, the newborn has to discard blood bilirubin by itself. The bilirubin may have elevated values in newborns up to concentrations causing the yellow colouration of skin and mucosae. This is due to organs immaturity and inability to cope with the rhythm needed for the bilirubin to be

extracted from the organism (Iacob et al., 2011). Neonatal jaundice therefore is the yellow colouration of the skin and sclera of newborn babies that result from hyperbilirubinaemia. Neonatal jaundice occurs worldwide up to 60% of term and 80% of preterm newborns in the first week of life (Slusher et al., 2004). It is one of the important contributors to neonatal morbidity and mortality which has remained very high in sub Saharan African, Asia, and Latin America (Ezechukwu et al., 2004). Unconjugated hyperbilirubinaemia is the most common

*Corresponding author. E-mail: kolasunde@gmail.com.

Table 1. Neonatal delivery from January 2007 to May 2013.

Annual delivery of neonates	Frequency	%
2007	161	6.4
2008	154	6.1
2009	173	6.9
2010	433	17.3
2011	470	18.7
2012	800	31.9
2013	318	12.7
Total	2,509	100
Sex		
Male	949	37.8
Female	1,560	62.2
Total	2,509	100

form of jaundice encountered by family physicians (Porter and Dennis, 2002). Even though extreme is rare in developed countries, it is still quite rife in developing countries often resulting in kernicterus with its attendant medical, economic and social burden on the patient family and society at large (Wang et al., 2005).

Institutional neonatal care started in Nigeria in the late 60s and use of incubators was introduced and special care baby units (SCBU) were set up. In the context of SCBU, there are still deficiencies as monitoring care is hampered by lack of equipment, such as infant monitors, pulse oximeters, arterial blood gas monitoring, epileptic power supply, and unstable supply of oxygen. Just as babies were dying so were their mothers (Lawn et al., 2005). All healthy newborns are at potential risk if their jaundice is unmonitored or managed inappropriately.

Risk of developing insignificant neonatal jaundice is higher in male infants (Hamid et al., 2003). Unlike the developed countries where fetomaternal blood group incompatibilities are the main causes of severe neonatal jaundice, it is mostly prematurity, glucose 6 phosphate dehydrogenase (G6PD) deficiency, infective causes as well as effects of negative traditional and social practices constitute the aetiology in developing countries (Oladokun et al., 2009; Onyearugha et al., 2011). This study was to determine the prevalence, pattern of occurrence, and associated risk factors of neonatal jaundice in Eku Baptist Community Hospital, Delta State, Nigeria.

MATERIALS AND METHODS

The study was carried out in Eku Baptist Community Hospital in Ethiope West Local Government Area of Delta State, Nigeria. The study included cast note records of mothers and their neonates (male and female neonates) from January 2007 to May 2013. A total of 2,509 neonatal case records were retrieved. The newborn

babies were between 1 and 28 days of age. History including onset time of hyperbilirubinaemia, onset of breast feeding and lab data of complete blood count, blood group and rhesus type of mother and neonate were taken. Data concerning age, sex, prevalence and risk factors were documented and analyzed using frequency tables, simple percentages, and chi-square. Prevalence of neonatal jaundice was calculated using number of cases divided by total cases multiplied by 1000.

RESULTS

The total number of neonatal delivery from January 2007 to May 2013 was 2,509. Neonates born were 1,560 (62.2%) females and 949 (37.8) males (Table 1). There were more female neonates delivered than male neonates during this period.

Neonatal jaundice was present in only 132 of the 2,509 neonates delivered with prevalence of 52.6 (Table 2). Total prevalence of neonatal jaundice in females was 43.6 and total prevalence in males was 67.4.

Table 3 shows the age at which neonatal jaundice occurred in the neonates. As shown in this table, 93 (70.5%) of the neonates developed jaundice within the first week of life.

Table 4 shows the associated risk factors of neonatal jaundice, from the study. The associated factors included sepsis (66.7%), anaemia (3.8%), prematurity (15.2%), ABO incompatibility (5.3%), and lack of breast feeding (9.0%).

DISCUSSION

The prevalence of neonatal jaundice in this study (52.6) was lower when compared with other studies with 126 (Kavehmanesh et al., 2008) and 149.9 (Najib et al., 2013)

Table 2. Prevalence of neonatal jaundice.

Sex	Occurrence of neonatal jaundice in total population			
	Total population	Present	Prevalence	Prevalence in total population
Male	949	64	25.5	67.4
Female	1560	68	27.1	43.6
Total	2309	132	52.6	-

Table 3. Age at which neonatal jaundice was presented

Age (days)	Frequency	Percentage
1 – 7	93	70.5
8 – 14	29	21.9
> 14	10	7.6
Total	132	100

Table 4. Associated risk factors of neonatal jaundice

Associated risk factors	Frequency	Percentage
Sepsis	88	66.7
Anaemia	05	3.8
Prematurity	20	15.2
ABO incompatibility	07	5.3
Lack of breast feeding	12	9.0
Total	132	100

and higher than the result from the studies of Iacob et al. (2011) with 17.1, Maisels and Kring (1998) with 4.2, and Tikmani et al. (2010) with 16.5. This study showed a significantly higher prevalence of males with neonatal jaundice than females even with the higher female neonates delivered. The higher prevalence of males with neonatal jaundice than females corroborated with the study of Hamid et al. (2003) who had higher males with neonatal jaundice due to the fact that the enzyme level of the activity of G6PD was significantly lower in males than in females (George and Akani, 2011). But the result of the study disagreed with the studies of Sciuto et al. (2009) and Egesie et al. (2008) where they reported lower prevalence of neonatal jaundice in males. Males have lower levels of the enzymes activity of G6PD than the females in view of the fact that the defect is X-linked recessive resulting in the male's tendency to develop neonatal jaundice (George and Akani, 2011).

Majority of the neonates developed neonatal jaundice in their early life probably due to prematurity and septicaemia (Udo et al., 2008). Septicaemia was the leading cause of neonatal jaundice from this study. West and Tabansi (2014) attributed the high prevalence of sepsis documented in their study to the exclusion of all

neonates who had prior antibiotic therapy or whose mother had antibiotics within a week of delivery. Low prevalence of sepsis in developed countries could be a reflection of a more hygienic environment, better obstetric and nursery care than in developing countries (Edwards, 2002). According to Egube et al. (2013), neonatal sepsis occurs from poor umbilical cord hygiene and haemolysis in G6PD deficient babies when menthol is applied to the umbilical cord. It could also be as a result of delay in seeking medical attention for neonatal jaundice; hence, contributing to development of kernicterus.

Studies from Owa and Ogunlesi (2009) reported that septicaemia and G6PD deficiency were the leading causes of neonatal jaundice. From this study, prematurity, lack of breastfeeding, ABO incompatibility, and anaemia were the other causes of neonatal jaundice at Eku Hospital, though there was significant difference ($P < 0.05$) between the risk factors for neonatal jaundice to be prevalent. This report corroborated with the studies of Najib et al. (2013) who had other associated risk factors as ABO and Rh incompatibility and breast feeding. Exclusive breastfeeding without prolonged periods of fasting and avoidance of supplementation with dextrose or water is some documented measure associated with

lower serum bilirubin levels in newborns (Dennery et al., 2001).

Since all healthy newborns are at potential risk if their jaundice is unmonitored or managed inappropriately, there is need to address the social demand for patient safety and to respond to calls for a public health policy to better manage the disease. Documenting the prevalence, identifying risk factors for severe hyperbilirubinaemia prior to discharge, lactation support to ensure optimal feeding, and parents education for hyperbilirubinaemia and keeping follow-up are necessary (Newman et al., 2006). Follow-up of babies is required to monitor the possible changes in skin and behavior. Phototherapy and exchanged transfusion may be required (Iacob et al., 2011).

Conclusion

The prevalence of neonatal jaundice at Eku Hospital was low, but the occurrence of neonatal jaundice and few deaths due to sepsis cannot be overlooked. Health care providers working with neonates should play a key role in identifying the associated risk factors and assessing neonates for pathological jaundice. Parental counseling, education for early detection, regular antenatal care, and longer hospital stay are required in order to prevent this condition.

Conflict of interest

The authors have not declared any conflict of interest

REFERENCES

- Dennery PA, Seidman DS, Stevenson DK (2001). Neonatal hyperbilirubinaemia. *New Engl. J. Med.* 344:581-590.
- Edwards MS (2002). Postnatal Bacterial Infections. In: Fanaroff, A. A., Martin R. J (eds). *Neonatal Perinatal Medicine: Diseases of the foetus and infant*, 7thed, St. Louis, C. V. Mosby. pp. 706-726.
- Egesie OJ, Joseph EE, Isiguzozo I, Egesie UG (2008). Glucose 6 – Phosphatedehydrogenase (G6PD) activity and deficiency in a population of Nigerian males resident in Jos. *Niger. J. Physiol. Sci.* 23(1-2):9-11.
- Egube BA, Ofili AN, Isara AR, Onakewhor JU (2013). Neonatal jaundice and its management: Knowledge, attitude and practice among expectant mothers attending antenatal clinic at University of Benin Teaching Hospital, Benin City. *Niger. J. Clin. Pract.* 16:188-194.
- Ezechukwu CC, Ugochukwu EF, Egbuonu I, Chukwuka JO (2004). Risk factors from neonatal mortality in regional tertiary hospital in Nigeria. *Niger. J. Clin. Pract.* 7:50-52.
- George IO, Akani NA (2011). Evaluation of Glucose – 6 – Phosphate dehydrogenase deficiency in icteric newborns in Nigeria. *Am. J. Trop. Med. Public Health* 1(3):73-78.
- Hamid MH, Chisti AL, Mumtaz A, Hussain S, Maqbool S (2003). Bilirubin estimation in neonatal jaundice. A comparative study between auto analyzer (Diazo Method) and bilicubinometer (direct photometric method). *Pak. Paediatr. J.* 27:68-73.
- Iacob D, Boia M, Iacob RE, Manae A (2011). Neonatal Jaundice – Etiology and Incidence. *Jurnalul Pediatrului* 14(55-56).
- Kavehmanesh Z, Mohammadi NE, Zarchi AAK, Amirsalari S, Matinzadeh ZK, Torkaman M (2008). Prevalence of readmission for hyperbilirubinaemia in healthy newborns. *Iran. J. Pediatr.* 18(2):130-136.
- Lawn JE, Cousens S, Zupan J (2005). Four million neonatal deaths: When? Where? Why? *Lancet* 365:891-900.
- Maisels MJ, Kring E (1998). Length of stay, jaundice and hospital admission. *Pediatrics* 101(6):995-998.
- Najib KS, Saki F, Hemmati F, Inaloo S (2013) Risk factors and causes of severe neonatal hyperbilirubinemia in the South of Iran (Fars Province). *Iran Red Cross Med. J.* 15(3):260 -263.
- Newman TB, Liljestrand P, Jeremy RJ (2006). Outcomes among newborns with total serum bilirubin levels of 25mg per deciliter or more. *New Engl. J. Med.* 354:1889-1900.
- Oladokun A, Otegbayo JA, Adeniyi AA (2009). Maternal and foetaloutcomes of jaundice in pregnancy at the University College Hospital, Ibadan. *Nigerian J. Clin. Pract.* 12(3):277-280.
- Onyearugha CN, Onyire BN, Ugboma HAA (2011). Neonatal jaundice: Prevalence and Associated factors as seen in Federal Medical Centre Abakaliki, Southeast Nigeria. *J. Clin. Med. Res.* 3(3):40-45.
- Porter ML, Dennis BL (2002). Hyperbilirubinemia in the term newborn. *Am. Family Phys.* 65(4):599-607.
- Sciuto M, Bertino G, Zocco M, Vecchio I, Raffaele R, Trifiletti, R, Pavone P (2009). Incidence and causes of neonatal hyperbilirubinemia in a center of Catania. *Therapeut. Clin. Risk Manage.* 5:247-250.
- Slusher TM, Angyo IA, Bode-Thomas F, McLaren DW, Wong RJ (2004). Transcutaneous bilirubin measurements and serum total bilirubin levels in indigenous African infants. *Pediatrics* 113(6):1636-1641.
- Tikmani SS, Warraich HJ, Abbasi F, Rizvi A, Darmstadt FL, Zaidi AKM (2010). Incidence of Neonatal hyperbilirubinemia: a population – based prospective Study in Pakistan. *Trop. Med. Int. Health* 15(5):502 -507.
- Udo JJ, Anah MU, Ochigbo SO, Etuk IS, Ekanem AD (2008). Neonatal morbidity and mortality in Calabar Nigeria: A hospital based study. *Nigerian J. Clin. Pract.* 11(3):285-289.
- Wang M, Hays T, Ambruso DR, Silliman CC, Dickey WC (2005). Haemolytic disease of the newborn caused by a high titer anti-Group B IgG from a Group A mother. *Pediatr. Blood Cancer* 45(6):861-862.
- West BA, Tabansi PN (2014). The prevalence of neonatal septicaemia in the University of PortHarcourt Teaching Hospital, Nigeria. *J. Paediatr.* 41(1):33-37.

A close-up photograph of a person's hand, likely a patient, with a clear plastic IV drip chamber and tubing attached to their wrist. The person is wearing a gold bangle on their wrist. The background is a blurred teal color, possibly a hospital gown or bedsheet. The image is framed with rounded corners.

Journal of Public Health and Epidemiology

Related Journals Published by Academic Journals

Journal of Diabetes and Endocrinology

Journal of Medical Genetics and Genomics

Journal of Medical Laboratory and Diagnosis

Journal of Physiology and Pathophysiology

Medical Practice and Reviews

Research in Pharmaceutical Biotechnology

academicJournals