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Long-Term Persistence of Income Poverty: Evidence from Belgium

Anna Mergoni

anna.mergoni@kuleuven.be

KU Leuven

Marco De la Cruz

KU Leuven

Ides Nicaise

KU Leuven

Anna Ruelens

KU Leuven

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Abstract

This study analyses long-term income poverty in Belgium over a decade (2008–2017) using linked administrative tax records, population registers, and census data. Belgium provides a useful case for European comparison because strong national welfare institutions coexist with pronounced subnational variation in economic structure and policy. The empirical strategy applies Cox proportional hazard model to incident spells and to re-entry after exit. Results show pronounced heterogeneity by age, family structure, origin, education, employment status, and homeownership. Young adults and single parent households exhibit elevated hazards of entry and continued poverty, while higher education, stable employment, and homeownership protect against both. A subnational perspective proves essential. Longer average durations in Brussels Capital Region and several Walloon provinces, compared with most Flemish provinces, indicate a spatial concentration of persistent poverty that national aggregates obscure. While the evidence is drawn from Belgium, the study's extended observation window and regional lens offer a methodological template for other European countries with rich administrative data but shorter follow-up periods. Longer-term coverage reshapes conclusions about who remains vulnerable and where poverty persists, with direct implications for the targeting and evaluation of social policy. As such, our findings highlight the added value of a longer observation window and a subnational lens for revealing the extent and geographic concentration of long-term poverty in Belgium.

Keywords: Poverty dynamics; Administrative data; Cox proportional hazard model; Poverty persistence; Regional inequality; Belgium

1 Introduction

In this paper, we explore the long-term dynamics of poverty in Belgium by examining persistent poverty patterns and the factors that influence them. Our research draws on a rich dataset that combines administrative tax records, population register, and census data to describe the prevalence of persistent poverty in Belgium and associates key individual characteristics and life events with poverty spells. Specifically, we ask: How prevalent is persistent poverty in Belgium? What life events are most associated

with changes in poverty status? What characteristics influence the hazard rate of poverty entry and exit?

By adopting a long-term, individual-level perspective, we examine the prevalence and duration of poverty spells in Belgium. We focus on factors such as education level, family composition, employment status, and migration background to better understand the characteristics of the most vulnerable. Our analysis reveals which factors are linked to longer periods of poverty by studying spells of different lengths. This allows us to identify the key drivers behind persistent poverty in Belgian society.

Long-term financial poverty creates enduring cycles of deprivation, restricting social mobility, worsening health outcomes, and limiting educational and economic opportunities (Anand, Jones, Donoghue, & Teitler, 2021). Beyond individual hardships, persistent poverty weakens social cohesion (Lewis, 2017) and hinders economic growth by reducing human capital and productivity (Bao & Liao, 2024). Understanding the structural drivers of long-term poverty is essential to address its intergenerational transmission and mitigate inequality (Parolin, Pintro-Schmitt, Esping-Andersen, & Fallesen, 2025).

To do so, longitudinal studies are essentials. Since the 1980s, researchers have emphasized the need for dynamic approaches to poverty that go beyond static headcounts, capturing how individuals move in and out of poverty over time and the life events that trigger these transitions. Bane and Ellwood (1983), introduced a life-course perspective on poverty and ntroduce the analyses to understand the ways in which the poor slip into poverty and escape it. Leisering and Leibfried (1999), introduced the life-course perspective in on poverty and welfare in Europe and studied the evolution of poverty for individuals living in Bremen (Germany) comparing two cohorts between 1989-1994 and 1983-1989. Their findings revealed that poverty for most people is only a temporary experience and recurrent welfare benefit can trigger poverty spells. This confirmed the theoretical foundations set by the individualization theory for which modern poverty often stems from unpredictable life shocks rather than chronic disadvantage and short-term benefit receipt rarely leads to sustainable poverty exits (Beck, Giddens, & Lash, 1994).

Subsequent studies further refined the dynamic lens and confuted the original idea that poverty is mainly a transient phenomenon. Snel, Reelick, and Groenenboom (2013) replicated the Leisering and Leibfried's framework for Rotterdam, but found striking different results. While for Leisering and Leibfried (1999) contemporary poverty is of a temporary nature, Snel et al. (2013) found that persistent poverty was still predominant.

Several methodological innovations emerged from this body of work. The need of breaking down the population into subgroups has lead Foster, Greer, and Thorbecke (1984) to the development of a poverty intensity measures that goes beyond the headcount ratio. While Rodgers and Rodgers (1993) focused on decomposing the chronological and transitory component of poverty, incorporating savings and debt to better capture economic vulnerability. Leisering and Leibfried (1999) distinguished between spell duration and net duration. Kuchler and Goebel (2003) used a combined the perspective of poverty incidence, poverty gap, poverty intensity and durability of poverty experiences to compare welfare states in Europe. Halleröd, Ekbrand, and

Bengtsson (2015) focused on the work-related poverty and elaborated on the definition of in-work poverty using clustering and mixed model to analyse labour market trajectories in diferent European countries.

Despite a flourishing literature, several common challenges remain. A key limitation of most cross-national studies (e.g., Halleröd et al., 2015; Kuchler & Goebel, 2003) is their reliance on country level aggregates for comparison, which can obscure significant within-country variation. Yet, poverty dynamics are often shaped by regional socioeconomic structures that national averages fail to capture. By focusing on Belgium as a case study, our analysis highlights how regional disparities within a single welfare regime can lead to markedly different poverty trajectories. This finding serves as a cautionary note for European level comparative research, suggesting that a full understanding of poverty patterns requires moving beyond macro-level indicators and taking subnational (regional and even provincial) variation into account.

A second recurring limitation is temporal. While many studies emphasize the importance of a long-term, dynamic perspective, available panel data in Europe—and particularly in Belgium—typically are survey based cover only four to six years (see, for example, Kuchler & Goebel, 2003; Leisering & Leibfried, 1999; Snel et al., 2013). This restricts our ability to fully understand persistent poverty and to link poverty spells to long-term structural or life-course factors. Although there are some notable exceptions to this trend, especially in the Nordic European countries (see, for example, Jonsson, Mood, & Bihagen, 2016; Minas, Jakobsen, Kauppinen, Korpi, & Lorentzen, 2018; Mood, 2015; Mood & Jonsson, 2016), even official European indicators—such as the EU's persistent at-risk-of-poverty measure—are based on a four-year observation window. Our findings reinforce the need for longer-term data, as we show that poverty spells often last well beyond four years, underscoring the importance of extended longitudinal databases for accurately capturing the dynamics of poverty.

The contribution of our paper is twofold. First, by leveraging a unique ten-year administrative dataset, we show that poverty persistence became a prevalent phenomenon in Belgium during the period 2008–2017, with poverty spells lasting the entire period occurring more frequently than shorter ones. Second, we demonstrate that regional and provincial variation plays a significant role in explaining poverty trends. These contributions position Belgium as a compelling case study and invite future research to move beyond classical (comparative) analyses by incorporating subnational perspectives and extending observation periods to better capture long-term poverty dynamics.

2 Poverty Persistence and Distribution in Belgium

Belgium offers a particularly instructive setting for analysing the persistence and distribution of poverty because its macro-level welfare resilience coexists with deep subnational economic and institutional fragmentation. Although geographically compact, the country displays pronounced internal differences in labour-market structure, social-policy implementation, and poverty risk.

At the national level, Belgium has long been regarded as a resilient welfare state: income redistributive mechanisms have helped sustain a sizeable middle class and relatively high living standards even during major shocks such as the Great Recession and the COVID-19 pandemic (Almeida et al., 2021; Marx & Schuerman, 2016). Nonetheless, this broad stability masks persistent relative income poverty among particular socio-demographic groups, notably the unemployed, single parent households, and non-Belgian nationals (Cantillon & Van Mechelen, 2014; Dagg, Promberger, Boost, & Gray, 2020; Guio & Vandenbroucke, 2019). In 2022, 13.2% of the population was at risk of poverty or social exclusion (Statbel, 2022), and the poverty reducing effect of social transfers declined markedly from 47.7% in 2005 to 34.7% in 2018 (EAPN, 2020). These trends qualify the expectation that a generous welfare state alone will eliminate long-term poverty. While the literature highlights the importance of labour-market integration and social safety nets (Decancq, Goedemé, Van den Bosch, & Vanhille, 2014; Royce, 2022), these mechanisms have not uniformly contained rising poverty among the working-age population, especially in Brussels Capital Region and Wallonia.

Part of Belgium's internal divergence reflects historical economic trajectories. In an interesting study, Buyst (2011) shows how regional specialisation around the turn of the twentieth century shaped long-run development: Wallonia developed an early, coal based industrial core supplying steel, glass and machine building sectors, whereas Flanders remained relatively agrarian and artisanal. Over time, the expansion of light industry and services—together with changes in international coal flows and the rising importance of the port of Antwerp—reversed these fortunes and favoured a sustained catching-up of Flanders. These structural shifts continue to influence contemporary labour markets and exposure to poverty.

These historical economic trajectories have left a lasting imprint on current labor market structures and poverty patterns. Regional disparities in poverty reflect not only economic legacies but also divergent policy strategies and institutional capacities. Key policy levers—such as the scope and targeting of labour-market supports, the intensity of activation measures, the organisation of vocational training, and the provision of education and social services—vary across regions and communities, producing different incentives, access barriers and remediation pathways for vulnerable households. As Béland and Lecours (2018) observes, debates about social policy in Belgium increasingly concern the territorial organisation of benefits and services as much as their aggregate generosity. Several papers are indeed accounting, empirically and theoretically, for subnational differences (see for example Béland & Lecours, 2018; Buffel & Nicaise, 2017; Buyst, 2011; Mariani & Cantillon, 2024).

Despite these clear territorial dynamics, several influential studies on Belgian poverty have not engaged systematically with regional or provincial variation. For example, Cantillon and Van Mechelen (2014) assesses the limits of the prevailing policy paradigm for poverty reduction without examining how outcomes differ across regions. Likewise, Lens, Marx, Oslejova, and Mussche (2023) investigates labour-market pathways into poverty but does not incorporate their territorial differentiation.

This tendency to prioritise national-level analysis is also evident in comparative European research, which often privileges cross-country contrasts at the expense of

subnational heterogeneity (see e.g. Barbieri & Bozzon, 2016; Biewen, 2014; de Smalen, Van Bavel, & Van Lancker, 2024; Goedemé, Decerf, & Van den Bosch, 2022; Greiss & Schoneville, 2023). While such work is essential for understanding broad institutional and macroeconomic patterns, it risks obscuring place based mechanisms that shape both the causes and consequences of poverty.

The results presented in this paper therefore argue that national level analyses are insufficient to capture Belgian poverty dynamics in full: provincial and regional disparities reflect the interplay of historical legacies, labour-market evolution and regionally differentiated policy regimes, and recognising these internal dynamics is necessary for a more complete and policy relevant understanding of poverty in Belgium.

Although our analysis focuses on Belgium, the provincial perspective has broader comparative relevance. Demonstrating large within-country variation in poverty persistence highlights that national aggregate statistics can conceal important place based mechanisms. Provincial differences in labour-market structure, policy design and administrative capacity alter the way individual risk factors (education, employment transitions, family composition, migration background) translate into poverty entry and exit. For comparative researchers, this implies that cross-country contrasts will be more informative when paired with analogous subnational comparisons.

3 Empirical Strategy

The literature on persistent poverty follows two main approaches: summary indices and econometric modelling. Summary indices provide aggregate measures of duration, intensity and recurrence. A widely used example is the EU's "persistent at-risk-of-poverty" indicator, which classifies an individual as persistently poor if they are poor in the fourth year of a four-year observation window and in at least two of the preceding three years (S. Jenkins & Van Kerm, 2014). Although recent methodological refinements have improved these measures (see for example Goedemé et al., 2022), summary indices remain largely descriptive and offer limited insight into the micro-level mechanisms that drive poverty transitions.

Conversely, econometric models aim to identify micro-level determinants of poverty persistence, employing statistical techniques such as hazard regression models (Fusco & Islam, 2020) and Markovian transition models (Chattopadhyay, Kumar, & Mallick, 2017). While these approaches enhance understanding of poverty entry and exit dynamics, they often rely on short observational windows and are limited by data availability, sample attrition, and difficulties in isolating causal relationships.

Our study incorporates elements of both streams as it is mainly descriptive, but aims at identifying factors associated with poverty entry and exit. Our empirical strategy proceeds in three complementary steps. Each of the three steps relies on the sample most appropriate to its question. Steps 1 and 2 describe poverty prevalence and life-course transitions using the full panel. Step 3 estimates hazard rates of exit and re-entry, which requires conditioning on observed spell starts to avoid left-censoring; the construction of those estimation samples is described below.

First, we document the extent and persistence of poverty in Belgium by province and population subgroups. A key highlight is the extended observation window

(2008–2017). This time frame provides the first overview of long-term poverty distribution in Belgium after the 2008 financial crisis. In this respect our analysis complements prior work based on shorter panels (e.g., Ayllón & Gábos, 2017; Bárcena-Martín, Blanco-Arana, & Pérez-Moreno, 2018; Biewen, 2014). Concretely, we report the average number of years each individual spent below the poverty threshold during 2008–2017 (zeros for those who never enter poverty), disaggregated by province of residence in 2008 (see Figure 2). And we present the share of individuals who were poor for exactly 1, 3, 5, 7, or 10 years within the observation window, broken down by province and by key demographic subgroups (see Table 1). These count based summaries are useful and transparent, but they have important limitations. They are bounded by the observation window (subject to left- and right-censoring) and do not capture spell sequencing or recurrence unless further disaggregated. They are descriptive rather than causal and can be sensitive to the chosen poverty threshold and equivalence scale.

The second step of our empirical strategy examines the main drivers of poverty dynamics by focusing on events related to poverty entries and exits (see Figures 4 and 3), as suggested by Bane and Ellwood (1983); Biewen (2014). Specifically, we consider changes in family, employment, and health status. This event based approach allows us to gain a deeper understanding of poverty trajectories and inform targeted policy interventions by identifying key transition points in individuals' lives. However, this approach has limitations, such as potentially overlooking the cumulative impact of minor events, gradual changes, unmeasured factors, or complex interactions influencing poverty dynamics. Additionally, some events may be both causes and consequences of poverty, raising concerns about endogeneity.

As a third step, we complement these descriptive results with survival analysis, specifically the Cox proportional-hazards model, as reported in Table 2. The Cox model estimates how covariates shift the hazard rate, i.e. the instantaneous probability of transitioning from one state to another at time t, given that the individual has not yet experienced the event. It accounts for right censoring, which is unavoidable in our setting because some spells continue beyond 2017. For an individual with characteristics $(x_{i1}, \ldots, x_{ip})$, the hazard is:

$$h(t|x_i) = h_0(t)\, e^{\sum_{j=1}^{p} \beta_j x_{ij}} \tag{1}$$

where $h_0(t) > 0$ is the baseline hazard, and e^{β_j} is the hazard ratio associated with a one-unit change in covariate j. A positive β_j indicates a faster transition (higher hazard).

A central concern in spell-based survival analysis is left-censoring: if an individual is already poor in the first year of observation, the true start of their spell is unknown and their estimated duration is downward-biased (S.P. Jenkins, 1995). To avoid this, we follow the approach recommended in the literature on poverty dynamics and define our estimation samples only on observed spell beginnings. For the analysis of poverty exits, we keep person-year observations from individuals who are observed to start a poverty spell in some year $t_0 \in \{2009, \ldots, 2017\}$ (i.e. non-poor in t_{0-1} and poor in t_0); these individuals contribute observations from t_0 until they either exit poverty

(event) or are right-censored at their last observed year. For the analysis of poverty re-entries, we apply the symmetric construction: person-years from individuals observed to end a poverty spell in $t_0 \in \{2009, \ldots, 2017\}$ (poor in t_{0-1} and non-poor in t_0), tracked until re-entry or right-censoring. The elapsed-duration counter is reset to 1 at each spell start. Individuals may contribute more than one spell to the same sample; standard errors are therefore clustered at the individual level. Covariates are measured at the 2008 baseline to avoid reverse causality from poverty transitions back onto contemporaneous covariates (e.g. employment status).

As a robustness check, we also estimate a discrete-time complementary log-log (cloglog) model on the same person-year samples. Because poverty is defined annually, transitions are inherently grouped into yearly intervals, and a discrete-time formulation is arguably more natural than the continuous-time Cox. Under the cloglog link, the model retains the proportional-hazards interpretation while explicitly modelling the annual hazard:

$$\log[-\log(1 - h_{it})] = \alpha_d + x_i'\beta, \tag{2}$$

where h_{it} is the discrete hazard in spell-year d and α_d is a set of dummies for each spell-year. The dummies absorb the baseline duration dependence semi-parametrically, allowing us to recover how the hazard of poverty exit and of poverty re-entry varies with time at risk — an aspect of the dynamics that the Cox specification leaves unidentified. Results from the cloglog model are reported in the Appendix together with the estimated duration-dependence profile (Figure B1).

4 Data and variable description

In this study, we analyse the income based poverty dynamics in Belgium between 2008 and 2017 for a representative sample of 50,265 individuals between 18 and 90 years old in 2008, measuring poverty in terms of disposable household income before tax. To do so, we rely on rich information on taxable incomes and demographic characteristics gathered from a unique combination of data, including tax records (Ipcal), administrative records about the minimum income scheme (Prima), population register data (Demobel), and census. Note that the risk of mismatches in merging these sources is minimal, as all originate from the Belgian official statistics system and are linked through a unique identifier, ensuring smooth and accurate integration. Despite our empirical methods are descriptive and not aimed at establishing causal relationships, the extended time frame and administrative nature of our data allow for a richer and more complete depiction of poverty trajectories than shorter window survey based approaches.

The Ipcal data include tax declarations from Belgian taxpayers (including people paying zero taxes), covering net taxable income, unemployment benefits, sickness benefits, pensions, income from dependent work, deductible expenses for the respondent and their partner (if any), and details on dependent children, parents, and persons with disabilities. Note that every person over 18 who has been living in Belgium since the previous year, have to file the yearly tax return, whether they have an income to declare or not. Our data also integrate information from the Prima database on the minimum guaranteed income. Demographic details, such as age, sex, nationality,

and family type (e.g., single, cohabiting or married without children, cohabiting or married with children, single parent), are drawn from the population register (Demobel). Additionally, Census 2011 data complements the dataset with information on respondents' education level and housing ownership.

The use of administrative tax data offers clear advantages in coverage and precision, but also entails important limitations. First, it restricts the analysis to a unidimensional income based measure of poverty, despite substantial evidence that deprivation is multidimensional (e.g., Tkach & Gigliarano, 2022; Tsui, 2002). Second, taxable income data may suffer from under coverage, under-reporting, especially among the self-employed (Edmiston, 2024), and do not capture household wealth, savings, assets, or debts—factors that are crucial for understanding economic vulnerability (Kuypers & Marx, 2021). Third, our 10-year observation window, while longer than the four-year span used in many survey based studies, is still bounded by right- and left-censoring: spells may begin before 2008 or continue beyond 2017, and thus true spell durations may be underestimated. The analysis therefore provides a more complete but still partial view of long-term poverty trajectories.

While these limitations must be acknowledged, the data used in this paper still allow for a robust analysis of poverty dynamics. First, the ability to follow individuals for a decade provides a rare opportunity to examine the persistence of poverty at a granular level, whereas most long-term studies rely on aggregated data and implement cross-country comparisons (e.g., Franzen & Bahr, 2024; Mussida & Sciulli, 2022). Second, although tax data do not capture all aspects of financial well-being, they are more reliable for income measurement than survey based sources such as EU-SILC, which are prone to self-reporting biases (Wirth & Pforr, 2022) and attrition. Finally, integrating tax data with demographic records enables a more detailed examination of individual and household characteristics, offering relevant insights into how different factors interact with income trajectories over time. In Sections 4.1 and 4.2, we present a detailed description of the variables of interest.

4.1 Poverty definition

This study focuses on income poverty, defined by a threshold set at 60% of the national median disposable household income, adjusted for household size and calculated after accounting for social transfers (including social security and social assistance benefits).

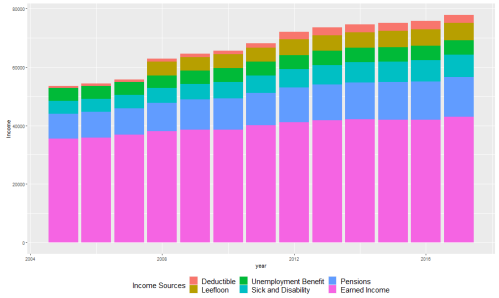
The disposable household income is the base to define the national median disposable income and the thresholds for poverty. Based on the tax register data, we define the disposable household income as the sum of three components: 1) the total net taxable income, which includes the net income from employment and self-employment, unemployment benefit, sickness benefit and pension; 2) the deductibles expenditures, i.e., the costs incurred during the taxable period that are deducted from net taxable income; 3) the guaranteed minimum income (Leefloon), assigned to people with insufficient means of living and not eligible for other forms of support. Our income definition shows a slight deviation from the EU-SILC income measure. EU-SILC offers detailed breakdowns of income components, yet it lacks a direct counterpart to the

taxable income concept used in IPCAL. For a detailed comparison of the income measures available in the Belgian tax register data and those in EU-SILC, see De Schrijver (2020).

The disposable income is then adjusted for the household composition. This is done by dividing the total household income by the Eurostat equivalence factor, which assigns to the first household member a weight of 1, to each additional person aged 14 an additional 0.5, and for each child aged under 14 by 0.3. This produces an equivalized household income, which we assign equally to all members of the household. This approach ensures conceptual coherence as within the same household, no member can be classified as poor while another is not. However, it also assumes equal sharing of resources within the household, which may not hold when income is unevenly distributed or when some members have access to separate resources.

Figure 1 shows the average composition of disposable household income. As such, it provides an overview of the changes in income sources over time. From the graph, it appears that earned income is the largest source of income, followed by pensions, sickness benefits, unemployment benefits, minimum incomes, and deductibles. A noticeable increase in total income over the years reflects inflation and higher share of income from pensions and sickness benefits.

Fig. 1 Temporal Evolution of Household Income Composition from 2001 to 2018.



4.2 Demographic characteristics

To give further insight into the dynamics of poverty and allow for heterogeneous patterns, we also consider demographic characteristics such as level of education, family type, age, gender, and first nationality.

- **Family type** is a nominal variable with four categories: single individuals (and other family structures), single parent families, couples with children (married or cohabiting), and couples without children (married or cohabiting). Additionally, we account for the presence of dependent individuals with a disability. In the Cox regression, we use family type as measured in 2008, the first year of observation. This choice avoids introducing changes in the covariate that might occur as a consequence of poverty transitions themselves, thereby reducing the risk of reverse causality. Moreover, using a fixed baseline measure ensures also means that any differences

in estimated hazards between family types reflect differences associated with the initial household situation, rather than shifts in household composition during the observation period.

- **Level of Education** is a categorical variable with five levels: no education, primary education, secondary education (level 1), secondary education (level 2), and higher education. This information is not included in the tax register, but comes from Census data, available for 2001 and 2011. Despite education levels change over time as individuals pursue further training, due to data availability, we look at the level of education in 2011 and we assume that it remains constant over the observed period.
- **Gender** is recorded in the Demobel database and remains constant throughout our observation period.
- **Age** is measured in 2008, with individuals classified into five groups: "Less than 25 years", "25 to 50 years", "50 to 65 years", "65 to 75 years", and "Over 75 years". The thresholds were chosen to ensure comparability in sample size while also accounting for the aging of the sample over the 10-year analysis period.
- **Origin** is represented by the variable 'first nationality', which records an individual's nationality upon their initial registration in Belgium. While nationality may change over time—such as when migrants acquire Belgian citizenship—first nationality remains constant, making it a more reliable indicator of origin. To ensure sufficient sample sizes, we group countries into macro-geographical areas: Africa, Europe, Belgium, and Other Regions. The "Other Regions" category includes Asia, North and South America, Oceania, and individuals for whom a region could not be assigned (e.g., stateless individuals and refugees).

While the available administrative data provide a rich basis for analysing poverty dynamics, they do not capture all dimensions that may influence trajectories. In particular, we have no direct measures of household wealth, assets, or debts, which are key to understanding resilience to income shocks. Similarly, our data contain limited indicators of health status or labour market histories (e.g., employment stability, job quality), both of which are well-documented correlates of poverty entry and exit. In addition, the data are recorded on an annual basis, which means that variables subject to more frequent changes—such as employment or benefit receipt—may be measured with less precision. These limitations imply that some heterogeneity in observed poverty risks may remain unexplained, introducing the possibility of omitted variable bias. Our results should therefore be interpreted with this caveat in mind.

5 Results

5.1 The Extent of Poverty Persistence

We begin our analysis by examining the persistence and incidence of poverty in Belgium. Previous studies have emphasized that despite its relatively small geographic size, Belgium exhibits substantial inequalities (Capéau, Decoster, De Rock, & Vanderkelen, 2024; Mariani & Cantillon, 2024). Our findings align with this body of literature, revealing a clear distinction in poverty incidence between Flanders, Walloon, and Brussels Capital Region (from now on referred to as Brussels). As illustrated

in Figure 2, Brussels shows the highest level of poverty incidence, with an average duration exceeding 3.4 years. Note that here the average duration refers to the average number of years individuals spent in poverty over the ten-year window, not necessarily consecutively. In Walloon, the average duration of poverty varies between 1.7 years in Luxembourg and 2.3 years in Hainaut. By contrast, Flanders demonstrates the shortest average poverty durations, ranging from 1.3 years in East Flanders to 1.5 years in Antwerp. These spatial patterns are consistent with long-standing regional differences in economic structure and institutional arrangements, rooted in historical industrial trajectories (e.g. Wallonia's industrial decline and Flanders' later economic ascent), and with regionally differentiated labour-market policies and social-policy organisation (Béland & Lecours, 2018; Buyst, 2011).

Fig. 2 Average duration of poverty (years, not necessarily consecutive) by Belgian province, 2008–2017 (national average = 1.67 years)

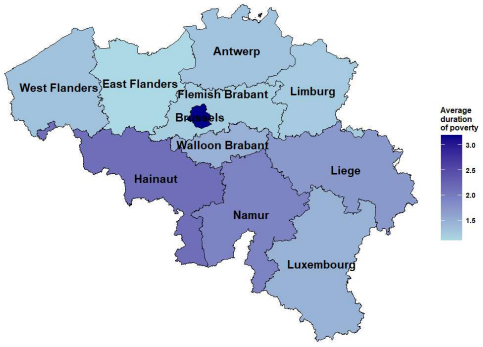


Table 1 summarizes the persistence and recurrence of poverty over the 2008–2017 observation window. The column "Poor at least once" reports the share of individuals who were poor in at least one year of the ten-year period. The columns "Poor for 1 year", "Poor for 3 years", "Poor for 5 years", "Poor for 7 years" and "Poor for 10 years" report the proportion of individuals who were poor in exactly n years out of the ten; these n years need not be consecutive. These non-consecutive counts correspond to the literature's concept of the sum of net poverty spells. To identify continuous episodes of disadvantage, the table also reports conditional measures labelled "Poor for 3 years (consecutive)", "Poor for 5 years (consecutive)" and "Poor for 7 years (consecutive)". Each conditional measure shows, among individuals who were poor in exactly n years, the percentage whose n-year experience took the form of a single uninterrupted spell. Comparing the non-consecutive and consecutive statistics therefore permits distinction between repeated, shorter spells and sustained poverty episodes, providing a compact but informative account of both duration and recurrence.

Table 1, Panel 'a' , confirms that the provinces with the highest incidence of persistent poverty, during the observed 10-year period, include Brussels (above 15%), Hainaut (above 8%), and Namur (above 6%). In these provinces, the proportion of people experiencing persistent poverty exceeds that of those facing short-term poverty

Table 1 Share of people experiencing different types of poverty spells by population subgroup. Percentages in parentheses indicate the share who experienced consecutive years of poverty, conditional on having the poverty spell of previous column.

	Size	Poor at least once	Poor for 1 years	Poor for 3 years	(consecutive)	Poor for 5 years	(consecutive)	Poor for 7 years	(consecutive)	Poor for 10 years
Panel a - by Province										
All Belgium	50,265	32.3	5.9	3.	(67.2)	2.4	(94.2)	2.1	(99.6)	5.9
Antwerpen	7,171	27.1	5.7	2.9	(71.2)	2.1	(96.3)	1.9	(100.0)	4.0
Brussels	6,694	50.7	5.9	3.9	(62.2)	3.2	(91.1)	3.3	(100.0)	15.1
Henegouwen	6,851	38.5	5.8	3.1	(65.3)	2.9	(94.9)	2.7	(99.4)	8.1
Limburg	3,834	28.0	6.5	3.3	(65.3)	2.0	(97.2)	1.8	(100.0)	3.1
Luik	4,566	33.3	7.0	3.3	(71.9)	3.0	(93.3)	2.2	(100.0)	5.6
Luxemburg	1,431	30.7	6.8	3.3	(75.6)	2.4	(90.0)	1.5	(100.0)	5.1
Namen	1,854	35.8	5.6	3.8	(63.5)	2.8	(91.5)	2.1	(100.0)	6.8
Oost-Vlaanderen	6,185	24.4	5.4	2.9	(67.3)	1.8	(95.1)	1.4	(98.8)	3.1
Vlaams-Brabant	4,876	25.0	5.1	2.2	(60.4)	2.0	(93.1)	1.8	(100.0)	3.3
Waals-Brabant	1,529	31.1	6.9	2.8	(60.5)	2.0	(92.9)	2.4	(100.0)	4.2
West-Vlaanderen	5,274	28.1	6.1	3.2	(74.4)	2.5	(96.7)	1.7	(97.5)	3.6
Panel b - by Age										
18 to 25	6,673	75.2	9.9	9.0	(82.8)	7.8	(97.3)	5.5	(100.0)	8.8
25 to 50	23,213	29.2	5.5	2.7	(55.9)	2.0	(90.1)	1.8	(99.2)	6.0
50 to 65	12,595	20.1	4.2	1.8	(66.4)	1.1	(94.6)	1.3	(99.3)	3.9
65 to 75	4,886	21.1	5.5	1.1	(42.2)	0.8	(96.9)	1.2	(100.0)	6.8
Over 75	2,898	28.1	10.5	1.7	(41.4)	1.3	(100.0)	1.5	(100.0)	5.9
Panel c - by Family Type										
Alone	8,631	32.3	7.1	2.8	(57.9)	2.3	(90.2)	2.1	(98.7)	5.8
Couple no child	13,589	18.8	5.0	1.5	(63.0)	0.9	(91.4)	1.1	(100.0)	3.7
Couple with child	23,106	34.5	5.9	3.7	(69.4)	2.8	(95.9)	2.4	(100.0)	5.9
Monoparental	4,939	58.4	7.1	5.5	(71.0)	5.0	(93.7)	3.8	(98.8)	12.3
Panel d - by Origin										
Africa	2,455	76.8	6.6	4.2	(56.5)	5.1	(91.9)	5.1	(100.0)	27.0
Belgium	41,509	27.4	5.7	2.9	(70.3)	2.2	(94.1)	1.8	(99.6)	3.9
Europe	5,549	47.8	7.5	4.2	(57.1)	3.4	(96.1)	3.0	(99.3)	11.1
Rest	698	60.6	9.6	4.1	(50.0)	3.1	(94.4)	4.1	(100.0)	17.8
Panel e - by Level of Education										
No Diploma	1,219	43.9	7.6	2.8	(51.7)	1.2	(100.0)	2.3	(100.0)	17.4
Primary Education	4,867	40.4	7.1	2.6	(48.6)	2.2	(94.4)	3.1	(100.0)	11.4
Lower Secondary	9,484	33.2	5.9	2.7	(60.7)	2.1	(91.3)	2.1	(98.4)	7.7
Upper Secondary	13,843	36.1	5.9	3.4	(63.9)	3.3	(94.4)	3.1	(100.0)	4.8
Higher Education	17,029	22.7	5.3	3.2	(80.0)	1.9	(96.3)	1.0	(99.4)	1.8

for only a single year. Notably, in Brussels, this proportion is more than double. In contrast, other provinces exhibit a different pattern, where the percentage of individuals experiencing poverty for just one year surpasses those enduring poverty for the entire decade. These figures include Limburg (6.5%), East Flanders (5.4%), West Flanders (6.1%), Antwerp (5.7%), Flemish Brabant (5.1%), and Luxembourg (6.8%). This disparity is further highlighted when considering the overall percentage of individuals who have experienced poverty for at least one year. Brussels stands out with over 50%, reflecting its higher levels of poverty persistence, which contrasts sharply with East Flanders, where the percentage drops to 24%.

Age is another factor frequently examined in the context of poverty studies (see, e.g., Aassve, Iacovou, & Mencarini, 2006; Easterlin, 1987; Maes, 2013; Shakibaei & Gholami, 2023). Previous research showed that young people are most at risk of poverty (Chevalier, 2023). Results in Table 1, panel 'b', show that poverty spells of all durations are disproportionately more common among individuals in the youngest age category (between 18 and 25 in 2008) . Over 8% of the youngest people in this age

group were in poverty for the entire observation period, and over 75% had experienced poverty at least once over the full observation window. In stark contrast, the corresponding figures for individuals aged 50 to 65 were 3.9% and 20.1%, respectively. These findings highlight the vulnerability of young people to poverty (Saltkjel, Andreassen, Helseth, & Minas, 2023). However, this vulnerability must be interpreted in light of the broader economic context: the observation period (2008–2017) coincided with one of the most severe financial crises in Europe and Belgium. Literature indicates that the crisis disproportionately affected young people entering the labor market, leading to elevated unemployment rates that persisted even after the economic recovery (Barakat, Holler, Prettner, & Schuster, 2010; Verick, 2009).

Another crucial factor influencing poverty dynamics is family composition. In this study, we differentiate between couples with and without children, as well as single individuals with and without children (see Table 1 - Panel c). The incidence of long-term poverty spells (10 years) is the highest among single individuals with children, labelled as Monoparental, (12.3%), followed by couples with children (5.9%) and single individuals without children (5.8%). Couples without children, on the contrary, exhibit the lowest incidence (3.7%). These findings suggest that having children is associated with increased financial vulnerability, particularly in single parent households, while couples appear better able to cope with the financial demands of parenthood. This pattern is also supported by the share of individuals experiencing poverty at least once between 2008 and 2017, which is 58.4% for single parents compared to 34.5% for couples with children, 32.3% for single without children, and 18.8% for couples without children. These results align with previous research, which links households with children to a higher likelihood of multidimensional poverty (e.g., Fabrizi & Mussida, 2020; Fusco & Islam, 2020). The elevated incidence of poverty spells among families with children is particularly concerning, given the evidence that persistent poverty has a cumulative detrimental effect on child cognitive development compared to their non-poor peers (Dickerson & Popli, 2016).

Table 1, panel 'd', also illustrates the varying incidence of persistent poverty among individuals of different backgrounds, as measured by first nationality (i.e., the nationality recorded at the time of initial registration in Belgium). While this approach does not distinguish between newcomers and long-term migrants, the extended observation period mitigates this limitation. Although migration is often driven by the pursuit of better economic opportunities, previous research has consistently shown that migrants face higher poverty risks in destination countries (Lelkes, 2007; Murrugarra, Larrison, & Sasin, 2010). Our findings align with this evidence, revealing that individuals of Belgian origin experience the lowest incidence of poverty across all durations of poverty spells. By contrast, individuals with a background from non-European countries (categorized as "Other Regions") and Africa exhibit the highest poverty rates. Of particular concern is the observation that 76.8% of individuals of African origin experienced poverty at least once during the observation period, compared to just 27.4% among individuals of Belgian origin. This stark disparity underscores the significant socio-economic challenges faced by migrants, particularly those from Africa, in Belgium.

Another important characteristic associated with poverty and persistence of poverty is the level of education (see Table 1, panel 'e'). In most countries, a high level of education has been found to considerably reduce the risk of persistent poverty (Biewen, 2006; Devicienti, 2011; Ranci, Beckfield, Bernardi, & Parma, 2021). A similar association can be drawn from our analysis supporting this relationship, highlighting a clear inverse relation between educational attainment and the incidence of poverty across all durations of poverty spells. Individuals without higher education experience the highest levels of poverty persistence. Specifically, 43.9% of those without a diploma experienced poverty at least once during the observation period, compared to only 22.7% of individuals with higher education qualifications. The disparity becomes even more pronounced when examining long-term poverty spells (10 years): 17.4% of individuals without a diploma lived in poverty throughout the observation period, whereas this figure drops sharply to 1.8% among those with higher education. This evidence highlights the critical role of education in mitigating poverty and fostering economic mobility (Hofmarcher, 2021). The disparities observed align with broader research that emphasizes the importance of education as a pathway to breaking intergenerational cycles of poverty (Spada, Fiore, & Galati, 2023).

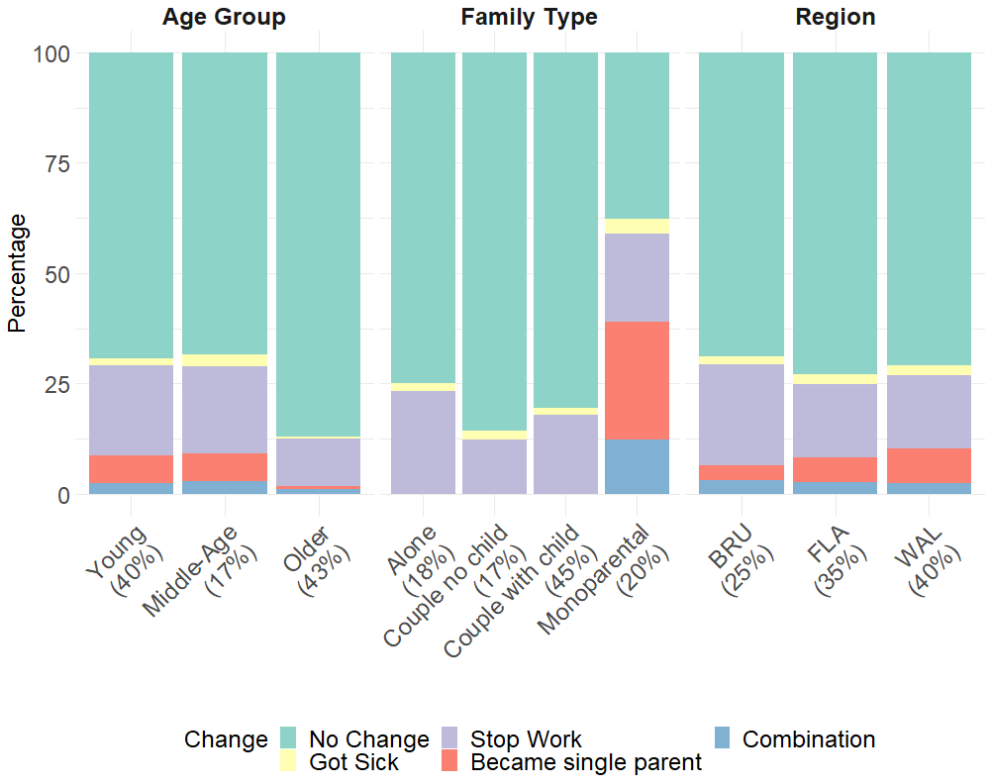
When we examine the share of individuals who remain poor in consecutive years, we notice that consecutive spells are preponderant for spells of any duration. For example, in all Belgian provinces, more than half of the individuals being poor for 3 years (out of 10 observed years) have been poor consecutively. Moreover, the likelihood of consecutive poverty increases with the total number of years spent in poverty, indicating that longer net poverty spells are more persistent, i.e., persistence increases with spell length.

5.2 Understanding Poverty Dynamics

To understand poverty dynamics, we examine how changes in poverty status are associated with other life events. This is in line with previous analysis by Biewen (2014) and Cappellari and Jenkins (2004), who investigated the relationship between life-event and the probability of entering poverty. Figure 3 illustrates the changes linked to transitions from non-poor to poor status, while Figure 4 focuses on transitions from poor to non-poor status. Specifically, we consider the following events: starting or stopping work (beginning or ceasing to receive income from employment or self-employment), becoming or ceasing to be sick (starting or stopping sickness benefits), becoming or ceasing to be a single parent, experiencing a combination of these events, or undergoing no other observable changes.

The descriptive analysis presented in Figures 3 and 4 is complemented by the survival analysis shown in Table 2. It is important to note that the sample used for Figure 3 consists of all events in which individuals entered poverty, whereas the sample for Figure 4 consists of all events in which individuals exited poverty. Focusing on changes in poverty status may lead to an overrepresentation of individuals who moved into and out of poverty multiple times during the observation period (2008–2017). Because these individuals are likely to experience greater life instability, the estimated association between life changes and poverty transitions may be overstated. The results should therefore be interpreted with this potential bias in mind.

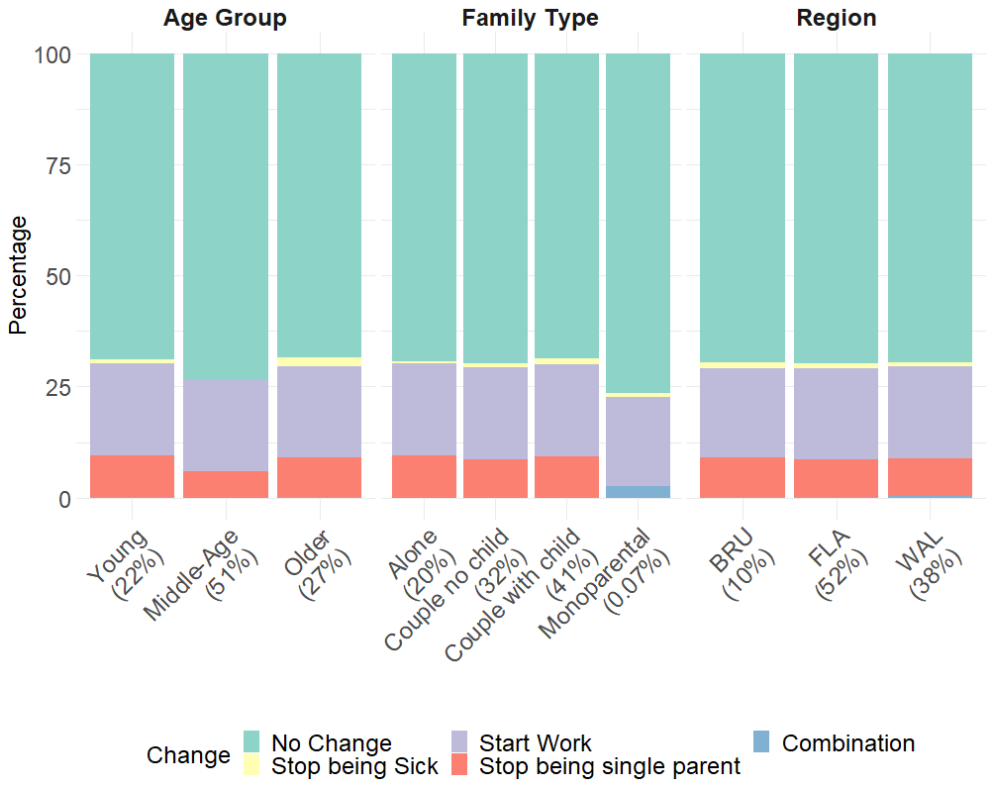
Fig. 3 This figure reports the proportion of individuals who experienced a change in family composition, working status, or health either in the same year as, or in the year prior to, a recorded transition into poverty. The analysis covers the period 2008–2017 and aggregates 59,169 such events, experienced by 15,611 unique individuals.



Results are presented separately by age category, family type, and region of residence. Age is grouped into three categories: Young (18–32), Middle-aged (33–59) and Old (60+). We adopt these groupings to capture broad life-cycle stages (entry into the labour market, prime working ages, and retirement) each of which may be associated with distinct mechanisms driving transitions into and out of poverty. Family type distinguishes household compositions (for example, single, couple with children, single parent) and region denotes the respondent's province of residence. Framing the analysis in these broad categories makes the results easier to compare across countries and institutional settings: life-cycle dynamics and household structures are common dimensions used in cross-national research, so our disaggregation helps identify which patterns are likely to be universal and which are shaped by national labour-market arrangements or social-policy regimes.

A substantial share of poverty transitions occurs without any concurrent, observable change in work, health, or family composition. This percentage is particularly high for older people entering poverty (87%) and couples with no children entering

Fig. 4 This figure shows the proportion of individuals who experienced a change in family composition, employment status, or health in the same year or in the year before a transition out of poverty (observation period 2008–2017). Across the period there were 59,461 events experienced by 33,361 distinct individuals.



poverty (86%). This suggests that many transitions into and out of poverty may be linked to other unmeasured factors, e.g., structural economic conditions, or cumulative disadvantages (Decancq, 2023; Vandecasteele, 2011).

Work-related changes are the most frequent observable correlate of poverty transitions. Stopping work is reported in about 20.3% of transitions into poverty among the young and in 19.6% among the middle-aged, but only in 10.9% of transitions for older people. Individuals living alone are especially exposed: 23.3% of their poverty transitions coincide with stopping work. Single parent households also show a high association with work interruptions (approximately 20%). At the regional level, Brussels Capital Region records the largest share of transitions associated with stopping work (22.96%), followed by Flanders (16.63%) and Wallonia (16.73%).

Changes in family status (becoming or ceasing to be a single parent) are also strongly associated with poverty transitions, particularly for young and middle-aged individuals; the incidence is much lower among older adults, likely because fewer people enter single parenthood at later ages.

At the contrary, start working is a major driver of escaping poverty, followed by becoming a single parent. But in this case the variation between population subgroups is much smaller, with the incidence of start working ranges between 20 nd 21% and the incidence of stop being a single parent ranging between 6% and 8% (except for people already in monoparental families).

Transitions out of poverty, instead, are most frequently associated with labour-market (re)entry, with incidence rates between 20% and 21% across the subgroups considered. The next most important observable correlate is stop being in a single parent family. Out of the individuals escaping poverty, between 6 and 8% also stopped being in a single parent family. This association likely reflects gains from household re-formation, increased earnings, or shared childcare responsibilities.

The prevalence of becoming sick is generally low (lower than 3%), also for individuals in the older age category . Only for monoparental rises to 3.2%). Stop being sick has also a low incidence, with shares lower than 2%, also for older people. The relatively low association between health status and poverty could be due to reverse causality (Economou & Theodossiou, 2011) or to an underreporting issue, as sick people often cannot 'allow' themselves to be sick (Van der Wel, Dahl, & Thielen, 2011). To verify this second hypothesis, we investigated whether receiving sickness benefits was more common among poor or non-poor individuals in our sample, finding no significant differences (3.99% for non poor and 3.36% for poor).

Experiencing a combination of life changes is relatively uncommon for both people who enter or escape poverty. For the event of entering poverty, the percentages are typically below 3.5%, with the exception of individual in monoparental families (who represents the 20% of people entering poverty), where the percentage rises to 12.3%. For people escaping poverty, the percentages are typically lower than 1%, and rise to 2.6% only for monoparental families. This result should not be interpreted as evidence that experiencing multiple events is less risky for individuals entering poverty. Rather, it reflects the descriptive nature of our analysis, which does not quantify the causal relationship or the strength of the association between multiple events and poverty transitions. Instead, the findings highlight how frequently individuals who enter poverty also experience other life changes within the same year or the year before, offering insights into the prevalence of such co-occurring events.

5.3 Survival Analysis

To better understand the timing of transitions into and out of poverty, we complement our descriptive and event-based analyses with survival analysis. Specifically, we implement Cox regression to model both the risk of re-entering poverty and the likelihood of escaping it (Table 2). Following the recommendation of the reviewer, the estimation samples are constructed to avoid left-censored spells: the poverty re-entry model is estimated on person-year observations for individuals who complete a poverty spell after 2008, while the poverty exit model is estimated on person-year observations for individuals who start a poverty spell after 2008. This ensures that all spell beginnings are directly observed, removing the bias introduced by spells already in progress at the start of the observation window. Standard errors are clustered at the individual level to account for the correlation of repeated observations within persons. The table

reports hazard ratios — values above 1 indicate a higher hazard (i.e., a shorter time to the event), while values below 1 indicate a lower hazard (i.e., a longer time to the event), relative to the reference category (Chen, Wu, & Zheng, 2024).

The hazard ratios for gender confirm that sex remains a relevant stratifying dimension in Belgian poverty dynamics (Lenaerts, Debruyne, Vandekerckhove, & Smits, 2020). Men face a 3.4% lower risk of re-entering poverty (HR = 0.966) and a 6.7% higher probability of escaping poverty (HR = 1.067) compared to women. While the effects are modest in magnitude, they are precisely estimated and point consistently toward a more favourable economic position for men, providing further evidence of persistent gender inequalities in the Belgian labour market. This provides new evidence confirming that the Belgian economy is still characterised by gender differences (Lenaerts et al., 2020).

Education displays a nuanced and partly counter-intuitive pattern for poverty re-entry. Remember that the level of education is retrieved from Census data relative to 2011 and assumed constant over the observation window. The reference category is people with No diploma. Relative to individuals with no diploma, those with primary education (HR = 1.203) or lower secondary education (HR = 1.221 for Secondary level 1; HR = 1.081 for Secondary level 2) actually face a *higher* hazard of re-entering poverty. Only university-level education provides a clear protective effect, with a hazard ratio of 0.742, corresponding to a 25.8% lower risk of re-entry compared to those with no diploma. For poverty exit, the gradient is more orderly: hazard ratios increase monotonically with education level, from 0.843 for primary education to 1.100 for university graduates, meaning that higher-educated individuals escape poverty significantly faster. The apparently elevated re-entry hazard for intermediate education levels may reflect that partial qualifications do not reliably translate into stable employment in Belgium, leaving individuals with low or mid-level credentials exposed to cyclical unemployment and precarious work arrangements. Together, these findings underscore the role of tertiary education specifically in breaking long-run poverty cycles, while pointing to a potential vulnerability gap for those who have acquired some, but not advanced, credentials.

Age is another critical determinant of poverty dynamics. Taking individuals younger than 25 as the reference, the 25–50 age group shows the highest hazard of poverty re-entry (HR = 1.994), followed by the 50–65 group (HR = 1.291) and the 65–75 group (HR = 1.237). Only individuals over 75 have a lower re-entry hazard than those under 25 (HR = 0.719). This finding likely reflects the economic cycle of prime working-age adults: individuals between 25 and 50 are most actively exposed to labour market risks such as job loss, household dissolution, or health shocks that can trigger poverty spells after a period of non-poverty. Regarding poverty exit, all older age groups show lower escape hazards relative to under-25s: the 65–75 group (HR = 0.578) and especially those over 75 (HR = 0.213) face substantially reduced probabilities of exiting poverty, likely reflecting their dependence on fixed pension incomes and limited labour market re-entry options (see also Saltkjel et al., 2023; Shakibaei & Gholami, 2023). These results thus convey a double vulnerability for older individuals: while they are less likely to re-enter poverty once out, those who fall into poverty face a very high degree of permanence.

Individuals of African origin face a 37% higher hazard of re-entering poverty (HR = 1.370) and a roughly 20.6% lower probability of escaping poverty (HR = 0.794) compared to Belgian nationals. Individuals originating from European countries outside Belgium also show elevated re-entry hazards (HR = 1.073) and reduced exit probabilities (HR = 0.935), as do those from other regions (HR = 1.197 and HR = 0.832 respectively). These disparities may reflect underlying structural inequalities in the labour market, where underrepresented groups encounter unequal access to employment opportunities, leading to persistent income disadvantage (Pager & Shepherd, 2008). Despite strong legal frameworks aimed at promoting equal treatment, such disparities persist in Belgium. Access to social networks and support systems also plays a role in economic resilience. Native Belgian communities may benefit from stronger social ties that provide financial and employment opportunities, whereas individuals of migrant origin might have more limited access to such networks, further constraining their ability to escape poverty.

Significant regional differences are also observed. Using Brussels Capital Region as the reference category, individuals living in Flanders have a 21.3% lower risk of poverty re-entry (HR = 0.787) and a 21.6% higher probability of escaping poverty (HR = 1.216). Wallonia also outperforms Brussels, with a 9.8% lower re-entry hazard (HR = 0.902) and a 12.6% higher exit hazard (HR = 1.126). These findings confirm the territorial concentration of poverty risk in Brussels, and are consistent with the descriptive patterns reported in Figure 2 and Table 1. They suggest the need to assess whether existing social policy frameworks sufficiently address the specific economic and demographic challenges of Brussels and the most disadvantaged Walloon provinces, taking inspiration from comparative analyses such as Minas et al. (2018).

When examining family characteristics, the results confirm that single parent families (the reference category) face systematically higher vulnerability relative to all other family types. The re-entry hazard is 3.0% lower for single individuals (HR = 0.970), 8.0% lower for couples without children (HR = 0.920), and 13.8% lower for couples with children (HR = 0.862). For poverty exit, single individuals and mono-parental families share similarly low escape hazards, while couples (both with and without children) show meaningfully higher exit probabilities (HR = 1.085 and HR = 1.073 respectively). These results highlight the economic disadvantage associated with single parenthood, particularly the reduced resource pooling and mutual support available to two-adult households (Harknett & Hartnett, 2011). Individuals living in households with a dependent with a disability also face elevated re-entry risk (HR = 1.051) and a 17.2% lower exit probability (HR = 0.828), reflecting the financial and care burden such situations entail.

Homeownership is associated with a 15.0% lower hazard of re-entering poverty (HR = 0.850) and an 18.8% higher probability of exiting poverty (HR = 1.188) relative to renting. This is consistent with the view that homeownership provides both financial stability and protection against housing market volatility, and can facilitate access to credit and other financial resources that reinforce economic resilience (see also Stephens & Leishman, 2017). By contrast, having at least some income from work has no statistically meaningful association with poverty re-entry (HR = 1.003), but is associated with an 18.0% higher probability of escaping poverty (HR = 1.180). The

absence of a protective effect of work income on re-entry, in contrast to its strong role in exit, may reflect the intermittent and precarious nature of employment among those who have previously been poor: occasional or low-intensity work may be sufficient to exit a poverty spell but may not durably prevent its recurrence.

Table 2 Cox proportional-hazards estimates of poverty re-entry and exit. Hazard ratios with cluster-robust standard errors (clustered on individual).

	Event = enter poverty	Event = escape poverty
	Hazard ratio	*Hazard ratio*
Gender (Ref:Female)		
Male	0.966*** (0.033)	1.067*** (0.029)
Education (Ref:No Diploma)		
Primary	1.203*** (0.114)	0.843*** (0.100)
Secondary (1)	1.221*** (0.112)	0.912*** (0.097)
Secondary (2)	1.081*** (0.112)	1.002*** (0.097)
University	0.742*** (0.115)	1.100*** (0.098)
Age (Ref:18 to 25)		
25 to 50	1.994*** (0.042)	0.904*** (0.039)
50 to 65	1.291*** (0.061)	0.914*** (0.051)
65 to 75	1.237*** (0.094)	0.578*** (0.081)
Over 75	0.719*** (0.128)	0.213* (0.113)
Origin (Ref:Belgium)		
Africa	1.370*** (0.058)	0.794*** (0.058)
Europe	1.073*** (0.048)	0.935*** (0.043)
Rest	1.197*** (0.110)	0.832*** (0.105)
Region (Ref:Brussels)		
Flanders	0.787*** (0.051)	1.216*** (0.047)
Wallonia	0.902*** (0.050)	1.126*** (0.047)
Family Type (Ref:Monoparental)		
Alone	0.970*** (0.054)	0.952*** (0.050)
Couple no child	0.920*** (0.061)	1.085*** (0.053)
Couple with child	0.862*** (0.043)	1.073*** (0.042)
Dummies		
Dependent with a disability	1.051*** (0.067)	0.828*** (0.059)
Home Ownership (vs Rent)	0.850*** (0.035)	1.188*** (0.031)
Some Work (vs No Work)	1.003*** (0.063)	1.180*** (0.080)
Person-year observations	61,679	38,806
Unique individuals	11,473	9,078
Note:		*p<0.1; **p<0.05; ***p<0.01

6 Conclusion

This paper examines the complex dynamics of long-term poverty in Belgium using a ten-year observation period from 2008 to 2017, based on linked administrative tax records, population registers, and census data. Our analysis underscores the value of a long-term perspective for capturing the full range of poverty experiences, while also highlighting the importance of a subnational lens to reveal geographical heterogeneity.

This approach allows us to shed light on both short-term and long-term poverty spells, providing a more nuanced understanding of poverty dynamics in Belgium. Although our empirical focus is Belgium, the design, characterised by longitudinal tracking with consistent definitions, explicit treatment of spells, and attention to regional variation, is directly applicable to other settings with administrative or panel data. As such, the findings and approach contribute to comparative work on poverty persistence beyond the Belgian context.

The findings point to substantial heterogeneity in Belgium, with marked differences by age, family structure, origin, province of residence, education, and homeownership. Young people and single parent households face elevated risks of both entering and remaining in poverty. Average poverty durations are longer in Brussels Capital Region and several Walloon provinces than in most Flemish provinces. Higher education, stable employment, and homeownership are associated with lower risks. Homeownership, in particular, is associated with greater economic resilience by providing financial security and stability during economic fluctuations.

Several limitations need to be acknowledged. First, the analysis is predominantly descriptive, which precludes strong causal claims about the determinants of poverty entry and exit. Future research could employ quasi-experimental designs, natural experiments, or instrumental variable approaches to uncover causal relationships and better isolate the effects of policy interventions, life-course events, or structural shocks on poverty dynamics. Second, our operationalization of poverty is largely income based. A genuinely multidimensional conception that incorporates health, education, housing quality, material deprivation, and psychosocial well-being would provide a more complete account of persistent disadvantage.

On the modeling side, it would be valuable to analyse the joint distribution and coevolution of deprivations. Examples include multistate or multivariate event history models for entries to and exits from multiple domains, joint hazards for income poverty and material deprivation with flexible dependence structures, and sequence or latent state models that characterise pathways through overlapping disadvantages. These approaches would clarify whether long income poverty spells coincide with sustained non monetary shortfalls, whether deprivations precede, accompany, or follow income losses, and which combinations are most persistent.

Finally, administrative data make such extensions feasible but also introduce design choices. Future work should ensure consistent definitions over time, harmonised thresholds, and secure linkage across registers that preserves confidentiality. Careful attention to these issues would enable a multidimensional, longitudinal portrait of poverty that complements income based results and strengthens the policy relevance of persistence estimates.

Appendix A Descriptive Statistics

Table A1 Descriptive statistics for categorical variables. All variables are measured in 2008, with the exception of except Education, which has been recorded in 2011.

Variable	Category	N	Perc.Freq
Sum of the net poverty spells (for those poor in 2008)			
	1	38634	76.9%
	2	2013	4.0%
	3	1452	2.9%
	4	1131	2.3%
	5	886	1.8%
	6	724	1.4%
	7	611	1.2%
	8	495	1.0%
	9	430	0.9%
	10	3889	7.7%
Sum of the out of poverty time (for those non poor in 2008)			
	1	11473	22.8%
	2	1256	2.5%
	3	874	1.7%
	4	709	1.4%
	5	729	1.5%
	6	544	1.1%
	7	621	1.2%
	8	519	1.0%
	9	454	0.9%
	10	33085	65.8%
Gender			
	Female	25888	51.5%
	Male	24377	48.5%
Education			
	No diploma	1219	2.6%
	Primary	4867	10.5%
	Secondary (1)	9484	20.4%
	Secondary (2)	13843	29.8%
	University	17029	36.7%
Age Category			
	18 to 25	6673	13.3%
	25 to 50	23213	46.2%
	50 to 65	12595	25.1%
	65 to 75	4886	9.7%
	Over 75	2898	5.8%
Origin			
	Belgium	41509	82.7%
	Africa	2455	4.9%
	Europe	5549	11.1%
	Rest	698	1.4%
Region			
	BRU	6694	13.7%
	FLA	23506	48.2%
	WAL	18536	38.0%
Family Composition			
	Monoparental	4939	9.8%
	Alone	8631	17.2%
	Couple no child	13589	27.0%
	Couple with child	23106	46.0%
Disability			
	0	45910	92.4
	1+	3771	7.6
Housing Status			
	0	12845	26.3
	1	36020	73.7
Work Status			
	Never Worked	2196	4.4
	Some Work	47487	95.6

Appendix B Discrete-time log-log estimates

As a robustness check on the Cox estimates reported in Table 2, we re-estimate the hazards of poverty exit and re-entry using a discrete-time complementary log-log (cloglog) model. The cloglog specification is the natural counterpart to a continuous-time proportional-hazards model when the underlying time axis is grouped into discrete intervals (in our case calendar years). It retains the proportional-hazards interpretation but explicitly models the *annual* hazard, which is arguably more appropriate given that poverty in our data is defined on annual taxable income. Unlike the Cox model, the cloglog specification also identifies the baseline duration-dependence pattern, which we discuss below.

We estimate the cloglog model on the same person-year samples used for the Cox estimates: for the exit model, person-years from individuals observed to start a poverty spell in some year $t_0 \in \{2009, \ldots, 2017\}$; for the re-entry model, person-years from individuals observed to end a poverty spell over the same window. We include semi-parametric dummies for each spell-year, which absorb the baseline duration dependence without imposing a functional form, and we cluster standard errors at the individual level to allow for multiple spells per person.

Table B2 reports the covariate coefficients. The eight spell-year dummies are included in the estimation but omitted from the displayed output; their joint contribution is summarized by the baseline hazard profile in Figure B1. Coefficient signs and significance are broadly consistent with those of the Cox estimates in Table 2: higher education, home ownership, employment income and older working-age categories are associated with longer time out of poverty and shorter time in poverty, while a non-Belgian origin (in particular African origin) and being a single parent at baseline are associated with the opposite. This concordance between two models that handle censoring and time differently lends support to the proportional-hazards interpretation underlying the main results.

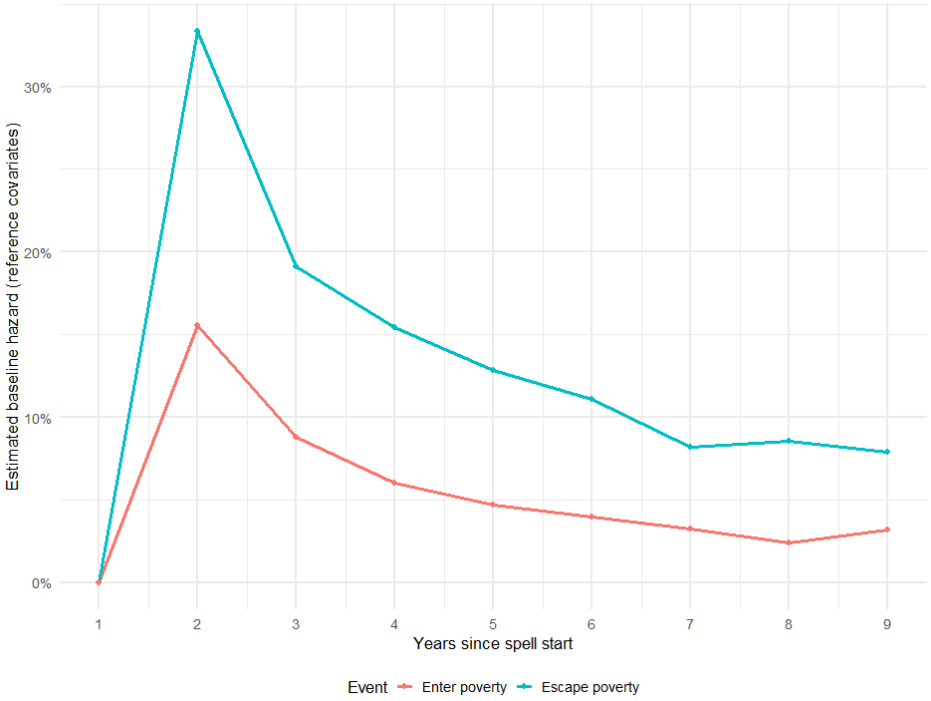
Figure B1 plots the estimated baseline hazard of each event by spell-year, holding covariates at their reference levels. Setting aside the year of spell start, both hazards decline monotonically with time at risk: the conditional probability of exiting poverty falls from approximately 33% in the second year of a spell to about 8% by year nine, and the conditional probability of re-entering poverty after an exit falls from approximately 16% to roughly 3% over the same window. This pattern of negative duration dependence is consistent with the wider literature on poverty dynamics, in which individuals who remain in or out of poverty for longer become progressively less likely to transition. It also reinforces a substantive point made in Section 3: the ten-year observation window is essential for documenting these later-spell hazards, which a four-year panel would entirely miss.

Table B2 Discrete-time complementary log-log estimates of poverty re-entry and exit hazards. Coefficients are log hazard ratios; cluster-robust standard errors (clustered on individual) in parentheses. Eight spell-year dummies are included but omitted from display; the baseline duration dependence is shown in Figure B1.

	Event = enter poverty	Event = escape poverty
	Hazard ratio	*Hazard ratio*
Gender (Ref:Female)		
Male	−0.035 (0.035)	0.066** (0.031)
Education (Ref:No Diploma)		
Primary	0.186 (0.128)	−0.173* (0.102)
Secondary (1)	0.200 (0.126)	−0.094 (0.099)
Secondary (2)	0.078 (0.126)	0.001 (0.098)
University	−0.298** (0.129)	0.096 (0.100)
Age (Ref:18 to 25)		
25 to 50	0.691*** (0.045)	−0.102** (0.041)
50 to 65	0.255*** (0.067)	−0.092* (0.052)
65 to 75	0.212** (0.102)	−0.552*** (0.086)
Over 75	−0.330** (0.137)	−1.553*** (0.116)
Origin (Ref:Belgium)		
Africa	0.316*** (0.062)	−0.232*** (0.058)
Europe	0.070 (0.051)	−0.068 (0.045)
Rest	0.181* (0.110)	−0.187 (0.115)
Region (Ref:Brussels)		
Flanders	−0.240*** (0.053)	0.198*** (0.049)
Wallonia	−0.104** (0.051)	0.120** (0.049)
Family Type (Ref:Monoparental)		
Alone	−0.031 (0.058)	−0.049 (0.052)
Couple no child	−0.084 (0.064)	0.082 (0.055)
Couple with child	−0.150*** (0.045)	0.072 (0.044)
Dummies		
Dependent with a disability	0.050 (0.072)	−0.191*** (0.063)
Home Ownership (vs Rent)	−0.163*** (0.037)	0.174*** (0.033)
Some Work (vs No Work)	0.003 (0.064)	0.167** (0.082)
Constant	−19.614*** (0.162)	−19.507*** (0.154)
Spell-year dummies	Yes	Yes
Person-year observations	53,950	31,225
Unique individuals	9,994	7,542

Note: *p<0.1; **p<0.05; ***p<0.01

Fig. B1 Estimated baseline hazard of poverty re-entry and poverty exit, by spell-year, from the cloglog models in Table B2. Hazards are evaluated at the reference categories of all covariates. By construction, the duration counter equals 1 in the calendar year in which the spell begins, and no event can occur in that year because both events require a transition between two consecutive years; the substantive pattern of duration dependence is therefore visible from spell-year 2 onwards.



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