

## Clinical Study

# Pattern of Suicide: A Review of Autopsies Conducted at Moi Teaching and Referral Hospital in Eldoret Kenya

**B. N. Macharia<sup>1</sup>, M. A. Iddah<sup>2</sup>, F. M. Ndiangui<sup>1</sup>, and A. Keter<sup>3</sup>**

<sup>1</sup>Department of Human Pathology, School of Medicine, Moi University, P.O. Box 4606-30100, Eldoret, Kenya

<sup>2</sup>Department of Biomedical Science and Technology, Maseno University, P.O. Box 333-40105, Maseno, Kenya

<sup>3</sup>Department of Research, USAID-AMPATH Partnership, P.O. Box 4606-30100, Eldoret, Kenya

Corresponding Author: B. N. Macharia; email: macharia4@yahoo.com

Received 20 August 2014; Accepted 3 September 2014

Academic Editors: Lone Jørgensen and Lars Lien

Copyright © 2015 B. N. Macharia et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Abstract.** *Problem statement.* Suicide is one of the ten leading causes of death in the world, accounting for more than 400,000 deaths annually. The pattern of suicide and the incidence of suicide vary from country to country. Cultural, religious and social values play some role in suicide. Currently, there is no data regarding the incidence of suicide in Kenya. *Setting.* Moi Teaching and Referral Hospital Mortuary. *Study population.* A seven-year retrospective study of all the autopsies performed at the Moi Teaching and Referral Hospital was analysed and the cases that were definitely determined as suicides were further studied. *Objective.* To characterize the pattern of suicide cases through autopsies conducted at MTRH mortuary between the years 2005 to 2012. *Methodology.* Retrospective descriptive cross-sectional study. Suicide cases were identified from the MTRH autopsy record books. From these record books, the autopsy number was used to retrieve the pathologists autopsy report. Data regarding age, gender and methods of suicide was retrieved and entered into a data collection form. *Data analysis:* Data collected was analysed using Stata version 10. *Results.* There were 213 autopsies performed. Majority were male 180(85%). The subjects had a median age of 29(IQR: 23–37) years. Organophosphate poisoning was the most preferred method followed by hanging. Organophosphate poisoning accounted for 195(91.54%) and hanging for 17(7.98%) of the subjects. *Conclusion.* The preferred methods of suicide were poisoning and hanging. The study may have missed some cases where the relatives could have declined for the postmortem procedure and hence the body released without postmortem examinations.

**Keywords:** Suicide; hanging; poisoning

## 1. Introduction

Suicide is an act of taking one's own life voluntarily and intentionally [1]. Suicide is high in societies that are socially isolated, mobile and disorganized. It is lower in countries or subcultures whose religious or cultural morals proscribe suicide [2]. Different suicide risk factors are present in

different age groups. The teenager cannot compete, in the young and middle-aged adult there is a lack of accomplishment of life goals along with failure in social relationships while in the elderly there is loss of friends and loved ones, health and financial problems and idea of death [3]. Suicide is one of the ten leading causes of death in the world, accounting for more than 400,000 deaths annually.

The incidence and pattern of suicide vary from country to country. Cultural, religious and social values play some role in this regard [4]. The rate of suicide varies from as low as 0.4/100,000 in Nigeria [5], to as high as 22.75/100,000 in Geneva [6]. Suicide is more common in males than females and the rates are said to increase with age [2]. Differences exist in countries in the most common means of suicide depending on the availability of various methods. In England and Wales men use hanging, poisoning by gas or vehicle exhaust and women are more likely to take an overdose [2], but in USA, the most common method of suicide is firearm [7], while in Singapore, jumping from a height is the commonest mode [8]. Suicide has been noted to be more prevalent in spring and winter [2]. Very few studies about the epidemiology of suicide have been conducted in Pakistan and even here most are based on newspaper reports [9, 10].

We wish to conduct this study on the patterns of suicide in autopsies conducted at Moi teaching and referral hospital mortuary, Eldoret Western Kenya to know the incidence, which subgroups of the population were most vulnerable to such deaths and the methods being used. This is the first step in trying to evaluate the risk factors for suicide in different population subgroups. This information can in turn be used in programmes aimed at prevention of suicide.

## 2. Materials and Methods

A retrospective review of all suicide autopsies that were conducted at the Moi Teaching and Referral Hospital (MTRH) Mortuary over the seven-year period from July 2005 to July 2012 was carried out. The cases consisted of deaths that occurred at the MTRH and the bodies of victims that were referred to the MTRH for autopsy.

The bodies are brought to the mortuary either from the hospital wards or directly from where death has occurred other than MTRH. These being police cases, postmortem is performed through the request of a police officer investigating the case. The postmortem is performed by the pathologist on duty who other than filling the police postmortem form, also records the findings in mortuary record book. It is from this mortuary record book that information regarding this study was extracted.

This institution handles most of forensic cases in and around Eldoret town located in the western part of Kenya. The cases were identified from the MTRH autopsy record books. From these record books, the autopsy numbers were used to retrieve the pathologists autopsy report. Data regarding age, gender, methods of suicide, and number of days of hospitalization was retrieved and entered into a data collection form.

## 3. Results

A total of 213 autopsies cases of suicides were performed in detail. Table 1 shows the methods of suicide used.

Ingestion of organophosphate poison, hanging and carbon monoxide poisoning were the methods used to commit suicide. There were a total of 195 deaths by organophosphate poisoning, 17 by ligature hanging and only one from carbon monoxide poisoning.

Of the 213 cases studied, males constituted 183 cases while females were 30 cases. Overall, (both males and females) thirty-two (15%) were below 20 years while only 6(2.8%) were above 60 years. Considering both genders, majority (40.1%) of those who committed suicide were between 21–30 years.

Males accounted for 183 (85.9%) cases, with 23 (10.8%) being below 20 years. Majority 76 (35.7%) were in the 21–30 years category followed by those in the 31–40 years category 57(26.8%). Only 5(2.3%) were above 60 years.

Females accounted for 30 (14.1%) cases, with 9 (4.2%) being below 20 years. Majority 11 (5.2%) were in the 21–30 years category followed by those in the 31–40 years category, 5 (2.3%). Only 1 (0.5%) were above 60 years.

## 4. Discussion

Three methods hanging, pesticide suicide and firearm suicide dominate country-specific suicide patterns [11]. In our study most preferred pesticide and hanging methods. No case of fire arm suicide was encountered. This could be explained by the fact that firearm possession is restricted to security personnel in Kenya. Most of the cases (195) were from ingestion of either herbicides or pesticides a fact that can be explained by the surrounding community being agricultural with households having stocks of agricultural pesticides available for impulsive acts in suicide. This is consistent with a study by Farmer RDT et al which showed workers within a plantation were most likely to ingest farm chemicals [12]. Our study finding is also similar to a report by WHO (2008) that found poisoning by pesticide to be common in many Asian countries and in Latin America [16].

In this study, hanging was found to be the second most preferred method. However, this method was found to be the most common method of suicide in many Asian countries, such as Japan, Korea, and Taiwan as well as many Western countries [13, 14]. The difference could be explained by the fact that Eldoret, Kenya, where this research was conducted is mainly agricultural region with every homestead having some form of pesticides. If the study was extended to the whole country the results could have been probably different.

Carbon monoxide poisoning is usually accidental where the victim leaves a burning jiko to warm the house while retiring to bed especially during the cold season. However, such death by suicide using has been documented [15, 16]. In

Table 1: Methods of suicide.

Variable	Levels	Sample size	n(%)
Cause of death	Organophosphate poisoning	213	195(91.54%)
	Hanging		17(7.98%)
	Caron monoxide poisoning		1(0.46%)

Table 2: Distribution of cases by age and gender.

Age(years)	Male	Female	Total
<20	23(10.8%)	9(4.2%)	32(15%)
21- 30	76(35.7%)	11(5.2%)	87(40.1%)
31-40	57(26.8%)	5(2.3%)	62(29.1%)
41-50	17(8%)	3(1.4%)	20(9.4%)
51-60	5(2.3%)	1(0.5%)	6(2.8%)
>60	5(2.3%)	1(0.5%)	6(2.8%)
<b>Total</b>	<b>183</b>	<b>30</b>	<b>213</b>

our study, there was one such case. The young man was found dead in a poorly ventilated room with partially cooked meal on the jiko. On autopsy the body had the characteristics of carbon monoxide poisoning and a suicide note was found next to the body.

Majority of the suicide cases were male accounting for 86%.this which compares with other studies. As much as girls make suicide attempts more often than boys, it has been known that boys commit suicide more often than girls [17].

Majority of cases were victims in their third decade of life (21–30 years) accounting for (40.1%). This compares well another study in Kuala Lumpur where majority of the suicide cases were between 20 and 40 years of age [18].

## 5. Conclusion

In conclusion, the study has shown that there is a distinct difference in the patterns of suicide across the life cycle of Western Kenya population. This has implications for understanding potential causes of suicide and for developing suicide prevention plans for this specific population. The observed suicide pattern depended upon the availability of the methods used.

Restricting access to the means of suicide is an important component of comprehensive strategies for suicide prevention.

## References

- [1] N. R. Awan, *Principles and Practice of Forensic Medicine*, 25, Sublime Arts, Lahore, 2002.
- [2] K. Nadesan, Pattern of suicide: a review of autopsies conducted at the University Hospital, Kuala Lumpur, *The Malaysian Journal of Pathology*, 21, no. 2, 95–99, (1999).
- [3] S. O. Nwosu and W. O. Odesanmi, Pattern of suicides in Ile-Ife, Nigeria, *West African Journal of Medicine*, 20, no. 3, 259–262, (2001).
- [4] R. La Harpe, Suicides in the Geneva Canton (1971–1990). An analysis of post-mortem cases in forensic medicine, *Archiv fur Kriminologie*, 195, no. 3–4, 65–74, (1995).
- [5] R. Bluglass and P. Bowden, Eds., *Principles and Practice of Forensic Psychiatry*, Churchill Livingstone, Edinburgh, 1990, 213–606.
- [6] V. J. M. Di Maio, *Gunshot Wounds Practical aspects of Firearms, ballistics and forensic techniques*, CRC Press, New York, 1993, 293–294.
- [7] K. L. Peng and A. S. Choo, Suicide and parasuicide in Singapore (1986), *Medicine, Science and the Law*, 30, no. 3, 225–233, (1990).
- [8] H. N. K. Arap Mengech and M. Dhadphale, Attempted suicide (parasuicide) in Nairobi, Kenya, *Acta Psychiatrica Scandinavica*, 69, no. 5, 416–419, (1984).
- [9] K. Nadesan, Pattern of suicide: a review of autopsies conducted at the University Hospital, Kuala Lumpur, *The Malaysian Journal of Pathology*, 21, no. 2, 95–99, (1999).
- [10] World Health Organization, The World Health Report 2001. Mental Health: New Understanding, New Hope, Tech. Rep., WHO, Geneva, 2001.
- [11] V. Ajdacic-Gross, M. G. Weiss, M. Ring, U. Hepp, M. Bopp, F. Gutzwiller, and W. Rössler, Methods of suicide: International suicide patterns derived from the WHO mortality database, *Bulletin of the World Health Organization*, 86, no. 9, 726–732, (2008).
- [12] R. D. T. Farmer, Suicide by different methods, *Postgraduate Medical Journal*, 55, no. 649, 775–779, (1979).
- [13] Prevention Center for Suicide Research, Final Report of the Centre of Suicide Research and Prevention, Tech. Rep., The University of Hong Kong, Hong Kong, China, 2006.
- [14] A. Varnik, K. Kolves, C. M. van der Feltz-Cornelis, et al., Suicide methods in Europe: a gender-specific analysis of countries participating in the “European Alliance Against Depression.”, *Journal of Epidemiology and Community Health*, 62, no. 6, 545–551, (2008).
- [15] J. Lin, S. Chang, and T. Lu, The leading methods of suicide in Taiwan, 2002–2008, *BMC Public Health*, 10, article no. 480, (2010).
- [16] C. K. Law, P. S. F. Yip, and E. D. Caine, The contribution of charcoal burning to the rise and decline of suicides in

Hong Kong from 1997-2007, *Social Psychiatry and Psychiatric Epidemiology*, **46**, no. 9, 797–803, (2011).

- [17] A. P. Perlstein, Suicide in adolescence, *New York State Journal of Medicine*, **66**, no. 23, 3017–3020, (1966).
- [18] K. Nadesan, Pattern of suicide: a review of autopsies conducted at the University Hospital, Kuala Lumpur, *The Malaysian Journal of Pathology*, **21**, no. 2, 95–99, (1999).

Editor-in-Chief  
Mostafa Z. Badr, USA

Geographical Editors  
Christopher Corton, USA  
Jörg Mey, Spain  
Marcelo H. Napimoga, Brazil  
Nanping Wang, China

#### Associate Editors

Leggy A. Arnold, USA  
Yaacov Barak, USA  
Thomas Burris, USA  
Ignacio Camacho-Arroyo, Mexico  
John Cidlowski, USA  
Lluís Fajas Coll, Switzerland  
Frédéric Flamant, France  
Mario Galigniana, Argentina  
Jan-Åke Gustafsson, USA  
Anton Jetten, USA  
Stafford Lightman, UK  
Jian-xing Ma, USA  
Sridhar Mani, USA  
Iain J. McEwan, UK  
Antonio Moschetta, Italy  
Bryce M. Paschal, USA  
Didier Picard, Switzerland  
Ralph Rühl, Hungary  
Bart Staels, France  
Jiemin Wong, China  
Wen Xie, USA

#### Editorial Board

Brian J. Aleskievich, USA  
Jeffrey Arterburn, USA  
Frank Beier, Canada  
Robert G. Bennett, USA  
Carlos Bocos, Spain  
Julius Brtko, Slovakia  
Moray Campbell, USA  
Thomas Chang, Canada  
Taosheng Chen, USA  
Hueng-Sik Choi, Republic of Korea  
Colin Clyne, Australia  
Austin Cooney, USA  
Pietro Cozzini, Italy  
Maurizio Crestani, Italy  
Paul D. Drew, USA  
Nouridine Faresse, Switzerland  
Grace Guo, USA  
Heather Hostetler, USA  
Wendong Huang, USA  
Young Jeong, USA  
Hiroki Kakuta, Japan  
Yuichiro Kanno, Japan  
Jae B. Kim, Republic of Korea  
Douglas Kojetin, USA  
Christopher Lau, USA  
Antigone Lazou, Greece  
Chih-Hao Lee, USA  
Xiaoying Li, China  
Yong Li, China  
Nick Z. Lu, USA  
Makoto Makishima, Japan  
Goldis Malek, USA  
Shaker A. Mousa, USA  
Zafar Nawaz, USA  
Noa Noy, USA  
Sergio A. Onate, Chile  
Eric Ortlund, USA  
Richard P. Phipps, USA  
Eric Prossnitz, USA  
Brian G. Rowan, USA  
Enrique Saez, USA  
Edwin R. Sanchez, USA  
Andrea Sinz, Germany  
Knut Steffensen, Sweden  
Cecilia Williams, USA  
Bingfang Yan, USA  
Xiao-kun Zhang, USA  
Chun-Li Zhang, USA  
Changcheng Zhou, USA

# Nuclear Receptor Research

## About the Journal

*Nuclear Receptor Research* is a peer-reviewed open access journal that publishes high-quality, original research and review articles covering all aspects of research involving all members of the nuclear receptor superfamily.

The editorial board of *Nuclear Receptor Research* has over 70 scientists representing a wide-scope of interest and expertise in the field, from 20 countries around the world.

*Nuclear Receptor Research* has a fully automated Manuscript Management System (MMS) which makes submission and reviewing as well as tracking of manuscripts an easy, efficient and prompt process to the advantage of the authors. Published articles in *Nuclear Receptor Research* are available in different formats including full-text HTML, full-text PDF, full-text ePUB, full-text XML, and Mobi.

## Free Advertising

100% Free of Charge

Advertise, in *Nuclear Receptor Research*, positions available in your laboratory, a position you are seeking, supplies and equipment as well as meetings and conferences related to the field of nuclear receptor research.

For more information about advertising in *Nuclear Receptor Research* please visit the journal website at: <http://www.agialpress.com/journals/nrr/>

For advertising in *Nuclear Receptor Research* please send your ad to [nrr.ad@agialpress.com](mailto:nrr.ad@agialpress.com)

## Contact

Editor-in-Chief: [badrm@umkc.edu](mailto:badrm@umkc.edu)

Editorial Office: [nrr@agialpress.com](mailto:nrr@agialpress.com)

