Summary

During the last decades public health has improved substantially in developed countries. This improvement has lead to lower morbidity and higher life expectancy. However, large health inequalities still remain within these countries. These inequalities are related to socioeconomic status: on average, persons from higher socioeconomic classes have better health. Still a lot remains unknown about the mechanisms underlying this strong relation between socioeconomic status and health.

Health at later ages depends on a large number of determinants. Important examples are income, education, genetics, lifestyle, major events and access to medical care. This thesis focuses on another important factor, i.e. the conditions very early in life. Recently, the importance of this stage has been shown by several studies. These long-run effects also have implications for the effectiveness of social policies. The benefits of interventions at early-ages accumulate over the life course and are reaped over a long period of time, whereas interventions at later ages may be less efficient.

Research on long-run effects of conditions early in life is hampered due to two main methodological issues. First, the nature of early-life conditions is endogenous. Variables that are often unobserved in the data, like genetic information, jointly affect early-life conditions and health later in life. Therefore, it is difficult to estimate causal effects of early-life conditions. Second, there is a limited amount of data that cover both conditions early in life and later-life outcomes due to the required window of observation. A way to deal with these issues is using historic events that have an impact on later-life outcomes but only through the effects of conditions early in life. These events are called natural experiments in the economic literature.

Early-life conditions may have long-run effects on health both directly and indirectly. Direct effects imply a direct biological link between early-life conditions and later-life health. Much attention is given to the health of the mother during pregnancy, i.e. the in utero or prenatal stage. The development of the fetus may be harmed when pregnant women are exposed to adverse conditions and this increases the risk for chronic diseases later in life. Indirect effects entail that risks to health gradually accumulate over the life course. There is cumulated damage on health as the number, duration and the severity of exposure to risk factors grows over time. Examples of such risk factors are poor nutrition
and stressful events. Moreover, there are critical developmental periods in which people are more sensitive to health risks.

During their lives individuals are exposed to major adverse events (or shocks). Examples are divorces, the death of a spouse and financial problems. Such major adverse events may be important in the observed relation between early-life conditions and health later in life. Possibly, individuals growing up in adverse conditions are more likely to encounter such adverse events. Another possibility is that the effects of such events on health are larger after exposure to adverse early-life conditions.

This thesis examines the interplay between early-life conditions, major events and health later in life. It consists of two parts. The first part (Chapter 2) investigates long-run effects of adverse conditions very early in life on health and labor market outcomes later in life. The second part (Chapters 3 and 4) examines whether major adverse life events occur more often and have larger effects on health for those individuals who were exposed to adverse conditions early in life, like maternal malnutrition during pregnancy or poverty around the moment of birth.

Chapter 2 analyzes the effects of prenatal malnutrition on hospitalization and labor market outcomes. This study uses the Dutch Hunger Winter famine of 1944-1945. This tragic event is usable as a natural experiment because of a number of characteristics, like its short duration. Exposure to the famine is determined by the location and date of birth, for example a birth in the western part of the Netherlands in the months following World War II. The study analyses the three trimesters of gestation separately to study the importance of critical periods in the fetal development. The analyses indicate that the males who were exposed to the famine during the first trimester of gestation have lower labor market participation rates. For the males who are active on the labor market, there is no effect of exposure to the famine on labor income. The results for hospitalization outcomes show that the aggregated number of hospitalizations of those males who were exposed to the famine during any trimester is higher. The cardiovascular-specific hospitalization rate of those who were exposed in the second trimester of gestation is also higher. However, no significant effects on cancerspecific hospitalizations are found. Finally, the relatively small number of individuals who are born during and shortly after the famine and are still alive at age sixty point to selection at the moment of conception, during gestation or over the course of life. This selection presumably results in an underestimation of the true famine effects.

Chapter 3 studies the impact of exposure to adverse economic conditions early in life on the effects of major shocks on later-life physical health. The major shocks include the onset or relay of chronic diseases, the death of a spouse, the death of a family member and the illness or accident of a partner. The number of functional limitations is selected as indicator for physical health. The study uses the stage of the macroeconomic cycles at birth as a source of variation in early-life conditions. The results indicate that the impact of the onset or relay of chronic diseases on the number of functional limitations is larger for
those individuals born during a recession. This implies that adverse economic conditions at birth magnify the impact of adverse shocks later in life. Moreover, the health stock of the individuals who are born in a recession is relatively poor. The analyses do not show effects of economic conditions early in life on the frequency of the major adverse life events.

Chapter 4 examines whether the effects of major adverse events on health later in life are larger after in utero malnutrition. The events are the death of a spouse, a divorce and the death of a child. This study also uses individuals who are born during or around the Dutch Hunger Winter famine. Hospitalization is adopted as measure for health. The results indicate that poor conditions early in life increase the occurrence of shocks at later ages. Those who were prenatally exposed to the famine are more likely to face the death of a spouse. The analyses also show that the impact of the death of a spouse on hospitalization is magnified after in utero malnutrition. These results jointly imply that the increased occurrence and magnified impact of shocks contribute to the long-run relation between in utero malnutrition and health later in life.

This thesis is relevant for the following reasons. The results point at the importance of conditions early in life. This emphasizes the importance of providing good education and guidance to pregnant women. The results also have implications for the demand for health care and labor market productivity of currently aging cohorts. Knowledge of long-run effects of adverse conditions early in life is as well important for the targeting of policy programs. The productivity of programs aimed at young individuals is presumably relatively high. Finally, the chapters provide insight into the health effects of major life events and ease the identification of individuals who are most vulnerable to these shocks.

This thesis provides two main conclusions. In utero malnutrition has long-run effects on hospitalization rates and labor market participation. Furthermore, a differential impact of major adverse life events is an underlying part of the widely documented relation between early-life conditions and health later in life.