

**COMPREHENSIVE ANALYSIS OF BROUGHT IN DEAD CASES: A
RETROSPECTIVE OBSERVATIONAL STUDY IN A TERTIARY HOSPITAL
IN NORTH-EASTERN NIGERIA**

Authors:

Hassan Musa Chiwar^{1,2}, Abba Bukar Zarami^{3,4}, Aksavdwa Isaac Agyigra^{5,6}, Haruna Asura Ngadda^{3,4},
Umaru Hamidu Pindiga^{3,4}, Hayatu Umar Bulama⁴, Modu Ahmed^{1,4}.

Author affiliations:

¹Department of Medical Laboratory Science, Faculty of Allied Health Sciences, College of Medical Sciences, University of Maiduguri, Nigeria.

²African Centre of Excellence for Neglected Tropical Diseases and Forensic Biotechnology, Ahmadu Bello University, Zaria, Nigeria.

³Department of Human Pathology, Faculty of Basic Clinical Sciences, College of Medical Sciences, University of Maiduguri, Nigeria.

⁴Department of Histopathology, University of Maiduguri Teaching Hospital, Borno State, Nigeria

⁵Department of Laboratory Services, National Ear Care Centre, Kaduna, Nigeria.

⁶Department of Pharmacology and Therapeutics, Ahmadu Bello University, Zaria, Nigeria.

Corresponding author:

Chiwar, H.M.

Department of Medical Laboratory Science,

Faculty of Allied Health Sciences,

College of Medical Sciences,

University of Maiduguri, Nigeria.

Tel: +2348037829229;

Email: alaskiry@gmail.com

ORCID number: 0000-0002-9660-6140

ABSTRACT

Introduction: The Accident and Emergency unit is often the main entry point to hospitals for unexpected diseases, even though no medical care can be provided to Brought In Dead (BID) cases upon arrival. However, valuable information can be deduced from forensic investigations and analysis. Despite a life expectancy of 53 years and civil unrest in North-Eastern Nigeria, there is a lack of studies on BID in the region.

Aims: This research aimed to evaluate the frequency, age, and sex distribution, as well as clinical conditions associated with BID cases at the University of Maiduguri Teaching Hospital.

Materials and Methods: This retrospective observational study was conducted in the Accident and Emergency Unit of the University of Maiduguri Teaching Hospital, Maiduguri, Borno State, Nigeria. Ethical approval was obtained, and data collection included all BID cases registered between January 2018 and December 2020. The data was summarized using frequency and percentages.

Results: Out of 955 deaths recorded during the study period, 204 cases (21.3%) were BID. The BID cases consisted of 136 males (66.7%) and 68 females (33.3%), with a male-to-female ratio of 2:1. The age range of BID cases varied from 0-18 to above 75 years, with the highest frequency observed in the age range of 38-56 years. The most common known clinical conditions associated with BID cases were bleeding from gunshot, cardiopulmonary arrest, chronic kidney disease, and severe malaria. Male BID cases were commonly associated with cardiopulmonary arrest, while female BID cases were associated with cancer.

Conclusion: This study provided valuable insights into BID cases at the University of Maiduguri Teaching Hospital. The findings can guide strategies to mitigate BID occurrences and improve health-seeking behavior, especially among young adults.

Key Words: *Brought-In Dead cases, Accident and Emergency, North-Eastern Nigeria, University of Maiduguri Teaching Hospital*

INTRODUCTION

Hospital establishments are primarily aimed at treating ailments and promoting healing, however, there are cases where individuals arrive at the hospital already clinically dead. This condition is commonly known as "brought in dead" (BID). Regrettably, a significant number of these BID cases could have been prevented if the actual cause of death had been identified earlier.¹ The main route of entry to the hospital in case of unexpected disease/ailment is via Accident and Emergency unit. Even though no medical care or support can be given to BID when received; much information can be deduced from the relatives and also following forensic investigations and analysis.² The information obtained from forensic investigations may give clue on how to mitigate the frequency of BID.³

Despite the average life expectancy of 53 years,⁴ and faced with high level of civil unrest in North-Eastern Nigeria, there is dearth of studies on BID,^{5, 6,7}

The research is aimed at reviewing comprehensive data to evaluate the frequency, age and sex pattern of distribution as well as clinical conditions associated with the Brought In Dead cases at University of Maiduguri Teaching Hospital, a tertiary institution in North-Eastern Nigeria.

MATERIALS AND METHOD

Study Area

This was a retrospective observational study carried out in the Accident and Emergency Unit of University of Maiduguri Teaching Hospital, Maiduguri metropolis, Borno State of Nigeria. Maiduguri is the capital and largest city of Borno State located in the North-East geopolitical zone of Nigeria Latitude 11° 49' 59.99" N and Longitude 13° 08' 60.00" E with a population of 1,907,600 people. Most inhabitants of the state are farmers.

Ethical Consideration

Ethical approval was obtained from University of Maiduguri Teaching Hospital research and ethics committee (OHRP-IRB00013572 UMTH/REC/22/1043) prior to the commencement of the study. Confidentiality and data protection were strictly maintained throughout the study. All procedures were conducted in accordance with the ethical guidelines outlined in the declaration of Helsinki 2010.^[8]

Data Collection

Decedents that were registered as brought-in-dead at the Accident and Emergency unit of University of Maiduguri Teaching Hospital Death register, whether from suspected medical causes or not were included in the study. Deaths that occurred within the Hospital setting were excluded from the study, BID registered outside the range of January 2018 and December 2020 were also excluded from the study. All cases that met the inclusion criteria from January 2018 to December 2020 were recorded and data obtained were presented using frequency tables and percentages.

RESULTS

A total of 955 deaths were recorded between January 2018 and December, 2020, out of which 204 cases (21.3% of the total deaths) were Brought In Dead (BID). In 2018, out of 279 deaths, 57 cases (20.4%) were BID.

In 2019, out of 309 deaths, 86 cases (27.8%) were BID. In 2020, out of 367 deaths, 61 cases (16.6%) were BID (Table 1). The BID cases were composed of 136 males (66.7%) and 68 females (33.3%), resulting in a male-to-female ratio of 2:1

The age range of the BID cases varied from below 0-18 years to above 75 years. The lowest number of cases, 1.96% (4), was observed in the age range of 0-18 years, while the highest number of cases, 43.63% (89), was observed in the age range of 38 -56 years (see Table 2). Table 3 presents the different clinical conditions associated with the BID cases in this study. The majority of cases, 21.6% (44), had unknown clinical conditions. However, among the known clinical conditions, bleeding from gunshot, cardiopulmonary arrest, chronic kidney disease, and severe malaria were the most common. Bleeding from gunshot accounted for the highest number of associated clinical conditions with BID cases, with 33 cases (16.2%).

Table 4 provides the breakdown of associated clinical conditions according to age groups. The study revealed that road traffic accidents (RTA) were the most common associated clinical condition among the age group 0 to 18. In the age groups 19 to 37, 57 to 75, and above 75 years, the majority of BID cases had no known associated clinical condition. However, the most common clinical conditions associated with these age groups were cardiopulmonary arrest (9), chronic kidney disease (9), and severe malaria (2), respectively. Among the age group 38 to 56 years, bleeding from gunshot was the most common associated condition with BID cases, accounting for 19 cases.

Table 5 presents data of gender and associated clinical conditions. A significant number of male BID cases (34) had no known associated clinical condition. The commonest clinical condition associated with male gender was cardiopulmonary arrest (27). Among female BID cases, the highest frequencies were observed in those with no known clinical condition and those with cancer, both accounting for 10 cases.

Table 6 shows the distribution of BID cases by month. The highest rate of BID cases, 17.2% (35), was observed in the month of December. Road traffic accidents were the most common associated clinical condition with BID cases in that month.

Table 7 provides information on the residential locations of the BID cases. The study found that 71% (145) of the BID cases lived within the metropolis.

Table 1: Mortality distribution for 3-year period

Year	Hospital cases	BID cases (%)	Total mortality
2018	222	57 (20.4)	279
2019	223	86(27.8)	309
2020	306	61 (16.6)	367
Total	751	204 (21.3)	955

Table 2: Age and sex distribution of BID

Age (years)	Sex		Total (%)
	Male (%)	Female (%)	
0-18	1	3	4(1.96%)
19-37	40	11	51(25%)
38-56	59	30	89(43.63%)
57-75	32	17	49(24.02%)
Above 75 years	4	7	11(5.39%)
Total	136 (66.7%)	68 (33.3%)	204(100%)

Table 3: Clinical conditions associated with BID Cases.

Clinical Condition	Frequency	Percent
Abdominal Pain	6	2.9
DM	3	1.5
DM/HTN	3	1.5
Epigastric pain	2	1.0
HTN	3	1.5
Parkinsons Disease	2	1.0
Pneumonia	2	1.0
RVI	1	0.5
Severe Malaria	19	9.3
Stroke	1	0.5
Suicide	2	1.0
Cardiopulmonary arrest	29	14.2
Unknown	44	21.6
RTA	14	6.9
Bleeding Disorder	1	0.5
Cancer	11	5.4
Gunshot Case	33	16.2
CKD	24	11.8
Diarrhoea	4	2.0
Total	204	100.0

RTA= Road Traffic Accident; CKD= Chronic kidney disease; HTN= Hypertension; DM= Diabetes mellitus; DM/HTN= Diabetes Mellitus and Hypertension; RVI=Retroviral Infection.

Table 4: Age range and associated clinical condition

Associated health condition	Age range					Total
	0-18	19-37	38-56	57-75	76-94	
Abdominal Pain	1	3	2	0	0	6
DM	0	0	1	2	0	3
DM/HTN	0	0	2	1	0	3
Epigastric pain	0	1	0	1	0	2
HTN	0	1	0	1	1	3
Parkinsons Disease	0	0	1	1	0	2
Pneumonia	1	0	0	0	1	2
RVI	0	0	1	0	0	1
Severe Malaria	0	4	8	5	2	19
Stroke	0	0	1	0	0	1
Suicide	0	2	0	0	0	2
Cardiopulmonary Arrest	0	9	16	4	0	29
Unknown	0	10	16	15	3	44
RTA	2	7	4	1	0	14
Bleeding Disorder	0	0	1	0	0	1
Cancer	0	1	5	3	2	11
Gunshot Case	0	8	19	5	1	33
CKD	0	4	10	9	1	24
Diarrhoea	0	1	2	1	0	4
Total	4	51	89	49	11	204

Table 5: Gender and associated health condition

Associated clinical condition	Gender		Total
	Male	Female	
Abdominal Pain	0	6	6
DM	2	1	3
DM/HTN	3	0	3
Epigastric pain	2	0	2
HTN	2	1	3
Parkinsons Disease	2	0	2
Pneumonia	1	1	2
RVI	0	1	1
Severe Malaria	12	7	19
Stroke	1	0	1
Suicide	2	0	2
Cardiopulmonary Arrest	27	2	29
Unknown	34	10	44
RTA	7	7	14
Bleeding Disorder	0	1	1
Cancer	1	10	11
Gunshot case	24	9	33
CKD	15	9	24
Diarrhoea	1	3	4
Total	136	68	204

Table 6: Month and associated health condition

Associated Health Condition	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Abdominal Pain	0	5	0	0	0	0	0	0	0	0	0	1	6
DM	0	0	1	0	0	0	0	0	1	0	0	1	3
DM/HTN	0	2	1	0	0	0	0	0	0	0	0	0	3
Epigastric pain	0	1	1	0	0	0	0	0	0	0	0	0	2
HTN	1	0	0	1	1	0	0	0	0	0	0	0	3
Parkinsons Disease	0	0	0	1	0	0	0	0	0	0	1	0	2
Pneumonia	1	0	0	0	0	0	0	0	0	1	0	0	2
RVI	0	0	0	0	0	0	1	0	0	0	0	0	1
Severe Malaria	1	2	0	2	3	1	1	0	5	2	2	0	19
Stroke	0	0	0	0	0	0	0	0	1	0	0	0	1
Suicide	0	0	0	0	0	0	1	0	0	0	0	1	2
Cardiopulmonary Arrest	2	2	1	0	2	8	0	0	2	1	2	9	29
Unknown	5	2	7	4	3	0	3	2	7	3	5	3	44
RTA	1	1	0	0	1	1	0	0	0	0	0	10	14
Bleeding Dissorder	0	0	0	0	0	0	0	0	1	0	0	0	1
Cancer	2	2	2	0	2	0	0	1	2	0	0	0	11
Gunshot Case	3	3	2	1	2	1	6	0	1	6	2	6	33
CKD	4	1	0	0	5	0	1	3	2	2	2	4	24
Diarrhoea	0	0	1	0	0	0	1	0	0	1	1	0	4
Total	20	21	16	9	19	11	14	6	22	16	15	35	204
(Total Percentage)	(9.8)	(10.3)	(7.8)	(4.4)	(9.3)	(5.4)	(6.9)	(2.9)	(10.8)	(7.8)	(7.4)	(17.2)	(100)

Table 7: Location of BID Cases

Location of BID cases	Frequency of BID	Percentage
Within metropolis	145	71
Outside metropolis	59	29
Total	204	100

DISCUSSION

This study delved into the BID cases in the accident and emergency unit of the University of Maiduguri Teaching Hospital. The findings shed light on various aspects of BID cases and offer valuable insights into the local healthcare landscape. The number of hospital deaths observed in 2018 was lower than in 2019, while 2020 witnessed the highest number of hospital deaths. The significant reduction in BID cases during 2020 can be attributed to the impact of the COVID-19 lockdown, which prompted numerous patients relying on life support or undergoing specialized treatments to refrain from visiting the hospital altogether. Additionally, individuals were reluctant to bring their deceased loved ones to the hospital for fear of the COVID-19 stigma. This finding aligns with a study⁹, which concluded that between March and June 2020, there was a significant increase in mortality, with 87% of the deaths being COVID-19-related. The dramatic decline in BID cases during 2020, likely influenced by the COVID-19 lockdown and fear of hospital visits, emphasizes the importance of adapting healthcare strategies during pandemics.

The overall frequency of BID cases in this study was 21.3%, which is somewhat consistent with a similar study conducted in a referral hospital in the western region of Ghana¹⁰. However, when compared to studies conducted in Rivers and Cross River States of Nigeria, the frequency of BID cases in this study appears to be significantly higher. In those studies, the frequencies of BID were reported as 3.5% at the University of Port Harcourt Teaching Hospital³ and 4.2% at the University of Calabar Teaching Hospital¹¹. This discrepancy can be attributed to the unique characteristics of the study area. The University of Maiduguri Teaching Hospital serves as a tertiary health institution and the sole referral point with the only active histopathology and mortuary services in the entire Borno State, catering 27 local government areas and neighboring states.

Consequently, the burden of BIDs is on the University of Maiduguri Teaching Hospital, with cases even coming from primary or secondary health facilities. In contrast, the previously mentioned cited studies had hospitals that shared the burden with other referral hospitals, as multiple facilities exist with active mortuary services^{3,11}.

The study revealed a lower frequency of BID cases among children aged 0 to 18 years, while the highest frequency was observed among adults aged 38 to 56 years. This finding aligns with a study conducted in the United States of America¹², which indicated lower death rates among American teenagers compared to adults. The prevalence of factors contributing to death is generally higher among adults than teenagers and young adults.

The high frequency of BID cases in the older age group can be attributed to the burden of family and relative responsibilities, as individuals in this age range often find themselves engrossed in the struggle to provide for their families, sometimes neglecting their own health. Additionally, the study demonstrated that male BID cases were twice as frequent as female BID cases. This discrepancy can be attributed to the risky and unhealthy behaviors more commonly exhibited by men, such as cigarette smoking, heavy drinking, involvement in gun-related incidents, employment in hazardous occupations, engaging in risky recreational activities, and driving. These findings align with Roger's interpretation¹³ that highlights the physical risks related to road traffic accidents and personal lifestyle risks associated with poor diet, smoking, and alcohol consumption, leading to higher mortality rates among men.

A significant proportion of the BID cases (21.6%) had no known clinical condition recorded in the death register (Table 3). This finding is consistent with studies by Cummings, which reported sudden death as the most common cause of non-traumatic death¹¹. Undiagnosed cardiovascular diseases and hypertension are plausible explanations for this occurrence. These conditions are becoming increasingly prevalent in Africa¹⁴, and it is possible that they were either undetected or missed during the BID cases. To address this issue, it is crucial for legislators and policymakers to advocate compulsory post-mortem examinations for all BIDs. By doing so, the actual cause of death can be ascertained, potentially mitigating avoidable BID cases.

Furthermore, the involvement of governments, legislators, religious leaders, traditional leaders, and media communities in raising awareness about the significance of forensic investigations can play a vital role in addressing various challenges, including health and security issues affecting the population of the study area.

One notable finding from the study is that bleeding from gunshots was the most common known condition associated with BID (16.2%). This finding is strongly linked to the prevailing insurgency and high levels of insecurity in the study area. Implementing forensic scientific analysis, including forensic crime scene analysis, can aid in identifying culprits and criminals involved in murder cases, as gunshot-related incidents were among the prominent factors associated with BID in the study area.

It was observed from the study that a majority of BID cases in almost all age groups had no known clinical conditions. However, in the age group of 19-37 years, cardiopulmonary arrest was the commonest clinical condition associated with BID. This finding is consistent with the findings of Amakiri¹⁵, who identified cardiovascular diseases and hypertension as prevalent conditions among young adults in Africa. In the age group of 38-56 years, bleeding from gunshots emerged as the most common condition associated with BID. This can be directly attributed to the insurgency affecting the study area, with men being disproportionately affected due to their involvement in various risky activities, such as farming, fishing, and security-related roles. Although a majority of BID cases had no known clinical conditions, chronic kidney disease emerged as the most common condition associated with BID. This finding aligns with research indicating a significant decline in kidney function with increasing age¹⁶. It highlights the importance of addressing the prevalent issue of kidney disease among the elderly population in the study area.

dden death, particularly among young adults.

The study revealed that cardiopulmonary arrest was the most common clinical condition associated with male BID cases which is consistent with the notion that men are at increased risk of developing heart disease earlier than women due to physiological, behavioral, and emotional responses to stressful events¹⁷. The second most common condition associated with male BID cases was bleeding from gunshots, which can be attributed to their higher exposure to risky lifestyles, as previously discussed. In contrast, cancer was the most common clinical condition associated with female BID cases. While it contradicts findings suggesting higher cancer death rates among men, the high incidence of breast and cervical cancer among women in the study area provides a reasonable explanation¹⁸.

December stood out with the month with the highest percentage of cases (17.2%). This can be attributed to various factors, including the festive season, weddings, increased travel activities, and a surge in road traffic accidents. Insurgent attacks on roads leading to Maiduguri city also contribute to accidents during this period. People often begin preparations well in advance, prioritizing their engagements over their health concerns. Additionally, individuals living outside the state may skip their hospital appointments due to travel back home, further delaying medical attention. It is crucial to raise awareness about health issues and encourage individuals to prioritize their well-being, especially during such significantly busy and potentially risky periods of heightened activity.

Furthermore, the majority of BID cases (62.2%) were observed to be from the metropolis and this finding indicates that there is still a segment of the population in urban areas with poor health-seeking behavior. While accessibility to hospital facilities plays a role in BID cases, it is important to note that even within the metropolis, individuals who are far from health facilities may face reduced chances of survival by the time they reach the hospital¹⁹. Psychological, social, and economic factors can also contribute to delays in seeking medical care²⁰. These findings emphasize the need to improve health education and promote a culture of seeking timely medical attention to prevent avoidable cases of su

CONCLUSION

In conclusion, the study highlighted the frequency, clinical patterns, and challenges associated with Brought In Dead (BID) cases at the University of Maiduguri Teaching Hospital in North-Eastern Nigeria. Male adults appear to be the most vulnerable group to BID cases, underlining the need for targeted health initiatives. The need for post-mortem forensic examinations was highlighted.

Conflict of interest: The authors declare that **there is no** conflict of interest regarding the publication of this manuscript

REFERENCES

- 1- Sudnow, D. (1967). Dead on Arrival: *Transaction*;5, 36-43.
- 2- Boulton, C., Kane, R.L., Louis, T.A., Boulton, L., Mccaffrey, D. (1994). Chronic Conditions That Lead to Functional Limitation in the Elderly: *Journals of Gerontology*;49, M28-M36.
- 3- Ekere, A.U., Yellowe, B.E., Umune, S. (2005). Mortality Patterns in the Accident and Emergency Department of an Urban Hospital in Nigeria: *Nigerian Journal of Clinical Practice*;8, 14-18.
- 4- World Bank. (2017). World Development Indicators. Washington DC: World Bank.
- 5- Adeole, A. A., Arowolo, O. A., Alatise, O.I., Osasan, S. A., Basiriye, L. A., Omoniyi, E. O. (2010). Pattern of death in a Nigeria teaching hospital; 3 decade analysis: *African Health Science*; 10:266–272.
- 6- Iliyasu, Z., Abubakar, . IS., Gajida, A. U. (2010). Magnitude and leading cause of in-hospital mortality of Aminu Kano Teaching Hospital, Kano, Northern Nigeria, A 4 –year prospective analysis: *Niger J Med*; 19: 400–406. PMID: 21526628
- 7- Arodiwe, E. B., Nwokediuko, S, C., and Ike, S. O. Medical causes of death in a teaching hospital in south — eastern Nigeria: a 16 year review: *Niger J Clin Pract*; 17:711–716. 144383 PMID
- 8- World Medical Association (WMA). (2013). World Medical Association Declaration of Helsinki ethical principles for medical research involving human subjects. *Journal of American Medical Association*; 310(20). 2191 – 2194.
- 9- Jianhua, W., Marion, M., Mamas, A. M., Muhammad, R., Evangelos, K., John, E. D., Mark, A. B., Chris, P. G. (2021). Place and Underlying Cause of Death During the COVID-19 Pandemic: Retrospective Cohort Study of 3.5 Million Deaths in England and Wales, 2014 to 2020: *Mayo Clin Proc*; 96(4): 952–963. PMID: 33714592
- 10- Orish, V.N., Ansong, J.Y., Anagi, I.B., Onyebor, O.S., Okorie, C., Sanyaolu, A.O. and Iriemenam, N.C. (2014) Cases of Brought in Dead Patients in the Accident and Emergency Unit of a Referral Hospital in the Western Region of Ghana. *Open Access Library Journal*, 1: e1179. <http://dx.doi.org/10.4236/oalib>.
- 11- Ugare, G.U., Ndifon, W., Bassey, I.A., Oyo-Ita, A.E., Egba, R.N., Asuquo, M., Udosen, A.M. (2012). Epidemiology of Death in the Emergency Department of a Tertiary Health Centre South-South of Nigeria: *African Health Sciences*;12, 530-537.
- 12- Jiaquan, X., Kenneth, D. K., Sherry, L. M., Betzaida, T. V. (2010). Deaths: final data for 2007; *National Vital Statistics Reports*: 58(19): 1 – 19. PMID: 25075874
- 13- [Roger, D. \(2006\). Men are more likely than women to die early: *British Medical Journal*; 29: 333\(7561\): 220.](#)
- 14- Cummings, P. (1990). Cause of Death in an Emergency Department: *American Journal of Emergency Medicine*; 8, 379- 384.
- 15- Amakiri, C. N., Akang, E. E., Aghadiuno, P. U., Odesanmi, W. O. (1997). A Prospective Study of Coroner's Autopsies in University College Hospital, Ibadan, Nigeria: *Medicine, Science and the Law*; 37, 69-75.
- 16- Rainer, D. (2012). Risk Factors in the Progression of Chronic Kidney Disease. *European Endocrinology*. 2006(2):41-46.
- 17- Weidner, G. (2000). Why do men get more heart disease than women? An international perspective; *J Am Coll Health*: 48(6):291-4. PMID: 10863872doi: 10.1080/07448480009596270.
- 18- Hae, I. K., Hyesol, L., Aree, M. (2018). Sex Differences in Cancer: Epidemiology, Genetics and Therapy: *Biomolecules and Therapeutics*. 26(4): 335–342.
- 19- Nicholl, J., West, J., Goodacre, S., Turner, J. (2007). The Relationship between Distance to Hospital and Patient Mortality in Emergencies: An Observational Study: *The Journal of Emergency Medicine*;24, 665-668.
- 20- Walsh, J.C., Lynch, M., Murphy, A.W., Daly, K. (2004). Factors Influencing the Decision to Seek Treatment for Symptoms of Acute Myocardial Infarction: An Evaluation of the Self-Regulatory Model of Illness Behaviour: *Journal of Psychosomatic Research*; 56, 6