Educational Disparities in the Risk of Dementia and Subsequent Risk of Hospitalization in Lazio Region

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Abstract. Against the backdrop of population aging, dementia is an increasingly relevant issue for population health. Education plays a key role in this regard, influencing the risk of developing dementia and serving as a crucial dimension in health disparities among older adults. While many studies indicate a protective effect of more years of education on the risk of dementia, the extent to which education shapes inequalities beyond the onset of the disease remains underexplored. In this study, we analyze educational differences in the risk of developing disease and in healthcare utilization among people living with dementia. Regarding the latter, we focus on the risk of first hospitalization after dementia identification. The analysis is conducted in the Lazio Region (Italy) between 2012 and 2022. We use the Lazio Longitudinal Study, combining 2011 Census data (resident population aged 50-90) and information from regional healthcare administrative databases through record linkage. We estimate Kaplan-Meier survival curves by level of education for dementia identification among disease-free individuals, and cumulative hazard functions for the risk of first subsequent hospitalization among patients identified as incident cases. Combining population-comprehensive data sources, our study contributes to current knowledge by offering novel evidence on the educational gradient in dementia incidence and healthcare utilization in Italy.

Keywords: Health disparities, dementia, aging population, Italy.

1 Background

Against the backdrop of population aging, dementia has become an increasingly relevant issue for population health. As the risk of dementia increases with age, the number of dementia cases worldwide is expected to triple by 2050 due to increasing life expectancy [1]. Although the rise of dementia is inevitable in these circumstances, recent evidence suggests that dementia incidence is declining at least in high-income countries [2]. Such a decline has been driven by general improvements in lifestyles, cardiovascular health, and increased educational opportunities [1].

Education is considered a protective factor against dementia for several reasons. First, it provides greater cognitive reserve, which delays the cognitive decline despite the beginning of brain deterioration [3, 4]. Education is also associated with healthier behaviors and more frequent access to preventive healthcare [5, 6]. Lastly, individuals with lower education are more exposed to chronic stress caused by insecure life circumstances, isolation, and discrimination [7], resulting in higher dementia risk [8].

Education is also an important dimension of health disparity in society, especially at older ages, and it might contribute to disparities far beyond the dementia onset (cit). While differences in the risk of developing dementia by educational attainment are well-documented [4, 7, 9], less is known about the role of education once dementia has already occurred, especially as far as healthcare utilization is concerned. Some studies show that dementia patients use services more extensively, especially for preventable causes [10, 11]. Higher educated individuals generally access specialist services more and have lower avoidable mortality rates [6, 12]. To the best of our knowledge, no recent studies have focused specifically on the association between education and healthcare utilization among individuals with dementia.

2 Aim of the study and contribution

This study aims shed light on educational disparities in the risk of developing dementia and subsequent hospitalization among people living with in the Lazio Region (Italy) from 2012 to 2022.

The contribution of this study is twofold. First, the study uses valuable population-comprehensive health records to evaluate educational disparities in dementia risk. This is pioneering in the Italian context, since previous evidence on educational disparities in dementia incidence in Italy is based on prospective studies in small areas [13, 14]. Second, it explores educational disparities beyond dementia onset, particularly focusing on the first hospitalization after dementia identification among incident cases.

3 Data and Methods

3.1 Data

We use the Lazio Region Longitudinal Study, which combines the 2011 Census cohort of residents in the region with health records from regional administrative databases, through record linkage procedures. More precisely, we use the following administrative data sources: the Hospital Discharge Registry (HDR), the Drug Claims Registry (PHARM), and the Ticket Exemption Registry (TER).

3.2 Research Design

We carry out a retrospective cohort study. In the first part of the analysis, we enroll all residents in Lazio aged 50-90 who completed the 2011 Census questionnaire and were not identified as dementia cases (i.e., dementia-free) by 1st January 2012 (N = 916,137 men; N =1,099,385 women). For dementia identification, we employ a validated algorithm [15] which considers individuals as dementia cases if they meet at least one of the following conditions: a) at least two different prescriptions of drugs for dementia within twelve months in the PHARM; b) at least one hospital discharge with a primary or secondary diagnosis of dementia in the HDR; c) reported exemption from healthcare co-payment specific to dementia in the TER. To ascertain whether individuals are dementia-free, we use a five years look-back period before the beginning of the observational window. We then follow dementia-free individuals are identified with dementia, censored, or until the end of follow-up (31st December 2022).

In the second part of the analysis, we enroll the incident cases retrieved from the first stage of analysis (N = 24,551 men; N = 34,454 women) and follow them until the first hospitalization after dementia identification, censoring, or the end of follow-up (31st December 2022). Hospitalizations are retrieved from the HDR.

3.3 Methods

To achieve our aim, we conduct two separate analyses. In the first analysis, we estimate Kaplan-Meier survival curves for dementia identification. Survival is considered from the beginning of follow-up, i.e. on 1st January 2012, until the earliest fulfillment of the conditions denoting dementia identification. In the second analysis, we estimate cumulative hazard functions for subsequent hospitalization. Here, individuals are considered exposed to risk from the time they are identified with dementia until the first hospitalization, if any. In both analyses, the exposure variable is education, which is retrieved from the Census and is categorized into three levels: up to lower-secondary (low), upper-secondary (middle), and tertiary (high). Individuals are right-censored if they do not appear in health records for more than twelve months, at age 90 (included), at death, and at the end of the observational period on 31st December 2022. We carry out the analyses separately for men and women, using continuous age as time scale.

4 Results

4.1 Dementia identification

We observe a striking educational gradient in the risk of dementia identification for both men and women (see Fig. 1). Consistently across sexes, the lower educated show a remarkably higher risk of being identified with dementia, while the opposite holds true for the higher educated. The risk of the middle educated is slightly different between men and women. Whereas middle educated men show a significant divergence

from the higher educated at the oldest age, middle educated women show a more similar survival to those with higher education at all ages.

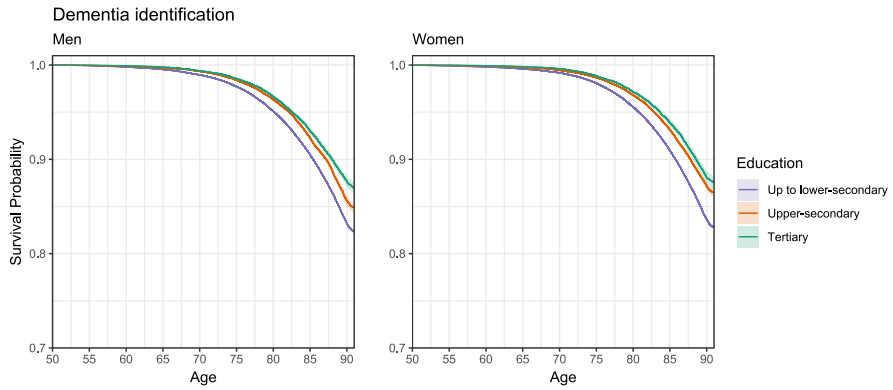

Fig. 1. Kaplan-Meier survival curves for dementia identification by level of education in Lazio among men (left-hand side) and women (right-hand side). Lazio Longitudinal Study (2012-2022). Authors' elaboration. Note: Surrounding areas are 95% C.I.

4.2 Subsequent hospitalization

Regarding the first hospitalization after dementia identification, the data present a more complex picture and more heterogeneity for men and women (see Fig. 2). On one hand, men clearly exhibit an educational gradient, with the lower educated showing a much higher cumulative hazard compared to the middle and higher educated from age 50. On the other hand, women's cumulative hazard is more similar across educational groups. At the earliest ages considered, middle educated women have higher risk compared to lower and higher educated. Around age 65, the cumulative hazard of the lower educated converges with the middle educated, whereas the hazard for higher educated women remains slightly lower. However, the differences between groups do not reach significance at 95%.

5 Conclusion

This study uses population comprehensive health records to investigate educational disparities in the risk of developing dementia and healthcare utilization after disease onset. We are able to identify an educational gradient in the risk of dementia onset, consistently with previous research [4, 9]. For both men and women, low education is confirmed as an important risk factor for dementia.

For what concerns the educational disparities in healthcare utilization after dementia identification – particularly in the first subsequent hospitalization – we found a clear educational gradient among men and less heterogeneity among women. This

result suggests a gendered pattern in educational disparities in healthcare utilization among dementia patients.

The next steps of this research consist in modelling the risk of dementia onset and subsequent healthcare utilization using proportional hazard regression models and several outcomes of healthcare utilization.

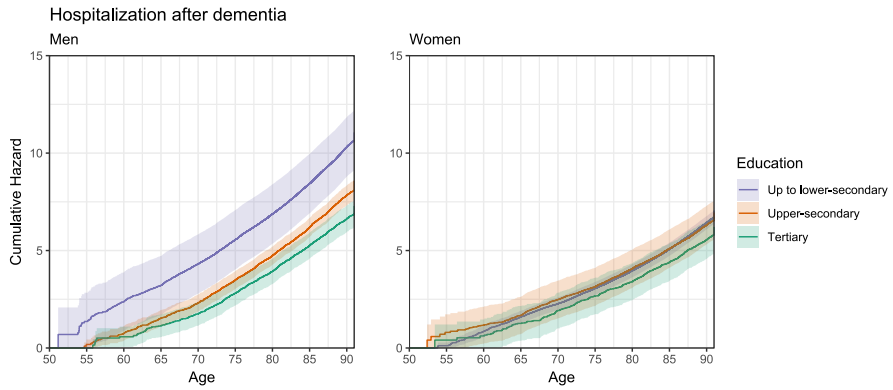

Fig. 2. Cumulative hazard functions for first hospitalization after dementia identification among men (left-hand side) and women (right-hand side). Lazio Longitudinal Study (2012-2022). Authors' elaboration. Note: Surrounding areas are 95% C.I.

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