2. Research proposal

2a. Description of the proposed research (max. 2000 words on 5 pages)

2a1. Overall aim and key objective

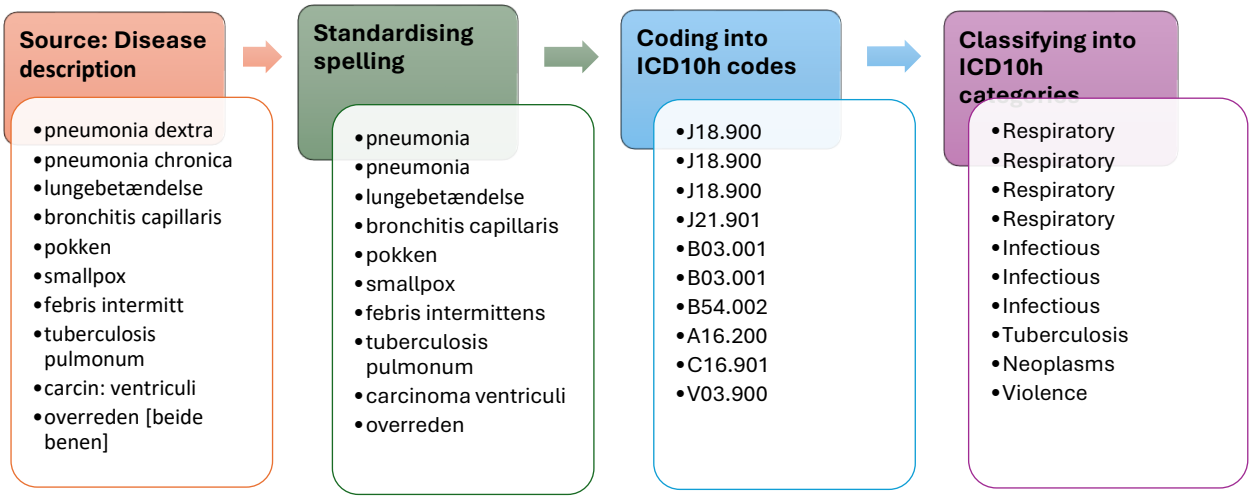
Current inequalities in health painfully demonstrate that not everyone has benefited equally from the advancement in health the world has made in the past 200 years (Deaton 2015). Death, sometimes called the great equaliser, is in fact the opposite as the timing and cause of death are not distributed randomly. Fundamental cause theory assumes a constant relationship between social status and health outcomes despite structural social changes (Clouston & Link 2021). Yet, recent research argues that structural inequalities between social groups have arisen from the late nineteenth century and still persist today (Mackenbach et al. 2017; Bengtsson et al. 2020). Still, there is much uncertainty on what the socio-economic, cultural, and environmental roots are for divergences in mortality and health from the nineteenth and early twentieth century onwards. While some emphasise that mainly economic growth has led to a higher standard of living, others argue that improved sanitary facilities or public health measures were paramount (Mackenbach 2020). These disagreements stem from three major challenges in the academic field. Firstly, studies often rely on **inadequate sources and data**: all-cause mortality or national aggregates grouped into nineteenth-century disease categories (Janssens & Devos 2022). Secondly, when individual-level causes-of-death are used, most adopt a narrow **single-city or national focus** (Ramiro Fariñas & Oris 2016). Thirdly, the focus is on **mortality only**, while **morbidity** is crucial in understanding determinants of health inequalities. As a result, these studies are not able to unravel the mechanisms behind health inequalities along socioeconomic, cultural and gender divides. Addressing these three limitations will therefore transform our understanding of which determinants have historical roots and still influence social differences in health today. Likewise, it not only provides more insight in how and why people died in the past, but also the conditions under which they lived.

My research solves these previous limitations using a **comparative mixed methods approach** to **study the determinants of health inequalities in Amsterdam, Copenhagen, and Glasgow between 1850-1950** (see Table 1)**.** In this timeframe, the most substantial decline in mortality took place. The rationale behind choosing these specific cities in Western Europe is partially pragmatic: **high-quality source material** was made available during recent mass-digitation efforts of **cause-of-death and patient records**. Their availability, soon also in databases, allows to **combine the study of both mortality and morbidity using individual-level information**. To overcome problems of comparability of diseases, my project scales-up a pilot-infrastructure: the Historical International Classification of Diseases (ICD10h). This makes it possible to standardise, code, and classify individual descriptions of diseases (from different languages) into a couple of basic disease classifications (Janssens 2021; Janssens & Riswick 2023) (see Figure 1). Advanced quantitative methods (multinominal regression and competing risks event history models) are applied to disentangle the importance of specific determinants for these disease classifications. Still, qualitative sources are essential to formulate hypotheses and interpret results. In particular medical reports, yearly governmental reports, newspapers, and medical dictionaries are analysed next to civil registries and patient records. The selection of these cities for the availability of their source material is therefore not merely advantageous, but imperative for ensuring the feasibility and innovation of the project methodologically: it adds new perspectives on how both fatal and non-fatal diseases attributed to health inequalities during the epidemiological transition.

Table 1: Overview of selected cities

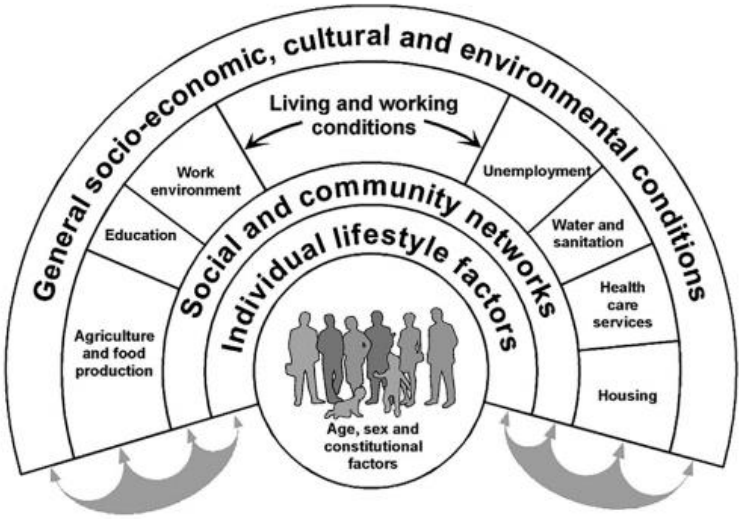
	Amsterdam	**Copenhagen**	**Glasgow**
Time period	1854-1950	1861-1942	1856-1950
Population	224.000 -> 835.000	155.000 -> 760.000	370.000 -> 1.089.000
Cause-of-death records	Doodsoorzakenregister	Begravelseprotokoller	Statutory Registers of Deaths
Patient records	Binnen- and Buitengasthuis	Blegdams and Øresundshospitalet	Glasgow Royal Infirmary and Royal Hospital for Sick Children
Databases	Amsterdam Cause-of-Death Database and Amsterdam Patient Record Database	The Copenhagen Burial Register Database	Scottish Historic Population Platform - Digitising Scotland

Figure 1: Process from source to ICD10h classification with some examples



Besides the availability of source materials, these specific cities also offer theoretical advantages. In particular, ports functioned as **hubs for the transmission of contagious diseases** (Janssens and Walhout 2018). During the period 1850-1950, they were characterised by high endemic and epidemic disease burdens, high rates of population turnover, vast economic change, and public health advances. In many ways, all shared similar socio-economic and cultural developments occurring across the North Sea basin. Yet, **each city also differed in the specific manner in which health transition-related developments unfolded.** For instance, Glasgow was one of the unhealthiest places in the United Kingdom, seriously lagging behind other British cities from the late nineteenth century onwards (Walsh et al. 2016). In contrast, Amsterdam was a forerunner in terms of public health policies and medical knowledge (Lammertink 2023), while Copenhagen remained a metropole with a high urban mortality penalty compared to its rural countryside (Villefrance-Perner 2024). The geographical focus on these specific Western European cities will therefore offer the opportunity for a contextualised exploration of differences within similar modernising societies, making it possible to assess whether, how and why specific determinants contributed to cause-specific health disparities. This is reflected in the theoretical model (see Figure 2). This model allows investigating differences between individuals, social groups and neighbourhoods within cities, and the socio-economic, cultural and environmental conditions between cities (Dyar et al. 2022). In other words, **emphasis is on the role that local factors/conditions play in specific diseases and how their impact may have changed over time**. For instance, factors may affect mortality and morbidity directly (e.g. contaminated water, specific health policies), or indirectly (e.g. living standards, poverty, labour conditions, religion) depending on the type of disease and time period.

Figure 2: Determinants of health inequalities



Note: General conditions are different for each of the cities, while studying the living and working conditions, social and community networks, individual life style factors and constitutional factors within each city. They form the basis of understanding why some inequalities in health along socioeconomic, cultural and gender divides existed (Dahlgren & Whitehead 2021).

To advance the comparative analysis this project focuses not only on the determinants for several informative (ICD10h) disease categories, but also **four specific diseases are examined in depth: tuberculosis, measles, smallpox, and cholera**. These specific disease categories provide detailed clues to which determinants cause health inequalities. Tuberculosis is frequently understood in relation to the nutritional status or labour circumstances of individuals. Chronic malnutrition, overcrowding and poverty aggravated measles, often leading to mortality among young children. Vaccination played a key role in determining who was effected by smallpox amid factors like overcrowding and wealth. Cholera, by contrast, is closely linked to inadequate access to clean water because of infected water sources and sanitation facilities (Hardy 1993; Muurling et al. 2023). Moreover, both endemic and epidemic diseases are studied to observe how health disparities may be differently affected. In particular epidemic diseases acted as a 'societal shock', meaning that either they functioned as a great equaliser affecting everyone, or increased already existing health disparities (Riswick et al. 2022).