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Despite overall improvements in child health and survival, gender discrepancies persist, reflecting complex interactions among socio-cultural norms, healthcare access, and socioeconomic conditions. This research paper focuses on the gender-based discrepancy in infant mortality rates in Nigeria. This paper aims to explore the elements prompting gender-based discrepancies in infant mortality. For the objective of the study, records from the NDHS 2018 were obtained. Log-rank test at level of significance was used to ascertain the factors influencing gender-based discrepancies in infant mortality. The findings of this study depict higher risk among males than females in all the variables under study with an exception of maternal age groups 35-39 (50.36%) and 40-49 (50.25%), which depict the risk of infant mortality is higher among female infants than males. The relationship between gender and mortality can vary based on factors such as maternal age, maternal education, breastfeeding, and antenatal visits. These emphasize the need for targeted interventions and policies to address the underlying causes of gender-based discrepancies in infant mortality and to improve the health outcomes of all infants in Nigeria.

Keywords: Gender discrepancy, Infant mortality, Child health, Log-rank test, level of significance, Nigeria.

1. Introduction

Numerous studies have examined the relationship between a child's gender and their likelihood of dying earlier than age 5, but little is known about the precise mechanisms by which sex impacts childhood mortality. Previous studies on the differences between males and females in childhood mortality consistently show that male children have greater mortality rates than females, especially in the first few months of life see (LeGrand, 2000). It is a significant issue to address gender-based

gaps in child survival, which include differences across and within different countries. This matter is especially important for policies and initiatives that support the welfare and survival of children, for instance see (Mishra et al. 2004). Infant girls typically have greater survival rates than infant boys. This is explained by the fact that they are less vulnerable to infections, birth problems, and genetic abnormalities see (Sawyer, 2012).

The rates of infant mortality are vital determinants that affect the health and growth of a country. Nigeria faces the challenge of lowering death rates among its earliest population. Given the potential differences in healthcare access, socioeconomic circumstances, and cultural norms, gender-based investigation of infant mortality is a significant aspect that has to be discovered. Nigeria has an under-five mortality rate of 117 deaths per 1,000 live births, according to UNICEF data. Infant and under-five mortality rates in Nigeria have stayed constant over the past five years, at 74 and 117 deaths per 1,000 live births, respectively (Unicef.org). According to Unicef.org, at these rates of mortality, one in every 13 Nigerian babies dies before they turn one, and one in every eight does not live to see their fifth birthday.

Studying gender disparities in infant mortality in Nigeria holds significant implications for public health, social equality, and sustainable development. Addressing these disparities is crucial to ensure fairness and uphold human rights. The core principle is that all children, regardless of gender, have the right to survival. Achieving Sustainable Development Goal 3, which aims for healthy lives and well-being for all, necessitates acknowledging and eliminating gender-related inequalities. Nwokocha (2013) emphasizes that while global MDGs are important, addressing gender discrepancies in Nigeria requires considering the country's diverse socio-cultural norms. Achieving these objectives it demands challenging and transforming existing gender norms and promoting equality in a society marked by its multicultural nature. This effort is essential to create a more equitable future.

Gender plays a pivotal role in shaping healthcare access and utilization. Discrepancies in access to healthcare facilities, preventive measures, and maternal and child health services can lead to divergent health outcomes for boys and girls. Examining these discrepancies sheds light on potential barriers preventing equal healthcare access for all. Maternal health, access to maternal health care is negatively influenced by gender discrepancy in various ways see (kraft et al. 2014; Singh et al. 2012). Several studies have researched the issue of gender discrepancies in mortality across the globe among which are;

Hossain et al. (2015) focused on the important health challenge of child mortality in Bangladesh, despite remarkable developments in child mortality rates over the years with an aim of understanding the occurrence and determinants of hazard causes contributing to child mortality in the country. He used data from the BDHS conducted in 2011. Findings revealed that child mortality rates were 13.0% for boys and 11.6% for girls in Bangladesh.

Chowdhury et al. (2017) investigated gender disparities in infant survival within diverse time frames and socioeconomic settings. Data was analyzed from 60,480 infants, with 4,060 documented infant deaths. Results revealed that deaths were 7.2%

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of all female births and 6.3% of all male births. Female infants experienced a significantly higher death rate not during the neonatal phase, but rather during the post-neonatal period (29-365 days).

In South Asia, Aghai et al. (2020) investigated gender differences in neonatal mortality, stillbirths, and perinatal mortality. 297,509 births—154,790 males and 142,719 females—were studied between 2010 and 2018. The findings show that male infants had a considerably greater rate of neonatal mortality than female neonates. Males also had higher rates of early neonatal and stillbirth mortality. There were no discernible gender differences in late neonatal mortality or mortality between 29 and 42 days. Compared to female newborns, male infants had greater hospitalization rates within the first 42 days after birth.

Pal et al. (2020) used information from the NFHS-4, 2015–16 to assess gender differences and mortality risk among infant and under-five in India. According to the research, males are more possible to die earlier than age 5. While sex-related infant mortality disparities seem to be uniform crossways India, there is variability in under-five mortality.

Almossawi et al. (2021) used the PICANet dataset to analyse data from infants aged 0 to 12 months admitted to UK PICUs between 2005, and 2015. Their study was focused on sex-related infant mortality in PICUs. In the 71,243 cases examined, mortality rates were 4.8% for females and 4.3% for males. The study discovered that female infants had a 13% higher risk of mortality than male infants after accounting for several factors.

Studying gender discrepancy in infant mortality in Nigeria holds profound significance for achieving health equity, gender equality, and sustainable development. It informs policies and interventions that highlight the well-being of all children, regardless of their gender, and contributes to a more inclusive and just society. Hence, this paper aims to explore the factors influencing gender-based discrepancies in infant mortality.

1.1 Research Objectives

- i. To examine gender-based discrepancy in infant mortality rates in Nigeria
- ii. To identify key factors contributing to gender discrepancies in mortality outcomes

1.2 Research Questions

- i. Are there significant gender discrepancies in infant mortality rates in Nigeria?
- ii. What are the key factors contributing to gender-based difference in mortality outcomes?

1.3 Hypothesis

There is a significant gender discrepancy in infant mortality rates in Nigeria

There is no significant gender discrepancy in infant mortality rates in Nigeria

2. Materials and Methods

The Nigerian Demographic and Health Survey (NDHS) has been a valuable source of data for studying health-related issue in the country. The most recent demographic and health data on the population of Nigeria was taken from the 2018 NDHS Birth Recode data file. After data cleaning the gender sample size based on variables under study was 16,633 for Infant mortality.

2.1 Variables

Variables used include; infant, maternal age, maternal education, breastfeeding, and antenatal visits.

2.2 Data Analysis

The data collected was subjected to data analysis using the Log-rank statistics.

2.3 The Log-rank test statistics

The log-rank test calculates a chi-squared statistics based on the observed and expected number of events in each group over time. The formula for the test statistics is;

$$Log - rank = \frac{(\sum_{i=1}^k \frac{O_i - E_i}{V_i})^2}{\sum_{i=1}^k \frac{O_i}{V_i}} \quad \text{at } \alpha = 0.05$$

Where

O_i : Observed number of events in group

E_i : Expected number of events in group

V_i : Variance of events in group

Decision rule: if P-value is less than 0.05 level of significance the null hypothesis (H_0) is rejected otherwise is accepted.

3. Results

The results presented in Table 1 provide insights into gender discrepancies in infant mortality in Nigeria. The data suggests that there are varying patterns of infant mortality risk for different variables, with differences between male and female infants. The analysis is based on different maternal age groups, which are 15-24, 25-34, 35-39, and 40-49 years old ($Log - rank(\chi^2) = 1621.55$ $P - value = < 2e - 16$) the data shows that there are differences in infant mortality rates between males and females within these maternal age groups. For maternal age groups 15-24 (51.51%) and 25-34 (51.09%), the results indicate that the differences of infant mortality are greater between males compared to females. This suggests that male infants in these age groups are more vulnerable to mortality matched to

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their female counterparts. However, in the maternal age groups 35-39 (50.36%) and 40-49 (50.25%), the situation reverses. The difference of infant mortality is higher among female infants in these age groups. This highlights the complexity of the relationship between maternal age and infant mortality, which can vary across different age ranges.

Table 1. Output variables discrepancy by infant gender in Nigeria

<i>Variables</i>	<i>Total(N)</i>	<i>Infant_Gender</i>		χ^2	<i>Log – rank Value</i>	<i>P – value</i>
		Male (%)	Female (%)			
<i>Maternal age</i>						
15-24	2654	1367(51.51)	1287(48.49)			
25-34	8581	4384(51.09)	4197(48.91)			
35-39	3211	1594(49.64)	1617(50.36)			
40-49	2187	1088(49.75)	1099 (50.25)			
				827.65	1621.55	<2e-16
<i>Maternal education</i>						
No education	7704	3877(50.32)	3827(49.68)			
Primary	2763	1403(50.78)	1360(49.22)			
Secondary	4926	2524(51.24)	2402(48.76)			
Higher education	1240	629(50.73)	611(49.27)			
				25.91	69.27	0.007
<i>Breastfeeding</i>						
Yes	8105	4097(50.55)	4008(49.45)			
No	8528	4336(50.84)	4192(49.16)			
				5727	22654.00	<2e-16
<i>Antenatal Visit</i>						
Greater than 4 visits	7216	3653(50.62)	3563(49.38)			
Less than 4 visits	9417	4780(50.76)	4637(49.24)			
				40.68	153.2	<3e-19

Researcher's computation 2023

The analysis based on different levels of maternal education with ($Log - rank(\chi^2) = 69.27$ $P - value = < 0.007$) depict difference in male and female education level. Among infants whose mothers have no education (50.32%), primary education (50.78), secondary (51.24%) and higher education (50.73%), the results indicate a higher differences of mortality between male infants matched to female infants. This suggests that regardless of the maternal education level, male infants tend to have a higher risk of mortality.

The statistics ($Log - rank(\chi^2) = 22654.00$ $P - value = < 2e-16$) depict differences in the breastfeeding between males and females infant mortality. According to breastfeeding results, male infant die more frequently than female infant counterparts, regardless of whether breastfeeding is practiced. This suggests that breastfeeding does not eliminate the gender-based discrepancy in infant mortality risk.

The antenatal visits results ($\text{Log-rank}(\chi^2) = 153.2$ $P\text{-value} = << 3e-19$) reveal that infant males have a higher risk of mortality than infant females, regardless of the number of antenatal visits. This implies that antenatal care, while important for maternal and infant health, might not completely mitigate the gender-based discrepancy in infant mortality.

4. Conclusion

The research findings illuminate the urgent need for targeted efforts to bridge the gender hole in infant mortality in Nigeria. While male infants tend to have a higher risk of mortality overall with an exception of maternal age groups 35-39 (50.36%) and 40-49 (50.25%), which depict the risk of infant mortality is higher among female infants than males, the relationship between gender and mortality can vary based on factors such as maternal age, maternal education, breastfeeding, and antenatal visits. These findings emphasize the need for targeted interventions and policies to address the underlying causes of gender-based discrepancies in infant mortality and to improve the health outcomes of all infants in Nigeria.

4.1 Author's contribution

All authors have an equally contributed to the manuscripts.

4.2 Data Source

Upon request, the data used to produce the analysis are easily accessible from: https://dhsprogram.com/data/dataset_admin/index.cfm.

4.3 Conflicts of interest

The authors certify that they have no competing interests.

4.4 Funding source

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4.5 Acknowledgments

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4.6 Abbreviation

Bangladesh Demographic and Health Survey (BDHS)

National Family Health Survey (NFHS)

Nigerian Demographic and Health Survey (NDHS)

Paediatric Intensive Care Audit Network (PICANet)

Paediatric Intensive Care Units (PICUs)

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References

Aghai, Z.H., Goudar, S.S., Patel, A., Saleem, S., Dhaded, S.M., Kavi, A., Lalakia, P., Naqvi, F., Hibberd, P.L., McClure, E.M. and Nolen, T.L., 2020. Gender variations in neonatal and early infant mortality in India and Pakistan: a secondary analysis from the Global Network Maternal Newborn Health Registry. *Reproductive health*, 17, pp.1-11.

Almossawi, O., O'Brien, S., Parslow, R., Nadel, S. and Palla, L., 2021. A study of sex difference in infant mortality in UK pediatric intensive care admissions over an 11-year period. *Scientific Reports*, 11(1), p.21838.

Chowdhury, R., Taneja, S., Mazumder, S., Bhandari, N. and Strand, T.A., 2017. Gender differences in infant survival: a secondary data analysis in rural North India. *BMJ open*, 7(8), p.e014179.

Hossain, M.M., Mani, K.K. and Islam, M.R., 2015. Prevalence and determinants of the gender differentials risk factors of child deaths in Bangladesh: evidence from the Bangladesh demographic and health survey, 2011. *PLoS neglected tropical diseases*, 9(3), p.e0003616.

Kraft JM, Wilkins KG, Morales GJ, Widyono M, Middlestadt SE. 2014. An evidence review of gender-integrated interventions in reproductive and maternal-child health. *Journal of Health Communication* 19(Suppl 1): 122–41.

LeGrand, T., 2000. United Nations. *Too Young to Die: Genes or Gender?* New York, United Nations Population Division, 1998, 260 pages.(ST/ESA/SER. A/155). *Cahiers québécois de démographie*, 29(2), pp.365-372.

Mishra, V., Roy, T.K. and Retherford, R.D., 2004. Sex differentials in childhood feeding, health care, and nutritional status in India. *Population and development review*, 30(2), pp.269-295.

Nwokocha, E.E., 2013. Implications of gender inequity for achieving the Millennium Development Goals by 2015: Is Nigeria really making progress. *The Nigerian Journal of Sociology and Anthropology*, 11(2), pp.1-22.

Pal, A., Yadav, J., Kumari, D. and Singh, K.J., 2020. Gender differentials and risk of infant and under five mortality in India. A comparative survival analysis. *Children and Youth Services Review*, 118, p.105477.

Sawyer, C.C., 2012. *Child mortality estimation: estimating sex differences in childhood mortality since the 1970s*.

Singh K, Bloom S, Haney E, Olorunsaiye C, Brodish P.. 2012. Gender equality and childbirth in a health facility: Nigeria and MDG5. *African Journal of Reproductive Health* 16: 123–9