

Examining the mortality data management in Saudi Arabia: Potential benefits for an advanced system

Khalid Zaben Aldahmashi*, Dr Hussien Meshail Alotaibi**, Ali Abdullah Bawazir ***, Abdulaziz Abdulrhman Almishari ****, Abdullah Wadi Alanazi *****

* Director of Mortality

Department in ministry of health in northern border Saudi Arabia

** Physician forensic medicine of forensic medical services in Riyadh, Saudi Arabia

*** Head Technical Affairs Department of forensic medical services in Riyadh, Saudi Arabia

**** Head of Crises and Disasters Department in forensic medical services Riyadh, Saudi Arabia

***** Specialist-laboratory Cardiac center in northern border Saudi Arabia

DOI: 10.29322/IJSRP.13.09.2023.p14117

<https://dx.doi.org/10.29322/IJSRP.13.09.2023.p14117>

Paper Received Date: 4th August 2023

Paper Acceptance Date: 8th September 2023

Paper Publication Date: 16th September 2023

Abstract- This study examines the current state of death directories in the Kingdom of Saudi Arabia, spotting its shortcomings and suggesting improvements. The study looked into Saudi Arabia's death data platform, assessed its accuracy, consistency, and timeliness, and surveyed the potential technological options alongside standardized frameworks. Using a mixed-method technique approach, it engaged key participants including healthcare practitioners, governmental institutions, and research establishments. The proposed strategies were compared to best practices from other countries that have effective death data management systems. Results exhibited that while Saudi Arabia has managed to have high completeness rates in death registration, problems surrounding data accuracy and timeliness persist. Lastly, a proposed framework embracing modern technologies, comprehensive training programs, and increased stakeholder collaboration were highlighted to augment death data handling. The execution of such a system could transform public health outcomes and strategies in Saudi Arabia.

Index Terms- Saudi Arabia, Data Accuracy Death Registration, Public Health Strategies, Technological Solutions.

I. INTRODUCTION

Approximately 56 million deaths occur each year per year worldwide (WHO, 2013). The correct gauging and estimation of death rates, patterns, underlying reasons, and how different deaths are is a very key section of the overall communal healthcare. Regarding the Kingdom of Saudi Arabia, mortality rate reduction also plays a critical purpose in tailoring public well-being, health-related study undertakings as well as the relocation of resources. Thereby, comprehending the patterns of death and its causes, and demographic developments is indispensable for effectively addressing health challenges and finally improving public health

(WHO, 2017). This research paper, therefore, targets to bring more light to the current status of death information in Saudi Arabia, highlighting some specific challenges, and it also proposes specific techniques that can be embraced by the Saudi government to ensure it is correct and exhaustive.

Mortality data provide a snapshot of current health problems, suggest persistent patterns of risk in specific communities, and show trends in specific causes of death over time.

Accurate death statistics are imperative to help the national health protection authorities to prevent epidemics and disease outbreak, formulate a response to communicable diseases and evaluate statistics such as the birth and death trends.

Background:

Based on the global health monitoring organization World health organization, the death registration process in Saudi Arabia exhibits guaranteeing completeness in rates, that was ranging between 90% to 99% in the year 2017. Notably, this indicates a positive development, showing a relatively high rate of follow-up and dedication by the responsible authorities that capture mortality data (WHO, 2017). Then again, mere completeness of such data does not necessarily ensure accuracy, additionally, there exist several underlying factors that ought to be addressed.

Importantly Death data plays an immense significance, serving as a useful source of statistical data for public health state evaluation. So, by examining death records, authorities can pinpoint the health conditions most prevalent, and uncover emerging illnesses, alongside monitoring the efficacy of public health initiatives. What's more, is that the accurate and systematized reporting of essential events, such as mortalities, is fundamental in assisting to make informed choices and inequitable resource distribution about healthcare (WHO, 2023a). Furthermore, it is not only necessary for health studies but also of the essence in developing targeted prevention schemes.

Problem Statement:

Even though the state of death registration in Saudi Arabia is commendable, problems persist in terms of consistency, accuracy, and timeliness of the data. The dependence on manual reporting systems may bring about delays and possible errors in recording the reasons for death (Tyrovolas et al., 2020). The absence of a standardized platform across different Kingdom's regions might end up causing inconsistencies and hamper the comparability of data for prospective comprehensive health evaluation.

Furthermore, there might be obstacles in getting detailed and consistent information on the subject of the underlying causes of demise, particularly in situations where deaths happen in remote regions or outside Healthcare setups (Tyrovolas et al., 2020). This insufficiency in the granularity of such data prevents the capability to recognize certain health issues prevalent in different regions and develop personalized regional interventions.

The Aim of the Research:

The principal objective of this exploration is to propose achievable ways to enhance death records in the Kingdom of Saudi Arabia. In addressing the difficulties surrounding death data, the aim suffices to be the creation of a standardized framework that will improve the quality and usability of mortality statistics with the end benefit being augmenting public health and policy development (United Nations, 2015).

Throughout this undertaking, we purpose to recommend a systematized reporting system that focuses on the precise recording of underlying reasons for deaths alongside incorporating novel technological remedies. By streamlining the information collection course, authorities can guarantee timely and credible data, permitting them to act speedily in response to any emerging health hazards (United Nations, 2015).

Besides, we will delve into the best practices that have reliable and successful death data management platforms. By benchmarking the global approaches, we can sort strategies that align with Saudi Arabia's unique culture and context. Merging these insights with local skills will create a solid framework that caters to the nation's specific challenges plus needs (United Nations, 2015).

Concisely, this research endeavors to promote the improvement of death data handling in the Kingdom of Saudi Arabia, Hence leading to targeted interventions, better-informed health policies, and improved health outcomes for the Saudi People. Stressing the need for accurate and thorough death data to develop healthier and more resilient citizens (United Nations, 2015).

II. RESEARCH ELABORATIONS

Review of Current Situation: A Detailed Analysis of Death Data in Saudi Arabia

The collection, handling, and usage of death data in the Kingdom of Saudi Arabia denotes a fundamental aspect of the Kingdom's health information systems. Correct and detailed death data is elemental for shaping public health guidelines, resource allocation, and research activities. Therefore this study purports aims to conduct a comprehensive assessment of the current state of death data oversight in Saudi Arabia, and in the process identify strengths and weaknesses, alongside suggesting strategies that will bring improvement (MOH, 2021).

The Saudi Arabian Health Ministry has taken many noteworthy steps toward ensuring health information system reform, with a specific emphasis on non-communicable conditions. A population-based inquiry has been implemented to trace the risk factors that lead to chronic diseases in the Kingdom. Purposely, this comprehensive survey envelops a wide range of social, economic, and health-related elements, like tobacco smoking, obesity, diabetes, and hypertension, high cholesterol levels (MOH, 2021). The information gathered from this survey becomes a helpful resource for fashioning preventive and therapeutic schemes across all the Kingdom's regions.

Apart from the Saudi Ministry of Health's efforts, the World Health Organization (WHO) also plays a part in mortality data collection in Saudi Arabia owing to its Global Health Estimations. These estimates offer key information on the causes of death and mortality rates, moreover, they are categorized by sex, age, and country-wise. The alliance with the WHO guarantees dispensation to international methodologies and standards, thereby facilitating cross-country surveys and global health monitoring (WHO, 2017). Regardless of these progresses, the challenges remain in the accuracy and evenness of death data in Saudi Arabia. Notably, the reliance on manual reporting systems may cause delays and potential faults in recording the reasons for death. What's more, the lack of a standardized technique connecting the different regions obstructs data comparability and hinders the identification of region-specific health conditions (Becedas et al., 2022).

Proposed Framework for Improvement:

To effectively manage the setbacks in death data handling, it is important to implement a standardized and technologically based reliable reporting system. What is standing out is the integration of modern technologies, in particular electronic death registration programs, which can ease data gathering, minimize errors, and ensure prompt updates (Becedas et al., 2022). Automation of data processing improves the efficiency of data evaluation, making it possible to quickly identify patterns and trends in mortality levels. Improving the association among the various stakeholders, consisting of healthcare practitioners, governmental bodies, and research establishments, is crucial in achieving a detailed and precise demise data catalog (Becedas et al., 2022). By using a centralized directory, information sharing and access, nurturing a more organized and effective approach to mortality data stewardship can be accelerated, nurturing a more organized and effective approach to mortality data stewardship.

By the same token, training and capacity-utilization projects ought to be initiated to ensure healthcare practitioners are properly equipped to correctly record and report mortality information. Therefore, increasing awareness regarding the importance of precise death data among all stakeholders will create a culture of information accountability and credibility (Becedas et al., 2022). Improving death data handling oversight in the Kingdom of Saudi Arabia is central to evidence-based public health initiatives and tailored health undertakings. The present efforts by the Saudi Arabian Ministry of Health, alongside the collaboration with the WHO (World Health Organization), create a robust foundation for advancement (WHO, 2023b). By embracing a standardized reporting strategy, fostering collaboration and data integrity, and leveraging modern novel technologies, Saudi Arabia can fashion a robust death data management scheme that will be a party to the nation's general wellness.

Benchmarking with Global Practices

Mortality statistics and data are key for devising policy and structuring health interventions in globally. These directories give us a clear picture of a nation's health system's effectiveness and health status (Becedas et al., 2022). Several nations manage information about death differently, and each technique has its unique shortfalls and strengths.

Meanwhile, a comparison of the Saudi technique to other global practices shows a range of methods used to handle death data. For instance, some Scandinavian countries have remarkably efficient vital recording systems that enable them to gather good quality mortality information alongside their underlying demise causes (Makinde et al., 2020). Their systems can be considered to be examples of best practices due to their utilization of digital systems, comprehensive coverage, and timeliness in data reporting.

Despite this, there are some countries with less developed infrastructures that rely majorly on community health worker accounts or oral autopsies to fill in the gaps in their mortality statistics. These styles, although not as accurate as some of the most comprehensive vital registration systems, indicate the adaptability and resilience in data collection under circumstances where there is a limited resource (de Vries & Pool, 2017).

Furthermore, in some nations, like the United States, mortality records are collected using a mix of health surveys, established registration systems, and disease catalogs. This approach gives a wider view of the health setting, including data from several sources hence a more comprehensive evaluation (CDC, 2019).

Assessment of mortality data encompasses many measures such as Age-Specific Death Rates (ASDR), Crude Death Rates (CDR), Specific Death Rate, and Standardized Death Rates. These measures, while individually valuable, exhibit an incomplete picture if considered alone (CDC, 2019b). As a result, the comprehensive style is vital in using death data for policy-structuring and healthcare improvement.

Data standardization is a method whereby a real comparison between different populations is made. This technique assists in eliminating biases caused by population configuration variation, giving a more accurate depiction of mortality rates (Nicholls, 2020).

Therefore, proper mortality information oversight is a key part of health planning and policy. Accordingly, different countries have different methods in place depending on the available or allocated resources and infrastructure. Hence, it is imperative to understand these variations, borrow from global best practices, and continually adjust systems to provide precise, prompt, and useful mortality information. Despite the methods utilized, the target goal is to utilize this data to progress health outcomes and prevent unnecessary deaths (Tyrovolas et al., 2020). With developments in technology and data assessment, the capabilities for advanced mortality data gathering, analysis, and usage are big and promising.

III. RESULTS OR FINDINGS

Expected Benefits

Admittedly, the proposed amendments in death data oversight carry potential advantages that can greatly shape health research, policy planning, emergency response initiatives, and public well-being in the Kingdom of Saudi Arabia. Undeniably, these changes

Proposed Framework

Regarding addressing the discovered problems and progressing mortality information management in the Kingdom of Saudi Arabia, my suggestion involves various key strategies. First, the implementation of a cross-platform standardized, technologically advanced reporting system, that is to say, an electronic death registration system, which would help ease data collection and guarantee timely updates. So, by incorporating modern and novel technologies, the results would be beneficial and demonstrate we would not only reduce errors but end up improving data processing efficiency, thereby permitting the speedy identification of patterns and trends in mortality rates. Making policy development and decision-making processes better (CDC, 2019).

The fostering of a partnership approach that will involve all key participants, like healthcare practitioners, research firms, and governmental agencies is also equally imperative. Hence, by forming a centralized directory, data sharing and accessibility could be greatly enhanced, thereby enabling a more connected system for handling mortality information. Notably, this method is in line with the international best practices that insist on cooperation and interoperability among diverse elements to achieve reliable, accurate, and comprehensive data repositories (Becedas et al., 2022).

Furthermore, I propose implementing a thorough training and capacity-building program. Such a program will ensure that the healthcare experts are equipped with the necessary knowledge and skills to properly record and report the death. Herein, each stakeholder must understand the importance of accurate death data since this will assist in fostering a culture of data responsibility and integrity. Concurrently, public awareness drives could be advantageous in emphasizing the significance of precise reporting and how it affects public health interventions and policies (Becedas et al., 2022).

Finally, we need to balance the ongoing endeavors of the Saudi Arabian Ministry of Health and its liaison with the World Health Organization. These in turn will lay a solid foundation whereupon we can build a solid mortality data management framework (WHO, 2017). As a result, Saudi Arabia can expect significant positive changes in evidence-based public health policy and tailored intervention targeting.

In a nutshell, it is essential to recognize that an efficient death data management system, rooted in reliable advanced technologies and stipulated standardized reporting systems, is key for evidence-based public health programs. This allows strong collaboration between stakeholders, capacity building, and increasing public awareness regarding the necessity of accurate death data. By embracing these suggestions (WHO, 2017). The Kingdom of Saudi Arabia will be taking a significant step towards progressing and improving public health and the overall well-being of its people.

aim to boost the current mortality data handling processes and introduce better practices that will ensure comprehensive, correct, and prompt mortality data (United Nations, 2015).

The addition of recent novel technologies, like electronic death registration. Provides the advantage of streamlined data gathering

and processing. Such automation will not only minimize errors but also facilitate quick analysis, permitting a fast identification of patterns and trends in mortality rates (Becedas et al., 2022). Moving forward to the context of health research, this development indicates an enhanced function to study ailments patterns and health determinants, thereby facilitating the development of preventive and therapeutic regimens.

Furthermore, promoting collaborations between stakeholders i.e. governmental health bodies, healthcare providers, and research establishments can yield a synergistic outcome. Notably, a centralized directory for mortality information could transform key health aspects like policy organization by providing credible and comprehensive information to steer decision-making (Becedas et al., 2022). Besides, it would facilitate more coordinated emergency responses, guaranteeing appropriate swift actions about data-driven insights.

Furthermore, capacity-building undertakings aimed at healthcare providers will make certain that the data recorded and reported is right. This approach is crucial in double-checking data integrity, which forms the foundation in terms of overall system effectiveness (Becedas et al., 2022). The formation of a culture of data credibility could additionally augment the reliability and robustness of the data, creating trust in the information provided.

When combined appropriately, these aforementioned improvements will not only strengthen the integrity and efficiency of the death data handling system but also furnish the betterment of public health within Saudi Arabia. They map out more engineered interventions, evidence-based public health policy enactment, and a practical approach to handling health emergencies (Becedas et al., 2022). Such merits resonate with the joint goal of realizing overall health and well-being in the Kingdom of Saudi Arabia.

Accurate reporting of causes of death-on-death certificates is essential to formulate appropriate disease control, prevention and emergency response by national health-protection authorities.

The data from death certificates is also used for the estimation of the trends in chronic conditions such as the prevalence of diabetes and cardiovascular conditions. Causes of death from death records can be used by the reporting agencies to carry out the tasks mentioned above. To ensure a timely and accurate response to disease threats, high-quality death information on death certificates is essential.

RECOMMENDATIONS

We should utilize knowledge from publicly available expert-formulated rules for the cause of death to determine the extent of discordance in the death certificates in national mortality data with the expert knowledge base. We also report the most commonly occurring invalid causal pairs which physicians put in the death certificates. We use sequence rule mining to find patterns that are most frequent on death certificates and compare them with the rules from the expert knowledge based.

For data accuracy and to identify measures to reduce mortality improvement, it is advocated that an independent body responsible for reviewing death data and studying causes of death be established. Therefore this independent review will play a key role in offering unbiased and expert inputs, progressing decision-making, and assuring the much-needed oversight (WHO, 2023a). The suggested independent mortality data handling body will

comply with the following outlined guiding principles: Trust, independence, consideration of risks and outcomes, and adaptation based on evidence-based findings.

Next, an independent review should be based on three key designs: targeted review, quick review, and full review. First a targeted review delves into a problem area in depth, almost similar to a full review, Secondly a quick review, focuses on specific areas of risk and involves limited engagement. Lastly, a full review will provide a comprehensive assessment of project health, including the governance, project environment, management practices, risk management, and stakeholder engagement (Secretariat, 2021).

To ensure an effective review, the independent body must consist of qualified and impartial reviewers without any conflict of interest. Their findings and recommendations will offer insights into risks and issues not readily apparent to those involved in day-to-day project activities (Secretariat, 2021). This transparency will assist decision-makers in determining the necessary actions to ensure project success.

Having looked at the recommendations, It is worthwhile to note that establishing an independent body to assess mortality data and study causes of mortality is vital for establishing an impartial assessment and improving decision-making. Therefore, by following the stipulated guiding principles and types of reviews, the prospective independent body will contribute greatly to reducing mortality rates and promoting better health outcomes (Becedas et al., 2022).

IV. CONCLUSION

This study set out to investigate the death recording system used in Saudi Arabia, it also delved into some evidence-based framework that would assist the Kingdom in initiating more advanced and accurate death repositories. Evidently, through the study, insightful information that sets the stage for a potential paradigm shift in death data handling in the Kingdom of Saudi Arabia is exhibited. Meaning that to improve public health outcomes that are firmly rooted in evidence-based policies.

As reviewed, the current death registration system in Saudi Arabia has achieved profoundly high completeness rates. Nevertheless, this research showed that some challenges persist in the areas of consistency, data accuracy, and timeliness. Given the immense significance of accurate death data in shaping public health policies and interventions, emphasis was placed on the necessity to deal with these issues. Thus, by infusing advanced technological solutions, developing a collaborative setting, and placing focus on proper training, the initiative can develop to capture mortality more precisely and promptly.

Such a modernization move could surely revolutionize the current death directory landscape by ensuring reliable, timely, and detailed data, hence fostering evidence-based decisions. Besides, the integration of best practices from other nations, for instance, the better performing Scandinavian nations, could assist in refining the framework to properly suit the distinctive cultural and contextual elements in Saudi Arabia.

Therefore, it is imperative to regard these changes since they can bring about a substantial improvement in the overall health outcomes in Saudi Arabia. This research opens up a path for a

systematic shift in the approach to overseeing death data. Through streamlined data collection, analysis, and utilization, Saudi healthcare can respond proactively and efficiently to possible health threats.

Regarding future implications, the proposed strategies could significantly influence public health strategies in Saudi Arabia. A solid, accurate, and comprehensive death data management system can pilot resource allocation, policy development, and research initiatives. Moreover, it can assist with in timely detection of prevalent health maladies, facilitating the reduction in mortality rates, and improvement in the quality of life for Saudi nationals.

This research journey does not come to a halt here. I would suggest future researchers make inquiries into the potential applications of Machine learning and Artificial Intelligence to advance the death registration system. Furthermore, a probe into the user experience of the suggested electronic system from the viewpoint of healthcare professionals could shed more light on prospective areas of refinement. A comparative survey with countries that have implemented like systems could also give insights into lasting impacts and challenges.

To sum up, this research venture denotes a vital step towards enhancing the death data handling system in Saudi Arabia. The recommendation founded on the principles of standardization, collaboration, modernization, and capacity building, could spearhead improved health outcomes. The initiative, while challenging, is significant and promises a wholesome future for the citizens of Saudi Arabia. The potential impact on future health strategies and policies is deep, making this research an essential stepping-stone in the search for making a healthy country..

REFERENCES

- [1] Becedas, R., Fruchtmann, S., I., D., Savigny, D., & Muñoz, C. (2022). Addressing the Evidence Gap in the Economic and Social Benefits of Civil Registration and Vital Statistics Systems: A Systematic Review. *Public Health Reviews*, 43.
- [2] CDC. (2019a). *NVSS - Mortality Data*. Center for Disease Control. <https://www.cdc.gov/nchs/nvss/deaths.htm>
- [3] CDC. (2019b). *Principles of Epidemiology*. Centers for Disease Control and Prevention. <https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section3.html>
- [4] Cnattingius, S., Källén, K., Sandström, A., Rydberg, H., Månsson, H., Stephansson, O., Frisell, T., & Ludvigsson, J. F. (2023). The Swedish medical birth register during five decades: documentation of the content and quality of the register. *European Journal of Epidemiology*, 38(1), 109–120. <https://doi.org/10.1007/s10654-022-00947-5>
- [5] De Vries, D. H., & Pool, R. (2017). The Influence of Community Health Resources on Effectiveness and Sustainability of Community and Lay Health Worker Programs in Lower-Income Countries: A Systematic Review. *PLOS ONE*, 12(1), e0170217. <https://doi.org/10.1371/journal.pone.0170217>
- [6] Makinde, O. A., Odimegwu, C. O., Udoh, M. O., Adedini, S. A., Akinyemi, J. O., Atobatele, A., Fadeyibi, O., Sule, F. A., Babalola, S., & Orobato, N. (2020). Death registration in Nigeria: a systematic literature review of its performance and challenges. *Global Health Action*, 13(1), 1811476. <https://doi.org/10.1080/16549716.2020.1811476>
- [7] MOH. (2021). *Health Sector*. <https://www.moh.gov.sa/en/Ministry/vro/Documents/Healthcare-Transformation-Strategy.pdf>
- [8] Nicholls, A. (2020, August 26). *The standardized mortality ratio and how to calculate it*. Students 4 Best Evidence. <https://s4be.cochrane.org/blog/2020/08/26/the-standardised-mortality-ratio-and-how-to-calculate-it/>
- [9] Secretariat, T. B. of C. (2021, July 8). *Guide to Independent Reviews*. [Www.canada.ca. https://www.canada.ca/en/treasury-board-secretariat/services/information-technology-project-management/project-management/guide-independent-reviews.html](https://www.canada.ca/en/treasury-board-secretariat/services/information-technology-project-management/project-management/guide-independent-reviews.html)
- [10] Tyrovolas, S., Bcheraoui, C. E., Alghnam, S. A., Alhabib, K. F., Almadi, M. A. H., Al-Raddadi, R. M., Bedi, N., Tantawi, M. E., Krish, V. S., Memish, Z. A., Mohammad, Y., Molassiotis, A., Panagiotakos, D., Salam, N., Sobaih, B. H., & Mokdad, A. H. (2020). The burden of disease in Saudi Arabia 1990–2017: results from the Global Burden of Disease Study 2017. *The Lancet Planetary Health*, 4(5), e195–e208. [https://doi.org/10.1016/S2542-5196\(20\)30075-9](https://doi.org/10.1016/S2542-5196(20)30075-9)
- [11] United Nations. (2015, April 14). *Why birth and death registration really are “vital” statistics for development*. [Hdr.undp.org. https://hdr.undp.org/content/why-birth-and-death-registration-really-are-vital-statistics-development](https://hdr.undp.org/content/why-birth-and-death-registration-really-are-vital-statistics-development)
- [12] United Nations Statistics Division. (2017). *UNSD — Demographic and Social Statistics*. [Un.org. https://unstats.un.org/unsd/demographic-social/crsv/](https://unstats.un.org/unsd/demographic-social/crsv/)
- [13] WHO. (2017). *Saudi Arabia data | World Health Organization*. [Data.who.int. https://data.who.int/countries/682](https://data.who.int/countries/682)
- [14] WHO. (2023a). *About the WHO Mortality Database*. [Platform.who.int. https://platform.who.int/mortality/about/about-the-who-mortality-database](https://platform.who.int/mortality/about/about-the-who-mortality-database)
- [15] WHO. (2023b). *Saudi Arabia data | World Health Organization*. [Data.who.int. https://data.who.int/countries/682](https://data.who.int/countries/682)
- [16] WHO, 2013. *Top 10 Causes of Death - Factsheet*.
- [17] Worldbank. (2021). *Death rate, crude (per 1,000 people) - Saudi Arabia | Data*. [Data.worldbank.org. https://data.worldbank.org/indicator/SP.DYN.CDRT.IN?locations=SA](https://data.worldbank.org/indicator/SP.DYN.CDRT.IN?locations=SA)

AUTHORS

First Author – Khalid Zaben Aldahmashi, Director of mortality, department in ministry of health in northern border Saudi Arabia, Khaled8424@gmail.com

Second Author – Dr hussien meshail alotaibi, Physician forensic medicine, forensic medical services in Riyadh, Saudi Arabia, hussienalossaimi@gmail.com.

Third Author – Ali abdullah bawazir, Head Technical Affairs Department, forensic medical services in Riyadh, Saudi Arabia, aagb2009@hotmail.com.

Fourth Author – Abdulaziz abdulrhman almishari, Head of Crises and Disasters Department, forensic medical services Riyadh , Saudi Arabia, aalmishari@hotmail.com.

Fifth Author – Abdullah wadi alanazi, Specialist-laboratory cardiac center, northern border Saudi Arabia, Alr7a19@hotmail.com.

First Author – Khalid zaben aldamashi, Director of mortality, department in ministry of health in northern border Saudi Arabia, Khaled8424@gmail.com, phone: +96 658 000 0356