



DEMOGRAPHIC RESEARCH

A peer-reviewed, open-access journal of population sciences

DEMOGRAPHIC RESEARCH

VOLUME 53, ARTICLE 32, PAGES 1045–1062

PUBLISHED 28 NOVEMBER 2025

<https://www.demographic-research.org/Volumes/Vol53/32>

DOI: 10.4054/DemRes.2025.53.32

Descriptive Finding

Gender disparities in death registration during the COVID-19 pandemic in an urban African setting

Orsola Torrissi

Sabine Margarete Damerow

Ane Fisker

Didier Abdel Fernandes

Amabelia Rodrigues

Stéphane HELLERINGER

© 2025 Orsola Torrissi et al.

This open-access work is published under the terms of the Creative Commons Attribution 3.0 Germany (CC BY 3.0 DE), which permits use, reproduction, and distribution in any medium, provided the original author(s) and source are given credit.

See <https://creativecommons.org/licenses/by/3.0/de/legalcode>.

Contents

1	Introduction	1046
2	Data	1047
3	Methods	1048
4	Results	1049
4.1	Characteristics and circumstances of deaths	1049
4.2	Death registration	1051
4.3	Reasons for (not) registering deaths	1053
5	Discussion and conclusion	1055
6	Acknowledgements	1056
	References	1058

Gender disparities in death registration during the COVID-19 pandemic in an urban African setting

Orsola Torrisi¹

Didier Abdel Fernandes⁴

Sabine Margarete Damerow²

Amabelia Rodrigues⁵

Ane Fisker³

Stéphane HELLERINGER⁶

Abstract

BACKGROUND

In many low- and middle-income countries (LMICs), the completeness of death registration is lower among women, hampering accurate monitoring of health and mortality, gender equality, and rights.

OBJECTIVE

We quantify the gender gap in death registration and examine its determinants in Guinea-Bissau, a data-scarce West African context during 2020–2023, a period of potentially high mortality.

METHODS

We collected survey data from 477 urban households where deaths had occurred among regular members since January 2020. We describe the characteristics and circumstances of these deaths. We then use logistic regressions to evaluate which factors are related to the likelihood of death registration. We apply Fairlie decomposition techniques to assess how much compositional factors explain the observed gender gap in death registration. Finally, we analyse reported reasons for (non-)registration.

¹ Corresponding author. Department of Sociology, McGill University, Montreal, Quebec, Canada, and Division of Social Science, New York University Abu Dhabi, United Arab Emirates, <https://orcid.org/0000-0003-1760-679X>. Email: orsola.torrisi@mcgill.ca.

² Department of Clinical Research, University of Southern Denmark, Odense, Denmark.
Email: sdamerow@health.sdu.dk.

³ Bandim Health Project/Projecto de Saúde Bandim, Bissau, Guinea-Bissau, and University of Southern Denmark, Odense, Denmark. Email: afisker@health.sdu.dk.

⁴ Bandim Health Project/Projecto de Saúde Bandim, Bissau, Guinea-Bissau.
Email: didieradriano5@gmail.com.

⁵ Bandim Health Project/Projecto de Saúde Bandim, Bissau, Guinea-Bissau. Email: a.rodrigues@bandim.org.

⁶ Division of Social Science, New York University Abu Dhabi, United Arab Emirates.
Email: sh199@nyu.edu.

RESULTS

Of 610 reported deaths, only 24% were registered; no infant deaths were registered. Among adult deaths (ages 15+), registration rates were higher for men (44.7%) than for women (22.1%). Gender differences in education among adult decedents explained more than 60% of the gap. Post-mortem financial transfers motivated registering male deaths, whereas non-registration was linked to low perceived benefits and limited awareness of the registration process, regardless of gender.

CONCLUSIONS

The observed under-registration of female deaths has implications for accurately representing and understanding gender-specific mortality and health trends. Low completeness can increase vulnerabilities for surviving relatives lacking death certificates, which are often needed to claim rights. Addressing knowledge barriers and introducing gender-sensitive incentives could help improve coverage and reduce gender disparities.

CONTRIBUTION

Findings offer insights into a neglected dimension of gender inequality: its correlates and drivers in LMICs.

1. Introduction

Civil registration and vital statistics (CRVS) systems are essential platforms for officially documenting vital events, such as births, deaths, and marriages (AbouZahr et al. 2015). They form the cornerstone of legal identification systems that allow individuals to access essential rights and services (Cappa et al. 2014). They also generate data that enable the calculation of key demographic indicators. This information helps administrators develop, implement, and evaluate a broad range of policies in various sectors (AbouZahr et al. 2021). It also allows tracking of the effects of epidemics and other health crises in near real time (Aburto et al. 2022).

In many low- and middle-income countries (LMICs), CRVS systems are deficient (Karlinsky 2024), with only a fraction of vital events being registered (UN 2020; WHO 2014). The registration of deaths is much more incomplete than that of marriages and particularly births (Fisker, Rodrigues, and Helleringer 2019; Makinde et al. 2016; Saikia, Kumar, and Das 2023). Furthermore, the completeness of death registration varies across sociodemographic groups (Fall et al. 2021; Saikia, Kumar, and Das 2023). In particular, evidence from several LMICs shows that female deaths are much less likely to be registered than male deaths (Haider et al. 2021; Mathenge et al. 2013; Peralta et al. 2019; Silva 2016).

Gender disparities in death registration may arise from factors known to operate as incentives or barriers to civil registration in LMICs. For example, because men are more likely to own property or land and to have formal employment, and because death registration is required to access inheritance, land, and other benefits, economic incentives may lead households to register male deaths more frequently (Haider et al. 2021; Suthar et al. 2019). Because of gender disparities in mortality, no one might be available to register the death of a widowed woman (Kamiya and Hertog 2020). Moreover, men more often die from causes requiring police investigations (e.g., injuries, accidents, assaults), and in some contexts they are more likely to die in health facilities (Adair et al. 2021; Waldron, McCloskey, and Earle 2005) – both circumstances where death registration tends to be more routine.

This study examines gender disparities in death registration in Guinea-Bissau, a low-income West African country, during the first years of the COVID-19 pandemic. Leveraging primary survey data from urban households, we quantify and decompose gender inequalities in death registration and assess gender differences in the reasons given for (non-)registration.

2. Data

Guinea-Bissau is a low-income country with a population of about 2 million and an estimated life expectancy at birth of 60 years (World Bank 2023). The civil authority in charge of registering vital events is the Ministry of Justice. Death registration is compulsory and needs to be conducted within 24 hours of a death. It is free of charge if accomplished within that time frame; late registrations incur a penalty (Guinea-Bissau Ministry of Justice 2022). Registration is typically conducted by relatives of the deceased or occasionally by others who are familiar with the circumstances of the death. Registrants must provide information about the deceased (e.g., age at death, place of occurrence) as well as various documents, such as identification cards.

Data for this study come from a randomised trial of new methods to collect retrospective data on mortality, particularly about the dates of recent household deaths (Torrissi et al. 2025). Evaluating levels and correlates of death registration was a secondary goal of the trial. The study took place in several urban areas of Bissau – the country’s capital city – where the Bandim Health Project (BHP) conducts trials of health interventions (Fisker et al. 2022; Nanque et al. 2023) and implements a health and demographic surveillance system (HDSS). In these neighbourhoods, the BHP routinely monitors deaths during periodic household visits. We used HDSS records to draw a stratified random sample of households, from which we oversampled households that had experienced at least one death between January 2020 and May 2022. An independent team of trained enumerators then visited sampled households between April and July

2023. In each household, a regular member aged 18+ who spoke Guinea-Bissau Creole served as the informant.

The study instrument was adapted from questionnaires about household deaths often included in national censuses and surveys. It asked informants a series of questions about their households, such as whether they owned various items. Then it prompted informants to list all the deaths that had occurred among regular household members since January 2020, along with details about the sociodemographic characteristics of the deceased (e.g., gender and age at death) and circumstances of the death (e.g., place of death, whether it was due to an accident, or whether it was pregnancy-related). Informants were also asked to indicate if each reported death was registered with the civil authority. Finally, they were asked to state reasons for (non-)registration of deaths. For the registration questions, multiple responses were allowed and recorded using a list of pre-specified options, adapted from earlier studies (Fisker, Rodrigues, and Helleringer 2019). After each reason stated by the informant, interviewers were instructed to probe non-specifically by asking whether there was another reason why the death was (not) registered.

3. Methods

First, we describe differences in characteristics and circumstances of male and female deaths. We consider categorical variables denoting the age group at the time of death, the educational level of the deceased, the relative wealth of the household (ranked in quintiles), the place of death (home vs. a health facility), and the size of the household. We use χ^2 tests to evaluate the null hypothesis that there are no differences in the distribution of these variables between male and female deaths. Second, we measure the gender gap in death registration in our study sample. We do so among deaths of all ages and among adult deaths (those that occurred at ages 15+). Third, we employ logistic regressions to assess the correlates of death registration. Since death registration is particularly rare for infant and child deaths, we focus these analyses on adult deaths. In our model, the dependent variable is a binary variable taking the value of 1 if the death was registered. Independent variables include the characteristics and circumstances previously described, as well as a binary variable indicating the deceased's gender and a continuous variable capturing the date of death (a century month code [CMC]). Due to missingness/"don't know" answers for some characteristics (e.g., education), we used chained equations to impute 20 datasets and ran the models on the imputed data.

Fourth, we use Fairlie decomposition analysis (FDA) to understand how the gender gap in death registration emerged among adult deaths. FDA is an extension of Oaxaca–Blinder–Kitagawa decomposition methods for nonlinear regression models (Fairlie 1999, 2006). It partitions intergroup differences (male vs. female) in the mean level of an outcome (death registration) into those due to differences in observable characteristics

(explained component effects or compositional effects) and those due to differences in unobserved characteristics (unexplained component effects or rate effects). FDA thus yields a series of coefficients that indicate how large the gender gap in death registration would be if male and female deaths differed only on a specific characteristic (e.g., age at death). We use the `fairlie` module in Stata to conduct FDA (Jann 2023). We ran the decomposition on the imputed 20 datasets, bootstrapping estimates 100 times per dataset, and combined results using Rubin's rules to obtain final estimates with standard errors. Lastly, we investigate stated reasons for (not) registering deaths. Here we examine whether the proportion of informants stating a given reason varies by the decedent's gender. In all analyses, we adjust standard errors for the clustering of deaths within households.

4. Results

4.1 Characteristics and circumstances of deaths

Informants were interviewed in 508 households, and in 477 of those (93.9%), they reported that at least one death had occurred among regular members since January 2020. In total, informants reported 610 deaths (approximately 1.3 deaths per household). Most deceased household members were male (52%; Table 1). Infant deaths (< 1 year old) accounted for 12% of all reported deaths, while 30% involved adults reportedly aged 60–79 and 9% involved adults aged 80+ at the time of death. Age at death was unavailable for 1% of reported cases. Among adult deaths, recently deceased women had lower educational levels than men (e.g., 40% vs. 9% with no schooling), although education was more often reported as unknown for male deaths. Female deaths also occurred in the poorest households more frequently than did male deaths (24% vs. 16%). Among reported deaths, 58% happened in a health facility, and 4% were reported as due to an accident. Among women, only two deaths were reported as related to complications of pregnancy or childbirth.

Table 1: Characteristics of reported deaths, Guinea-Bissau, 2020–2023

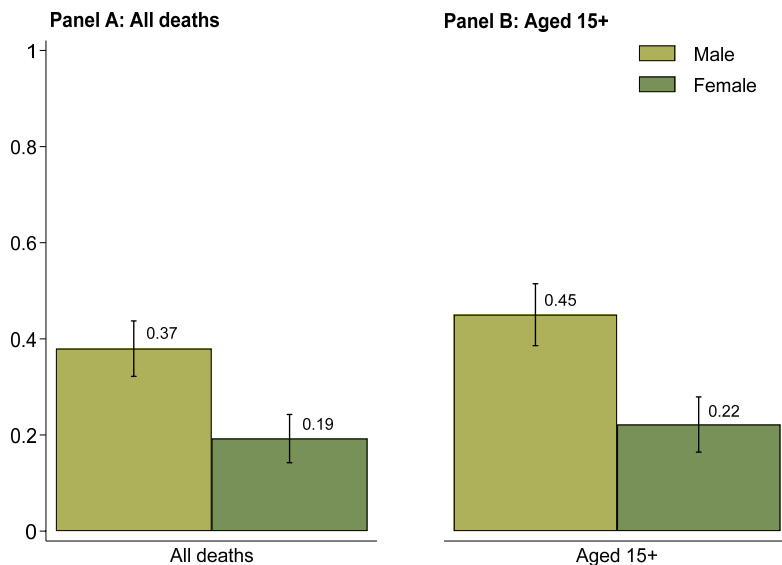
	All deaths			Adult deaths (aged 15+)		
	Male	Female	Total	Male	Female	Total
<i>Characteristics of deceased person</i>						
Age at death						
< 1	42 (13.2%)	29 (10.0%)	71 (11.6%)			
1–14	9 (2.8%)	14 (4.8%)	23 (3.8%)			
15–59	137 (42.9%)	139 (47.8%)	276 (45.2%)			
60–79	105 (32.9%)	75 (25.8%)	180 (29.5%)			
80+	23 (7.2%)	31 (10.7%)	54 (8.9%)			
Unknown	3 (0.9%)	3 (1.0%)	6 (1.0%)			
Education of deceased						
No schooling	24 (7.5%)	100 (34.4%)	124 (20.3%)	23 (8.6%)	99 (39.9%)	122 (23.6%)
Primary (≤ 6 years)	60 (18.8%)	61 (21.0%)	121 (19.8%)	57 (21.3%)	58 (23.4%)	115 (22.3%)
Secondary (7–12 years)	64 (20.1%)	43 (14.8%)	107 (17.5%)	64 (23.9%)	43 (17.3%)	107 (20.7%)
Higher (> 12 years)	52 (16.3%)	10 (3.4%)	62 (10.2%)	51 (19.0%)	9 (3.6%)	60 (11.6%)
Unknown/missing	73 (22.9%)	39 (13.4%)	112 (18.4%)	73 (27.2%)	39 (15.7%)	112 (21.7%)
Not applicable ¹	46 (14.4%)	38 (13.1%)	84 (13.8%)			
<i>Circumstances of death</i>						
Place of death						
Health facility	188 (58.9%)	166 (57.0%)	354 (58.0%)	150 (56.0%)	134 (54.0%)	284 (55.0%)
Outside health facility	129 (40.4%)	122 (41.9%)	251 (41.1%)	117 (43.7%)	111 (44.8%)	228 (44.2%)
Unknown/information refused	2 (0.6%)	3 (1.0%)	5 (0.8%)	1 (0.4%)	3 (1.2%)	4 (0.8%)
Accident-related death						
Yes	16 (5.0%)	9 (3.1%)	25 (4.1%)	14 (5.2%)	8 (3.2%)	22 (4.3%)
No	302 (94.7%)	281 (97.3%)	583 (95.6%)	254 (94.8%)	239 (96.4%)	493 (95.5%)
Unknown/information refused	1 (0.3%)	1 (0.3%)	2 (0.4%)	0 (0.0%)	1 (0.4%)	1 (0.2%)
<i>Deceased's household characteristics</i>						
Wealth quintile						
Lowest	51 (16.0%)	71 (24.4%)	122 (20.0%)	40 (14.9%)	59 (23.8%)	99 (19.2%)
Second	71 (22.3%)	67 (23.0%)	138 (22.6%)	55 (20.5%)	54 (21.8%)	109 (21.1%)
Middle	87 (27.3%)	65 (22.3%)	152 (24.9%)	79 (29.5%)	59 (23.8%)	138 (26.7%)
Fourth	45 (14.1%)	46 (15.8%)	91 (14.9%)	40 (14.9%)	41 (16.5%)	81 (15.7%)
Highest	65 (20.4%)	42 (14.4%)	107 (17.5%)	54 (20.1%)	35 (14.1%)	89 (17.2%)
Household size						
< 4 members	26 (8.2%)	20 (6.9%)	46 (7.5%)	21 (7.8%)	19 (7.7%)	40 (7.8%)
4–9 members	179 (56.1%)	179 (61.5%)	358 (58.7%)	151 (56.3%)	143 (57.7%)	294 (57.0%)
10+ members	114 (35.7%)	92 (31.6%)	206 (33.8%)	96 (35.8%)	86 (34.7%)	182 (35.3%)
<i>Observations</i>	319	291	610	268	248	516

¹ "Not applicable" includes infant deaths (ages 0–4) and deaths with an unknown age at death.

4.2 Death registration

For 64 out of the 610 reported deaths (10.5%), household informants did not indicate registration status. Deaths with unavailable registration information did not differ systematically from those with known registration status (data not shown). Among deaths with available registration information ($n = 546$), we document a substantial gender gap in death registration: 37% of male deaths were registered or in the process of registration compared to 19% of female deaths (Figure 1, Panel A). Among adult deaths, corresponding figures were 45% and 22%, respectively (Figure 1, Panel B). Death registration was very rare for deaths that occurred before age 15. No infant deaths were reported as registered (data not shown).

Figure 1: Proportion of registered deaths by deceased's gender at all ages (Panel A) and among adult deaths (aged 15+) (Panel B)



Among adult deaths, the odds of registration were higher for deaths occurring at ages 60–79 than for deaths that occurred at ages 15–59 (odds ratio [OR] = 2.51; Table 2). Death registration was also positively associated with the level of education of the deceased, and it was more likely for deaths that occurred in a health facility (OR = 2.09). The odds of registration increased with household wealth, especially among women. We

observed no greater registration for accident-related deaths. Finally, death registration was less frequent in households with 10+ members (OR = 0.42).

Table 2: Logistic regression of death registration, overall and by gender of the deceased

	All deaths	Male deaths	Female deaths
	(1)	(2)	(3)
Gender of deceased (ref: male)			
Female	0.57 [0.34, 0.96]		
Timing of death (CMC)	1.00 [0.98, 1.01]	1.00 [0.98, 1.02]	1.00 [0.98, 1.01]
Age at death (ref: 15–59)			
60–79	2.51 [1.41, 4.47]	2.02 [0.97, 4.20]	4.39 [1.68, 11.48]
80+	1.84 [0.70, 4.81]	2.24 [0.61, 8.18]	1.63 [0.36, 7.34]
Education of deceased (ref: no schooling)			
Primary (≤ 6 years)	2.51 [1.15, 5.47]	1.66 [0.46, 5.93]	4.13 [1.43, 11.95]
Secondary (7–12 years)	2.14 [0.88, 5.17]	1.8 [0.45, 7.22]	2.31 [0.61, 8.77]
Higher (> 12 years)	6.65 [2.44, 18.09]	5.74 [1.40, 23.60]	4.76 [0.56, 40.49]
Household wealth quintile (ref: lowest)			
Second	1.47 [0.65, 3.36]	1.8 [0.56, 5.79]	1.02 [0.23, 4.50]
Middle	1.86 [0.88, 3.95]	1.89 [0.65, 5.52]	2.24 [0.57, 8.83]
Fourth	4.61 [1.95, 10.87]	4.93 [1.38, 17.53]	5.53 [1.29, 23.75]
Highest	3.77 [1.63, 8.72]	3.07 [0.94, 10.08]	6.40 [1.64, 25.03]
Household size (ref: 1–3)			
4–9	0.68 [0.29, 1.58]	0.82 [0.24, 2.84]	0.44 [0.10, 1.85]
10+	0.42 [0.17, 1.04]	0.57 [0.16, 2.04]	0.26 [0.06, 1.20]
Accident-related death (ref: no)			
Yes	0.84 [0.27, 2.56]	1.29 [0.30, 5.46]	0.3 [0.06, 1.45]
Place of death (ref: outside health facility)			
Health facility	2.09 [1.31, 3.34]	2.05 [1.16, 3.64]	2.29 [1.02, 5.13]
Observations	458	239	219

Notes: The sample excludes deaths with unknown/missing information on death registration and the deceased before age 15. Exponentiated coefficients. Missing values on observed characteristics (see Table 1) were imputed using chained equations based on fully observed variables (household wealth, household size, gender, and accident-related death status). Decompositions were run on 20 imputed datasets. Standard errors were adjusted for multiple deaths in a household; 95% confidence intervals in brackets.

Table 3 shows the results of the FDA. Controlling for time of death, compositional factors explained 80% of the observed gender gap in death registration. Gender differences in educational attainment of the deceased explained the largest portion of the registration gap (61%). Estimates of the contribution of other factors (e.g., household wealth) to the gender gap in death registration were more uncertain.

Table 3: Fairlie decomposition of gender gap in death registration among adult deaths (ages 15+)

Gender difference	0.22			
Contribution to difference	Contribution (%)		95% CI	
Age at death	0.013	5.77%	(-0.019;	0.044)
Place of death	0.004	1.82%	(-0.013;	0.021)
Accident-related death	0.003	1.23%	(-0.006;	0.012)
Education	0.135	61.14%	(0.078;	0.191)
Household wealth	0.022	10.05%	(-0.009;	0.054)
Household size	0.001	0.32%	(-0.015;	0.016)
Explained (%)	0.177	80.33%		

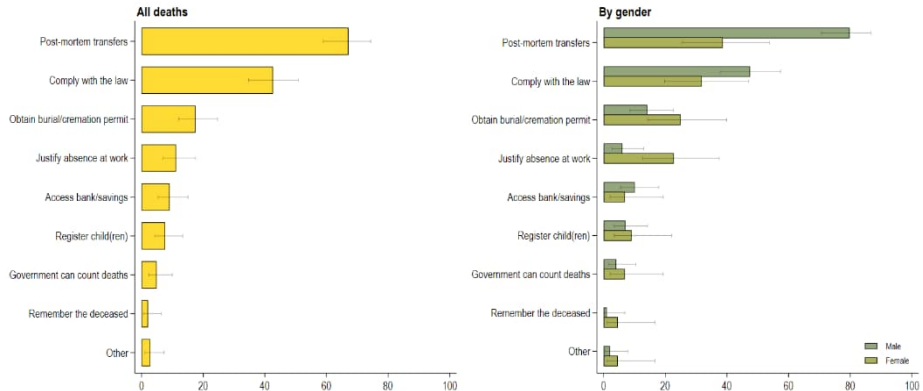
Notes: Parameter estimates are from the pooled sample, controlling for time of death (CMC) dummies. Missing values on observed characteristics (see Table 1) were imputed using chained equations based on fully observed variables (household wealth, household size, gender, and accident-related death status). Decompositions were run on 20 imputed datasets, with 100 bootstrap replications per dataset. Rubin's rules were used for combined overall estimates. Standard errors were adjusted for clustering of deaths within households.

4.3 Reasons for (not) registering deaths

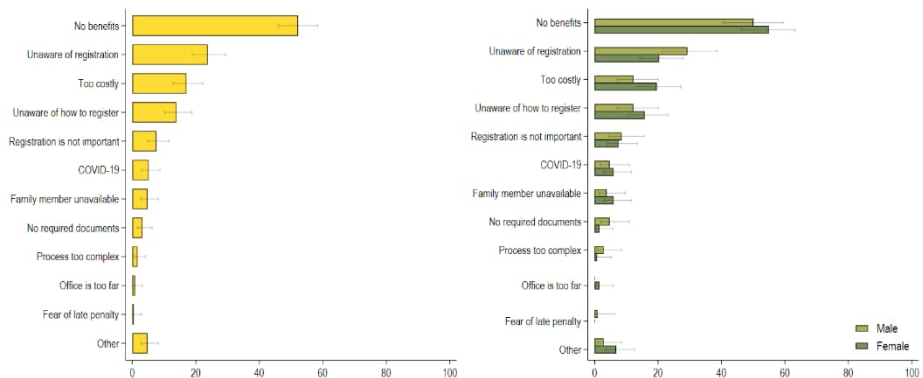
Among deaths that were registered or for which registration was in progress, post-mortem financial transfers (i.e., insurance, pensions, social services) were the most reported reason for pursuing registration, followed by legal compliance (Figure 2, Panel A). Stated motivations differed by the deceased's gender: Securing post-mortem transfers was more frequently reported for male deaths (80% vs. 39%); justifying absence at work was more commonly reported for female deaths (6% vs. 23%). No other reasons differed by gender (Figure 2, Panel A).

Figure 2: Reported reasons for registering deaths ($n = 156$) and not registering deaths ($n = 390$)

Panel A: Reasons for registering deaths



Panel B: Reasons for not registering deaths



Notes: In Panel B, the category “other” comprises non-prespecified reasons. These reasons might include the fact that the person died at home or died far from the household neighbourhood (such as at sea or outside the city), emotional distress (“The household was grieving, so we did not think about registration”), or the recency of the death. Observations and percentages are based on household informants (percent of cases). Because multiple responses were allowed, totals may exceed 100%.

The perception that death registration provides no benefits was the most frequently reported reason for not registering adult deaths, followed by general unawareness of the registration process and its associated costs (Figure 2, Panel B). Reasons for non-registration did not differ by the deceased’s gender. The response “COVID-19”

constituted only 3% of all reported reasons for not registering deaths, with no differences by gender of the deceased (Figure 2, Panel B).

5. Discussion and conclusion

Using primary survey data, we found that in several neighbourhoods of Bissau, male deaths were almost twice as likely to be registered as female deaths. This result aligns with prior studies documenting the under-registration of female deaths in LMICs (Haider et al. 2021; Peralta et al. 2019; Silva 2016). In Bissau, gender inequalities in educational attainment accounted for more than 60% of the gender gap in death registration. Financial motivations related to post-mortem transfers were the primary reasons for registering male deaths. They were much less frequently cited as a reason for registering female deaths.

These results help us better understand the emergence of gender inequalities in death registration and their underlying contributors in Guinea-Bissau and similar LMICs. In such settings, females might have substantially less access to education than males (UNICEF 2021). For example, by the end of secondary school in Guinea-Bissau, 1.5 boys are enrolled for every enrolled girl (Marshall, Nicolai, and Silva 2020). So one of the likely explanations for our results is that men, due to higher educational attainment, are more likely to secure employment, to hold transferable assets, or to subscribe to an insurance policy (Embaló 2021). Specifically, they are more likely to obtain jobs in the civil service or other formal employment that offers social protection. In a context where death registration is required for accessing pensions, insurance payments, and/or inheritance claims (UNICEF 2024), these factors likely incentivise families to register male deaths at a higher rate than female deaths. An extension of this explanation is that households experiencing the death of educated men may also have greater access to information and resources, as well as the social status and connections that can help them initiate or complete the registration process. It is also possible that low-educated women are more likely to lack birth certificates in the first place, which may both constrain their educational opportunities (Corbacho, Brito, and Osorio Rivas 2012) and limit the perceived need for registering their deaths.

Our study also highlighted several barriers that similarly affect the registration of male and female deaths. These include systemic factors previously documented in other studies, such as a general lack of awareness of death registration, frequent procedural hurdles and requirements, and high perceived registration costs (e.g., Fisker, Rodrigues, and Helleringer 2019). By comparison, the disruptions created by the COVID-19 pandemic were seldom cited as a reason for non-registration of deaths. One explanation for this null finding could relate to changing burial practices, with more households opting for informal burials over communal cemeteries, which require permits and death

certificates (UNICEF 2024). This may help explain why a lack of perceived benefits, rather than COVID-19 itself, emerged as the most common reason for non-registration. In settings with limited CRVS, crises like a pandemic might operate as additional impediments to registration rather than as primary barriers.

This study has several limitations. First, we did not verify reported registrations by requesting death certificates. Second, without information on dates of registration, which are typically available on death certificates, we could not assess the timeliness of registration. Third, due to limited sample size, some decomposition results remain uncertain. Fourth, our study was conducted in urban areas of the capital city, where CRVS services are likely more accessible than in the rest of the country. Poverty, transportation costs, and knowledge barriers may pose greater challenges to registration in smaller towns or rural areas.

Reducing gender disparities in death registration likely requires interventions that go beyond financial incentives, which in Guinea-Bissau, as in other LMICs, primarily encourage registering male deaths. As prior research documenting similar knowledge-related barriers and remarkably low levels of infant death registration has suggested (Fisker, Rodrigues, and Helleringer 2019), information and awareness campaigns could help promote a broader understanding of the benefits of death registration. Such campaigns could specifically target women, given that they do not enjoy the same opportunities as their male counterparts (Embaló 2021) and may experience further marginalisation when family members' deaths go unregistered.

6. Acknowledgements

Funding and financial disclosure

The study was supported by Grant R01HD088516 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development and by Grant R03AG070660 from the National Institute on Aging.

Conflict of interest disclosure statement

The authors report that there are no competing interests to declare.

Ethics statement

This study was approved by the Institutional Review Board of New York University Abu Dhabi (Protocol HRPP-2023-39) and by the Comité Nacional de Ética na Saúde in Guinea-Bissau (reference: 026/CNES/INASA/2023).

Data availability

Bandim Health Project HDSS data that support the findings of this study are available from the authors upon request. The survey data will be made publicly available on the corresponding author's GitHub repository upon publication.

Author contributions

Conceptualisation: S.H., A.B.F., O.T. Data collection: A.B.F., D.A.F., O.T. Formal analysis: O.T. Methodology: S.H., A.B.F., O.T. Project administration: A.B.F., S.H. Supervision: A.B.F., S.H., O.T. Writing of original draft: O.T. Review and editing: O.T., A.B.F., S.D., A.R., D.A.F.

References

- AbouZahr, C., Bratschi, M.W., Cercone, E., Mangharam, A., de Savigny, D., Dincu, I., Forsingdal, A.B., Joos, O., Kamal, M., Fat, D.M., Mathenge, G., Marinho, F., Mitra, R.G., Montgomery, J., Muhwava, W., Mwamba, R., Mwanza, J., Onaka, A., Sejersen, T.B., and Setel, P. (2021). The COVID-19 pandemic: Effects on civil registration of births and deaths and on availability and utility of vital events data. *American Journal of Public Health* 111(6): 1123–1131. doi:10.2105/AJPH.2021.306203.
- AbouZahr, C., de Savigny, D., Mikkelsen, L., Setel, P.W., Lozano, R., and Lopez, A.D. (2015). Towards universal civil registration and vital statistics systems: The time is now. *Lancet (London, England)* 386(10001): 1407–1418. doi:10.1016/S0140-6736(15)60170-2.
- Aburto, J.M., Schöley, J., Kashnitsky, I., Zhang, L., Rahal, C., Missov, T.I., Mills, M.C., Dowd, J.B., and Kashyap, R. (2022). Quantifying impacts of the COVID-19 pandemic through life-expectancy losses: A population-level study of 29 countries. *International Journal of Epidemiology* 51(1): 63–74. doi:10.1093/ije/dyab207.
- Adair, T., Gamage, U.S.H., Mikkelsen, L., and Joshi, R. (2021). Are there sex differences in completeness of death registration and quality of cause of death statistics? Results from a global analysis. *BMJ Global Health* 6(10): e006660. doi:10.1136/bmjgh-2021-006660.
- Cappa, C., Gregson, K., Wardlaw, T., and Bissell, S. (2014). Birth registration: A child's passport to protection. *The Lancet Global Health* 2(2): e67–e68. doi:10.1016/S214-109X(13)70180-3.
- Corbacho, A., Brito, S., and Osorio Rivas, R. (2012). Birth registration and the impact on educational attainment. (IDB Publications Working Papers 4060). Washington, D.C.: Inter-American Development Bank. doi:10.18235/0011407.
- Embaló, B. (2021). *UNDP Guinea-Bissau gender analysis* (UNDP Guinea-Bissau Gender Analysis). UNDP. <https://www.undp.org/guinea-bissau/publications/undp-guinea-bissau-gender-analysis>.
- Fairlie, R. (1999). The absence of the African-American owned business: An analysis of the dynamics of self-employment. *Journal of Labor Economics* 17(1): 80–108. doi:10.1086/209914.

- Fairlie, R. (2006). An extension of the Blinder–Oaxaca decomposition technique to logit and probit models. (IZA Discussion Papers 1917). Bonn: IZA. doi:10.2139/ssrn.497302.
- Fall, A., Masquelier, B., Niang, K., Ndiaye, S., and Ndonky, A. (2021). Motivations and barriers to death registration in Dakar, Senegal. *Genus* 77(1): 21. doi:10.1186/s41118-021-00133-7.
- Fisker, A.B., Martins, J.S.D., Nanque, L.M., Jensen, A.M., Ca, E.J.C., Nielsen, S., Martins, C.L., and Rodrigues, A. (2022). Oral Polio vaccine to mitigate the risk of illness and mortality during the Coronavirus disease 2019 pandemic: A cluster-randomized trial in Guinea-Bissau. *Open Forum Infectious Diseases* 9(9): ofac470. doi:10.1093/ofid/ofac470.
- Fisker, A.B., Rodrigues, A., and Helleringer, S. (2019). Differences in barriers to birth and death registration in Guinea-Bissau: Implications for monitoring national and global health objectives. *Tropical Medicine and International Health* 24(2): 166–174. doi:10.1111/tmi.13177.
- Guinea-Bissau Ministry of Justice (2022). *Registro civil horizonte 2028: Estratégia nacional de registro civil e produção de estatísticas vitais*. Ministério da Justiça, Governo da Guiné-Bissau.
- Haider, M.M., Alam, N., Ibn Bashar, M., and Helleringer, S. (2021). Adult death registration in Matlab, rural Bangladesh: Completeness, correlates, and obstacles. *Genus* 77(1): 13. doi:10.1186/s41118-021-00125-7.
- Jann, B. (2023). FAIRLIE: Stata module to generate nonlinear decomposition of binary outcome differentials. *Statistical Software Components*. <https://ideas.repec.org/c/boc/bocode/s456727.html>.
- Kamiya, Y. and Hertog, S. (2020). Measuring household and living arrangements of older persons around the world: The United Nations Database on the Households and Living Arrangements of Older Persons 2019. (UNDESA Technical Paper 3). New York: United Nations, Department of Economics and Social Affairs, Population Division. <https://desapublications.un.org/working-papers/measuring-household-and-living-arrangements-older-persons-around-world-united>.
- Karlinsky, A. (2024). International completeness of death registration. *Demographic Research* 50(38): 1151–1170. doi:10.4054/DemRes.2024.50.38.
- Makinde, O.A., Olapeju, B., Ogbuoji, O., and Babalola, S. (2016). Trends in the completeness of birth registration in Nigeria: 2002–2010. *Demographic Research* 35(12): 315–338. doi:10.4054/DemRes.2016.35.12.

- Marshall, J.H., Nicolai, M., and da Silva, R. (2020). Out-of-school children in Guinea-Bissau: A mixed-methods analysis. *International Journal of Educational Development* 77: 102223. doi:10.1016/j.ijedudev.2020.102223.
- Mathenge, G.W., Lehigh, P.J., Makokha, A.O., and Wanzala, P. (2013). Factors associated with low levels of birth and death registration in Kieni East district of the Central Province of Kenya. *African Journal of Health Sciences* 26(4): 272–229.
- Nanque, L.M., Jensen, A.M., Diness, A.R., Nielsen, S., Cabral, C., Cawthorne, D., Martins, J.S.D., Ca, E.J.C., Jensen, K., Martins, C.L., Rodrigues, A., and Fisker, A. (2023). Effect of distributing locally produced cloth facemasks on COVID-19-like illness and all-cause mortality – a cluster-randomised controlled trial in urban Guinea-Bissau (SSRN Scholarly Paper 4307646). doi:10.2139/ssrn.4307646.
- Peralta, A., Benach, J., Borrell, C., Espinel-Flores, V., Cash-Gibson, L., Queiroz, B.L., and Mari-Dell’Olmo, M. (2019). Evaluation of the mortality registry in Ecuador (2001–2013) – social and geographical inequalities in completeness and quality. *Population Health Metrics* 17(1): 3. doi:10.1186/s12963-019-0183-y.
- Saikia, N., Kumar, K., and Das, B. (2023). Death registration coverage 2019–2021, India. *Bulletin of the World Health Organization* 101(2): 102–110. doi:10.2471/BLT.22.288889.
- Silva, R. (2016). Disentangling Sex-differentials in death registration & mortality estimates: Preliminary findings from Morocco & Kuwait. United Nations. Expert Group Meeting on Methodology for and Lessons Learned from CRVS Assessments. New York: United Nations. un.org/en/development/desa/population/events/pdf/expert/26/presentations/Session3/silva-DDMsslides-2016-11-03.pdf.
- Suthar, A.B., Khalifa, A., Yin, S., Wenz, K., Fat, D.M., Mills, S.L., Nichols, E., AbouZahr, C., and Mrkic, S. (2019). Evaluation of approaches to strengthen civil registration and vital statistics systems: A systematic review and synthesis of policies in 25 countries. *PLOS Medicine* 16(9): e1002929. doi:10.1371/journal.pmed.1002929.
- Torrise, O., Fisker, A.B., Fernandes, D.A.A., and Helleringer, S. (2025). Improving retrospective data on recent household deaths: A multi-arm randomized trial in Guinea-Bissau. *International Journal of Epidemiology* 54(2): dyaf009. doi:10.1093/ije/dyaf009.
- UN (2020). Demographic and social statistics. New York: United Nations. <https://unstats.un.org/unsd/demographic-social/crvs/index.cshtml>.

- UNICEF (2021). Access to learning in Guinea-Bissau. New York: UNICEF. <https://www.unicef.org/guineabissau/access-learning>.
- UNICEF (2024). CRVS – Birth, Marriage and death registration in Guinea-Bissau. UNICEF DATA. New York: UNICEF. <https://data.unicef.org/crvs/guinea-bissau/>.
- Waldron, I., McCloskey, C., and Earle, I. (2005). Trends in gender differences in accidents mortality. *Demographic Research* 13(17): 415–454. doi:10.4054/DemRes.2005.13.17.
- WHO (2014). Global civil registration and vital statistics scaling up investment plan 2015–2024. Geneva: World Health Organization. <https://www.who.int/publications-detail-redirect/global-civil-registration-and-vital-statistics-scaling-up-investment-plan-2015-2024>.
- World Bank (2023, June 5). World bank country profile: Guinea-Bissau. New York: World Bank Open Data. <https://data.worldbank.org/country/guinea-bissau?view=chart>.

