Determinants of mortality – findings of the Study of Health in Pomerania (SHIP)

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This study analysis the effects of medical, social, environmental, and behaviourally health factors on individual mortality risk, using for the first time the information from the prospective Study of Health in Pomerania (SHIP). A second objective is to test the representativeness of the SHIP-sample regarding on the observed mortality for the basic sample population of Pomerania.

Pomerania is a region in the northeast of Germany. The SHIP is one of the very few prospective studies (including a mortality follow-up) in Germany and the only one within the territory of the former GDR. Between 1997 and 2001 a sample of 7,006 men and women aged 20 to 79 years was drawn in two steps: 32 communities in the region were selected, and were followed by a simple random sample within the communities, based on the residence registries and stratified by age and gender. The first survey included medical examination, health-related interview, and a health-risk-related questionnaire. The final sample size was 4,308 persons. A second survey with almost the same examination procedure followed during the years 2001 to 2005 for 3,300 persons of the first wave. Mortality follow-up information are available for all persons of the initial sample (n = 7,006). During an observation period between October 1997 and July 2009 1,076 person died, including 469 deceased persons, who participated at least on the first survey.

Studies, which investigating mortality risk factors, revealed a high number of health determinants, which can be differentiated into socioeconomic (e.g., Zajacova, 2006; Lynch et al., 2004; Lauderdale 2001), behavioural (e.g., Bessaoud/Daurès, 2008; Mukamal et al., 2006; Freedman et al., 2006) and hereditary (e.g., Little et al., 2009; Gjonça/Zaninotto, 2008; Terry et al., 2007; Dellera et al., 2004; Schächter et al., 1994) factors. The existence of an inverse relationship between SES and mortality or respectively the aetiology for specific diseases was demonstrated by a multitude of prospective studies (e.g., Mäki/Martikainen, 2008; Elo et al., 2006; Thurston et al., 2005; Klein et al., 2001; Blakely et al., 2000). However, regarding the causation and selection hypothesis the direction of interdependency remains vague. Furthermore the question, if the relationship between SES and mortality risk weakens with increasing age has not yet proved satisfactory (Huisman et al., 2004, 2005; Lynch, 2003; Lauderdale, 2001). Beside SES and its influence on mortality risk, there is a substantial literature according to health behaviour and lifestyle characteristics, which interacts with SES.

Smoking, alcohol consumption, nutrition, physical activity, stress, marital status, social networks, health prevention behaviour, and sleep are known to be related to morbidity and mortality risks respectively. Smoking, with more than 60 carcinogenic ingredients (cf. Hecht 2003: 735), shows potentially the most negative effect on survival probability (e.g., Gong et al., 2008; Freedman et al., 2006; Koon et al., 2006; Chao et al., 2000). Compared to the clear impact of smoking, the effect of alcohol consumption on morbidity/mortality is more complex but describable in more detail concentrating on specific diseases or causes of death and the amount of alcohol consumption (e.g., Bagnardi et al., 2008; Linton et al., 2007; Friesema et al., 2007; Schminke et al,. 2005). Beside this, physical activity appears to be an independent predictor of mortality risks. A high level of sport activities is positive related to lower the risk of morbidity and mortality (e.g., Chakravarty et al., 2008; Chipperfield, 2008; Noda et al., 2005) or dementia (Middleton et al., 2007). Protective effects on morbidity and mortality are also given by one's individual social ties (Kuper et al., 2002, 2006; Ceria et al., 2001; Avlund et al., 1998; Rosengren et al., 1993). As a special relationship marriage protects against stress and low emotional or instrumental support (e.g., Wilson/Oswald, 2005; Brockmann/Klein, 2004; Lund et al., 2004; Cheung, 2000; Murray, 2000), which are known to be related to higher mortality risk (e.g., Chandola et al., 2008; Öhlin et al., 2004). An association between sleep duration and mortality was first described over 40 years ago (cf., Hammond, 1964). Meanwhile a substantial number of studies have generally confirmed the presence of a U-shaped association between sleep and mortality risk (e.g., Gangwisch et al., 2008; Ferrie et al., 2007; Patel et al., 2004; Tamakoshi/ Ohno, 2004).

Along with the mentioned and much more available individual information on social, socioeconomic and behavioural characteristics, the SHIP affords an opportunity for a comprehensive morbidity and mortality analysis in a longitudinal setting. First, we want to identify those factors which determine the mortality risk of people in Pomerania (as a part of the former GDR). We investigate the impact of 24 potential mortality risk factors (age, cohort, sex, hereditary disposition, education level, household net income, occupational status, experience of unemployment, marital status, social ties, self-rated health, stress, sleep duration, weekly sportive activity, smoking status and history, amount of alcohol consumption, BMI, WHR, nutrition, and medical covariates). We apply event-history analysis with a model for the force of mortality as the outcome variable. The models include as baseline hazard for age a Gompertz function.

A second aim is to test the representativeness of the SHIP-sample regarding on the observed mortality to the Pomerania population. Longitudinal datasets exhibit panel attrition

when time proceeds. This reduces the sample size and may hamper its representativeness with respect to the corresponding basic population. Recent studies confirm that persons with a lower social status are lost to follow-up from longitudinal studies more frequently than persons with a higher social status (cf., Harald et. al. 2007; Young et al. 2006). Such observations make it necessary to test the remaining sample's mortality on basic population representativeness. We use the concept of Relative Survival to control for the heterogeneous composition of the sample population. We calculate the expected number of survivors that would occur given the real survival of the general population during the observation time.

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