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Post-retirement mortality patterns and socioeconomic inequalities among male civil servants in Burkina Faso

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Abstract

Population aging is accelerating in sub-Saharan Africa, yet evidence on mortality after retirement remains scarce due to limited data availability, even as the share of formal-sector retirees grows across the region. This study examines post-retirement mortality trajectories and occupational and socioeconomic inequalities in survival among male civil-service retirees in Burkina Faso using individual administrative data from the national civil-service pension register to follow 5,715 male retirees from the 2005–2015 retirement cohorts through December 31, 2023. Mortality patterns were assessed across five occupational categories, from unskilled workers to senior managers, using Kaplan–Meier estimates of cumulative mortality from retirement age up to eight years. Cox proportional hazards models estimated associations between occupational category, annual pension amount, and mortality risk within the 60–64 age interval, controlling for marital status and retirement cohort. Post-retirement mortality trajectories varied across occupational categories, with unskilled workers experiencing a rapid increase in mortality during the first two years following retirement, whereas mortality rose more gradually in other categories. Among retirees aged 60–64, middle managers, clerical employees, and support staff faced significantly higher mortality risks than senior managers. However, unskilled workers did not differ significantly from senior managers, a pattern most plausibly explained by selective survival into pension eligibility or data quality issues. Higher annual pension amounts were strongly and negatively associated with mortality. These findings provide rare administrative evidence on post-retirement mortality in West Africa and highlight the importance of pension income for survival after retirement in low-income settings.

Keywords: Post-retirement mortality; Occupation; Pension system; Socioeconomic inequality; Survival analysis; Burkina Faso; West Africa

1. Introduction

Health policies and interventions across sub-Saharan Africa have largely focused on maternal and newborn health, reflecting the region's young population structure (Katey *et al.*, 2025). These efforts have contributed to major improvements in survival, particularly during infancy and childhood. Life expectancy at birth increased from 37.2 years in 1950 to 62.1 years in 2023, a gain of 24.9 years (United Nations, 2024). Although these gains have been more pronounced among children, survival has also improved at older ages. The population aged 50 and over increased from 9.4 million in 1950 to 54.7 million in 2020, while life expectancy at age 50 rose from 19.6 years to 23.2 years over the same period (United Nations, 2024).

Despite these demographic changes, older adults remain weakly integrated into health and social protection policies in many sub-Saharan African countries. They are increasingly exposed to non-communicable diseases, frailty, and chronic health risks associated with population aging and nutrition transition (Kämpfen *et al.*, 2018). Yet public responses remain fragmented and often limited to small-scale or pilot initiatives that are not fully integrated into health and social protection systems (Aboderin & Beard, 2015; Saka *et al.*, 2019). Understanding the social determinants of mortality at older ages is therefore increasingly important.

Retirement is a particularly important transition in later life. For older individuals who have been formally employed, retirement can reshape daily routines, income, social interactions, and access to healthcare (Atchley, 1982), with potential implications for health and survival (Filomena & Picchio, 2023; Nazar *et al.*, 2025). However, evidence on mortality around retirement remains extremely limited in sub-Saharan Africa due to the lack of routine data on older adults and retirees. In contrast, the literature from high-income countries provides mixed evidence: some studies suggest that retirement is associated with increased mortality, whereas others find no significant association or even protective effects, depending on the institutional context, prior health, working conditions, and pension protection (Garrouste & Perdrix, 2020; Sewdas *et al.*, 2020).

Beyond the retirement transition itself, available evidence suggests that socioeconomic inequalities in mortality persist after retirement and may even widen in absolute terms with advancing age (Ebeling *et al.*, 2023; Marmot & Shipley, 1996). Individuals with higher levels of income, education, occupational status, and pension resources generally have lower mortality risks. The magnitude of these inequalities varies across pension systems and social protection regimes (Bosworth, 2018; Demakakos *et al.*, 2016; Ebeling *et al.*, 2023). These inequalities reflect cumulative and selective life-course processes. Occupational hazards, working conditions, health behaviors, and access to resources accumulate over working life (Ebeling *et al.*, 2023), while only individuals who survive to retirement and meet pension eligibility conditions are observed.

Evidence from low-income countries remains scarce because of major data limitations. Large-scale surveys such as the Demographic and Health Surveys rarely include older adults in sufficient detail. Censuses often lack information on the health and socioeconomic characteristics of deceased individuals, while Health and Demographic Surveillance Systems provide mortality follow-up but usually include too few formal-sector retirees to support detailed mortality analysis (Duthé *et al.*, 2009; Ouedraogo, 2020). These constraints limit the ability to describe mortality patterns after retirement. This gap is increasingly important because the proportion of retirees among older adults in sub-Saharan Africa increased from 18.9% to 22.3% between 2015 and 2023 (International Labour Organization, 2024). Although the share remains low in Burkina Faso, at 6.7%, the number of retirees almost doubled over the same period (International Labour Organization, 2024).

This study examines mortality patterns after retirement and socioeconomic inequalities in mortality among male civil-service retirees in Burkina Faso. It uses individual administrative data from the national civil-service pension register, focusing on cohorts retiring between 2005 and 2015. To the best of our knowledge, this is the first study to use administrative survival data to document post-retirement mortality in francophone West Africa. The analysis describes mortality up to eight years after retirement and estimates occupational and pension-related gradients using survival methods and Cox proportional hazards models. The findings provide empirical evidence for understanding post-retirement mortality in a low-income setting and offer operational benchmarks for improving the monitoring of retirees, coordinating pension systems with health coverage, and identifying at-risk subgroups among civil-service pensioners.

1.1. Literature review and hypotheses

Retirement is a major life-course transition through which individuals leave paid employment and reorganize their daily routines, social roles, income sources, and patterns of healthcare use (Atchley, 1982, 1989). Its consequences for health and survival are theoretically ambiguous. Retirement may reduce exposure to work-related stress, physically demanding tasks, occupational hazards, and

time constraints. Conversely, it may generate vulnerability through income loss, reduced social participation, loss of occupational identity, changes in health-related behaviors, and weaker access to healthcare. Empirical evidence from high-income countries remains mixed. Some studies suggest that retirement improves survival, especially when it reduces exposure to stressful or physically demanding work and is accompanied by adequate pension protection (Bloemen *et al.*, 2017; Hallberg *et al.*, 2015; Hernaes *et al.*, 2013). Other studies reported increased mortality after retirement, particularly when the transition is abrupt, involuntary, or associated with major changes in income, routines, and social roles (Fitzpatrick & Moore, 2018; Kuhn *et al.*, 2020; Sewdas *et al.*, 2020). These findings suggest that post-retirement mortality cannot be understood as a direct consequence of retirement alone. It depends on institutional arrangements, pension systems, employment histories, previous working conditions, prior health, and socioeconomic resources accumulated over the life course.

Our study draws on cumulative disadvantage and cumulative inequality perspectives to interpret socioeconomic differences in mortality after retirement (Dannefer, 2003; Ferraro & Shippee, 2009; O'Rand, 1996). These perspectives emphasize that social systems generate inequalities that accumulate through differential exposure to risks and opportunities. Occupational status, income, health, and access to resources are not independent characteristics observed only at retirement; they are produced through long-term trajectories of education, employment, working conditions, family responsibilities, and institutional opportunities. Cumulative inequality theory also stresses that accumulated disadvantage may lead to premature mortality, thereby changing the composition of populations observed at older ages. Pension-register populations are therefore selected populations: they include individuals who survived to retirement, remained in formal employment, accumulated sufficient years of service, and became entitled to pension benefits. Moreover, a related phenomenon, well documented in demographic research, is the mortality crossover or healthy survivor effect. At older ages, members of initially disadvantaged groups who survive may exhibit mortality risks that are similar to, or even lower than, those of more advantaged groups, because the frailest individuals in the disadvantaged group have already died before reaching the observed age interval. This convergence reflects population heterogeneity and differential selection across the life course (Coale & Kisker, 1986; Manton & Stallard, 1981; Vaupel & Yashin, 1985). In the context of pension-register data, such crossover dynamics are especially relevant because the observed population at retirement age is already a survivor population, and the intensity of prior selection may differ substantially by occupational category.

Evidence focused on men is particularly relevant for the present study. In many pension-register studies, men constitute the main analytical population because of their historically stronger attachment to formal employment, greater representation in long public-sector careers, and larger number of observed deaths after retirement (Pérez-Salamero González *et al.*, 2022; Rogne & Syse, 2018). Male post-retirement mortality may also be shaped by the social meaning of work. Qualitative research consistently shows that paid employment is central to older men's identity, self-worth, and sense of social purpose (Oliffe *et al.*, 2013). Retirement, therefore, represents not only an administrative transition but also a potential disruption of masculine status, economic authority, and family responsibilities (Pietilä *et al.*, 2020). In sub-Saharan Africa specifically, retirement, unemployment, and declining income have been documented as systematically undermining older men's identities as household heads and breadwinners, leading to anxiety and diminished self-worth (Folorunsho, 2025).

The first major dimension of socioeconomic inequality after retirement is occupational status. Occupation reflects educational attainment, working conditions, physical strain, job autonomy, exposure to occupational hazards, income trajectories, and access to social protection (Bosworth, 2018). Studies from high-income countries generally show that men in lower-status, manual, service, production, or physically demanding occupations have higher mortality than men in professional, managerial, or technical occupations. In the United States, Asfaw and Bhattacharya (2024) show that men whose longest-held occupation was in food preparation, machine operation, personal services, handling and labor, protection services, clerical work, agriculture, sales, or production had higher mortality risks than men in professional and technical support occupations. Similarly, evidence from the Netherlands indicates that unskilled, technical, and transport-related occupations have shorter life expectancy than professional occupations (Deeg *et al.*, 2021). African evidence on occupational differences after retirement remains limited. In Ghana, research among pensioners shows that pre-retirement occupational background is associated with post-retirement health outcomes (Nuertey *et al.*, 2022). However, most African studies focus on general older-adult health rather than on occupational inequalities in mortality after statutory retirement.

The second major dimension of post-retirement inequality is pension income. Pension income shapes the ability to maintain living standards, access healthcare, purchase medication, secure adequate nutrition, support

dependents, and remain socially integrated (Ongoh *et al.*, 2023; Pérez-Salamero González *et al.*, 2022). In high-income countries, income, pension level, and earnings histories are consistently associated with mortality after retirement. In the United States, higher career earnings are associated with lower mortality after age 60 (Waldron, 2007). In Spain, Pérez-Salamero González *et al.* (2022) documented a clear gradient among male pensioners; lower initial pension income is associated with higher mortality. Evidence from Denmark and Sweden shows that socially advantaged groups live longer and therefore receive larger lifetime pension transfers (Alvarez *et al.*, 2021; Shi & Kolk, 2022). In low- and middle-income countries, pension income may be especially consequential because health insurance coverage and old-age protection are often limited. In Ghana, higher basic salary and longer years of service are associated with greater longevity among pensioners (Gyamfi, 2024). In Tanzania, retirees in lower pension-related socioeconomic categories have higher mortality risks (Rutagumirwa, 2024). These findings indicate that, in African settings where retirees face direct healthcare costs and ongoing family obligations, higher pension resources are associated with better survival.

Despite these emerging findings, the African literature has yet to provide a consolidated account of how occupational trajectories and pension income jointly shape post-retirement mortality. Burkina Faso's civil-service pension register helps address this gap by linking statutory retirement, occupational category, pension amount, and mortality follow-up in a low-income West African setting.

The current study addresses two analytical questions. First, do mortality trajectories after statutory retirement differ across occupational categories? Second, is the pension amount associated with mortality within occupational categories? Drawing on cumulative inequality and socioeconomic mortality research, higher occupational categories are expected to be associated with lower post-retirement mortality, reflecting more favorable working conditions, higher socioeconomic resources, and cumulative advantages over the life course. The pension amount is also expected to be negatively associated with post-retirement mortality, as pension income is a key post-retirement resource for accessing healthcare, medication, nutrition, and material support.

1.2. The Burkinabè context

Burkina Faso provides an important case for examining post-retirement mortality and socioeconomic inequalities among pensioners. The population aged 55–70 increased from 676,134 in 2006 to 984,001 in 2019, which represents 4.8% of the national population (INSD, 2009, 2024). The proportion of this age group living in rural areas decreased from 80.5% to 75.2% between the two censuses. According to the 2019 census, only 31.1% of individuals aged 60 and over were employed. Socioeconomic conditions remain highly unequal; in 2021, annual expenditure per individual was estimated at USD 516 in rural areas and USD 1,234 in urban areas (INSD, 2022). Survival at older ages has improved modestly. Indeed, life expectancy at age 56 increased from 17.4 years in 2005 to 18.3 years in 2015, while life expectancy at age 60 rose from 14.6 to 15.4 years over the same period (United Nations, 2024). Retirement pensions in Burkina Faso are managed primarily by two institutions. The Autonomous Pension Fund for Civil Servants (Caisse Autonome de Retraite des Fonctionnaires; CARFO) provides retirement benefits for public servants, including civil servants, military personnel, and magistrates. The National Social Security Fund administers the scheme for salaried and similar workers in the private sector. According to CARFO Statistical Yearbooks, the number of pensioners in the civil-service scheme increased from 14,679 in 2016 to 23,198 in 2023 (CARFO, 2020, 2024). The government of Burkina Faso has implemented a series of statutory retirement-age reforms. Through Decree 2005-024, the retirement age for Categories E and D was set at 56 years, for Categories C and B at 58 years, and 60 years for Category A. Decree 2017-1066 subsequently modified some of these thresholds, and Decree 2023-0132 introduced additional revisions for salaried workers.

The Burkinabè civil-service pension system is particularly relevant for this study because it combines a hierarchical occupational structure, category-specific statutory retirement ages, and pension benefits that only partially reflect resources accumulated during active employment. Civil servants are classified into six main occupational categories designated by letters, reflecting educational attainment, occupational responsibilities, and career hierarchy. Category P includes employees holding doctoral-level qualifications, mainly physicians, university lecturers, and researchers. Category A comprises senior managers and professional staff with at least a Bachelor's or Master's degree who generally occupy high-level administrative and managerial positions. Category B includes middle managers and associate professionals holding technical or post-secondary diplomas. Category C consists of operational and clerical staff recruited with lower-secondary education credentials. Category D includes support and auxiliary staff recruited with primary education qualifications. Category E comprises manual and unskilled workers, many of whom have limited or no formal education. Category P is excluded from the present analysis because of its small sample size. Statutory retirement ages differ by category: 56 years for Categories

E and D, 58 years for Categories C and B, and 60 years for Category A.

Selection into the pension-register population begins before retirement. To qualify for a retirement pension, civil servants must complete at least 15 years of service, survive to statutory retirement age, and become formally entitled to a pension. The CARFO register, therefore, includes only individuals who were recruited under civil-service conditions, remained in public employment, accumulated sufficient service years, survived to statutory retirement age, and obtained pension rights. This institutional selection is important for interpreting mortality gradients among retirees.

Civil-service pensions are calculated primarily on pensionable salary, grade, and years of service, with 2% per liquidable annuity of annual emoluments (CARFO, 2026). The civil-service statute distinguishes the treatment subject to pension deductions from other components of remuneration, including residence allowances, family allowances, expense-related allowances, and benefits in kind (Loi n°081-2015/CNT, 2015). As a result, the pension amount does not necessarily capture total pre-retirement income. This distinction is central to the present study. Occupational category captures long-term career position, while pension amount reflects post-retirement resources that are only partially linked to active income.

2. Data and methods

2.1. Data sources

This study was based on individual data from the administrative register maintained by CARFO. Access to individual data was granted following a formal request by the Higher Institute of Population Sciences. All data were anonymized before analysis. The register contains information on retired civil servants and their beneficiaries in the event of death, including dates of birth, recruitment, retirement, and death; sex; occupational category; marital status; and annual pension amount. Survival status was recorded as of December 31, 2023.

The analytical sample was restricted to male civil-service retirees from the 2005–2015 retirement cohorts, excluding those of category P. The focus on cohorts 2005–2015 ensured comparability in statutory retirement ages across categories. Indeed, earlier and later cohorts were subject to successive reforms that modified age-at-retirement thresholds, as described in Section 1.2. Female retirees were excluded for two reinforcing reasons. First, the number of female deaths observed was too small to yield stable estimates due to their low participation in the formal labor market, as reported in other studies (Pérez-Salamero González *et al.*, 2022; Rogne *et al.*, 2018). Second, lower occupational categories, particularly Category E (unskilled workers), were predominantly male. Retaining women in the analysis would conflate the occupational gradient with compositional gender differences, obscuring the association between occupational category and mortality (Crimmins *et al.*, 2019). The final analytical sample comprised 5,715 male retirees (Table A2).

An assessment of data quality revealed that dates of birth were reported imprecisely for a non-negligible share of retirees, with an excess concentration of births in December. This may suggest digit heaping in December. Dates of death, by contrast, appear to be accurately reported. Distributions of birth and death months are presented in Figures A1 and A2. Importantly, heaping in birth dates did not vary systematically across the statutory retirement age. This was unlikely to bias comparisons between groups.

2.2. Measurements

The primary outcome was death, with a focus on the cumulative risk of death by age during the first eight years following retirement. Age was used as the underlying time scale. Individuals entered observation at their retirement age and exited at their death or censoring age, whichever occurred first. Retirees who survived beyond the observation period were right-censored at their last known follow-up date or at eight years after retirement.

The primary independent variables were occupational category and annual pension amount. The annual pension amount varied according to category and years of service. To reduce skewness, the pension amount was log-transformed in regression models (centered on the sample mean). Control variables included marital status and retirement cohort.

Pension income should be interpreted carefully. It was a direct measure of post-retirement resources, but only a partial reflection of cumulative socioeconomic advantage over working life. In pension systems where benefits were calculated primarily on pensionable salary, grade, and years of service, while some components of active income, such as allowances, were not fully incorporated into the pension base, the pension amount captured post-retirement resources, whereas the occupational category captured longer-term career trajectories, cumulative advantage, income replacement shocks, and selection into pension eligibility. This distinction guided the analytical strategy of the present study, which treated occupational category and pension income as complementary but distinct dimensions of socioeconomic position.

2.3. Statistical analysis

Post-retirement mortality patterns were examined by estimating cumulative death risks for every single year of age, stratified by occupational category, using the Kaplan–Meier estimator. Cumulative probabilities of death were less sensitive to small sample sizes than age-specific mortality rates, and conceptualized mortality as a cumulative process through which social and occupational disadvantages shape risks over time.

Socioeconomic inequalities in mortality were analyzed using Cox proportional hazards models. To ensure comparability across occupational categories that differ in their statutory retirement ages, the analysis was restricted to retirees observed between ages 60 and 64. Four models are presented: M1 included occupational category only; M2 added marital status and retirement cohort; M3 used centered log pension as the main predictor, stratified by occupational category (allowing each group its own baseline hazard); M4 combined log pension with the control variables, also stratified. Stratified models allowed examination of the pension-mortality gradient within each occupational group, while avoiding direct comparison of baseline hazards across groups. The proportional hazards assumption was assessed using Schoenfeld residuals; no major violations were detected. Given the exhaustive (non-sampled) nature of the administrative data, confidence intervals were estimated using bootstrap methods with 500 replications (Salibian-Barrera & Zamar, 2002). All analyses were conducted using Stata (19.5, StataCorp LLC, USA).

3. Results

3.1. Sample description

Table 1 presents the demographic and socioeconomic characteristics of 5,715 male retirees from the 2005–2015 cohort. The distribution across the 2005–2010 and 2011–2015 sub-cohorts was relatively even among unskilled workers. The share of retirees from the 2005–2010 cohort was highest among support staff. In contrast, the proportion of retirees from the 2011–2015 cohort was higher among upper occupational categories, reaching 73.3% among senior managers. This pattern may reflect a change in recruitment policy over time, with a growing focus on higher occupational categories in more recent periods. Regarding marital status, most retirees were married across all occupational categories. The annual median pension amount increased with occupational

Table 1. Socio-demographic characteristics of male retirees by occupational category, cohorts 2005–2015

Variables	Unskilled workers (Category E)	Support staff (Category D)	Clerical employees (Category C)	Middle managers (Category B)	Senior managers (Category A)	Total
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	
Marital status[a]						
Married	729 (89.2%)	623 (90.8%)	1,085 (91.9%)	1,350 (91.4%)	1,397 (91.2%)	5184 (91.1%)
Not married	88 (10.8%)	63 (9.2%)	96 (8.1%)	127 (8.6%)	134 (8.8%)	508 (8.9%)
Retirement cohort						
2005–2010	412 (50.2%)	396 (57.6%)	302 (25.5%)	555 (37.4%)	411 (26.7%)	2076 (36.3%)
2011–2015	409 (49.8%)	292 (42.4%)	882 (74.5%)	929 (62.6%)	1,127 (73.3%)	3639 (63.7%)
Annual pension amount (USD)						
First quartile (Q1)	874.71	1,274.91	1,927.79	2,525.39	4,317.14	1,709.46
Median (Q2)	1,097.30	1,556.78	2,220.84	3,019.56	5,152.90	2,715.14
Third quartile (Q3)	1,377.38	1,819.80	2,567.39	3,399.86	5,691.72	3,939.08
n	821	688	1,184	1,484	1,538	5,715

Note: [a]Marital status is missing for 23 observations.

category, ranging from USD 1,097 for unskilled workers (Category E) to USD 5,153 for senior managers (Category A).

Table 2 presents the demographic and socioeconomic characteristics of male retirees aged 60–64 years from the 2005–2015 cohort. Senior managers represent 27.8% of the sample, middle managers 25.7%, clerical employees 20.6%, and support staff 11.7%, while unskilled workers account for only 14.1%. This occupational distribution suggests that a majority of retirees had attained at least a secondary level of education. Most male retirees are married (91.2%), and 64% retired between 2011 and 2015. In total, 379 deaths were recorded among retirees in the 60–64 age group.

3.2. Post-retirement mortality patterns

Figures 1–3 and A3 present the cumulative risk of death after retirement. Figure 1 shows the cumulative risk of death from the time of retirement up to eight years post-retirement among unskilled workers (Category E) and support staff (Category D). Among unskilled workers, mortality rose rapidly during the first two years following retirement, then slowed around age 59. In contrast, among support staff, mortality increased more steadily up to approximately age 61, after which the rise accelerated. During the first two years following retirement, the cumulative risk of death was lower among support staff than among unskilled workers. This pattern reversed at age 59, with unskilled workers exhibiting lower cumulative mortality risks at older ages. The mortality gap between the two categories tended to widen after age 59, favoring unskilled workers. The risk of dying between ages 56 and 64 was estimated at 102‰ among unskilled workers (Category E) and 125‰ among support staff (Category D).

Figure 2 shows that, among clerical employees (Category C) and middle managers (Category B), the cumulative risk of death increased steadily after retirement. The two curves remained relatively close throughout the observation period and intersected around ages 60 and 63. Between retirement at age 58 and age 66, the cumulative risk of death was estimated at approximately 160‰ for both groups.

Figure 3 shows that, among senior managers (Category A), the cumulative risk of death increased almost linearly from age 60, suggesting a relatively steady progression of mortality after retirement, reaching approximately 130‰ eight years after retirement.

3.3. Mortality inequalities among male retirees

Table 3 presents the crude and adjusted associations of occupational category and pension amount with mortality among male retirees aged 60–64 years. Categories B, C, and D exhibited significantly higher mortality than senior managers (Category A), whereas mortality did not differ substantially between unskilled workers (Category E) and senior managers (Category A). At the same time, retirees in occupational Categories B, C, and D did not differ in terms of mortality. These effects persisted after adjusting for marital status and retirement cohort. For example, the hazard ratio for dying was 52% higher among support staff (Category D) compared to senior managers (Category A). Similarly, pension amount had a significant effect on retiree mortality. Mortality decreased significantly with increasing annual pension amount; specifically, a 10% increase in annual pension amount was associated with an approximately 3.7% reduction in mortality. Marital status and retirement cohort were not significantly associated with mortality in any model.

4. Discussion

This study examined post-retirement mortality patterns and socioeconomic inequalities among male civil-service retirees in Burkina Faso. Drawing on original administrative data from the CARFO pension register and focusing

Table 2. Socio-demographic characteristics of male retirees aged 60–64 years, cohorts 2005–2015

Variables	*n* (%)
Occupational category	
Senior managers (Category A)	1,538 (27.8%)
Middle managers (Category B)	1,423 (25.7%)
Clerical employees (Category C)	1,141 (20.6%)
Support staff (Category D)	650 (11.7%)
Unskilled workers (Category E)	783 (14.1%)
Marital status[a]	
Married	5,026 (91.2%)
Not married	487 (8.8%)
Retirement cohort	
2005–2010	1,991 (36.0%)
2011–2015	3,544 (64.0%)
Annual pension amount (USD)	
First quartile (Q1)	1,743
Median (Q2)	2,748
Third quartile (Q3)	4,046
Sample size	5,535
Number of deaths	379

Note: [a]Marital status is missing for 22 observations.

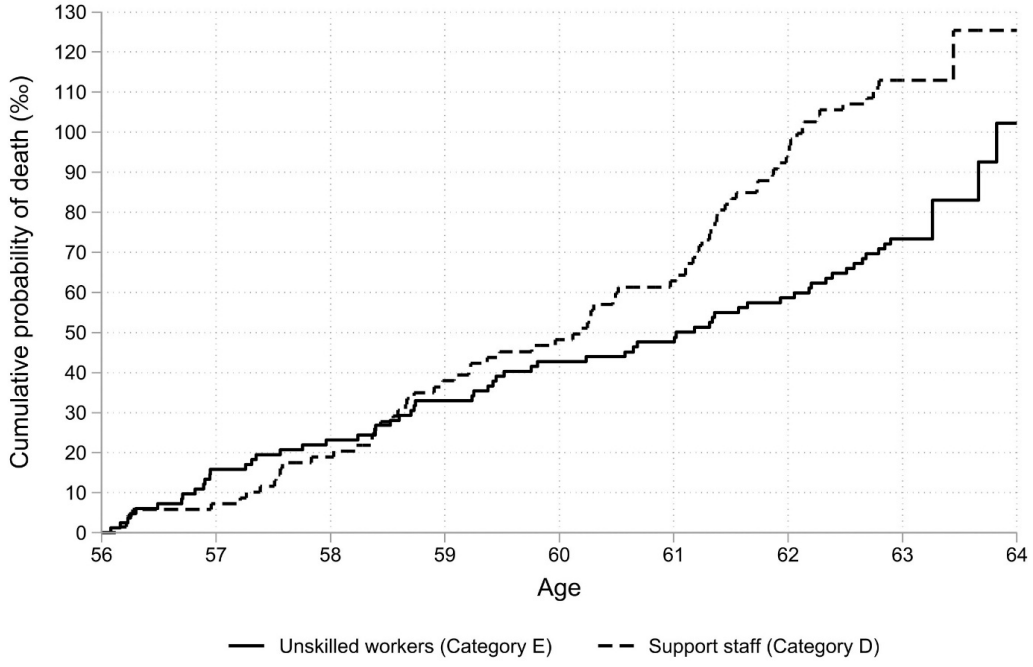

Figure 1. Cumulative risk of death from retirement up to eight years among male unskilled workers (Category E) and support staff (Category D), cohort 2005–2015



Figure 2. Cumulative risk of death from retirement up to eight years among male clerical employees (Category C) and middle managers (Category B), cohort 2005–2015

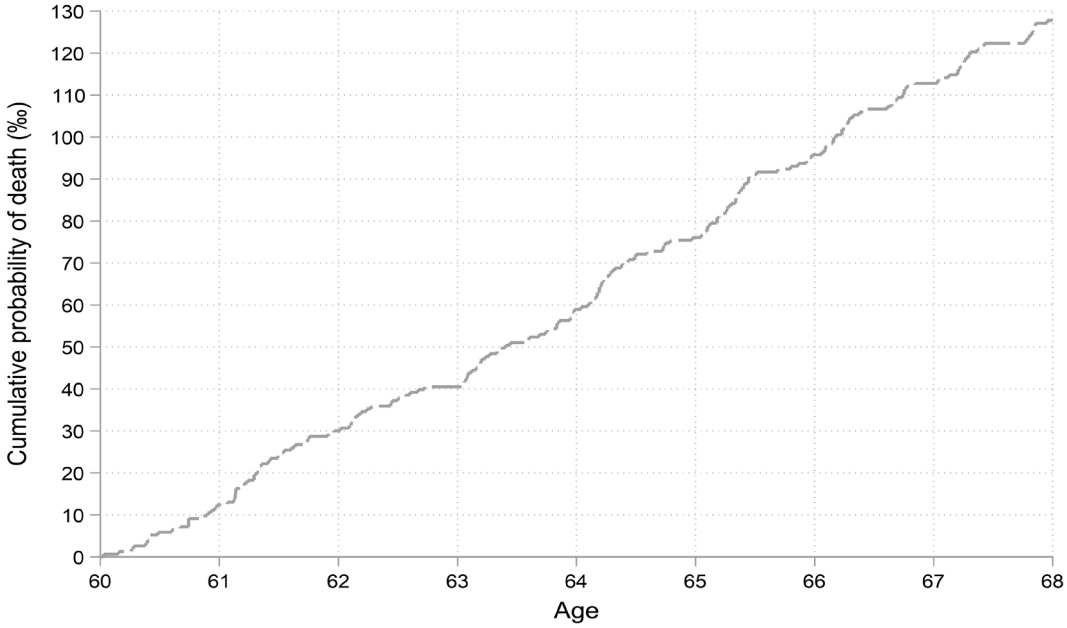

Figure 3. Cumulative risk of death from retirement up to eight years among male senior managers (Category A), cohorts 2005–2015

on retirement cohorts from 2005 to 2015, the analysis combined cumulative mortality probabilities with Cox proportional hazards models to assess occupational and income-related gradients in post-retirement survival. This study is among the few to investigate mortality inequalities among retirees in West Africa. Prior research in the region has predominantly examined health differentials among older adults along dimensions such as age, sex, education, and marital status (Akinrolie *et al.*, 2024; Duthé *et al.*, 2009; Sankoh *et al.*, 2003). The present study contributes to this literature by focusing specifically on occupational category and pension income as dimensions of inequality, comparing distinct civil-service grades within a common age interval.

The results show that post-retirement mortality trajectories differ across occupational categories over the eight years following retirement. Among unskilled workers (Category E), mortality rose rapidly during the first two years after retirement, up to approximately age 58, before leveling off. Among support staff (Category D), in contrast, mortality increased after age 61. No distinct pattern emerged among the remaining categories, except for a slight decrease around age 65 among middle managers (Category B). The early excess mortality observed among unskilled workers (Category E) may reflect heightened vulnerability at the onset of retirement, a pattern also documented among lower occupational groups in high-income countries (Fitzpatrick & Moore, 2018; Furuya, 2025). Several mechanisms may be at work. While retirement may reduce exposure to physically demanding or hazardous working conditions, it may simultaneously increase health risks if the post-retirement period is marked by harmful behaviors such as physical inactivity, excessive alcohol consumption, or poor dietary habits. These risks are especially plausible in the context of sharply declining income and a relatively early statutory retirement age. Beyond behavioral pathways, cumulative physical strain accumulated over the working life, continued engagement in informal economic activities after retirement, and delayed healthcare utilization may further contribute to the elevated early mortality observed in this group. Among higher occupational categories, mortality increases more gradually and steadily after retirement, following a trajectory that broadly resembles that of the general aging population. This pattern is most pronounced among senior managers (Category A) and is consistent with evidence from high-income countries showing that individuals in advantaged occupational positions, who typically benefit from favorable working conditions and greater socioeconomic resources, do not face elevated vulnerability at retirement (Hoertel *et al.*, 2022; Rogne & Syse, 2018).

Table 3. Hazard ratios of death by occupational category and socio-demographic characteristics among retirees aged 60–64 years, cohorts 2005–2015

Variables	M1	M2	M3	M4
Occupational category				
Senior managers	Ref.	Ref.	Stratified	Stratified
Middle managers	1.45** [1.10–1.91]	1.43* [1.09–1.89]	–	–
Clerical employees	1.46* [1.09–1.94]	1.45* [1.09–1.94]	–	–
Support staff	1.57* [1.09–2.25]	1.52* [1.05–2.19]	–	–
Unskilled workers	0.79 [0.51–1.21]	0.77 [0.50–1.18]	–	–
Pension amount				
Centered log pension		–	0.63*** [0.55–0.73]	0.63*** [0.55–0.73]
Marital status				
Married		Ref.		Ref.
Not married		0.96 [0.66–1.39]		0.93 [0.65–1.35]
Retirement cohort				
2005–2010		Ref.		Ref.
2011–2015		0.90 [0.73–1.12]		0.91 [0.73–1.13]
Model statistics				
Observations	5,535	5,513	5,535	5,513
Deaths	379	379	379	379
Person-years	20,089.80	20,007.80	20,089.80	20,007.80
LR χ^2	18.67	19.56	26.93	27.91
p-value	<0.001	<0.001	<0.001	<0.001

Notes: Estimates were hazard ratios from Cox proportional hazards models; age was used as the underlying time scale; 95% confidence intervals were shown in brackets; M1 included the occupational category only; M2 added marital status and retirement cohort; M3 estimated the association between the centered log of the pension amount and mortality, stratified by occupational category; M4 added marital status and retirement cohort to M3 and was also stratified by occupational category; in M3 and M4, occupational category was used as a stratification variable; therefore, occupational-category coefficients were not estimated; Ref. = reference category; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

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In Burkina Faso, retirees are not covered by a universal or systematic health insurance scheme, and therefore, access to healthcare largely depends on individual economic resources. In recent years, civil servants have benefited from an annual free medical consultation and partial coverage for certain medical conditions, although this coverage remains limited. Consequently, the contrasting mortality patterns observed between lower occupational categories (Categories E and D) and senior managers (Category A) are likely associated with differences in post-retirement socioeconomic conditions.

The analysis conducted among retirees aged 60–64 years confirms an occupational gradient in mortality after retirement, except for unskilled workers (Category E). Male retirees in Categories B, C, and D face higher mortality risks than senior managers (Category A). This pattern is consistent with evidence from high-income countries, where higher occupational categories are generally associated with lower mortality, and reflects cumulative inequalities that originate during working life and persist into retirement (Ebeling *et al.*, 2023; Furuya, 2025).

Surprisingly, the findings show that unskilled male retirees (Category E) have mortality rates similar to those of senior managers (Category A). Several mechanisms may explain this unexpected finding. First, survivors to retirement in lower occupational categories may be more strongly selected for health than those in higher occupational categories. Individuals in Category E may have died before reaching statutory retirement age or before becoming entitled to pension benefits. The rapid increase in mortality during the first two years after retirement is consistent with this interpretation. The subsequent convergence between Category E and senior managers at ages 60–64 may reflect a mortality crossover or healthy survivor effect, whereby initially disadvantaged groups that experience high prior mortality become increasingly composed of more robust survivors at older ages. This mechanism is consistent with classic demographic work on population heterogeneity, selective survival, and mortality convergence at advanced ages (Coale & Kisker, 1986; Manton & Stallard, 1981; Vaupel & Yashin, 1985). The similar mortality observed between Category E and Category A should therefore not be interpreted as evidence that socioeconomic inequalities are absent, but rather as a possible consequence of differential frailty selection before and immediately after retirement.

Second, although the data do not directly demonstrate an underestimation of mortality among unskilled workers, administrative under-reporting cannot be ruled out. Death under-reporting at older ages is a well-documented structural challenge in sub-Saharan Africa (Ouedraogo, 2020; Rao *et al.*, 2004), and evidence from demographic surveillance systems suggests that death registration may be less complete among lower socioeconomic groups (Garenne *et al.*, 2016). This limitation may be particularly relevant for Category E. Unskilled workers generally have lower levels of formal education, which may reduce familiarity with administrative procedures and legal obligations to report a retiree's death to CARFO. Their families and social networks may also have fewer contacts with public institutions, potentially weakening informal pressure to comply with reporting requirements. In addition, when pension benefits can continue to be collected by relatives after the retiree's death, surviving household members may have a financial incentive to delay notification. These mechanisms could make reporting delays or non-reporting more prevalent among lower occupational categories than among higher professional tiers.

Finally, the geography of retirement may reinforce these administrative reporting constraints. Unlike senior managers, who are more likely to remain in urban centers where pension administration and payment infrastructure are concentrated, unskilled workers may be more likely to relocate after retirement or become less connected to institutional reporting channels. In rural or less administratively connected areas, access to civil registration services, communication infrastructure, and transport links to the capital may be more limited, making timely reporting to the CARFO central register more difficult. Deaths may therefore remain unreported for extended periods, especially when family members are unfamiliar with reporting procedures or depend on continued pension payments. Evidence from Burkina Faso and Senegal shows that some urban residents die outside their city of residence or leave the urban setting for end-of-life care (Lankoandé *et al.*, 2018), a pattern that may further reduce the completeness of death reporting in administrative registers when retirees are no longer closely connected to the administrative or institutional systems through which they were previously monitored. Taken together, selective survival and possible administrative under-reporting provide plausible explanations for the unexpected mortality profile of Category E.

Across all occupational categories, lower pension amounts are associated with higher mortality among male retirees. Similar associations between income and mortality have been widely documented among older adults (Alarilla *et al.*, 2023; Demakakos *et al.*, 2016). A recent study conducted in Ghana, for instance, found that many public-sector retirees perceive their pension benefits as insufficient, forcing them to adopt alternative strategies to meet their daily living expenses (Ongoh *et al.*, 2023).

More broadly, a higher pension amount generally reflects higher earnings during working life and, consequently, more favorable socioeconomic conditions accumulated over the life course. Retirees receiving larger pensions are therefore more likely to hold savings, assets, or investments that generate additional income after retirement. Such financial resources may facilitate better access to healthcare, healthier living conditions, and improved nutrition. Income is also closely associated with health-related behaviors and healthcare utilization throughout the life course.

This study has several limitations. First, the analysis is restricted to male civil-service retirees, excluding female retirees and those from the private sector or the military. Second, only the last occupational category held before retirement is considered to determine the pension amount. Some retirees may have moved up through occupational categories over their careers, a trajectory that is difficult to capture in this analysis. Third, the register does not include a direct measure of individual educational attainment. This limitation should be interpreted in light of the structure of the Burkinabè civil service, where recruitment into occupational categories is closely linked to educational credentials and formal qualifications, as shown in **Table A1**. Therefore, the occupational category partly captures the educational hierarchy of the civil service. However, it remains an imperfect proxy for education. Individuals may have entered the civil service with a given qualification and later acquired additional education, passed professional examinations, or moved across occupational categories during their careers. As a result, the analysis cannot fully disentangle the independent roles of educational attainment, career mobility, occupational status at retirement, and pension income in shaping post-retirement mortality. Fourth, data quality issues and death under-reporting among some occupational categories are not excluded and may help explain the lower mortality of unskilled workers (Category E). Finally, the analysis of mortality inequalities could be strengthened by incorporating additional variables, such as the number of children, external sources of income, and retirees' social and leisure activities.

5. Conclusion

This study is among the first to examine post-retirement mortality patterns and socioeconomic inequalities in survival among male civil-service retirees in West Africa. Drawing on administrative pension-register data from Burkina Faso, the analysis documents distinct mortality trajectories across occupational categories. Mortality rises rapidly in the early post-retirement period among unskilled workers (Category E) and further increases around age 61 among support staff (Category D), while no marked pattern emerges among the remaining categories. Within ages 60–64, higher pension amounts are consistently associated with lower mortality, and senior managers (Category A) exhibit lower mortality risks than middle managers (Category B), clerical employees (Category C), and support staff (Category D), but not relative to unskilled workers (Category E). The unexpected mortality profile of unskilled workers (Category E) warrants further investigation. Extending the analysis to the broader working population prior to retirement would help disentangle the mechanisms underlying these patterns, particularly the unexpected mortality profile of unskilled workers (Category E). Multi-country comparative studies examining mortality trajectories and socioeconomic inequalities after retirement would further strengthen the evidence base for low-income settings in the region. The importance of pension income as a determinant of post-retirement survival in low-income settings with limited health coverage underscores the need for targeted health interventions for lower occupational categories.

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Conflict of interest

The authors declare they have no competing interests.

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Ethics approval and consent to participate

Ethical approval was not sought for this study because the analysis used retrospective administrative data, and responsibility for ethical approval rested with the institutions that originally collected the data. The present

study did not involve direct recruitment or interaction with participants.

Consent for publication

Not applicable.

Availability of data

Data used in this study are available from the corresponding author upon reasonable request.

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Appendix

Table A1. Civil service occupational categories in Burkina Faso: recruitment requirements, approximate ISCED equivalence in years of schooling, typical occupational profile, and statutory retirement age

Occupational category	Recruitment requirement	Approximate ISCED 2011 equivalence in normative years of schooling/training	Typical occupational profile	Statutory retirement age
Category P	Doctorate in medicine, pharmacy, or dentistry plus specialization, or baccalauréat plus 7–9 years of cumulative professional training, depending on subscale	ISCED 8, or sometimes long professional training broadly comparable to ISCED 7–8; roughly 19–22+ cumulative years of schooling/training after primary entry	Highly specialized senior professional positions	63 years
Category A	License, Maîtrise, DEA/ Master II/DESS, depending on subscale	ISCED 6–7; roughly 15–18 cumulative years of schooling/training	Senior professional and managerial positions	60 years
Category B	Baccalauréat, technical baccalauréat, BEP, DUT, BTS, or DEUG II, depending on subscale	From ISCED 3–5; roughly 12–14 cumulative years of schooling/training	Intermediate professional, administrative, and technical positions	58 years
Category C	BEPC, CAP, or BEPC plus short vocational training, depending on subscale	From ISCED 2–4; roughly 9–12 cumulative years of schooling/training	Qualified clerical, technical, and execution positions	58 years
Category D	CEPE, or CEPE plus short vocational training, depending on the subscale	From ISCED 1–3; roughly 6–10 cumulative years of schooling/training	Basic support, auxiliary, and service positions	56 years
Category E	No single formal school-based requirement; includes qualified, semi-qualified, and unskilled manual positions	Usually below or outside standard formal attainment categories, or short non-formal training, often below completed lower secondary, with no uniform cumulative duration	Manual and low-formal-qualification support work	56 years

Notes: In ISCED 2011, primary education corresponds to level 1, lower secondary to level 2, upper secondary to level 3, post-secondary non-tertiary to level 4, short-cycle tertiary to level 5, Bachelor's or equivalent to level 6, Master's or equivalent to level 7, and Doctoral or equivalent to level 8; Under a standard progression, this corresponds roughly to 6 years for ISCED 1, 9 years for ISCED 2, 12 years for ISCED 3, 13–14 years for ISCED 5, 15–16 years for ISCED 6, 17–18 years for ISCED 7, and 19+ years for ISCED 8.
Abbreviations: BEPC: Lower Secondary School Certificate; BEP: Vocational Studies Certificate; BTS: Higher Technician Certificate; CAP: Certificate of Professional Aptitude; CEPE: Elementary Primary Studies Certificate; DEA: Diploma of Advanced Studies; DESS: Specialized Higher Studies Diploma; DEUG: General University Studies Diploma; DUT: University Diploma of Technology; ISCED: International Standard Classification of Education.

Table A2. Number of male retirees by cohort and occupational category in Burkina Faso

Year of retirement	Unskilled workers (Category E)	Support staff (Category D)	Clerical employees (Category C)	Middle managers (Category B)	Senior managers (Category A)	Total
2005	3	6	7	10	40	66
2006	66	90	1	6	4	167
2007	91	97	4	127	7	326
2008	76	68	90	165	9	408
2009	87	82	88	114	158	529
2010	89	53	112	133	193	580
2011	88	53	158	147	180	626
2012	78	57	180	187	190	692
2013	80	56	171	181	238	726
2014	90	61	184	195	247	777
2015	73	65	189	219	272	818
Total	821	688	1,184	1,484	1,538	5,715

Source: Authors' calculation based on the data from The Autonomous Pension Fund for Civil Servants (Caisse Autonome de Retraite des Fonctionnaires; CARFO).

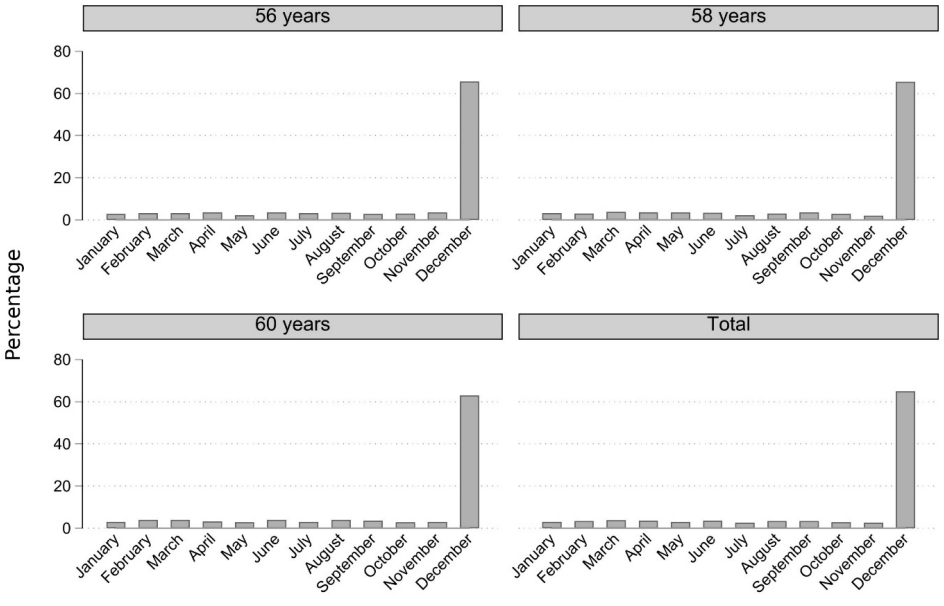

Figure A1. Distribution of birth months by statutory retirement age among the 2005–2015 cohort of male retirees

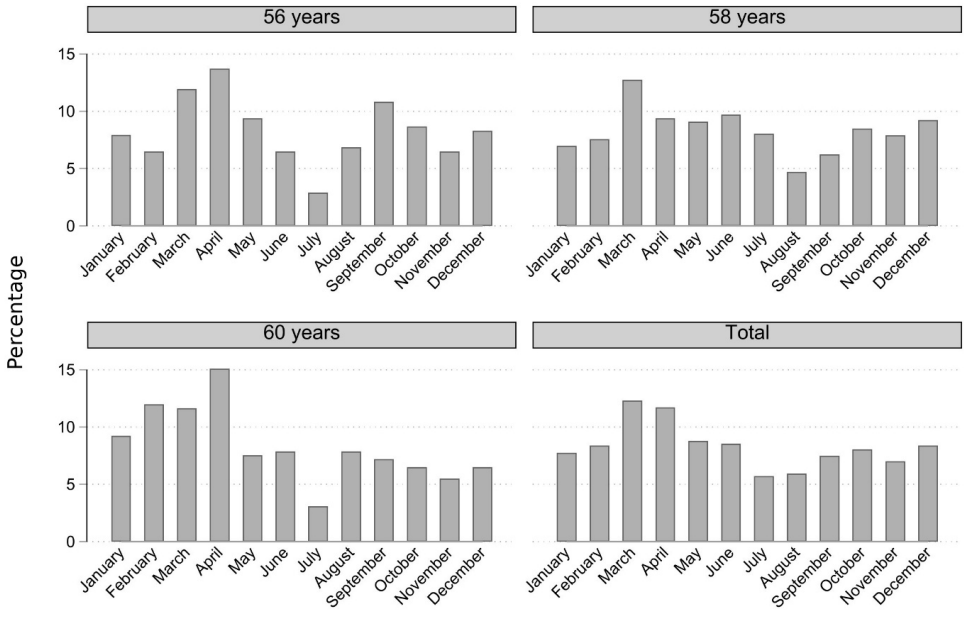

Figure A2. Distribution of months of death by statutory retirement age among the 2005–2015 cohort of male retirees

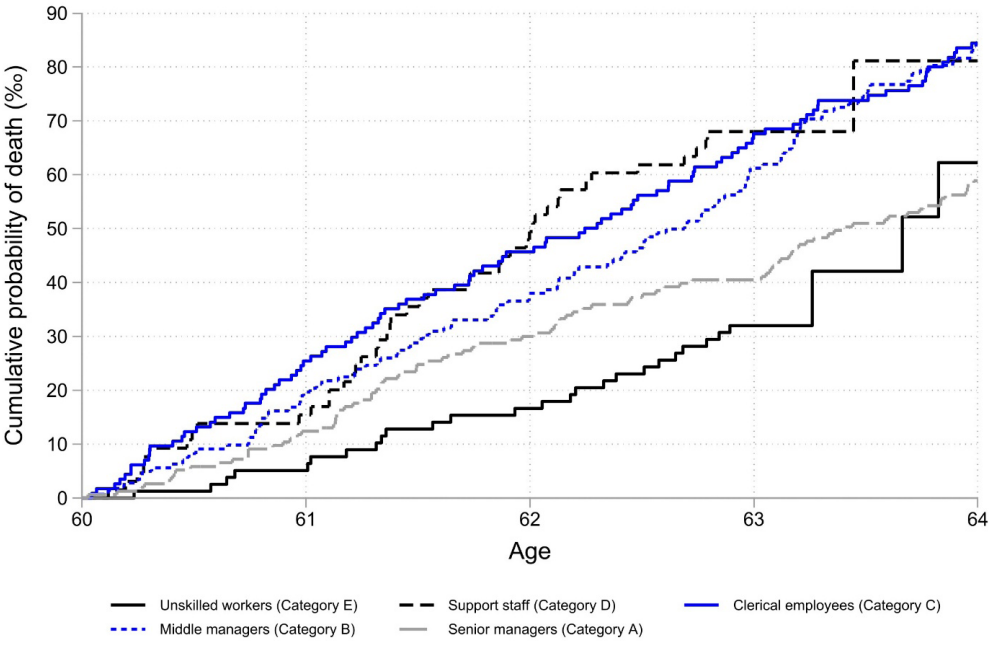

Figure A3. Cumulative risk of death by occupational category among male retirees aged 60–64 years, cohort 2005–2015