

Coroner Autopsy Findings Among Children and Adolescents of Rivers State of Nigeria.

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ABSTRACT

BACKGROUND

Children/adolescents face avoidable deaths in Nigeria. This 11-year retrospective study of coroner autopsies carried out on children/adolescents aged between 0-19 years, evaluated the pattern, causes and demographic features of childhood deaths in Rivers state, Nigeria.

METHODS

A retrospective review of case records of decedents' gender, age, and circumstances were of death and autopsy-defined causes of death in Port Harcourt were analyzed.

RESULTS

Children/adolescents constituted 11.4% of 1,987 cases reviewed. The age range was 3 weeks to 19 years and the mean was 14.4 years. Adolescents, 15-19 years were most affected constituting 65.5% of cases. Male female ratio was 1.7:1. Accidents with 39.8% were the commonest manner of death followed by homicides (38.5%) and sudden natural deaths (12.8%). Maternal deaths and suicides constituted 7.1% and 1.8% respectively. Accidents, mainly of the road traffic type and homicides resulting from firearm injuries are significant causes of sudden deaths among children and adolescents of Rivers state.

CONCLUSION

Instituting measures aimed at improving care of children and adolescents, especially during out-door activities will reduce the largely preventable deaths observed among this age group.

KEYWORDS

Coroner autopsies; childhood and adolescents; accidents and homicides; Rivers State; Nigeria.

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INTRODUCTION

Legally, a child is a minor or a person younger than the age of maturity¹. The United Nations convention on the rights of the child defines a child as a human being below the age of 18 years and reaffirms that the child by the reason of his physical and mental immaturity needs special safe guards and care, including appropriate legal protection, before as well as after birth². The adolescent age is between 13 and 19 years and can be considered the transitional stage from childhood to adulthood. Children and adolescents are the leaders of tomorrow therefore the death of a child or adolescent is not just a public health problem, but also a social tragedy.

According to UNICEF, 48% of children deaths occur in Africa and 27% in South East Asia, but the leading causes of death vary greatly by region³. Nigeria with infant mortality rate of 94.35 is ranked 212 out of the 224 countries listed⁴.

While attention has been reasonably paid to childhood deaths in the Western world,⁵⁻¹¹ not much has been documented in the literature on the pattern and demographic features of childhood and adolescent deaths among Nigerian researchers¹²⁻¹⁴.

This study brings to the fore the pattern, causes and demographic features of deaths among children and adolescents in Rivers state of Nigeria. Hopefully, the findings will assist pathologists, legislators and the law enforcement agents in investigating, preventing and predicting the pattern of childhood deaths.

MATERIALS AND METHODS

This was a retrospective review of sudden deaths that occurred among children and adolescents aged between 0-19 years whose autopsies were performed by the authors during the period spanning from January 2000 to December 2010. The autopsies, which were at the instances of Coroners as part of the investigations of such sudden deaths, followed standard procedures of thorough external examination of body as well as the internal organs. Tissue histology was done at the discretion of the Pathologists and detailed authorized reports were issued to the Coroner while the duplicate copies were archived.

The archived duplicate copies of reports were analyzed for the decedents' age, gender, circumstances of death, and final autopsy diagnoses. The autopsy diagnoses were stratified into: natural deaths, accidental deaths, homicidal deaths, suicidal deaths and maternal deaths. The information obtained were tabulated and statistically analyzed.

The autopsies were performed by the authors at different mortuary centres located across the state including the University of Port Harcourt Teaching hospital and the Braitewit Memorial Specialist hospital, both of which are tertiary health care facilities located in the city. The others include government and privately owned mortuary centres sited in the semi-urban and rural parts of the state. The population of the state is 5,198,716 consisting of 2,673,026 males and 2,525,690 females. Children and adolescents aged 0-19 years make up 604,685 of the population and are composed of 309,657 males and 295,028 females.

The Coroners laws of Rivers state under which auspices the autopsies were performed hold that any person who died either of violent or unnatural death or suddenly without known cause shall be notified to the coroner forthwith through the police by any person finding the body or being aware of the death. Autopsies are done in all cases as part of death investigations.

RESULTS

Children and adolescents aged between 0 and 19 years constituted 226 cases (11.4%) out of the 1,987 medico-legal autopsies performed by the authors during the eleven-year study period.

The age range of the subjects was 3 weeks to 19 years and the mean was 14.4 years. One hundred and forty-eight cases (65.5%) were adolescents of 15-19 years age bracket, while those aged 10-14 years, constituted 34 cases (15.0%) and the 0-4 years age group recorded 23 cases (10.2%). The 5-9 years age range was the least involved with 21 cases (9.3%). (Figure 1).

Overall, males with 142 cases (62.8%) predominated over females with 84 cases (37.2%), giving a male: female ratio (MFR) of 1.7:1. MFR varied with age groupings and manners of death with 15-19 years recording the highest of 2:1 and homicides recording 5.7:1 respectively. (Table 1).

The commonest manner of death was Accidents with 90 cases (39.8%) followed by homicides with 87 cases (38.5%). Natural and maternal deaths were less while suicide was uncommon - 4 cases (1.8%). (Table 1). Motor vehicle crashes were the commonest circumstances of accidents (66.7%) distantly followed by motorcycle crashes (16.7%) and drowning (7.8%). Burns, trappings in collapsed buildings and electrocution contributed less. (Table 2).

Accidental deaths occurred majorly among adolescents (67.7%). Children aged 0-9 years constituted far less (32.3%).(figure 2)

Drowning outstandingly recorded the highest MFR of 7:1 while the other causes of accidental deaths recorded lower MFR ranging from 0.5:1 to 2:1. (Table 2)

Homicides with 87 cases (38.5%) were the second most common cause of death (Table 1) and showed majority of cases in the teenage age group (90.8%) while 5-9 years age group was the least (3.4%). (Figure 2) Firearms were the commonest weapons of homicide (55.2%) while strangulation (4.6%) was the least. (Table 3) Firearm related injuries showed the highest MFR of 11:1 while beating (blunt force) was least with 1.2:1. (Table 3)

Natural deaths were the third commonest manner of deaths with 29 cases (12.8%). (Table 1) The commonest cause of natural deaths was pneumonia (27.6%) while Hypertension and epilepsy were the least causes of natural deaths (3.5%) each. (Table 4) Natural deaths also showed predominance of adolescence involvement (75.8%) while 5-9 years age group constituted the least (10.3%).

Among the causes of natural deaths, pneumonia, anaemic heart failure and tetanus showed male predominance with MFR of 3:1, 2:1 and 2:1 respectively. (Table 4)

Maternal deaths constituted (7.1%) of cases of which poorly procured abortion (56.3%) was the commonest cause, followed by ruptured ectopic pregnancies (37.5%). Anaemia in pregnancy (6.22%) was the least cause. All cases of maternal deaths occurred within 15-19 years age group. Nine of the victims (56.3%) died at 19 years, while 5 victims (31.3%) died at 18 years. Only 2 victims (12.5%) died at 17 years of age.

Suicides with 4 cases (1.8%) were the least common manner of death. (Table 1) All cases were committed through hanging and all victims were males aged within 15-19 years. (Figure 2).

Table 1. Manners of death and gender distribution.

Manner of Death	Male	Female	Total	%	MfR
Accidents	49	41	90	39.8	1.2:1
Violent	74	13	87	38.5	5.7:1
Natural	15	14	29	12.8	1.1:1
Maternal		16	16	7.1	
Suicides	4		4	1.8	4: infinity
Total	142	84	226	100	1.7:1

Table 2 Causes of accidental deaths and gender distribution.

	M	F	TOTAL	%	MFR
Motor	29	31	60	66.7	0.9:1
Motorcycle	9	6	15	16.7	1.5:1
Drowning	7	-	7	7.8	7:0
Electrocution	1	1	2	2.2	1:1
Fire burn	1	2	3	3.3	0.5:1
Trapped in collapsed building	2	1	3	3.3	2:1
Total	49	41	90	100%	1.2:1

Table 3 Weapons of homicides and gender distribution.

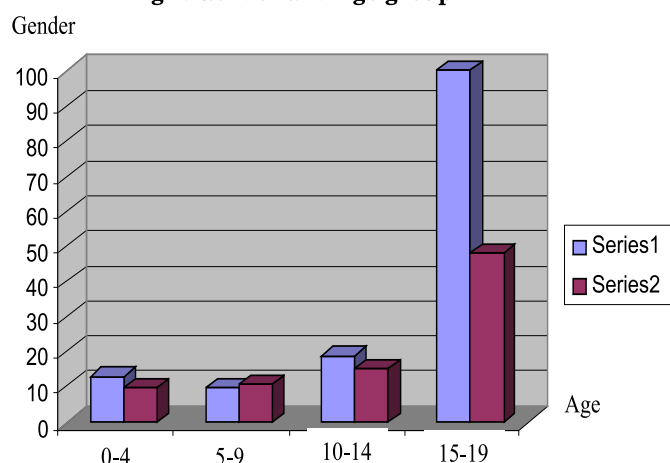
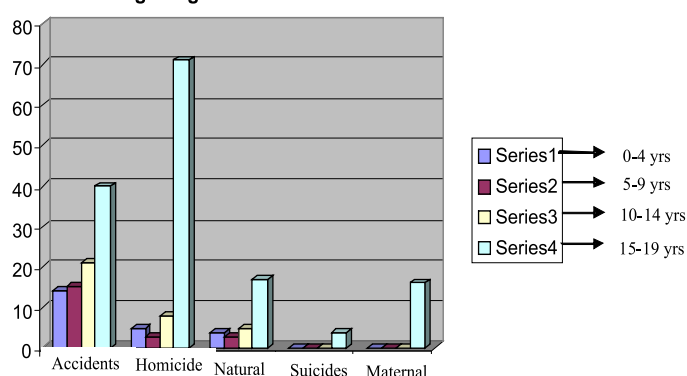
	M	F	Total	%	Mfr
Gunshots	44	4	48	55.2	11:1
Machete cuts	8	1	9	10.3	8:1
Stabs	13	2	15	17.3	6.5:1
Beating	6	5	11	12.6	1.2:1
Strangulation	3	1	4	4.6	3:1
Total	74	13	87	100	5.7:1

Table 6 Causes and sex distribution of natural deaths.

	M	F	Total	%	Mfr
Pneumonia	6	2	8	27.6	3:1
Anaemic heart failure	2	1	3	10.3	2:1
Asphyxia/Aspiration	2	3	5	17.3	0.7:1
HPN	1	-	1	3.5	1:0
Tetanus	2	1	3	10.3	2:1
Malaria	1	2	3	10.3	0.5:1
Hepatitis	-	3	3	10.3	0:3
Septicaemia	1	1	2	10.3	1:1
Epilepsy	-	1	1	6.9	0:1
Total	15	14	29	3.5	1.1:1

Table 7. Causes of maternal deaths

Illegal abortion	9	56.3%
Anaemia in pregnancy	1	6.2%
Ectopic pregnancy	6	37.5
		100%

Fig 1. Gender and Age group**Fig 2. Age and Manners of Deaths**

DISCUSSION

Of the 1,987 coroner autopsies reviewed within the eleven-year study period, children and adolescents constituted 11.4%. This is consistent with the population statistics of Rivers state as is reflected in the 2006 Nigerian national census results which showed that children and adolescents aged between 0-19 years constitutes 604,685 (11.6%) out of the totaled 5,198,716 residents of the state. Comparatively, Etebu¹¹ and Amakiri¹² in their separate studies in Nigeria also reported 11.5% and 10.4% respectively as proportions of children deaths in their autopsy review reports. In USA, Okoye⁷ reported childhood deaths in 10.9% of forensic autopsies performed at the Lancaster county. This reflects a close range in the proportion of childhood deaths and underscores the global distribution of the burden of childhood mortality.

Some of the deaths are avoidable and thus negates the rights of the child as given by the

United Nations, which states that the child because of immaturity needs special safe guards and care². Furthermore, the death of a child is not just a public health problem, but also a social tragedy and a truncation of the role of the child in the sustenance of human existence and preservation of generational legacies and cultures.

The 14.4 years mean age of our study is well above the 7.6 years and 6.8 years mean ages reported in Nebraska and Florida USA respectively by Okoye⁷ and Noland.⁹ Moreover, Benito et al⁸ and Neuspiel¹⁰ in their series in Europe, reported that sudden deaths among children is much more frequent during the first years of childhood (1-4 years) and during adolescence (15-19 years). Interestingly while these Western studies showed predominance of childhood deaths in the 1-4 years age group followed by 15 -19 years age group, ours showed marked predominance of deaths in the 15 -19 years followed by 10 -14 years. This discrepancy is likely due to the relatively high rate of sudden infant death syndrome (SIDS), in Western studies. The diagnosis of SIDS is made among the very young age group of 0-1 year. In Western series, Okoye reported SIDS as the second most common manner of death while Dimaio⁵ and Norman et al⁶ reported high rates of 73.4% and 68.3% respectively. Similar to our finding, Odesanmi¹³ and Amakiri¹² in their separate series from Nigeria reported no case of SIDS. Indeed SIDS is an uncommon diagnosis in Nigeria due more likely to under diagnosis than rarity of the phenomenon among Nigerians. Considering that most decedents in the 0 – 4 year age group are quickly buried by the parents without autopsy because of negative socio-cultural believes about autopsy cases would be missed.

Reducing mortality rates among adolescents who constitute the bulk of victims in this study needs that parents and guardians should always remember that these category of people have a tendency to claiming or assuming maturity, and may engage in activities that could endanger their lives. Thus

they should be adequately equipped with childcare education and injury prevention strategies. Their activities, especially out-door ones should be effectively monitored and supervised.

Although male deaths predominated over female ones in the overall with MFR of 1.7:1, there is variation in the extent of gender gap observed with the different manners of death in this study. While natural deaths recorded the least of 1:1, homicides recorded the highest of 5.7:1 (table 2). This report is reflective of the findings of the main study involving the entire 1,987 autopsies analyzed that showed a remarkable variation in the manners of death with the least of 2.7:1 observed in natural deaths and 12.4:1 observed in homicidal deaths (unpublished). Similarly, Mandong¹⁴ in a study in Northern Nigeria observed MFR of 1.6:1 for natural deaths and 16:1 for homicidal deaths. Different series have tried to explain the male dominance in the various manners of deaths in children. Morongiello and Rennie¹⁵ opined that the predominance of male children in accidental deaths is a reflection of the impulsive nature and curiosity attributable to the male gender. The Tennessee child fatality review team,¹⁶ in explaining the male predominance of natural deaths among children aged 1-17 years indicated that both mortality and morbidity are higher in males than in females in early life, with malnutrition and infection as the triggers and that males are more vulnerable to environmental stress than females. Operating in a developing country with poor health and social infrastructure and lower average life expectancy, we agree with the above assertions as likely explanations for our findings on gender variation.

Accidental deaths with 39.8% occurrence rate were the most common manner of death. This is consistent with the reports of previous researchers^{7, 9, 11, 17-20}. This shows that accidents remain a major threat to public health. The frequency of accidental deaths increased with age contrary to published reports of similar studies in America^{7,9} where majority of

accidental deaths occurred in the 0-4 years age group. To us, there is no readily adducible reason for this discrepancy; perhaps further epidemiologic studies may provide explanation.

Motor vehicle crashes accounting for 66.7% of accidental deaths in our study is comparable to 46.5% rate reported by Okoye⁷ in the Nebraska, USA. Reports by the center for disease control in America indicate that motor vehicle crashes are the leading causes of deaths among teenagers in USA, accounting for more than one in three deaths in the age group.²¹ This is attributable to the recklessness of teenage drivers and intoxication with alcohol, drugs and other toxic substances especially males who are more involved in risky behaviors. But in Nigeria, the predominance of adolescent deaths in road traffic accidents is not only due to the recklessness of teenage drivers but also due to the deplorable condition of the highways, poor vehicle maintenance culture of vehicle owners and drivers, and the lack of a quality health care system.

That drowning occurred in 7.8% was remarkable and reflects the riverine nature of the state, with 40% of her geographic terrain covered by water bodies. All the drowning incidents were accidental and occurred in different rivers and creeks where the children were at, either for the leisure of swimming, fishing or travelling with boats. Indeed some of the communities are accessible only by water routes and fatal private and passenger boat accidents often occur along the waterways. These crashes occur because of poor enforcement of the necessary maritime transportation guidelines and laws by the regulatory agency on marine transportation in Nigeria, ineffective rescue organizations, and frequent use and even over loading of small passenger boats. Again, males because of their daring and adventurous nature are more prone to drowning as reflected in this study.

Although the occurrence of electrocution, Burns, and trappings in collapsed buildings are not remarkable among accidental deaths in this study, improvement in the supervision of children by their parents and care-givers will be helpful in avoiding them.

Homicides with 38.5% occurrence were the second most common cause of childhood death in this study. It is note-worthy that the occurrence rate of homicides in this study is almost as high as accidental deaths. On the contrary, homicides among children are uncommon in the Western world⁷. The reason for the very high rate of homicidal deaths in this study especially the execution by means of firearms is the involvement of most under-aged youths and adolescents in militancy activities and armed robberies in the Niger Delta region of Nigeria, of which Rivers state is the melting point. This region is richly endowed with crude oil reserves but has witnessed decades of oil exploration and production with environmental pollution from incessant oil spillages, and gas flaring. There has also been generalized poverty and high level of unemployment among the people of the region with many youths indulging in militancy activities and armed robbery.

The other methods of homicide perpetration recorded in this study including physical beating, machete cuts and strangulation are typical of underdevelopment and reflect farm implements used impulsively by the resident during provocations and quarrels especially relating to the often-arising land ownership disputes. The mean MFR of 5.7:1 recorded in homicides is the highest among all manners of death in this study and shows the predisposition of male children and adolescents to homicidal deaths owing to their adventurous, impulsive, out-going and risk taking nature.

The high rate of firearm mediated deaths indicates high level of illegal possession and proliferation of guns among unauthorized civilians including adolescent children and other private individuals. Although Nigerian

law forbids possession of firearms by private individuals without license, the law is porous owing to poor enforcement by the ill-equipped and poorly motivated police force.

Natural deaths were distantly the third most frequent manner of death (12.8%) with 75.8% being adolescents. This finding sharply contrasts those of the West. In Okoye⁷ and Benitos⁸ series in USA and Spain respectively, natural deaths featured more prominently as a manner of death among children. Besides, the younger age group of 0-4 years were more affected in natural deaths of Western studies contrary to ours where adolescents of 15-19 years age group were affected more. Given the poor health infrastructure in Nigeria characterized by ill-equipped health facilities, virtual absence of emergency medical services, poor remuneration of healthcare workers with incessant industrial actions in the sector, it is obvious that so many avoidable natural deaths are recorded in this study.

Like other African studies, infectious causes especially pneumonia constituted majority of the natural deaths.²² Similarly, Melissa and Randall²³ in a study in Louisiana USA, observed infections especially of the central nervous system and septicemia as the most common causes of deaths in children. It is instructive to note that infectious causes order than malaria is taking a huge toll on the health of children in Africa. This underscores the usefulness and progress being made in the roll back malaria program initiated by WHO and being implemented in most African countries. A report by the Roll Back Malaria Partnership in 2011 showed that reductions in disease burdens have occurred in every malaria-endemic region in the world including Africa where the lives of about 1.1million children have been saved over the past decade, since inception of the programme²⁴. However the establishment of infectious disease control programmes especially for children, equipping of functional health care facilities, proper training and remuneration of health care personnel as well as provision of emergency medical services will reduce the rate of

childhood and adolescent deaths, especially from infectious causes in Nigeria.

That no case of SIDs was observed in this study is in keeping with the finding of previous authors.^{12,13}

Maternal deaths (7.1%) were remarkable as victims were aged between 15 and 19 years. Illegal abortion was the commonest cause (56.3%), followed by ruptured ectopic pregnancy (37.5%) with anemia in pregnancy as the least. World over, teenage pregnancy is a problem that is yet to be contained.²⁵ The rates of teenage pregnancy vary and range from 143 per 1000 girls in sub Saharan African countries to 2.9 per 1000 in South Korea. The rate for the United States is 52.1 per 1000, the highest in the developed world and about four times the European Union average.²⁵

One third of Nigeria's total population of over 160 million are youths between the ages of 10 and 24 years. Lack of sexual health information and services places these young people at risk for pregnancy, abortion, sexually transmitted infections (STI) and HIV/AIDs. These also truncate the girls' educational and career opportunities.

All the cases were premarital and unintentional pregnancies. In many communities and cultures in Nigeria, because of the social stigma associated with premarital teenage pregnancy, most victims resort to procuring illegal abortion. These victims are also associated with many social issues including lower education levels, and higher rates of poverty, which often drive them to cheap but quack medical practitioners for abortion that commonly cause their preventable untimely deaths.

Peer pressure has been identified as a factor that encourages both boys and girls to have early premarital sex.²⁶ The increased sexual activity among adolescents results in increased teenage pregnancies and an increase in sexually transmitted diseases.

Our data indicate that almost all victims did not carry the pregnancies to term, as there was no death recorded from complications of childbirth. This is in line with previous research that indicated that pregnant teens are less likely to receive prenatal care, often seeking it in the third trimester, if at all.²⁷ This may explain the high rate of ruptured ectopic pregnancies, which could have been diagnosed and the resulting death averted if proper antenatal care was instituted timely. Besides, many pregnant teens are subject to nutritional deficiencies from poor eating habits including attempts at losing weight through dieting, skipping meals, food faddism, snacking and consumption of fast foods²⁸. The inadequate nutrition during pregnancy is more marked among teenagers in developing countries²⁹. This would explain the case of anemia in pregnancy among these children and support the assertion that poor obstetric outcome of teenage pregnancies is related to non-utilization of prenatal care rather than their biological age³⁰.

Suicide was the least common cause of death in this study (1.8%). The low rate of suicides in this study is consistent with literature documentation on the rarity of suicides in Nigeria^{12-14,31}. On the contrary suicide rates are high in medico legal autopsies of western countries and WHO has identified it as a public health problem³². Studies from the Western world showed that suicides among children were relatively common, accounting for at least 10% of deaths^{7,18,33,34}. As in other Western studies, all the victims were between 15 and 19 years with average age of 18.4 years^{18,34,35}. All victims of suicides in this study were males and the method of commission was hanging. This is consistent with reports that males are disproportionately affected by teenage suicides^{36,18,33,37}. However unlike findings in the Western world with most of suicides executed by firearm,³⁴ hanging is the preferred method in this study and other previous Nigerian studies^{13,31}. The preference for hanging is convenience, easy availability of ligature material and difficulty in acquiring firearms. The reasons offered by some authors

³⁸ for the involvement of adolescents in suicide include: the great emotional anxiety associated with the social change to adulthood independence from adolescence dependence, the unique egocentric way of thought of adolescents leading to some of them believing that no one can understand them thus creating a sense of intense aloneness and isolation as they face problems and the believe by some adolescents that suicide is somehow romantic and heroic with the regard of death as a peaceful sleep that will make everything better, not comprehending that death is irreversible.

Irrespective of the method of execution, the effects of suicides on the loved ones of the deceased can be devastating.

This study is limited by restriction of evaluated childhood and adolescence deaths to only cases that warranted autopsies owing to the suspicious nature of such deaths. Thus many other deaths involving children and adolescents which were not in suspicious circumstances are not captured and that represents missed opportunities which would have enabled a holistic evaluation of the pattern of childhood and adolescent deaths in Rivers state of Nigeria. Owing to negative myths and believes, autopsies are not freely accepted by the populace.

CONCLUSIONS

Male adolescents are more prone to all manner of childhood and adolescent deaths in Rivers state of Nigeria unlike in the Western world where younger children of 0-4 years are more involved. Accidents and homicides are the major causes. Instituting measures that will improve care of the adolescent, especially outdoor ones will reduce the spate of the largely preventable childhood/adolescent deaths observed in the state and ensure sustenance of generational legacies.

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REFERENCE

1. Childhood. Available at http://www.en.wikipedia.org/wiki/child#Age_of_responsibility. Accessed 27th Dec. 2011.
2. Convention on the rights of the child. Office of the United Nations High Commissioner for Human Rights. United Nations general assembly. The Policy Press. Document A/RES/44/25. 12th Dec 1989.
3. UNICEF, WHO. Count down to 2015 decade report (2000-2010): taking stock of maternal, new born and child survival. 2010.
4. List of countries by infant mortality rate. United Nations Population Division. S o u r c e d f r o m www.wikipedia.org/wiki/list_of_countries_by_infant_mortality_rate. Retrieved 27th Dec 2011.
5. Dimaio V.J and Dimaio D.J. Natural deaths as viewed by the Medical Examiner: a review of 1000 consecutive autopsies of individuals dying of natural diseases. *J. forensic Sci.* 1991; 36: 17-24.
6. Norman M.G, Taylor G.P and Clarke L.A Sudden unexpected natural deaths in childhood. *Pediatr. Pathol.* 1990;10 (5): 769-84.
7. C.N. Okoye, M.I. Okoye. Forensic epidemiology of childhood deaths in Nebraska, USA. *J forensic and legal med.* 2011;18:366-374.
8. Benito M, B. Aguilera, Pedro M.G, M.P Suarez-Mier. Sudden unexpected non-violent death between 1 and 19 years in north Spain. *Arch Dis Child* 2000; 82: 456-461.
9. Noland VJ, Jolly BM, Liller KD. Child death review team findings: implications for health educators. *Intl Electron J Health Education.* 2000;3(4):291-7.
10. Neuspiel DR, Kuller LH. Sudden and unexpected natural death in childhood and adolescence. *JAMA* 1985;254:1321-

- 1325.
11. Etebu EN, Ekere AU. Paediatric accidental deaths in Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. *Nigerian J. Med.* 2004; 13: 140-143.
 12. Amakiri CN, Akang EE, Aghadiuno PU, Odesanmi WO. A prospective study of coroner's autopsies in University College Hospital, Ibadan, Nigeria. *Med Sci Law* 1997; 37(1):69-75
 13. Odesanmi WO. Forensic pathology in Nigeria: the Ife experience. *Med Sci Law* 1982; 22: 269-74.
 14. Mandong BM, Manasseh AN, Ugwu BT. Medicolegal autopsies in North Central Nigeria. *East Afr Med J* 2006; 83:627-632
 15. Morrongie BA, Rennie H. Why do boys engage in more risk taking than girls? The role of attributions, beliefs and risk appraisals. *Journal of Pediatric Psychology*, 1998;23(1):33-43.
 16. Tennessee Department of Health. Bureau of Health Informatics. over view of Tennessee childhood deaths. 1997-1999: Analysis of child fatality review data. Available at : [http://www.childhooddeathreview.org/reports/Tennessee 1997-1999 CDR Overview.pdf](http://www.childhooddeathreview.org/reports/Tennessee%201997-1999%20CDR%20Overview.pdf); June 2002. Retrieved Feb 15, 2012.
 17. Canturk N, Esiyok B, Ozkara E, Canturk G, Ozata AB, Yavuz MF. Medico-legal child deaths in Istanbul: data from the morgue department. *Pediatr Int.* 2007; 49:88-93.
 18. Batalis NI, Collins KA. Adolescent death: a 15-year retrospective review. *J Forensic Sci* 2005;50(6):144-9.
 - 19 Meel BL. Mortality of children in the Transkei region of South Africa. *Am J Forensic Med path* 2003;24(2):141-7
 20. Rafindadi AH. A study of sudden medicolegal deaths in Zaria. *Nigerian Post Grad. Med. J.* 1998; 5: 28-30.
 21. CDC Childhood injury Report: Patterns of unintentional injuries among 0-19 years old in the United States, 2000-2006. Available at : <http://www.cdc.gov/safechild/images/CD C-Childinjury.pdf>. [Accessed Nov. 15, 2010].
 22. Manortey S, Carey A, Ansong D, Ryan H, Good B, Boaheng J, Crookston B, Dickerson TY. Verbal autopsy: an analysis of the common causes of childhood deaths in the Barakese sub-district of Ghana. *J of Public Health in Africa*, 2011; 10: 43-54.
 23. Taggart MW, Craver R. Causes of death, determined by autopsy in previously healthy (or near healthy) children presenting to a childrens hospital. *Arch of Pathol and Lab Med* 2006;130:1780-1785.
 24. Malaria report shows rapid progress towards international targets. World Health Organisation report. Accessed online through <http://www.who.int/mediacentre/news/releases/2010/malaria-report2010/214/en/index.html>. Retrieved 8th Jan 2012.
 25. Treffers PE. Teenage pregnancy, a worldwide problem. *med. Tijdschr Geneesk* 2003;147:(47): 2320-5
 26. Colin Allen. Peer pressure and Teen sex. *Psychology Today*. Accessed online through www.psychologytoday.com/articles/200305/peer-pressure-and-teen-sex. Retrieved 10th Jan 2012).
 27. Makinson C. The health consequences of teenage fertility. *Fam plan Perspect* 1985;17(3):132-9.
 28. Gutierrez, Y. king JC. Nutrition during teenage pregnancy. *Pediatr Ann* 1993;22(2): 99-108.
 29. Sanchez PA, Adrisa A., Bobzom DN, Airede A, Hollis BW, Lison DE, Jones DD, Dasgupta A, Glew RH. Calsium and Vitamin D Status of pregnant teenagers in Maiduguri, Nigeria. *J Natl Med Assoc.* 1997 Dec; 89 (12); 805-811.
 30. Loto OM, Ezechi OC, Kalu BKE, Loto AB, Ezechi LO, Oguniyi SO. Poor obstetrics performance of Teenagers: is it age-or quality of care-related ? *J of Obst. and Gynae* 2004;24 (4): 395-398.

31. Nwosu SO, Odesanmi WO. Pattern of homicides in Nigeria. The Ile –Ife experience. Nigerian Med. Pract. 1994; 28:16-17.
32. Bertolote JM, Fleischmann A. Suicide behavior prevention: WHO perspectives on research. Amer J Med Genet. 2005; 133:8-12.
33. Sauvgeau A. Racette S. Child and adolescent victims in forensic autopsy: a 5 year retrospective study. J Forensic sci. 2008;53(3):699-702.
34. Heninger M, Hanzlick R. Non-natural deaths of adolescents and teenagers: fulton county, Georgia. 1985- 2004. Am Forensic Med Path 200B;Z9(3):208-13.
35. Lalwani S, Sharma Gask, Kabra SK, Girdhar S, Dogra TD. Suicide among children and adolescents in South Delhi (1991-2000). Indian J pediatr. 2004; 71: 701-703.
36. Fraga AMA, Fraga GP. Stanley C. Costantini TW. Coimbra R. Children at danger: injury fatality among children in San Diego county. Eur J Epidemiol 2010;25:211-7.
37. Vieweg WVR, Linker JA, Anum EA, Turf E, Pandurangi AK. Sood B, et al. Child and adolescent suicides in Virginia.1987 to 2003.J child Adolesc Pharmacol 2005; 15(4):655-63.
38. R.J Fetsch, C.L Collins, D. Whitney. Preventing youth and Adult suicide. Colorado State University Extension. No. 10. 213. Accessed through www.ext.colostate.edu/pubs/consumer/10213.html. Jan 10-2012.