

UMEÅ UNIVERSITY MEDICAL DISSERTATIONS
New Series No. 828 ISSN 0346-6612 ISBN 91-7305-395-3

From Epidemiology and Public Health Sciences, Department of Public Health
and Clinical Medicine, Umeå University, SE-901 85 Umeå, Sweden

LONE PARENTING, SOCIOECONOMIC CONDITIONS AND SEVERE ILL-HEALTH

Longitudinal register-based studies

Gunilla Ringbäck Weitoft



Epidemiology and Public Health Sciences
Department of Public Health and Clinical Medicine
Umeå University, Umeå, Sweden



EPIDEMIOLOGISKT CENTRUM
SOCIALSTYRELSEN

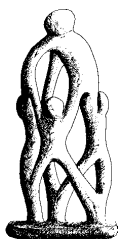
Centre for Epidemiology
National Board of Health and Welfare
Stockholm, Sweden

ISSN 0346 – 6612 ISBN 91-7305-395-3
Copyright: Gunilla Ringbäck Weitoft

Cover painting: From the cartoon “Ensamma mamman”,
author Cecilia Torudd, with her permission

* What makes *me most* miserable is that there’s never enough money,
I can’t control the kids, I’m so entirely alone, I get treated like dirt and
everything’s just hell. What makes *you most* miserable?

Printed in Sweden by Print & Media, 2003



Epidemiology and Public Health Sciences
Department of Public Health and Clinical Medicine
Umeå University, SE-901 87 Umeå

ABSTRACT

The general aims of this dissertation are to analyse how family situation, and especially lone parenting, influence health and life chances in Sweden and the extent to which possible relations are influenced by socioeconomic circumstances and health selection.

In two population-based cohort studies we analysed overall and cause-specific mortality (1991-95), and also severe morbidity (1991-94) from different causes among lone mothers in comparison with mothers with partners. Information on the mothers was obtained from the Swedish Population and Housing censuses of 1985 and 1990. The outcomes considered were death or utilisation of (overnight) hospital care, with data taken from population-based national health registers. In the analyses we adjusted for socioeconomic and demographic circumstances, such as socioeconomic status, country of birth, receipt of social-welfare benefit, and housing situation. To take health-selection effects into account, we adjusted for previous inpatient history (1987-90). Our findings suggest that lone motherhood entails health disadvantages with regard to mortality, severe morbidity and injury. Socioeconomic circumstances were found to play a major role in accounting for increased risks, but the risks are partly independent of both socioeconomic conditions and health selection into lone motherhood.

In two further studies we analysed mortality (1991-98), severe morbidity and injury (1991-99), and also educational achievement (in 1998 at ages 24-25 of offspring), of children who had lived in lone-parent families in comparison with children in two-parent families. We mainly used data from the Swedish censuses and national health-data registers. Living in a lone parent family was found to be associated with increased risks of a variety of unfavourable outcomes: psychiatric disease, suicide/suicide attempt, injury, addiction, and low educational attainment. Relatively poor educational performance and also health disadvantages are explicable to a large extent by socioeconomic conditions, especially a lack of economic resources (as measured here by receipt of social-welfare benefit and having rented accommodation). Educational achievement

among children varies with cause of lone parenthood, with the best prospects found among the children of widows/widowers.

In a fifth study we analysed mortality from different causes (1991-2000) among lone fathers (fathers with and without custody of their children) and childless men (with and without partners) in comparison with cohabiting fathers with children in the household. For this purpose we linked information from the Swedish censuses of 1985 and 1990 to Sweden's Multi-Generation Register (which contains information about all known biological relations between children and parents). Lone non-custodial fathers and lone childless men suffer from the most pronounced elevated risks, especially of death from injury or addiction, but also from all-cause mortality and death from ischaemic heart disease. Being a lone custodial father also seems to entail an increased mortality risk, although generally to a much lesser degree, and not for all outcomes studied. The elevated risks for all subgroups fell when variables assumed to control health selection and socioeconomic circumstances were introduced into the initial regression model employed. However, even following adjustments, significantly increased risks, albeit greatly attenuated, remained in all the subgroups investigated.

Key Words: Single parent, single mother, single father, children, risk factor, socio-economic status, mortality, morbidity, injury, psychiatric disease, education, epidemiology, longitudinal

LIST OF PUBLICATIONS

The dissertation is based on the following papers which will be referred to in the text by their Roman numerals:

- I. Ringbäck Weitoft G, Haglund B, Rosén M. Mortality among lone mothers in Sweden: a population study. *Lancet* 2000;355:1215-19.
- II. Ringbäck Weitoft G, Haglund B, Hjern A, Rosén M. Mortality, severe morbidity and injury among long-term lone mothers in Sweden. *Int J Epidemiol* 2002;31:573-580.
- III. Ringbäck Weitoft G, Hjern A, Haglund B, Rosén M. Mortality, severe morbidity, and injury in children living with single parents in Sweden: a population-based study. *Lancet* 2003;361:289-95.
- IV. Ringbäck Weitoft G, Hjern A, Rosén M. School's out! Why earlier among children of lone parents? Manuscript.
- V. Ringbäck Weitoft G, Burström B, Rosén M. Premature mortality among lone fathers and childless men. Manuscript.

All papers are reprinted with the permission of the respective copyright holders.

“Contemporary Western medicine is likened to a well-organized, heroic, and technologically sophisticated effort to pull drowning people out of a raging river. Devotedly engaged in this task, often quite well rewarded, the establishment members never raise their eyes or minds to inquire upstream, around the bend in the river, about who or what is pushing all these people in.”

Aaron Antonovsky, from “Unraveling the mystery of health”, page 89

CONTENTS

ABSTRACT	III
LIST OF PUBLICATIONS	V
CONTENTS	VII
INTRODUCTION AND AIMS.....	1
Outline of the dissertation	2
Aims of the dissertation.....	3
BACKGROUND	5
Family situation and health.....	6
Differences between men and women	7
The effect of parenting	8
Lone parents	9
Children of lone parents	11
Lone mothers and social policy.....	14
Social determinants of health and selection mechanisms.....	16
MATERIAL AND METHODS	21
Data sources.....	21
Seeking knowledge from registry data	24
Design of the studies	28
Paper I	29
Paper II.....	30
Paper III.....	31
Paper IV	32
Paper V.....	35
Conceptual framework for the studies.....	37
Sociodemographic characteristics – potential confounders.....	38
Age	38
Sex.....	39
Socioeconomic group.....	40
Education.....	41
Country of birth.....	41
Place of residence.....	41
Previous illness among subjects – control for health selection.....	42
Parental illness	42
Sociodemographic characteristics – potential mediators.....	43
Number of children	43
Receipt of social-welfare benefit.....	43
Receipt of unemployment benefit	43
Housing	44
Outcome variables.....	45
Paper I	45
Paper II.....	46
Paper III.....	46
Paper IV	48
Paper V.....	48
RESULTS.....	49

Aim 1: Mortality and severe morbidity and injury among lone mothers (papers I and II)	49
Analyses of mortality	49
Analyses of severe morbidity and injury	50
Aim 2: Mortality, severe morbidity, injury and educational attainment – are there differences with regard to outcome between children living with lone or partnered parents? (Papers III and IV)	52
Analyses of mortality, severe morbidity and injury	52
Analyses of educational attainment	55
Aim 3: Family situation and mortality among men (Paper V)	56
DISCUSSION	60
Strengths and limitations of the studies	62
Alternative explanations	65
Future research	70
CONCLUSIONS	73
ACKNOWLEDGEMENTS	74
REFERENCES	76

INTRODUCTION AND AIMS

Personal family situation is an important indicator of problems concerning welfare, health status and security. Over the past decades the proportion of lone-parent families has increased substantially in Sweden, and also in other Western countries. Today, more than 20% of all Swedish families are headed by a lone parent. Although studies show that Swedish lone parents have an economically more favourable situation than their counterparts in other countries, many findings indicate that their situation is still disadvantageous [1-4] Relying on one income, lone-parent families are to a greater extent dependent on public subsidies. Receipt of social-welfare and housing benefit is far more common among lone-parent families than among other families, and studies consistently show that lone parents often face a variety of welfare problems at one and the same time. Some analyses also indicate that their financial situation, relative to others, has deteriorated over the last decades [4-6].

Since there is a well-established link between socioeconomic status (SES) and health, it is not surprising that research findings point to the over-representation of people in poor health among both grown-ups and children in lone-parent families. The relevant studies of lone mothers have mainly focused on self-reported health [7-13] and only a few have reported on health conditions among Swedish mothers [2, 5, 14, 15]. However, although there are many reports of strong (statistical) associations between lone parenting and health, the direction of the relationship is far from fully established. There are for instance several problems involved in disentangling whether lone parenting is a risk factor for disease per se or whether disease select people into lone parenthood?

Outline of the dissertation

The main outcomes focused upon in this dissertation are mortality, severe morbidity and injury among women, children and men in lone-parent families relative to the same groups in two-parent families. Data on deaths and hospital-discharge records have been employed to examine these outcomes and some associated factors. Differences with regard to educational achievement among children of lone parents are also addressed in one of the specialised studies. One objective was to estimate the magnitude of the relation between family situation and health, another to analyse the extent to which this might mirror differences with regard to socioeconomic circumstances and health selection. Paper I focuses on mortality among lone mothers, while paper II addresses data on hospitalisation, with regard to both severe morbidity and injury. Paper III addresses mortality, severe morbidity and injury among children in lone-parent families, while Paper IV is concerned with differences in educational achievement among children. Finally, Paper V focuses on the effects of family situation on health among men.

The dissertation is exclusively based on routine statistics from health-data registers and other surveys covering the entire Swedish population. Sweden's long tradition of collecting data on deaths and diseases, and the employment of health-data registers of high quality with full population coverage, create exceptional opportunities for research in the Nordic countries. A unique national registration number, personal identification number (PIN), is assigned to each inhabitant, and is used in the country's population-based registers. This individual identifier makes it possible to link information between different data sources. Record headers in the final data set used for the purposes of the studies in this dissertation were deleted after individual record linkages, thereby making it impossible to identify any specific person. In our analyses we have taken advantage of the opportunities offered – using routinely collected data – to adopt a

longitudinal approach, to cover a broad range of background characteristics, to have a low dropout rate, and to obtain full population coverage of an entire country. Despite all these advantages, however, there are limitations to the studies, which will be discussed later. However, whereas other designs may elucidate mechanisms and processes on the individual level, the approach employed in this dissertation, rather give indications of structural factors of importance, over and above thousands of individual life stories.

The aims of the thesis are presented immediately below, followed by a background presentation of research within the field of family situation and health, covering differences between men and women, the effects of parenting, and the health of lone parents and their children. Thereafter there is a section addressing lone mothers and social policy, and finally one that considers the issues of social determinants and selection mechanisms in relation to health.

The Material and Methods chapter contains a description of the data sources employed, and also a description of how knowledge can be obtained from registry data. Thereafter, there are accounts of the designs of the studies and statistical analyses, the conceptual framework employed, the sociodemographic variables used, and the outcome variables considered. The results of the separate studies are then presented, followed by a discussion.

Aims of the dissertation

The general aim of the studies in this dissertation is to analyse how family situation influences health and life chances in a population by using a combination of health-data and statistical registers mainly based on routine collection.

The following specific questions are posed:

1. Is there a difference with regard to mortality and severe morbidity between lone mothers and mothers with partners, and to what extent are any differences influenced by differing socioeconomic circumstances and health selection? (Papers I and II)
2. Is there a difference with regard to mortality and severe morbidity and educational attainment among children in one-parent households in comparison with children living with two adults? To what extent are possible differences affected by differences in parents' socioeconomic circumstances, severe morbidity, psychiatric disease and addiction? (Papers III and IV)
3. To what extent do men's mortality risks vary with family situation? More specifically: Do lone fathers show increased mortality risks in comparison with fathers with partners. Do risks differ between lone fathers who live with their children and those who do not? What are the relative risks of mortality among lone and cohabiting men without any biological children? To what extent do health-selection effects and differing socioeconomic circumstances contribute to any mortality-risk differences? (Paper V)

BACKGROUND

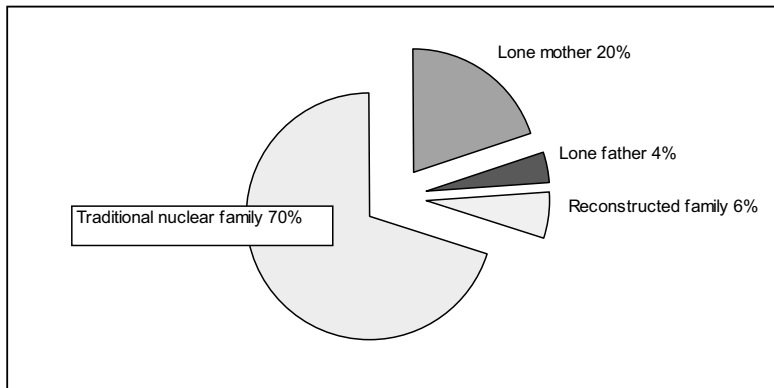
There were more than one million families with children in Sweden in 1999, of which more than 20% were headed by a lone parent. About 70% of all children aged 0-17 still live in a traditional nuclear family, but the proportion is decreasing. In 1970 about 75% of all 17 year-olds were living with their original parents; by 1999 the proportion had fallen to 65% [16].

Statistics Sweden estimates that there are about 250,000 lone-parent families in the country, of which 40,000 are headed by a father. Figure 1 shows the percentage distribution by household type. Population-based annual registers cannot give exact numbers for different family types; the numbers vary somewhat according to data source used. For example, it is not possible to identify cohabiting people without children together as couples.¹ This leads to an over-estimation of the number of lone parents because a woman who is living together (without being married) with someone other than her child's biological father will be classified as a lone mother. Sweden's survey of living conditions (ULF) for 1998/99 suggested that 18% of all 0-17 years lived with a lone parent, whereas population statistics report a corresponding figure of 21% [16].

A further problem when estimating the prevalence of lone motherhood or fatherhood is to decide at what age a dependent child enters adulthood. In Sweden today this age is usually regarded as 18 years, but other ages have been used over time. Also, there may be difficulties in determining who has the custody of a child. According to Swedish law, the default case in separation is joint custody, but it is much more common that the child continues to live with the mother. But, irrespective of with

¹ The population-based annual registers tell us whether married people live together, whether children are living with one or both of their biological parents, and whether unmarried people with children are registered on the same property.

which of the parents the child is registered, he or she may spend (more or less) equal time with both parents (so-called alternate living). Information on this is not available when using Swedish register-based data in research. We only have information about the household in which the child is registered. The parents in such households will, somewhat inappropriately, here be referred to as custodial parents, while biological parents who do not live with their children will be defined as non-custodial (despite the facts that parents may have joint custody and their children practise alternate living) [1, 16].



Source: Statistics Sweden Demographic Reports 2002:2. Children and their families. From the Register of Families with Children (population-based statistics).

Figure 1. Proportions of children (aged 0-17) in Sweden by type of family as of 31 December 1999.

Family situation and health

As stated, family situation is an important indicator of problems concerning welfare, health status and security. Lone parents, mainly, but also people living alone without children often face many welfare problems simultaneously. Studies from a range of Western countries have shown that the married live longer than the unmarried, whether widowed, divorced or never married [17-20]. Studies of physical illness and psychological well-being give broadly the same picture [21-24].

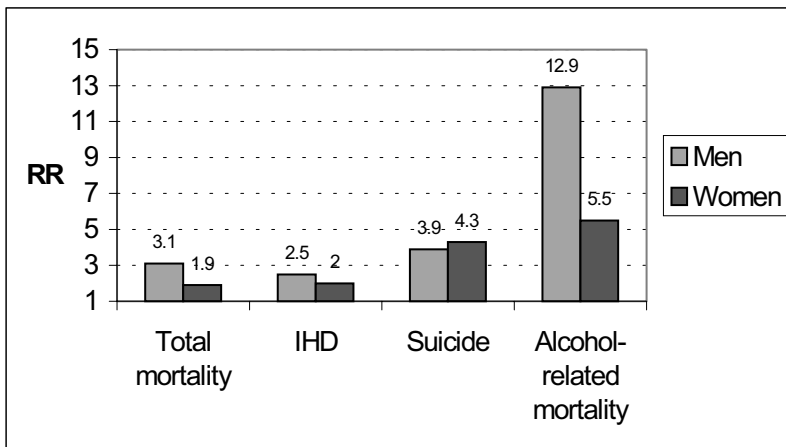
In most countries divorced people have the highest mortality rate, followed by the widowed, those who have never married, and finally the married [25]. The pattern of higher mortality among the unmarried seems to be characteristic primarily of the types of mortality that are affected by factors such as emotional stability and willingness to take risks. Particularly regarding suicide and alcohol-related causes of death, mortality rates have been found to be higher among people who are not married or cohabiting [20, 26]. However, a study undertaken in Sweden showed that while smoking and alcohol abuse were more prevalent among divorced men, even among non-smoking and non-alcoholic men, the divorced had a mortality rate twice that of the married [27].

Differences between men and women

It is unclear whether divorce and single living have different effects on men's health and survival than they do on women's. Verbrugge [28] found that men and women benefit from marriage to a similar extent with regard to self-reported health. Further, in later analyses of morbidity, disability and health-service use he found that women were even more sensitive to change in marital status than men [23]. Riessman and Gerstel [29] found that, after divorce, men experienced more severe health outcomes, including mortality and hospitalisation, whereas women faced a larger number of less severe health problems. However, in analyses of 16 Western countries unmarried males have been found to have higher mortality rates when compared with married males than do unmarried females when compared with married females [30]. Gove [20] has suggested that divorce has a less marked effect on women, and found that gender-mortality differences were greatest for certain specific causes of death, such as suicide, homicide, accident, and also causes of death associated with diseases that demand special care (e.g. tuberculosis or diabetes). For these causes relative mortality rates were greater among divorced men. Women were considered to have stronger social ties to relatives and

friends than men, and should therefore manage a divorce better, whereas men are supposed to depend more on marriage and living together for their social networks. Women, on the other hand, are considered to be more dependent on marriage for their personal finances [18], and it is suggested that they provide more health benefits to their spouses than do men. Accordingly, divorce might be expected to have more detrimental consequences for men's health than for women's [31]. Hemström [32] has found that divorced unskilled manual male workers, in particular, have a high mortality ratio.

In Figure 2 Swedish population-based data is used to illustrate the common findings that married/cohabiting men and women have lower mortality rates than the non-married/non-cohabiting and that differences are generally greater for males than for females.



Source: Health in Sweden – The National Public Health Report 2001.

Figure 2. Mortality among lone dwellers aged 40-54 in 1990 compared with partnered dwellers (1991-1995). Age-adjusted relative risks (RRs).

The effect of parenting

As early as in 1897 Durkheim [33] demonstrated a protective effect of having children in the household, but results since then are less clear-cut in this respect. In a

review by Ross et al. [34] during the 1980s, it was concluded that having children at home only has a small, inconsistent effect on parents' physical health. A later review by Mastekaasa [35] indicates the same conclusion, except with regard to suicide mortality, which seems to be lower among parents than among non-parents. Kotler and Wingard [36] found that neither number of children nor the presence of a child at home affects mortality risk among men. Umberson [31] found that parenting reduced the inclination to engage in negative health behaviours more when children and parents live in the same residence than when they live separately. Analyses of Swedish population-based data (from the 1990 census and Cause of Death register) show that for both men and women, whether cohabiting or not, having a child in the household entails lower mortality risk (Table 1).

Table 1. Age-adjusted relative risks (RRs) for mortality (1991-1995) by family situation among men and women aged 40-54 in 1990 (95% confidence intervals in brackets). Comparison group of cohabitants with children (RR=1.0).

Family situation	Total mortality	Ischaemic heart disease	Injury and poisoning
Men			
Cohabiting with children	1.0	1.0	1.0
Cohabiting without children	1.4 (1.3-1.5)	1.4 (1.2-1.5)	1.2 (1.1-1.4)
Lone with children	1.5 (1.2-1.7)	1.8 (1.3-2.5)	1.5 (1.0-2.1)
Living alone	3.7 (3.5-3.8)	3.0 (2.7-3.3)	4.1 (3.8-4.6)
Women			
Cohabiting with children	1.0	1.0	1.0
Cohabiting without children	1.4 (1.3-1.5)	2.0 (1.6-2.5)	1.6 (1.4-1.9)
Lone with children	1.5 (1.4-1.7)	1.6 (1.0-2.5)	2.8 (2.2-3.6)
Living alone	2.5 (2.3-2.6)	3.4 (2.6-4.4)	4.5 (3.8-5.3)

Sources: Social database of the Centre for Epidemiology, National Board of Health and Welfare.

Lone parents

When interaction between marital and parental roles has been analysed, a range of studies, from both Sweden and elsewhere, report relatively poor health among lone

mothers, usually with mothers living with a partner as comparison. Studies from Britain [7-11] and Norway [12, 13] demonstrate poorer self-perceived health in the lone-mother group. A Swedish study [5] has shown that throughout the period 1979-95 lone mothers reported worse self-perceived health than mothers with partners. In a study of the employed population in Sweden, single mothers had a considerable higher sickness absence than mothers living with a partner [37]. Studies from Finland [38] and north America [36] have reported an increased risk of premature death among lone mothers. The few attempts to elucidate the health situation of lone (custodial) fathers show that they report worse health than cohabiting fathers, although better than lone mothers [8, 9]. They also have increased mortality risks [39].

The explanations offered for health disadvantages among single people mainly divide into those based on social causation and those concerned with health selection [21]. Social-causation theory suggests that marriage has a protective effect, and that adverse health consequences are the result of stress due to a lack of material resources, indulgence in risky negative health behaviours, greater vulnerability arising from deficient social networks, and a lack of social support. For previously married people the stress suffered during marital break-down also contributes. The disadvantageous situation of Swedish lone parents has been pointed to in much research [1, 2, 6, 40, 41]. They, alongside young people, showed the worst income trend between 1975 and 1995 [3]. One in two single parents had upkeep problems during the 1990s, i.e. difficulties in managing current expenses for food, rent and bills. In the adult population as a whole the corresponding proportion was under 5% [4]. An increasingly proportion of lone parents have been exposed to crime. In 1999 15% of the lone-parents (mostly mothers) had been the victim of violence and threat, a fourfold risk increase in comparison with the general population. Lone parents with financial problems reported the highest rates (1988-1999). 26% among social welfare recipients had been victims of

violence and threat in comparison with 7% among non-recipients within the lone parent group [42].

By contrast, the health-selection argument is that emotionally unstable and/or physically handicapped persons have lower probabilities of getting married, staying married and remarrying. Most researchers would maintain that the observed health differences between lone and partnered people are the product of a combination of selection/environmental factors.

Children of lone parents

In step with the rising frequency of divorce and changing family patterns, increasing numbers of children are growing up with just one parent. As far back as in 1891, data from a parish in Stockholm showed that being born out of wedlock was an important risk factor for childhood and infant death, with children 0-14 years showing a doubled risk [43]. Living conditions were harsh and mortality rates among children generally high, with 20% of all infants not surviving their first year of life. Being born out of wedlock was strongly associated with poor health, and diarrhoea and pneumonia/bronchitis in particular. Possible explanations for the increased mortality rate of children born out of wedlock during this period include material deprivation, breast-feeding difficulties, and lack of access to water and sanitation. Another study, from the first half of the twentieth century, followed a cohort of men born in Uppsala 1915-29. The results demonstrated an excess risk of mortality from ischaemic heart disease in middle and old age among men born outside marriage compared to men who were born inside marriage [44].

Although mortality rates are no longer anywhere near as high as during the 19th century, social factors are important indicators of infant and child mortality even in Sweden today. The children of manual workers and children living with one parent still show higher mortality

than the offspring of non-manual workers and those living with both parents [45].

Numerous studies have examined the implications of parental divorce and lone parenthood for children's educational achievement, conduct, psychological adjustment, social competence and health [46]. Despite these contributions there is still some controversy regarding any conclusions that should be drawn with regard to health and well-being. Findings generally indicate that divorce has short-term adverse consequences [47-49]. In one review of the literature Edwards [50] suggests that most children recover from divorce with few enduring consequences, whereas Krantz [51] and Wallerstein [52], in other reviews, conclude that the favourable psychological adjustment of the children of divorcees is at considerable risk. Presumptions about the importance of long-term effects have been supported by more recent analyses from Sweden and Finland where the breaking-up of a family and having a lone-parent background have been found to have negative effects on mental and general health, and also to be associated with mortality among young adults [53-56]. In a Swedish study of the social aetiology of violent deaths among Swedish children, living in a single parent household was found to be significantly related to death from intentional injury [57]. A Danish study of familial, psychiatric and socioeconomic risk factors for suicide among young people found that those with single parents were more likely to commit suicide than others [58].

The importance of conditions during infancy and childhood for adult health has aroused increasing interest. However, Östberg [45], stresses that children's circumstances per se, like those of adults, are important even if they do not have long-term effects. Children should be seen as a permanent group in society, and the conditions for this group do not alter because individuals who make up that group are constantly shifting.

Research studies also fairly consistently report that children from separated families are at an educational disadvantage – regardless of whether this is measured by standardised tests, grade-point averages or completed years of education [59-61]. However, the differences are often modest, and are greatly attenuated when socioeconomic circumstances are controlled for [62-65]. A number of explanations and intervening processes have been proposed to account for why divorce, separation and lone parenting may have negative effects on children’s health and educational prospects. Two main types of explanations are often distinguished, derived separately from the so-called “crisis model” and theories of the consequences of parental absence [64]. The former mainly concerns conditions during infancy. By contrast, the latter places a greater emphasis on long-term consequences. For example, parental divorce means living in a lone-parent household, separated from at least one of the original parents, with the consequences this entails.

The crisis model implies that it is largely upheaval and disturbed social relations in a family during the process of divorce that negatively impact on children [49]. Divorce is usually preceded and followed by a period of inter-parental conflict. This may affect children directly, but it also has indirect effects through changed child-rearing practises and parent-child relationships [66]. The parental-absence perspective emphasises the loss of a parent and what this implies in terms of reduction of household resources in at least three areas:

- The amount of time devoted to a child may be reduced since one parent is missing.
- Loss of the parent with the higher educational or social position may influence a child’s educational aspirations.
- Economic deprivation may follow from separation, especially among lone mothers. Income-related

processes, i.e. economic difficulties predating later separation, seem to be less influential [2, 65].

Lone mothers and social policy

Lone mothers have reached the top of the political agenda in many Western countries during the last ten years. The main reasons for the increased attention are their increasing number and, in many places, their dependence on state benefits [67].

A distinctive feature of Swedish social policy has been the inclusion of lone mothers within a framework for all working parents – the so-called “parent-worker” model. In accordance with this model, families are provided with government-subsidised day-care services, which permits women to become equal participants on the labour market alongside men. The policy has enabled Swedish women (like women in the other Scandinavian countries) to form autonomous households with lower risks of poverty and stigmatisation than in many other Western countries. The system can be described as universal, in that it addresses income earners in general, and do not support categorical benefits targeted specifically at lone mothers. It has also meant that lone mothers have not been singled out as a deviant group, and developments parallel to those in the USA and the UK have been avoided. In these countries lone mothers have been regarded as constituting both a social and moral problem (the latter mainly reflecting concern about marital dissolution and increasing numbers of never-married mothers) [68].

The principles guiding Swedish social policy are the results of legislation and policymaking developed during the 20th century. As early as in 1917 new principles were established concerning the right of children born outside marriage to know the identities of both their mother and their father. The registered father would then bear the cost of supporting his child, and thus improve the financial situation of the lone mother and the child. Income

maintenance payments were introduced in 1937; lone mothers were assured payment from the state for child support, and the state then sought to collect what it could from the absent father. The system later became gender-neutral, and when a parent failed to pay, or only paid part of the maintenance, a certain minimum level was guaranteed by the government to the custodial parent. In 1948 general child allowance was introduced with the purpose of covering part of the cost associated with child-rearing. In 1955 universal maternity-leave payments were introduced, initially for three paid months but extended to six in 1963. In 1989 payment was further extended to twelve months plus three months at a flat rate. In 1995 the days of payment were divided equally between the two parents if both had custody of the child. The 1970s saw reform of individual taxation aimed at reducing gender differences in both labour-market participation and caring responsibility. Working men with a dependent wife were no longer favoured by personal-taxation laws; every Swedish Crown a married woman earned was extra income in a two-earner family. Also, subsidised day care for children and the right to work part-time for members of families with small children became part of the incentive to induce women to enter the labour market [1, 68].

Figures on poverty rates among lone mothers in different countries show that welfare is greatest where labour-participation rates for lone mothers are high, transfers are generous, and benefits are universal. The Scandinavian countries are at the bottom of the list with regard to poverty rates among lone mothers, while the list is headed by the USA, Australia and Canada [67-69].

In recent years, however, apprehension has arisen that the additional social and economic pressures lone mothers face as sole breadwinners and family carers may become hidden or rendered invisible in a system that, in the first instance, views women not as mothers but as paid workers. This view implies that important elements in

single parenthood are neglected, in particular that lone mothers have fewer resources than married/cohabiting mothers in terms of time, money and social networks. It has been suggested, for example, that lone mothers suffer from “time poverty” to a greater extent than partnered mothers. This might place them under greater psychosocial stress, with loss of control over day-to-day life and ensuing effects on well-being and health [14, 70].

The parent-worker model is also gender-neutral in that it ignores the aspects of gender inequality present in society, and thereby the different realities experienced by single fathers and single mothers, e.g. those related to the gendered wage gap or the extent to which many women with children have previously been financially dependent on their husband. It has also been argued that, now that women have rights and duties as income earners, a new challenge is to give men rights and duties as carers [70].

Social determinants of health and selection mechanisms

Differentials in health and longevity by socioeconomic status and by the nature of social relationships have been identified in a large number of studies over the years. The field has engaged researchers from many disciplines, including sociology, economics, demography, epidemiology, biology and medicine. In the light of the importance of taking into account socioeconomic circumstances in analyses of family situation and health, there follows a brief discussion of explanations of social differences in mortality and ill-health.

Broadly speaking, three comprehensive categories of explanations for the observed patterns of ill-health have been proposed:

- selection or reverse causation, whereby a person’s health status affects his or her social position;
- artifactual mechanisms, such as measurement error; and,

- causal mechanisms, which operate via the social environment.

Researchers have employed a variety of data sources and analytic strategies in their attempts to disentangle the selection and causal mechanisms that confound and mediate the relationship between social factors and health [71]. Earlier research has indicated a number of possible causal factors, such as circumstances during childhood and as a foetus, life-style, work conditions, and income and other economic resources.

Financial resources are a fundamental factor, which render families more or less capable of shaping many aspects of life, including children's well-being and safety. Perceived control over life may be an important explanatory mechanism in the social patterning of mental and physical health. The struggle to pay the bills and to feed and clothe the family on an inadequate income takes its toll in being run-down and tired, and feeling that everything is an effort and the future is hopeless [34]. Habits of life, such as diet, exercise and smoking or not smoking, vary with people's social position. Differences in life habits may explain a large part of social differences in ill-health. The important question, however, is what in turn explains differences in living habits, and whether and to what extent they are determined by a person's own choices or that person's surroundings and living conditions while growing up. Positing stressful life-style factors as the sole explanation for health inequalities has therefore been seen as a simplification and individualisation of human risk behaviour. The issue is more complicated, and not likely to be solely a question of conscious choice.

Another research development in this context consists in the sharpening of focus on characteristics of the individual's broader social environment. Some studies have suggested that population health is affected by differences in relative income (differences between groups of people within the same society) more than by the

absolute level of average income for any one society taken as a whole [72]. The legitimacy of these findings has, however, been questioned [73]. The concept of “social capital” has become popular in recent years in reference to a phenomenon that is the product of individuals, groups or organisations developing good social relationships that create trust among individuals [74].

There is virtual consensus among researchers that observed disparities in health are driven largely by a complex set of causal processes rather than by selection or by artifactual mechanisms [75]. However, studies of single Japanese people serve as an example of the danger of making generalisations about the protective or selective mechanisms of marriage across times and places. Goldman [76] demonstrates that the mate selection process in Japan was probably the major factor in generating large differences in longevity, and also in mental disorders and infectious diseases, between single and married Japanese in the mid-20th century. Families used private detectives, relatives and neighbours to detect psychological ailments or illnesses thought to be hereditary among the family of the potential spouse in order to ward off a marriage. The health disadvantages of single Japanese have declined considerably in recent years, probably as a result of the abandonment of arranged marriages and the decreasing prevalence of infectious diseases [76].

Selection may be direct or indirect. It may operate on health and mortality itself. Poor mental and physical health in youth, for example, can lead to shorter education and less qualified work [77]. Or, it can operate on the basis of background variables that are related to both health and social position. For example, adult body height and economic hardship during upbringing seem to be related to both achieved social class and adult health status [78, 79].

Most researchers, and also lay observers, would maintain that selection and causal mechanisms should not be

viewed as competing explanations in the sense that the presence of the one precludes the other. Rather, to the extent that selection operates, it must do so alongside a complex set of causal pathways.

There is an increasingly evident tendency in contemporary research to adopt a life-cycle perspective on health. Several studies have shown a link between living conditions in childhood and future health and mortality [54, 80-82]. The life-cycle perspective embraces the notion that risk factors are accumulated over the whole of a person's life. For example, salutogenic factors may accumulate in a person who has good life preconditions. Social origin influences the particular risk factors to which people are exposed or expose themselves, and in consequence the social positions they achieve as adults. On this view, the selection discussion becomes partly superfluous – health and social career develop in parallel in positive and negative directions. This is partly because both are influenced by the same array of background factors, partly because each affects the other [83]. Accordingly, in an analytic situation, whether individual circumstances will be classified as exposures or outcomes, or even not at all, will depend heavily on when in time the slice of real life is taken.

In current research, in the area of understanding the pathways linking the social environment and health, there has been an attempt to incorporate biological measures into large-scale, population-based longitudinal investigations, and include a broad range of biological markers across various physiological systems. Goldman [75] suggests that the implications of this for future longitudinal surveys are vast. She presents a vision in which prospective surveys begin at birth and then follow respondents at regular intervals throughout the life cycle, thereby obtaining detailed life histories, both concerning socioeconomic status and on various psychological and health dimensions.

Such histories would consider not only the individual and family but also the broader social environment, further including biological measurements along the way. The resulting data would offer serious challenges to social statisticians, who would have to account not only for relationships that operate throughout the life cycle but also influences between a given set of factors at one time and the same factors at a later time. Alternative statistical methodologies using individual life histories (referred to as person-centred approaches to contrast with variable-based methodologies) may prove useful and are currently being developed. To fully understand the linkages between the social environment and health, the involvement of academics from a variety of disciplines is necessary. In particular, such understanding requires the integration of research across the multiple levels of analyses inherent in health research, i.e. at social/environmental, behavioural/psychological, organic-system, cellular, and molecular levels. However, even if more sophisticated tools for analysis are developed, analytic procedures will remain heavily dependent on simplifying assumptions, which can often only be succinctly captured by a small set of (generally) independent characteristics. Further, the financial costs of incorporating biological measurements may be substantial, and there are many ethical questions that have to be resolved [75].

MATERIAL AND METHODS

Data sources

This dissertation is exclusively based on routine statistics from health-data registers, used generally for administrative purposes, and other data sets covering the entire population of Sweden. A unique national registration number is assigned to each inhabitant of Sweden. It is used in population-based registers, and provides an individual identifier that makes it possible to link information between different data sources. The record headers in the data set used for the studies in this dissertation were deleted following individual record linkages, thus rendering it impossible to identify any specific person. The following registers were used:

The Swedish Population and Housing censuses of 1985 and 1990. Sweden has a long census history, the first being performed as early as in 1749. During the period between 1860 and 1930, population censuses took place every tenth year, and from 1930 until 1990 every fifth year with the exception of 1955. No census has been carried out since 1990. The first housing census, which covered the whole country, was performed in 1945, and housing and population censuses were co-ordinated in 1960. Every household in Sweden has an obligation to respond to and return a census questionnaire. Among other items, each census gathers information about age, gender, occupation, employment and education. One member of the household has to answer questions about the nature of the household dwelling, and also enumerate every person in the household, their relations and their personal identification numbers. Hence, it is possible to link individuals in any one household on the basis of census information.

The quality of the census data must be considered satisfactory for our purposes. The census of 1990 was extended also to include control and evaluation studies,

which showed that 94% of households were correctly classified with regard to number of members. 4% of all persons failed to provide information about their housing situation. The number of persons in the lone-parent category was underestimated, but the evaluations indicated that about 92% of the households were correctly classified [84].

Total Enumeration Income surveys are performed by Statistics Sweden, and record information about taxes and incomes as annual totals for the entire population. Data on individuals' annual income tax, founded on income tax returns and tax-authority decisions, is collected by the National Swedish Tax Board and supplied to Statistics Sweden. Information is available on receipts of both social-welfare and unemployment benefit.

The Multi-Generation Register contains links between children, so-called "index persons", and parents (both biological and adoptive). The register is limited to index persons in population records at some time since 1961 and born 1932 or later. Personal files and personal identification numbers were introduced as part of the population registration system in 1947; the personal files include information on the parents of persons aged 15 or younger. Hence, an index person had to be born in 1932 or later and the parent had to be recorded in the population at some time since the introduction of personal identification numbers in 1947 to be included in the register. It now contains more than 8.5 million persons and 11 million unique individuals (index persons+parents). Quality of data is less satisfactory than for the censuses, primarily for index persons with parents born outside Sweden and for those who immigrated as adults [85].

The National Cause of Death Register, maintained by Sweden's National Board of Health and Welfare (Centre for Epidemiology) since 1994, contains information on all deceased persons recorded as resident in the country at

time of death, irrespective of whether death occurred in Sweden or abroad. Hence, there are no records on stillbirths, persons who died accidentally while visiting Sweden, or asylum seekers without residence permit. The register comprises all deaths from 1961 and onwards, and is updated annually (currently including 90,000-95,000 deceased persons). Cause of death is generally determined from medical death certificates, in the first instance (in the case of disease) by the physician who had been taking care of the patient during terminal illness, or the family doctor or attending physician. The main source of statistical unreliability in the register lies in the examinations performed to define the underlying cause of death, which is reported on the death certificate. Underlying cause of death is defined as either a) the disease or injury that initiated the chain of events or conditions that finally resulted in death or b) the circumstances involved in the accident or the act of violence that caused the lethal injury.

The most exhaustive way of establishing cause of death is autopsy. However, the proportion of autopsies performed in all deaths in Sweden has decreased from about 50% at the beginning of the 1970s to about 15% in 2000. Causes of death are generally more reliable for younger people than for older. Likewise, the classification of violent deaths is more reliable than classification of chronic conditions. The number of missing cases is few (0.6% of all deaths in 2000). According to an evaluation of the quality of information-coding on death certificates, 6% had a faulty underlying cause of death at four-digit level in 1998 [86].

The Hospital Discharge Register covers all publicly provided inpatient care (for over-night patients) since 1987. Information is supplied once a year to the National Board of Health and Welfare (Centre for Epidemiology) by each of the 26 county councils in Sweden. The latest annual volumes are 1.5-1.7 million hospital stays per annum. (Data on out-patient care at hospitals has been gathered only since 2000.) There are four different types of

information in the register: data on the patient; data on the hospital; administrative data; and, medical data. Diagnoses are primarily based on the judgements of the responsible clinician, and standardised diagnostic assessments are rarely used. According to evaluation of quality, the number of missing cases with regard to somatic short-term care has been less than 1% in recent years, as too have been the numbers of missing or faulty personal identification numbers. Main diagnosis was missing on records for about 1% of hospital stays. The number of hospital stays with an injury or poisoning diagnosis where an E-code was missing increased from 3.1% in 1987 to 3.8% in 1996 [87].

Seeking knowledge from registry data

The Nordic countries have an extensive tradition of using administration-based registry data, both for the presentation of official statistics and within research.

A register, as it is defined by Statistics Sweden, is a complete list of all items (subjects) in a specified population, and is either based on a total survey (such as a Population and Housing Census or the Cancer Register) or on administrative data for which various authorities and other organisations are responsible [88]. The National Board of Health and Welfare's Hospital Discharge Register, which is used in the current work, offers an example of a register based on data gathered for administrative purposes. These are data from the administration systems within each county council that are used to manage patient admissions and discharges. They are sent on an annual basis to the National Board of Health and Welfare, which creates a national register of patients.

There are both prejudices and justified criticisms directed at register-based statistics. Among the prejudices there is the idea that statistics based on routinely collected data, although cheap, are impoverished in relation to the "real"

statistics obtained from surveys. It is supposed, for example, that poor quality is the product of the researcher having no control over data collection. It might be wondered, however, whether the registers based on data from censuses and tax-administration records would be of higher quality if Statistics Sweden had performed its own surveys in parallel with the Tax Administration's gathering of administrative data. Rather, such a procedure would have given rise to increased costs, placed a greater burden on information suppliers, and resulted in data with larger measurement errors [88]. Data from health data registers are usually the same diagnoses as is reported in the medical records. This indicates a quality similar to that in the health services in general.

Table 2 summarises the relative advantages and disadvantages of survey and registry statistics. The register-based statistics are divided into two categories: 1) administrative data, which are often routinely collected for purposes that affect the people involved in an operation, and are usually not time-restricted; and, 2) total-population surveys, i.e. routinely collected statistics whose purpose may vary, but which often provide a foundation for analysis, and are usually not time-restricted.

Table 2. Advantages and disadvantages of survey statistics and routinely collected registry data.

	Advantages	Disadvantages
Data gathered for specific research purposes – survey statistics	You can pose whatever questions you like	Respondents do not understand the question ... have poor recall ... do not reply ... do not bother to reply properly Expensive Low-quality estimates in case of small reporting groups (samples)
Register-based data – routinely collected statistics based on: <ul style="list-style-type: none"> • Total population surveys, e.g. the Housing and Population Census, the National Board of Health and Welfare’s Cancer Register, the Cause of Death Register, the Medical Births Register • Administrative data covering an entire population, e.g. the National Board of Health and Welfare’s Hospital Discharge Register and register for social assistance receipt, Statistics Sweden’s Total Enumeration Income Register, the Register of Universities and Colleges, the Education Register, and the Register of Companies 	Reduced burden on information suppliers Reduced costs Good coverage of the item in the population Data for every year Respondents are careful in their replies to questions of administrative significance Fewer sources of error associated with self-reporting (less recall bias) Good opportunities for obtaining regional statistics and longitudinal series The large number of variables and items included permit flexibility in study design, and the selection and management of background variables	You cannot pose some of the questions you would like to Sometimes a long period of time between study event and availability of data You are dependent on the administrative system’s population and item coverage, and also its definitions of variables Changes in administrative systems hinder comparisons over time Data on variables of lesser importance in administrative terms may be of lower quality No information on attitudes or perceptions

Sources: [88], supplemented by [89] and the author’s own classifications.

Administrative systems are commonly employed as sources of statistical information, but they are generally principally designed for administrative purposes. Thus, the statistical information becomes a bi-product. The essential difference between a purely administrative and a purely statistical system (such as Statistics Sweden’s surveys of the

labour market/workforce) are that information in an administrative system is used to implement practical (policy) measures with regard to the particular items in the system (such as wage determination). By contrast, information in a statistical system is employed as a basis for analysis and the generation of knowledge; i.e. the particular administrative area covered has no intrinsic interest. This difference influences perspectives on the errors that may arise. Sources of error that may be important for administrative action may play less of a role in the drawing of statistical inferences, and vice-versa [88].

The data on which registry statistics are founded are gathered in different ways and at varying intervals:

- As nation-wide registers from central authorities, such as the National Tax Board, the National Insurance Board and the National Board of Student Aid.
- As data from a large number of local registers. Data are gathered from registers held in different regions. For example, every university or college supplies data from its own study-documentation system to Statistics Sweden's national Register of Universities and Colleges. Every regional cancer registry delivers data for the National Board of Health and Welfare's nation-wide cancer register [90]. The Cancer Register, however, cannot be said to be based on administrative data, since the primary purpose of data collection is to obtain a statistical product.

Statistics Sweden's Total Enumeration Income Register, which was used for the studies in this dissertation, provides an example of a statistical register directly based on administrative data. Original data collection and management are in the hands of the authorities and other organisations, and definitions of variables are made to suit administrative goals. Each authority performs controls, corrections and other processing for its specific administrative purposes. The data are then delivered to

Statistics Sweden, where in several processing steps, based on standardised registry techniques, they are transformed from constituting an administrative register into a statistical register. Creation of the Total Enumeration Income Register involves compilation of information from tax declarations, annual payroll statements made to the tax authorities by employers, and tax assessments made by the National Tax Board. The Board then sends summary statistics to Statistics Sweden. The information is processed further to create variables such as income from employment and disposable income, which can then be assembled, on the basis of information on certain relationships, to be presented on a family as well as an individual basis. By co-ordinating more than one of Statistics Sweden's registers a variety of integrated data sets can be set up without further data collection. The Multi-Generation register, also used in the studies reported here, offers one example [88].

The Nordic countries are unique in their long tradition of gathering data and maintaining registers of deaths and cases of hospital care. Deaths have been recorded in Sweden since 1751, and the register has been stored in data medium since 1952. This and other registers can be seen as filling a treasure chest of information of immense value that future generations of researchers will inherit [91]. Further, the unique personal identification numbers of past and present residents in Sweden makes it possible to link information on health outcomes to various exposures recorded in one or several of the population-based registers based on either administrative data or total-population surveys.

Design of the studies

In all papers we included only subjects who lived in family households, thus excluding chronic patients in institutions and others in marginalised social situations. A household was defined as a person or group of persons registered in the same dwelling according to census information.

Paper I

The aim of the study was to analyse mortality among lone mothers in comparison with mothers with partners on the assumption that poor socioeconomic status and health selection contribute to higher observed mortality.

We selected 90,111 lone mothers with children aged 0-15 years and 622,368 mothers with partners aged 29-54 in 1990 from the census of 1990, using a variable concerning household type in combination with information about marriage/consensual union. We also obtained information about country of birth, socioeconomic status, number of children, housing situation and geographical location from the census. Records were linked to the census of 1985 to obtain data on family situation from an earlier period. Through linkage to the Total Enumeration Income Survey of 1990 we acquired information about social-welfare and unemployment benefit (as annual totals). Households that obtained an allowance in any amount were classified as receiving benefit (Yes/No variables). Further, to control for morbidity history (psychiatric and somatic) and death we linked records to the Hospital Discharge Register for 1987-90 (psychiatric and somatic illness) and the Cause of Death register respectively. We estimated overall and cause-specific mortality between 1991 and 1995.

Multivariate analyses were performed using Poisson regression, with mortality as the dependent variable. 95% confidence intervals were calculated. Age was entered as a continuous variable and present in all the statistical models. Adjustments were made for various groups of variables, including those mainly reflecting the health status of the individuals before entering the study, and those mainly reflecting the social and economic situation of the mothers. Health-status variables were used to control for possible confounding from selection of physically and psychologically vulnerable persons into lone motherhood, and socioeconomic variables were also

considered as possible explanatory variables for any excess mortality rate found.

Paper II

The aim of the study was to analyse mortality, severe morbidity and injury requiring hospital care among long-term lone mothers in Sweden in comparison with mothers with partners.

All women living alone with children 0-15 years in 1985 and 1990 and mothers living with partners at both times were identified from the censuses for these years in the same manner as for Paper I. To control for health-selection effects we only considered initially healthy women, as measured by non-hospitalisation four years prior to follow-up, except for maternity care (ICD9 codes 630-679). Data were obtained from the Hospital Discharge Register. We ended up with 26,619 lone mothers and 379,855 mothers with partners.

Information on age, country of birth, socioeconomic group, employment status, geographical location of residence and housing situation was also obtained from the census of 1990. Data on receipts of social welfare and unemployment benefit were obtained through record linkage to the Total Enumeration Income Survey of 1990.

Outcomes were studied for the years 1991-94 on the basis of information obtained from the Hospital Discharge Register and the Cause of Death Register. As well as a separate investigation of all-cause mortality we studied severe morbidity and mortality from specific causes, i.e. conditions either requiring hospital care or leading to death. Accordingly, each outcome incorporated death, hospital discharge or both. Odds ratios with 95% confidence intervals were used as estimates of the effects of lone motherhood on the different outcomes. We adjusted for different groups of variables in multivariate logistic regression analyses. We tried to distinguish between variables we presumed pre-dated the family situation

(confounders: age, socioeconomic group, living in a big city or not, country of birth), and those that operated between family position and the health measure in question (mediators: receiving social benefit and renting/owning a home of one's own). A third category of variables, regarded as occupying a more indeterminate causal position, was composed of variables such as employment status, unemployment benefit and number of children. We also analysed whether the effects of being a lone mother remained in different subgroups following interaction between variables.

Paper III

The aim of the study was to analyse differences in mortality, severe morbidity and injury in childhood and young adulthood between children living in households with one or two adults. Our hypothesis was that the generally poor socioeconomic status of lone parents contributes to a differential in children's health.

Children in Sweden living in households with the same lone adult (parent or guardian) according to the censuses of both 1985 and 1990, and children who were living with the same two adults of different sex at both times were identified. The children were 6-18 years-old at the start of follow-up (in 1991); by the end of 1999 the youngest were 14 and the oldest 26. 65,085 children living with a lone parent and 921,257 children living with two parents were encompassed by the study. Through information in the censuses about household affiliation, it was possible to link members of any one household.

Data on age of the child and parents (at delivery of the child, and preferably the mother's) and various parental characteristics (such as country of birth, socioeconomic group affiliation, housing situation, number of 0-17 year-olds living in the household, and residency) were obtained from the census of 1990. For households with two adults, the adult with the higher socioeconomic group status of the pair was chosen to characterise the household.

Regarding country of birth, the homeland of the mother was preferred.

Data on social-welfare and unemployment benefit were obtained via record linkage to the Total Enumeration Income Survey of 1990. Information about alcohol- or drug-abuse and psychiatric disease on the part of any adult in the household was obtained through linkage to the Hospital Discharge Register for the years 1987-99.

Our investigation encompassed mortality among children over the period 1991-98 and severe morbidity 1991-99. Individual record linkage to the Cause of Death Register provided data about mortality, and similar linkage to the Hospital Discharge Register gave information on morbidity (related to either disease or injury). Relative risks with 95% confidence intervals were used as estimates of effects, using children in households with two adults as the reference group. Multivariate analyses were conducted via Poisson regression. We tried to distinguish between variables referring to conditions predating the family situation (confounders) and those that operated contemporaneously between family position and the health outcome in question (mediators). Information about age of the child and parent was entered as a continuous variable and age of the child was present in all statistical models. Age of child and of parents and parental characteristics (such as socioeconomic group affiliation, living in a big city/medium-sized town/rural area, country of birth, alcohol or drug abuse, and psychiatric disease) were treated as confounders. Receiving social benefit and renting/owning a home of one's own were seen as measures of household resources and treated as mediators. Boys and girls were analysed together, alongside interaction between sex and type of parenting, but results were presented separately for the sexes.

Paper IV

The aim of the study was to investigate educational attainment at age 24-25 years among children of lone

parents in comparison with children with two parents. The intention was to establish whether generally poorer socioeconomic circumstances in lone-parent households contribute to a possible differential, and to see how the circumstances of the non-custodial parent influence any difference found.

We identified children born 1973-74 in the population in 1998 who lived either in households with the same lone parent in both 1985 and 1990 (according to census data) or with the same two parents at both times. By means of linkage to the Multi-Generation Register, we excluded children without information on both biological mother and father. We made distinctions between different forms of lone parenting. The children were divided into the following categories: children of widows/widowers (n=579); children of lone parents with a living non-custodial biological parent (n=9,493); children of lone parents with a deceased non-custodial parent (n=1,042); and, children living with the same cohabiting parents in both censuses (n=136,201) The final category was employed as comparison group for the analyses.

Through census information about household affiliation, it was possible to link members of any one household. Information on age of the child and of parents (at delivery of the child, preferably the mother's) and various parental characteristics (such as country of birth, education, socioeconomic group affiliation, housing situation and residency) was obtained from the census of 1990. For households with two adults, the socioeconomic group of the household was classified according to an index built upon the concept of dominance order [92]. With regard to educational attainment, the adult with the highest education was chosen to characterise the household. Regarding country of birth, the homeland of the mother was preferred

Data on receipt of social-welfare and unemployment benefit were obtained via record linkage to the Total

Enumeration Income Survey of 1990. Information about alcohol or drug abuse and psychiatric disease on the part of any adult in the household was obtained through linkage to the Hospital Discharge Register for the years 1987-99. The investigation considered educational attainment among youth in 1998. Two dichotomous indicators were used as measures of attainment: compulsory school at most (9 years or less) or not; post-high school (upper-secondary) education (at least 13 years) or not.

Odds ratios (ORs) with 95% confidence intervals were used as estimates of effects. Multivariate analyses were conducted using logistic regression in an attempt to distinguish between variables referring to conditions predating the family situation (confounders) and those that operated contemporaneously between family position and educational attainment (mediators). Information on age of the child and of the custodial parent was entered as a continuous variable and was present in all statistical models. Age of the child and of the parent and parental characteristics (such as education, socioeconomic group affiliation, living in a big city/medium-sized town/rural area, country of birth, alcohol or drug abuse, and psychiatric disease) were treated as confounders. Number of 0-17 year olds living in the household, receiving social benefit and renting/owning a home of one's own were treated as mediators.

We obtained information about the absent (non-custodial) parent through the Multi-Generation Register. For those parents who were alive, and accordingly theoretically had the possibility to take an active part in their child's life, we employed record linkages to obtain the same information as for the custodial parent. Regarding socioeconomic group affiliation, the dominating socioeconomic status of the two parents (custodial or non-custodial parent) was attributed to the child in the same way as for cohabiting parents. The same procedure was applied to highest educational attainment,

receipt of social welfare, and psychiatric disease or addiction (for either parent). We made these adjustments in order to incorporate such combined circumstances into separate models, alongside performing analyses based solely on the custodial parent. We also assessed the modifying effect of the child's sex and parents' educational level on the association between lone parenthood and the child's educational attainment.

Paper V

The aim of the study was to analyse mortality among lone fathers, with and without custody of their children, and childless men with and without partners, in comparison with cohabiting fathers with children in the household.

Various groups of fathers and non-fathers were formed by combining data on household composition from the censuses of 1985 and 1990 with information on all known relations (at least until 1998) between biological children and parents from the Multi-Generation Register. All men in the censuses of 1985 and 1990 aged 29-54 years in 1990 were selected. The men were divided into those who were biological parents and those who were not. Following linkage to the Multi-Generation Register the groups listed below were formed. (Note that long-term in this context means that the same family situation applied in both 1985 and 1990, and short-term that it had changed.)

Parents

- Long-term cohabiting custodial fathers
- Short-term lone custodial fathers
- Long-term lone custodial fathers
- Short-term lone non-custodial fathers
- Long-term lone non-custodial fathers

Non-parents

- Long-term cohabiting childless men
- Long-term lone childless men

Included in the study were all males classified as either childless men (at least until 1998) or fathers, meaning that men in the latter group had at least one biological child born 1973-85, i.e. in the relevant age range for the child to be classified as a “child in a household” in both of the censuses. Men who did not fulfil our criteria were excluded. We investigated 716,553 males, 51% of all males in the age groups who participated in both censuses (1985 and 1990).

Information on the following variables was obtained from the census of 1990: age, country of birth, socioeconomic group affiliation, residency, and housing situation. Regarding socioeconomic group, households with two adults were classified according to an index built upon the concept of dominance order [92]. Information on social-welfare and unemployment benefit was obtained from the Total Enumeration Income Survey of 1990. We controlled for possible health selection by taking into account history of former illness, i.e. discharges from hospitals between 1987 and 1990 via data from the Hospital Discharge Register (alcohol- or narcotics-related disease, psychiatric disease except for diagnoses indicating addiction, and other hospital care).

Our investigation encompassed all-cause and cause-specific mortality among males according to family-situation over the period 1991-2000 (individual linkage to the Cause of Death Register). We used relative risks with 95% confidence intervals as estimates of effects, using long-term cohabiting fathers as the reference group. Multivariate analyses were performed using Poisson regression, with adjustments made for health-selection effects and socioeconomic circumstances in some analyses.

Conceptual framework for the studies

Grouping of the background variables differs somewhat between the studies. Figure 3 shows the framework largely used for papers II-IV. One of our basic ideas was to distinguish between variables referring to conditions predating the family situation (confounders – most of them in practice measured at baseline) and those that were regarded as operating contemporaneously between family position and the outcome in question (mediators). For example, adjusting for different measures of income might control for circumstances resulting from lone parenthood that explain some of the ways in which lone parenthood influences health. On this approach a mediator provides a way of understanding a relationship; by contrast, controlling for confounders is necessary to dismiss a spurious association [18]. It should be emphasised, however, that interpretation must be made with care so that the substantial public-policy problem of poorer health outcomes among lone parents is not thought unimportant simply because it can be explained away by other factors [8].

The model (Figure 3) is considerably simplified and mainly intended to illustrate how the various categories of variables were handled in the analyses. When confronted with real life, it becomes obvious that many more arrows could be added to the figure, because of associations between variables within categories as well as between them. With regard to the variables treated as mediators, for example, housing situation (form of tenure) is related to the receipt of social-welfare benefit. Further, there is a case for arrows (in both directions) to be inserted between the mediators and the confounders. The outcomes in these categories are also related. For example, it is more common for people with alcohol-related disease to meet with intentional violence, and injury from fall or poisoning. In our analyses, however, each outcome is considered separately, despite the fact some individuals may suffer from more than one of them.

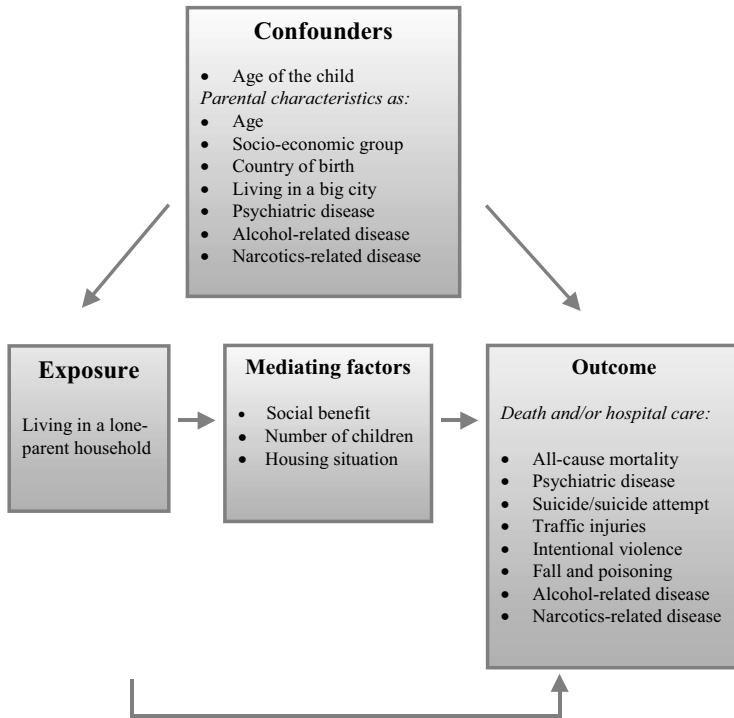


Figure 3. A conceptual framework for studying the impact of family situation on health.

Sociodemographic characteristics – potential confounders

Age

For papers I-II age among the women was limited to 29-54 at baseline 1990. The main reasons for excluding younger women was the importance attached to socioeconomic circumstances as contributing to higher mortality and morbidity. There are fewer cases of death and hospitalisation found in younger age groups. Further, reports on socioeconomic group affiliation were considered to be of better quality for the 29-54 group, since most people have completed their formal education

and are closer to their final positions at work by their early thirties.

For Paper III children in the households were aged 5-17 years at the time of the census of 1990, 6-18 at start of follow-up in 1991, and 14-26 by end of follow-up in 1999. The female adult in the household had to be in the age range 18-49 at the time of the child's birth, and the male adult in the range 18-59. These criteria were applied in order, as far as possible, to avoid household compositions where children live with grandparents, older siblings, etc. For Paper IV children in the households were aged 16-17 years in 1990, and 24-25 years when educational attainment was measured in 1998. For Paper V the men were aged 29-54 in 1990, younger age-groups having been excluded for the same reasons as reported for Paper I.

In the analyses we controlled for age as a continuous variable, with regard to both grown-ups and children (except for Paper IV). When children were the subjects of investigation, adjustments were made for parental age (preferably the mother's). For these analyses we presumed a curve-linear relationship between child's age/parental age and the various outcomes (i.e. when parents were considered, stronger relationships for younger and older age groups, and weaker for the in-betweens, and with regard to children the opposite). Accordingly, age was entered as a second-degree polynomial variable.

Sex

For papers I-II women, exclusively, were the focus of study, whereas Paper V considers men only. In studies III and IV boys and girls were analysed together, but interaction between sex and type of parenting was taken into account. Results were presented separately for the sexes, thus making it possible to obtain an indication of whether boys or girls faced significantly more pronounced increased risks.

Socioeconomic group

Socioeconomic group was used as a background variable in all the papers. Affiliation was defined according to a classification used by Statistics Sweden, based on main occupation at the time of the census of 1990. The definition also takes educational level for occupation, type of production and position at work into account. The division represents an attempt, within each category, to assemble occupations whose members are in similar situations on the labour market. Accordingly, the division serves well as an indicator of the work environment, but is less well suited for prestige grades of occupations [93]. For the papers III-V in this dissertation, households with two adults were classified either according to:

- The “higher” of the socioeconomic group statuses of the pair of adults – in practise in the following order: the self-employed; high and medium non-manual workers; low grade non-manual workers; skilled manual workers; unskilled manual workers; and, persons not gainfully employed, those with missing information, and those who were unclassifiable taken together (Paper III).
- An index built upon the concept of “dominance order”, [92, 93]. The index is based on which of the two work positions in the family is supposed to have the greatest impact upon ideology, attitudes, behaviours, consumption patterns and children’s life chances. According to this classification, categories of higher qualification “dominate” categories of lower qualification; non-manual categories dominate manual categories; and the self-employed dominate the employed. Here also, people not gainfully employed were grouped together with the unclassifiable and those with a missing value (papers IV and V).

For papers I-II women were classified according to their own socioeconomic group.

Education

Education was only used as a variable in Paper IV. Data on education were obtained from the Education Register for 1990 and 1998. It was established by Statistics Sweden in 1985 and is annually updated with information on the highest formal education attained by each individual, from elementary to post-graduate level [94].

Country of birth

Information about country of birth from the census of 1990 was used as a background variable in all the papers. Subjects were divided into those who were born in Sweden, other Nordic countries, other Europe, and other world. When children were the subjects of study, information about parental country of birth was used, preferably the homeland of the mother. For Paper I country of birth was not included in the multivariate analyses because the variable did not seem to affect any of the relationships studied.

Place of residence

For papers I-II we used a division of Sweden into so-called “local labour markets”, which were then further clustered into “employment regions” to provide a basis for geographical localisation (with information obtained from the census of 1990). These employment regions are considered homogenous with regard to educational structure and labour-market situation [95]. We made a crude subdivision between the employment regions of Stockholm, Göteborg and Malmö taken together and the remaining employment regions (also taken together).

For papers III-V we used a classification based on degree of urbanisation by municipality to obtain so-called H-regions. For this purpose we divided municipalities into big-city municipalities (Stockholm, Göteborg, Malmö), medium-sized-town municipalities (places with more than 90,000 residents within 30 kilometres from the municipal

centre, excepting the 3 large cities), and rural municipalities (all other areas, including small towns and villages).

Previous illness among subjects – control for health selection

In Paper I, in order to control for a history of morbidity, we used data from the Hospital Discharge Register for 1987-90. Former illness was defined by ICD group, and subjects were divided into two categories: those who had been discharged with a psychiatric diagnosis (ICD-9 291-319), and those with a somatic diagnosis other than psychiatric or maternity care (630-679).

Paper II covers only initially “healthy” women; that is, all women with a hospital stay for former illness (1987-90), except for maternity care, were excluded from the population.

For Paper V former illness among men was defined by ICD-9 group, and divided into four categories: alcohol-related disease, narcotics-related disease, psychiatric disease except for diagnoses indicating addiction, and other hospital care (all diagnoses except those indicating addiction or psychiatric disease). Definitions by ICD group are shown in Table 3. For each individual only primary diagnosis at first discharge was regarded, contributory diagnoses were used solely for alcoholism and drug addiction.

Parental illness

For papers III-IV information about alcohol, drug-abuse and psychiatric disease on the part of any adult in the household was obtained for the years 1987-99 to provide indicators of possible addiction, psychiatric health and adaptability among parents (see definitions by ICD-9 and ICD-10 codes in Table 3).

Sociodemographic characteristics – potential mediators

Number of children

Information about number of children from the census of 1990 was used in all papers except for Paper V. The variable values were 1, 2-3, and 4 children or more for papers I, III and IV; and, 1-2 or 3 children or more for Paper II.

Receipt of social-welfare benefit

Receipt of social-welfare benefit, based on information taken from the Total Enumeration Income Survey, was used as a background variable for all papers (although, in papers I and V, no distinction was made between variables considered separately as confounders and mediators). For the present work, receipt of social-welfare benefit was used as an indicator of economic resources, i.e. of having a low income at the extreme end of the spectrum. The social-assistance norm, used in Swedish social policy as a kind of poverty line, may be regarded as an indicator of economic deprivation. There is demonstrably a lack of economic resources when an individual takes the decision to seek allowance, and this is granted by the authorities. The measure is not without objection, however, since all people entitled to social-welfare benefit do not apply, and tighter restrictions during one period rather than another may imply that more persons live in a worse financial situation without being registered as social-welfare recipients [96]. We had access to annual totals, and individuals who received any benefit in 1990 were classified as receiving benefit, irrespective of the amount (a Yes/No variable).

Receipt of unemployment benefit

Information about receipt of unemployment benefit (including Swedish cash labour market assistance, so-called KAS) from the Total Enumeration Income Survey was initially included in all the studies, except for Paper

IV. For papers I and III the variable was excluded after preliminary analyses, since unemployment-benefit receipt did not seem to affect any of the relationships studied. The variable was coded in the same manner as receipt of social-welfare benefit.

Housing

Information about housing situation was obtained from the census of 1990, and subjects were divided into tenants, home-owners and others. Housing status in health research is usually treated as an indicator of an assumed underlying causal factor, such as income, social position or material well-being, rather than as having any direct health-damaging or health-promoting effect per se. Macintyre [97], however, found that living in rented accommodation (as also car access) was associated with worse outcomes on a number of health measures independent of income and self-esteem. In Swedish analyses Sundquist [98, 99] has found that being a tenant rather than a home-owner for both male and females is associated with increased mortality among both male and females, and also a higher consultation rate of general practitioners, even after controlling for a wide range of sociodemographic variables.

Research on housing, neighbourhood conditions and health suggests that there are various possible mechanisms via which housing tenure may influence health. Nowadays, however, the pathways between housing, social inequality and health are less discernible than during the 19th century when infectious diseases constituted the primary burden of illness, and were transmitted by contacts in poor overcrowded households [100].

Even today, it has been suggested that dampness, mould and overcrowding, which are supposed to be more common in publicly provided homes in the UK (but scarcely in Sweden), are contributory causes of respiratory and chronic illness, and also psychological distress [97]. Dunn [101] has suggested that housing has both a

material dimension (housing costs, wealth generation and storage, controlled physical environment, protection from the elements) and a psychosocial dimension (as a reflection of self-identity and pride, a place of refuge, a site for exercise of control, a source of social status, etc.). Both may contribute to health differences. In analyses of British data he found that both mental and general self-reported health were associated with housing control (home as a refuge) and housing demand (strain of housework). Crime rates are also influenced by neighbourhood-related factors.

It seems plausible, as suggested by Sundquist and Johansson [98] that tenancy reflects lack of income and a lack of wealth. People in a low socioeconomic position more often live in residential areas characterised by poor-quality housing, a lack of recreational facilities, poor neighbour contacts, poorer community services, and higher crime rates – circumstances which, in different ways, may be damaging to health. Also, in particular with regard to the situation of lone parents, the housing-situation variable may encompass resources that are not captured by variables such as income or socioeconomic status. Managing a home of one's own is likely to impose several demands that are linked to general health condition, such as being practically minded, possessing skills and knowledge, and having a network of helpful friends and relatives.

Outcome variables

For each individual only primary diagnosis at first discharge or underlying cause of death during the follow-up period was regarded for most outcomes. Contributory diagnoses were used solely for alcoholism and drug addiction.

Paper I

Analyses were performed for total mortality and the following broad cause of death groups, as defined in the

International Classification of Diseases (ICD-9): ischaemic heart disease (410-414, 429.2), cancer (140-209), respiratory diseases (460-519), and injuries and poisoning (E800-E999). External causes of death (injuries and poisoning) were further divided into the following categories: suicide, violence, assault and homicide, and alcohol-related mortality (See definitions by ICD-9 codes in Table 3).

Paper II

The study treated mortality (total mortality taken separately), and severe morbidity and injury. Conditions requiring either hospital care or causing death for the following diagnoses (ICD-9) were considered: psychiatric diagnoses (290-315) except for diagnoses indicating addiction (291, 292, 303-305.0); ischaemic heart disease (410-414); lung cancer (162); suicide/suicide attempt; (E950-E958, E980-E988); injuries from traffic (E800-E849); injuries from violence (E960-E968, E976); other accidents (E850-E949); alcohol- and drug-related diagnoses (see Table 3).

Paper III

Table 3 shows the outcomes considered in the study, according to ICD-9 and ICD-10, and also age at outcome.

Table 3. Classification of outcomes.

Outcome	Age at outcome	Type of data	ICD-9 1991-1996	ICD-10 1997-1998 (99)*
Total mortality	6-25	Mortality data	All diagnoses	
Child and adolescent psychiatric care (except for diagnoses indicating addiction)	6-19	Inpatient data	290-319 (except for diagnoses 291, 292, 303-305.0)	F00-F99 (except for diagnoses F10-F16, F18-F19)
Adult psychiatric care (except for diagnoses indicating addiction)	20-26	Inpatient data	290-319 (except for diagnoses 291, 292, 303-305.0)	F00-F99 (except for diagnoses F10-F16, F18-F19)
Suicide/suicide attempt	13-26 13-25	Inpatient data Mortality data	E950-E959, E980-E989	X60-X84, Y10-Y34
Traffic injury	6-26 6-25	Inpatient data Mortality data	E800-E849	V01-V99
Intentional violence	6-26 6-25	Inpatient data Mortality data	E960-E968	X85-Y09
Fall and poisoning	6-26 6-25	Inpatient data Mortality data	E850-E869, E880-E888	X40-X49, W00-W19
Alcohol-related diagnoses	13-26 13-25	Inpatient data Mortality data†	291,303,305.0, 357.5, 425.5, 535.3, 571.0-571.3, E860, E980+980	E24.4, F10.1-F10.9, G31.2, G62.1, G72.1, 142.6, K29.2, K70, K86.0, O35.4, P04.3, Q86.0, T51, Y90.1-Y90.9, Y91.1-Y91.9, Z50.2, Z71.4
Narcotics-related diagnoses	13-26 13-25	Inpatient data Mortality data‡	292‡, 304, 965.0, 968.5, 969.6, 969.7	F11.1-F11.9, F12.1-F12.9, F13.1-F13.9, F14.1-F14.9, F15.1-F15.9, F16.1-F16.9, F18.1-F18.9, F19.1-F19.9, O35.5, P04.4, T40.0-T40.3, T40.5-T40.9, T43.6, Z50.3, Z71.5

*Mortality data was analysed for 1991-1998 and inpatient data for 1991-1999.

†Alcohol-related and narcotics-related mortality are presented together (addiction).

‡Not included among mortality diagnoses.

Paper IV

Our investigation considered educational attainment (using data from the Education Register) among youth in 1998, i.e. education completed by the end of the spring term (academic year) of 1998, when the young people were 24-25 years-old. Two dichotomous indicators were used as measures of educational attainment:

- Compulsory school at most (9 years or less) or not.
- Post high-school (upper-secondary) education (at least 13 years) or not.

Paper V

The investigation encompassed mortality among men over the period 1991-2000. Analyses were performed on total mortality and the following cause of death groups, as defined by the International Classification of Diseases, ninth and tenth revisions (ICD-9 1991-96 ICD-10 1997-2000): ischaemic heart disease (410-414, I20-I25), lung cancer (162, C33-C34), traffic injury, fall and poisoning, violence, assault and homicide, suicide, addiction – alcohol-related and narcotics-related causes taken together (see definitions by ICD-9 and ICD-10 codes in Table 3).

RESULTS

Aim 1: Mortality and severe morbidity and injury among lone mothers (papers I and II)

Lone mothers were somewhat more often employed as manual workers and to a minor extent as high- or medium-grade non-manual workers, and were also more likely to lack an occupation. A higher proportion lived in one of the three largest cities in Sweden. It was three to four times more common for lone mothers to live in rented rather than owned accommodation in comparison with partnered mothers. Of long-term lone mothers (Paper II) 17% received social-welfare benefit during 1990, in contrast to only 2% of mothers with partners. It was twice as common for lone mothers to have been claiming unemployment benefit.

Analyses of mortality

Crude mortality rates by sociodemographic indicators showed overall excess risks for lone mothers almost irrespective of stratification. For lone mothers, the risk of dying within a five-year period was almost 70% higher than for mothers with partners after adjustments were made for age. However, the risks were reduced when hospital data indicating previous severe somatic or psychiatric morbidity were entered into the model, and fell further when socioeconomic conditions were added. There was an excess risk of ischaemic heart disease among lone mothers after adjusting solely for age. However, after adjustments for socioeconomic factors and previous disease the significant effects diminished. The greatest risk was found for death from external causes, where lone mothers faced an almost 60% increased risk after adjustments for both hospital inpatient care and socioeconomic conditions.

From grouping the mothers in 1990 according to their situation in 1985, it was found that women with children

who were without a partner at both times had the highest total mortality risk, regardless of adjustments. Having a partner at both times and changing from single to partnered status were associated with lower mortality. Mothers without partners in both 1985 and 1990 had an almost four-fold increased risk of committing suicide, and a five-fold increased risk of being a victim of violence (although the absolute number were small) or dying from alcohol-related causes in comparison with partnered mothers (taking only age into account). After controlling for hospital and socioeconomic variables the excess risks were reduced.

Analyses of severe morbidity and injury

Lone mothers showed increased risks of total mortality, lung cancer, suicide/suicide attempt, inflicted violence, traffic injury and other accidental injury, psychiatric disease and addiction, i.e. all the studied outcomes except for ischaemic heart disease (Table 4). The ORs for psychiatric disease and suicide/suicide attempt were about 2.5, and the odds for lung cancer were more than twice as high (after adjustment for age). The most pronounced risks were for diagnoses indicating drug abuse (more than a four-fold increased risk) and inflicted violence (more than a six-fold increased risk). For the latter outcome, however, there were very few cases.

The main explanation for increased risks of most outcomes, among the variables available in our study, seems to lie in deficient household resources, as indicated here by receipt of social-welfare benefit and housing situation. For the initially elevated outcomes, except for total mortality, significant risk increases remained unaccounted for even in the fully adjusted model. Attenuations in OR were most apparent in the cases of addiction and inflicted violence. Housing situation and social-welfare benefits accounted for 75% of the difference in addiction between lone mothers and mothers with partners (explained fraction). Corresponding fractions for

the other outcome variables were as follows: lung cancer 25%, suicide/suicide attempt 60%; violence 64%; non-traffic accidents 39% psychiatric morbidity 39%. (These fractions were computed for the significantly elevated ORs in Model II and Model III $[((OR''-1)-(OR'''-1))/(OR''-1)]$, see Table 4).

Associations varied according to subgroup. Lone motherhood was related to accidental injury, suicide and addiction among manual workers but not among medium- and high-grade non-manual workers. Although lone mothers in general showed no increased risk of ischaemic heart disease, those receiving social-welfare benefit were exposed to a significantly increased risk.

Table 4. Multivariate models for mortality, severe morbidity and injury (1991-1994) for lone mothers compared with partnered mothers (1990).

	Number of cases among lone mothers/partnered mothers	Model I		Model II		Model III	
		OR	95% CI	OR	95% CI	OR	95% CI
Total mortality	75/730	1.52	1.19-1.92	1.46	1.15-1.86	1.25	0.96-1.63
Ischaemic heart disease	35/446	1.16	0.82-1.64	1.14	0.80-1.61	0.88	0.61-1.28
Lung cancer	15/96	2.31	1.34-3.98	2.33	1.34-4.03	2.00	1.08-3.70
Suicide/suicide attempt	116/653	2.53	2.08-3.09	2.27	1.85-2.78	1.51	1.19-1.91
Violence	29/64	6.38	4.11-9.90	4.91	3.11-7.77	2.39	1.37-4.16
Traffic injury	111/1097	1.45	1.20-1.77	1.44	1.18-1.76	1.53	1.23-1.90
Other accident	484/5171	1.35	1.23-1.49	1.33	1.21-1.46	1.20	1.08-1.33
Psychiatric disease	351/2035	2.49	2.23-2.80	2.38	2.12-2.67	1.84	1.61-2.10
Addiction	139/480	4.17	3.45-5.04	3.58	2.95-4.36	1.65	1.30-2.08

Model I: Adjusted for age.

Model II: Adjusted for age+confounders (socioeconomic group, living in a big city, and country of birth)+indeterminate variables (employment status, unemployment benefit, and number of children).

Model III: Adjusted for age+confounders+indeterminate variables+mediators (housing situation and social-welfare benefit).

Aim 2: Mortality, severe morbidity, injury and educational attainment – are there differences with regard to outcome between children living with lone or partnered parents? (Papers III and IV)

Analyses of mortality, severe morbidity and injury

1,912 children in Sweden died during the eight-year study period. Crude mortality rates by sociodemographic indicator showed overall excess risks for children of lone parents virtually irrespective of stratification.

Following adjustment for age, the risk of dying for boys in lone-parent families within the eight-year period was more than 50% greater than for boys living with both parents. For girls no increased overall mortality risk was detected. However, the risk of death from suicide among girls was found to be more than double, and the risk of mortality from addiction strongly elevated. For the male offspring of lone parents there were substantial risk increases for mortality from addiction, falls and poisoning, and external violence. No difference was found with regard to fatal traffic injuries.

Children of lone parents showed elevated risks over the nine-year period for all studied outcomes when morbidity was measured using hospital data and adjustments were made for age (Table 5, Model I). The most pronounced risks for both boys and girls were for diagnoses indicating drug abuse, and there were also markedly elevated risks of suicide and violence. Only small risk increases were found for traffic injuries, falls and cases of poisoning observed at hospital.

The elevated risks of children of lone parents for most outcomes diminished when the variables treated as confounders were introduced into the initial model, and even more so when the mediators were added. The largest explained fractions, after encompassing all factors, were for violence and addiction to narcotics (at around 60% for both boys and girls). The explained fraction for all

variables taken together for suicide attempt was 46% for girls and 41% for boys. However, for all outcomes, significant risk increases remained unaccounted for even in the fully adjusted model. Boys in lone-parent household families showed higher risks than girls of psychiatric disease and narcotics-related disease (Table 5).

Table 5. Multivariate models for severe psychiatric diseases and injuries 1991-99 for children of lone parents compared with children of partnered parents.

1991-1999	Sex	Model I		Model II		Model III		Model IV	
		RR+95% conf. int.	RR+95% conf. int.	RR+95% conf. int.	RR+95% conf. int.	RR+95% conf. int.	RR+95% conf. int.	RR+95% conf. int.	RR+95% conf. int.
Psychiatric disease-Children, adolesc.	Girls	2.46 (2.27-2.66)	2.08 (1.91-2.26)	1.85 (1.69-2.02)	1.77 (1.62-1.94)				
	Boys	2.97 (2.70-3.27)	2.52 (2.28-2.78)	2.24 (2.02-2.48)	2.15 (1.94-2.39)				
Psychiatric disease-Young adults	Girls	1.82 (1.61-2.05)	1.58 (1.40-1.79)	1.46 (1.28-1.66)	1.42 (1.25-1.62)				
	Boys	2.24 (1.95-2.56)	1.96 (1.70-2.25)	1.81 (1.56-2.09)	1.77 (1.53-2.06)				
Suicide	Girls	2.44 (2.25-2.64)	2.04 (1.87-2.22)	1.84 (1.68-2.02)	1.78 (1.62-1.96)				
	Boys	2.79 (2.47-3.14)	2.33 (2.06-2.64)	2.12 (1.86-2.40)	2.05 (1.80-2.33)				
Traffic injuries	Girls	1.16 (1.07-1.27)	1.13 (1.04-1.23)	1.23 (1.13-1.34)	1.18 (1.08-1.28)				
	Boys	1.14 (1.07-1.22)	1.11 (1.04-1.18)	1.21 (1.12-1.29)	1.15 (1.07-1.23)				
Intentional violence	Girls	2.63 (2.08-3.33)	2.02 (1.59-2.57)	1.86 (1.46-2.38)	1.69 (1.32-2.16)				
	Boys	2.10 (1.89-2.33)	1.62 (1.45-1.81)	1.50 (1.33-1.69)	1.35 (1.20-1.53)				
Other injuries	Girls	1.20 (1.13-1.28)	1.18 (1.10-1.26)	1.21 (1.13-1.30)	1.18 (1.10-1.26)				
	Boys	1.12 (1.06-1.17)	1.09 (1.04-1.15)	1.12 (1.06-1.19)	1.09 (1.03-1.16)				
Alcohol-rel. dis.	Girls	2.96 (2.64-3.31)	2.42 (2.15-2.72)	2.23 (1.97-2.53)	2.09 (1.84-2.37)				
	Boys	2.66 (2.40-2.95)	2.18 (1.95-2.43)	2.02 (1.80-2.26)	1.88 (1.67-2.12)				
Narcotics-rel. dis.	Girls	4.53 (3.87-5.30)	3.17 (2.70-3.74)	2.54 (2.14-3.01)	2.38 (2.00-2.84)				
	Boys	5.63 (4.97-6.37)	3.97 (3.48-4.53)	3.21 (2.79-3.70)	3.01 (2.60-3.48)				

Model I=Adjusted for age of child.

Model II=Adjusted for age of child and parental confounders (age, socioeconomic group, living in a big city and country of birth, psychiatric disease, alcohol and drug addiction).

Model III=Adjusted for age of child and parental mediators (social benefit, number of children, and housing situation).

Model IV=Adjusted for age of child, and parental confounders, and mediators.

Analyses of educational attainment

It was more common for children of lone parents to have acquired only nine-year Swedish compulsory education (or less) at ages 24-25 than for children living in a two-parent household. The largest proportions were found among children in lone-parent-households with a non-custodial parent who had died; 24% of these children had completion of compulsory school as their maximum educational attainment. For children with a living non-custodial parent, the corresponding proportion was 18%, and for children of widows/widowers 13%. Among those with partnered parents the corresponding proportion was 8%. The same pattern of disadvantage for children in one-parent households appeared regarding post-high-school education (Table 6).

Table 6. Numbers of youths with full compulsory education at most and number with post-high-school education in 1998 in relation to parenting.

Family situation	All youth	Number with at most compulsory school (9 years or less)		Numbers with post-high-school education (13 years at least)		
		N	Proportion*	N	Proportion*	
Partnered parents	Girls	65 567	4476	6.8	26 675	40.7
	Boys	70 634	6520	9.2	22 957	32.5
	All	136 201	10 996	8.1	49 632	36.4
Widows/widowers	Girls	276	33	12.0	102	37.0
	Boys	303	42	13.9	80	26.4
	All	579	75	13.0	182	31.4
Lone parents - other parent alive	Girls	4609	783	17.0	1247	27.1
	Boys	4884	919	18.8	1058	21.7
	All	9493	1702	18.0	2305	24.3
Lone parents - other parent deceased	Girls	496	109	22.0	113	22.8
	Boys	546	144	26.4	95	17.4
	All	1042	253	24.3	208	20.0

*Percentage with outcome in each sub-group of children.

In multivariate analyses the elevated odds of finishing school after at most nine years diminished when the

variables treated as confounders and mediators were inserted into the initial model. For children of widows/widowers, the odds fell in a greater proportion in response to introduction of the confounders (parental age, socioeconomic group and education, living in a big city, country of birth, psychiatric disease, alcohol and drug addiction). By contrast, for children in other lone-parent households, the mediators (social-welfare benefit, housing situation, number of children) proved to be of greater importance. For children of lone parents with a living non-custodial parent, the OR fell from 2.49 to 1.33, giving an explained fraction of 78% after introducing the mediators into the model.

When analysing children with a living non-custodial parent, adjustments were also made for a combined measure of the custodial and the non-custodial parent's circumstances (with regard to socioeconomic group affiliation, education, psychiatric disease, addiction and social-welfare benefit). The findings strongly indicate that adjusting solely for the custodial parent's circumstances may lead to under-estimation of the relation between lone parenthood and educational attainment because of generally higher educational and socioeconomic status among, mainly male, non-custodial parents.

Lone parenting seemed to have a more detrimental effect on girls' education, and on children with highly educated parents, than on those with a relatively low education.

Aim 3: Family situation and mortality among men (Paper V).

Long-term cohabiting men, both with and without children, generally seemed to live under the most advantageous circumstances; the greatest proportions of high-grade non-manual workers and homeowners were found in this group. Receipts of social benefit and unemployment benefit were less common phenomena among these males, as too was hospital care for psychiatric

disease or addiction during the years prior to follow-up. By contrast, men living without either a partner or children seemed to suffer from the most disadvantageous conditions.

Long-term lone non-custodial fathers showed the most pronounced risk of all-cause mortality, and also of death from external violence, fall and poisoning, suicide or addiction (after adjustment for age). In comparison with long-term cohabiting fathers they had almost 4 times as great a risk of all-cause mortality, and 10 times of death from external violence, 13 times from fall and poisoning, almost 5 times due to suicide, and 19 times from addiction (selected outcomes shown in Table 7). Long-term lone childless men also showed strongly elevated risks. Being a lone custodial father also implied increased risk, although generally to a much lesser degree, and not for all outcomes. Cohabiting childless males had largely the same risk of all-cause mortality as long-term lone custodial fathers.

The elevated risks for all subgroups diminished when variables used as proxy measures of health selection (psychiatric-, alcohol-, narcotics-related, and other care taken separately) and variables indicating social and economic situation (socioeconomic group, living in a big city/medium-sized town/rural area, country of birth, social-welfare benefit, unemployment benefit, and housing situation) were added to the initial model. The adjustments substantially attenuated the relative risks; and, where elevated, they generally fell more in response to introduction of the socioeconomic variables than to addition of the health-selection variables (with the exception of traffic injury). Health-selection factors accounted for 57% of the differential with regard to all-cause mortality between long-term lone non-custodial fathers and long-term cohabiting custodial fathers, while the socioeconomic variables accounted for 72%.

In all the studied subgroups, significant increased risks, albeit greatly attenuated, remained unaccounted for even in the fully adjusted model with regard to all-cause mortality, and death from ischaemic heart disease or addiction (Table 7). After these extensive adjustments, excess risks were generally still most accentuated among lone non-custodial fathers and lone childless men. Consistently, for all subgroups, the greatest explained fractions, after encompassing all factors, were for addiction, fall and poisoning, external violence, and lung cancer.

Table 7. Mortality 1991-2000 from all-cause mortality, ischaemic heart disease, suicide and addiction among lone and partnered males, with and without biological children.

Cause of death	Data on biological children	Model I	Model II	Model III	Model IV
Total mortality	Yes	1.00	1.00	1.00	1.00
	Long-term cohabiting custodial fathers	1.4 (1.3-1.6)	1.4 (1.2-1.5)	1.2 (1.0-1.3)	1.2 (1.0-1.3)
	Short-term lone custodial fathers	1.7 (1.4-2.0)	1.6 (1.4-1.9)	1.3 (1.1-1.5)	1.3 (1.1-1.5)
	Long-term lone non-custodial fathers	2.5 (2.2-2.7)	2.1 (2.0-2.2)	1.8 (1.7-1.9)	1.7 (1.5-1.8)
	Short-term lone non-custodial fathers	3.6 (3.4-3.8)	2.7 (2.5-2.8)	2.2 (2.1-2.4)	1.9 (1.8-2.0)
Ischaemic heart dis.	No	1.7 (1.6-1.7)	1.6 (1.5-1.7)	1.5 (1.5-1.6)	1.5 (1.4-1.6)
	Long-term cohabiting childless men,	3.4 (3.3-3.6)	2.9 (2.8-3.0)	2.3 (2.2-2.4)	2.2 (2.1-2.2)
	Long-term lone childless men	1.00	1.00	1.00	1.00
Suicide	Yes	1.00	1.00	1.00	1.00
	Long-term cohabiting custodial fathers	1.6 (1.2-2.0)	1.5 (1.1-1.9)	1.3 (1.0-1.6)	1.2 (1.0-1.6)
	Short-term lone custodial fathers	2.2 (1.6-3.0)	2.1 (1.5-2.9)	1.6 (1.2-2.3)	1.7 (1.2-2.3)
	Long-term lone non-custodial fathers	2.2 (1.8-2.6)	1.9 (1.6-2.2)	1.6 (1.3-1.8)	1.5 (1.2-1.7)
	Short term lone non-custodial fathers	2.9 (2.5-3.3)	2.4 (2.1-2.7)	1.8 (1.6-2.1)	1.7 (1.5-1.9)
Addiction	No	1.6 (1.4-1.8)	1.6 (1.4-1.8)	1.5 (1.3-1.6)	1.4 (1.3-1.6)
	Long-term cohabiting childless men	3.1 (2.8-3.3)	2.8 (2.6-3.0)	2.1 (1.9-2.3)	2.0 (1.8-2.2)
	Yes	1.00	1.00	1.00	1.00
	Long-term cohabiting custodial fathers	1.4 (1.0-2.0)	1.3 (0.9-1.8)	1.2 (0.8-1.6)	1.1 (0.8-1.6)
	Short-term lone custodial father s	1.2 (0.7-2.2)	1.2 (0.6-2.1)	0.9 (0.5-1.7)	1.0 (0.5-1.8)
Model I = Adjusted for age.	Long-term lone non-custodial fathers	3.2 (2.7-3.7)	2.3 (2.0-2.8)	2.3 (1.9-2.8)	2.0 (1.6-2.3)
	Short term lone non-custodial fathers	4.6 (4.0-5.4)	3.0 (2.6-3.5)	3.0 (2.5-3.5)	2.3 (2.0-2.8)
	Long-term lone non-custodial fathers	1.2 (1.0-1.5)	1.2 (1.0-1.4)	1.2 (1.0-1.4)	1.1 (0.9-1.4)
	Long-term cohabiting childless men	3.8 (3.5-4.2)	2.8 (2.6-3.1)	2.7 (2.5-3.1)	2.2 (2.0-2.5)
	Long-term lone childless men	1.00	1.00	1.00	1.00
Model II = Adjusted for age+inpatient care (psychiatric, alcohol-, narcotics-related, and other care taken separately).	Yes	1.00	1.00	1.00	1.00
	Long-term cohabiting custodial fathers	3.4 (2.5-4.7)	2.9 (2.1-4.1)	2.0 (1.5-2.8)	2.2 (1.6-3.0)
	Short-term lone custodial father s	3.5 (2.1-5.6)	3.1 (1.9-5.0)	1.8 (1.1-3.0)	2.1 (1.3-3.4)
	Long-term lone custodial fathers	9.3 (7.9-10.8)	5.7 (4.9-6.7)	4.6 (3.9-5.4)	3.8 (3.2-4.6)
	Short term lone non-custodial fathers	18.9 (16.7-21.4)	8.5 (7.4-9.7)	7.1 (6.2-8.2)	4.7 (4.1-5.4)
Model III = Adjusted for age+socioeconomic group, living in a big city/medium-sized town/rural area, country of birth, social-welfare benefit 1990, unemployment benefit 1990, and housing situation.	Long-term lone non-custodial fathers	2.8 (2.4-3.3)	2.6 (2.2-3.1)	2.4 (2.0-2.8)	2.3 (1.9-2.7)
	Long-term cohabiting childless men	11.6 (10.5-12.8)	7.3 (6.5-8.1)	5.3 (4.8-6.0)	4.2 (3.7-4.7)
	No	1.00	1.00	1.00	1.00
	Long-term cohabiting custodial fathers	3.4 (2.5-4.7)	2.9 (2.1-4.1)	2.0 (1.5-2.8)	2.2 (1.6-3.0)
	Short-term lone custodial father s	3.5 (2.1-5.6)	3.1 (1.9-5.0)	1.8 (1.1-3.0)	2.1 (1.3-3.4)
Model IV = Adjusted for all variables.	Long-term lone custodial fathers	9.3 (7.9-10.8)	5.7 (4.9-6.7)	4.6 (3.9-5.4)	3.8 (3.2-4.6)
	Short term lone non-custodial fathers	18.9 (16.7-21.4)	8.5 (7.4-9.7)	7.1 (6.2-8.2)	4.7 (4.1-5.4)
	Long-term lone non-custodial fathers	2.8 (2.4-3.3)	2.6 (2.2-3.1)	2.4 (2.0-2.8)	2.3 (1.9-2.7)
	Long-term cohabiting childless men	11.6 (10.5-12.8)	7.3 (6.5-8.1)	5.3 (4.8-6.0)	4.2 (3.7-4.7)
	Long-term lone childless men	1.00	1.00	1.00	1.00

Model I = Adjusted for age.

Model II = Adjusted for age+inpatient care (psychiatric, alcohol-, narcotics-related, and other care taken separately).

Model III = Adjusted for age+socioeconomic group, living in a big city/medium-sized town/rural area, country of birth, social-welfare benefit 1990, unemployment benefit 1990, and housing situation.

Model IV = Adjusted for all variables.

DISCUSSION

The results of the studies in this dissertation suggest that lone parenthood is associated with health and longevity among women and men in Sweden. Lone mothers showed an increased risk of premature death, severe morbidity and injury compared with mothers living with partners. Among men, cohabiting fathers living with their children throughout the study period showed the lowest mortality risk, whereas lone fathers without custody of their children (in particular) and childless single men were worst off with regard to premature death. The most elevated risks among both men and women were found mainly for outcomes in the spheres of mental health/psychiatric disease, addiction and suicide.

Growing up in a lone-parent family seems to be associated with increased risk of a variety of unfavourable outcomes. The children of lone parents face increased risks of psychiatric disease, suicide, injury and addiction, and also have lower educational attainment as adults. With regard to education, achievement varies according to cause of lone parenting, where the best prospects were found for children of widows/widowers.

Large parts of the raised mortality and morbidity of lone parents, and also the relatively low educational attainment of their children, seem to be explicable by socioeconomic differences. An important explanation for this seems to lie in a lack of household resources (papers II-IV), as indicated here by receipt of social-welfare benefit and housing situation (tenancy rather than home ownership). These seem to be the circumstances that serve as intermediate pathways via which the lone-parent situation impacts on health.

We controlled for health selection, at least to some extent, through the inclusion, in multivariate analyses, of previous somatic and psychiatric illness (papers I, III-V) and drug-related morbidity (papers III-V) morbidity. Data on

hospitalisation were used for this purpose. Health-selection mechanisms seemed to be of importance for both men and women – among men, primarily for non-custodial fathers and lone childless men. The parents' illness seemed to be of minor importance for elevated risks of ill-health and lower educational attainment among children in lone-parent families, at least as measured with in-patient data.

An important question is whether lone parenthood entails a greater vulnerability in general among adults and children or whether there is an accumulation of persons in marginalised social situations within the group of lone parents who also are particularly unhealthy. Taking into account previous hospitalisation (either by exclusion of the previously hospitalised or making adjustments in the multivariate analyses), plus the fact that increased risks remain for most outcomes, even after adjustments for different socio-economic circumstances, mediate against the marginalisation interpretation as the major explanation.

Our finding that health differences between groups largely mirror variations in socioeconomic circumstances are in line with the results of previous studies. Benzeval [8] found that controlling for differences in household resources, such as access to a car, ownership of a wide range of consumer durables, housing tenure, employment status, and disposable family income, reduced the gap in self-perceived general health between lone and partnered mothers to a half or a third of its original size. Also, in a British study, Hope and colleagues [102], on measuring self-reported psychiatric distress among lone mothers, found the predominant explanation for excess psychological symptoms to lie in financial hardship, with more modest contributions being made by social support, employment, and number and age of children. In a Swedish study poverty and joblessness among lone mothers seemed to explain much less of the variation in self-reported health than was explained by social-welfare

benefit and housing situation in relation to severe morbidity in our study (Paper II) [14]. Previous findings concerning the relation between family situation and mortality [103], and also self-reported health [21], among married and unmarried men also suggest variations are attributable to differences in socioeconomic circumstances. Also, among the children of lone parents, large elements in elevated risks of ill-health and mortality [53, 54, 104], and also low educational attainment [62-65], have previously been found to be explicable by socioeconomic differences between households.

Strengths and limitations of the studies

The main strengths of these register-based studies lie in their full-population coverage of an entire country and the potential this offers to adopt a longitudinal approach with low dropout rate. We took advantage of the possibility to link information between registers, and achieved almost complete coverage of children and adults in different family situations and almost complete follow-up of outcomes. The information about family situation was collected independently of the study outcomes. Using records on deaths and hospital discharges meant that our health measures are not biased by self-reporting, and can be expected to cover most serious outcomes. A diagnosis on a hospital record sheet, however, does not include any information about degree of severity of disease or injury. Hence, if lone mothers and their children, for instance, are more likely to be admitted to hospital for less serious conditions, their risk will be overestimated. This is conceivable in the case of children since the decision to admit a child to hospital may be influenced by the physician's judgement of parental capability of taking care of the child at home. Also, lone parents may be more inclined to seek hospital care. Analyses from the UK show a higher rate of consultation with general practitioners for children in households with one adult [105]. And it also might be the case for adults. Hospital admission may be more likely for a person who does not live with another

adult capable of providing care in case of injury or illness. On the other hand, a partner at home might also serve as a trigger to seek hospital care, and also simplify admission by enabling young children to be taken care of at home. The reduction of hospital care in Sweden during the 1990s makes it less likely that decisions to admit patients are influenced by other factors than medical reasons.

To control for potential health-selection bias we checked whether the women or men had been admitted to hospital at any time during the four years preceding the follow-up period. We either excluded such individuals (Paper II) or adjusted for that circumstance within the multivariate analyses (papers I and V). This four-year period may have been too short, and inpatient history is only a crude indicator of overall health status. However, we had no information about health problems not requiring inpatient attention, and data on further previous hospital discharges was not available. For long-term lone mothers and fathers, hospital admission predating the follow-up period might have been relatively more common due to the stresses of the family situation. In such cases, adjustments for these circumstances would have resulted in an underestimation of the effect of family situation on health.

Selection may be based on other factors that influence the risks of future ill-health. Lack of material resources may in fact precede lone parenthood, and this may have relevance to the timing of possible interventions. In our study, however, we could not measure this due to lack of data. Women in a stronger financial situation and with a higher education in Sweden have been found to have a lower risk of lone motherhood [1]. However, another Swedish study found that the financial situation of mothers who later separated was about the same as those who continued to cohabit [2].

A major limitation of all studies in this dissertation is that, in the registers used, any child in a lone-parent household

is recorded as living with just one parent, usually the mother (86% of children aged 0-17 years in 1999). In reality many children live alternately with their mother and father, but the frequency of this arrangement is unknown. Interviews with parents in 1992/93 suggested that approximately 4% of children with separated parents live equal time with each parent – a form of arrangement that was found to be somewhat more common among younger children and among non-manual workers (compared with manual workers). In 1997 10% of all ten year-olds declared that they lived equal time with both parents [16] and in 2000 Statistics Sweden also estimated this proportion to about 10% [106]. According to a survey about children's' circumstances 2000 about 40% of children (aged 10-18) in lone mother-families live part-time with their father, with an average of 4 days per month [107]. However, 16% of children living in lone-parent families seem to have no contact at all with the absent parent, usually because that parent lives abroad, has died or is unknown [108]. To obtain a more complete picture of the burdens of lone parenthood, with regard to both adults and children, it would be necessary to distinguish parents who share responsibilities and expenses for their child with another committed adult from those who stand alone or are in conflict with the other parent. From another perspective, never or seldom seeing one's child, or perhaps being hindered from doing so, forms an important part of the picture.

We defined long-term exposure as having been in the same family situation for at least five years. We do not know, however, if the situation for any individual applied continuously across the entire period. Some long-term partnered people may, for example, have separated between 1985 and 1990, but got back together again by 1990. Measurements on sociodemographic variables (except for those concerning family status) were taken at just one point in time. Accordingly, in the context of this dissertation, although these variables are seen as indicators of socioeconomic situation, the instruments involved may

have been too blunt to form a true picture of household social and financial circumstances.

Alternative explanations

Within the everyday life of lone parents with dependent children there are, no doubt, many ingredients that may be injurious to health and give rise to elevated levels of psychological distress. Bringing up a child alone especially with weak material and social resources may take its toll on health. In one-parent households the lone adult takes on many different roles – in particular being the sole breadwinner, which constrains attention, help and supervision in relation to the child. It is possible that the absence of one parent is important in explaining the increase in mortality and morbidity risks found. It has also been suggested that the loss of one parent as a role model in the home is important, especially for boys who grow up with a single mother [59, 109].

The sons of lone parents seem to be worse off than girls in relation to psychiatric disease and narcotics-related disease. Our results do not, however, support the view that there are general risk differences related to gender of custodial parent. Divorce is usually preceded by family conflict, which in many cases continues well beyond actual separation. In intimate interviews with Swedish children of divorce, a relationship between the parents characterised by mutual respect and ability to co-operate concerning their children was considered to be the factor of the greatest importance for the well-being of the child [110]. Inter-parental hostility creates an aversive home environment in which children experience stress, unhappiness and insecurity. It is important to remember that several studies have suggested that children are better off in a lone-parent family with a low-conflict level than in an intact high-conflict family [2, 46, 54].

It has been suggested that lack of social support is one of many potential explanations for the health disadvantage of

lone mothers [14, 21, 102], and may influence health both directly and indirectly by increasing vulnerability to life events and adversities. In his analyses of Swedish data, Gähler [2] found that divorced women experience less access to social support than other women. Another Swedish study has reported that lone mothers perceive lower quality in their social networks [15]. Some health-related behaviours among lone mothers may constitute one of the additional factors involved. Although based on a small sample, one of the Swedish studies referred to above also reported that lone mothers were more likely to be daily smokers and to take less exercise than their partnered counterparts [15]. Self-report data from the Swedish Survey of Living Conditions (ULF) for 1996/97 indicate that, among lone mothers, 50% were daily smokers and 6% could be regarded as high-alcohol consumers. The corresponding proportions for partnered mothers were 25% and 2%. This doubled prevalence of smoking reflects the more than doubled risk of lung cancer found in our studies of lone mothers (a doubled risk that remains even after adjusting for variables strongly associated with smoking).

In research into the effects on health of the multiple roles occupied by many women – related to employment, marriage and motherhood – findings generally indicate that involvement in a number of different role relationships is associated with good mental and physical health. Multiple roles are supposed to provide a variety of benefits (more sources of social support, improved financial resources, etc.), and these may be regarded as outweighing possible disadvantages [28, 38]. However, in the case of lone parents there are studies indicating that lone mothers employed full-time suffer from role overload [10, 13, 36, 37]. It has been tentatively suggested that this is because of the strain involved in combining work and parental roles without the emotional or financial support that a partner can provide. Whitehead and colleagues [14] have suggested that lone mothers suffer from “time poverty” to a greater extent than other mothers. Data have

shown that more lone mothers than partnered mothers were in full-time employment in 1991, and their average working week, which included both paid and unpaid work, was more than three hours longer compared to cohabiting mothers [68]. It has been suggested that the Swedish social-policy principle of integrating lone mothers into the framework developed for working parents in general may have rendered invisible the economic and social pressures placed upon lone parents as sole breadwinners and carer in the family.

For some people, lone parenthood is an escape from a different set of problems and becoming a lone parent may actually improve their health chances. For example, in the UK, 20% of lone parents report violence, and 15% alcoholism and/or drug abuse as major factors in the breakdown of the relationship with their partner [111].

Previous research has also pointed to the fact that men generally have better economic resources than women following divorce [2], and a disadvantageous financial situation has been regarded as an explanation of ill-health among divorced women, especially lone mothers. Socioeconomic circumstances also seem to play an important role with regard to health disadvantages among lone fathers, custodial as well as non-custodial, and lone childless men, in comparison with cohabiting fathers, at least in terms of mortality from certain specific causes. Divorce and loss of custody of children may result in having to move from an owner-occupied home to a rented apartment, and a worsened financial situation, due to maintenance payments and having no one with whom to share household expenses (in the same way as for lone mothers).

The increased risks found in the studies were especially pronounced among lone non-custodial fathers and lone childless men with regard to all-cause mortality and deaths from ischaemic heart disease, addiction, suicide and injuries. These results are in line with those of Umberson

[31] who found that parenting reduces the inclination to engage in negative health behaviours more when children and parents live in the same residence than when they live separately. Divorced men living without their children showed more negative health behaviours than divorced men living with their children, with the deterrent effect of parenting being most apparent for behaviours such as illicit drug abuse [31]. Explanations of these circumstances may be that men are less likely to live with or even have as much contact with their children upon divorce. Children give structure to custodial parents' lives in that they provide much needed company and meaningful access to other adults, including neighbours, close kin and friends. In our study, for example, long-term lone non-custodial fathers were found to face four-fold risks of addiction and injury from fall or poisoning, and more than a doubled risk of committing suicide even after adjustments were made for previous illness and socioeconomic factors. This suggests that some of the mechanisms underlying the relationship between lone living and ill-health lie within the private sphere. Deeper relations are important, but out of reach of most social-policy interventions.

Lone men generally showed higher relative mortality risks than lone women (in comparison with their partnered counterparts), especially with regard to addiction and injury. An important question is how much of the variation in mortality among men can be attributed to selection processes. Men with mental-health or addiction problems are more likely to be selected out of both marriage and parenthood, and, if they have children, seldom get custody following divorce. Health-selection mechanisms seemed to play a major role mostly for non-custodial fathers and lone childless men, and selection processes can be presumed to be of major importance with regard to our results concerning these groups.

Our findings consistently show that lone parents and their children face a disadvantageous situation regarding both mortality and severe morbidity, and also socioeconomic

circumstances. Most studies of lone parents are concerned with self-reported impaired health or limiting illness, conditions that were found to be frequent in the studied population. Since we analysed quite rare events for people in the studied age groups (mortality and severe morbidity), most of the children and adults are not affected by these severe and negative outcomes. For example, 1.6% of children in lone-parent families had been discharged from hospital for suicide/suicide attempt during a 9-year period (0.6% of the children in two-parent families). It could be the case that most of the lone parent population differ little from the general population with respect to these severe outcomes, and the main differences appear only in the extremes of the population. Hence, interpretations on group level from “lone-parent background” may be somewhat biased for the entire group, as for different subgroups [112]. Living conditions also vary within the group of lone mothers – those with a high education and strong attachment to the labour market are probably doing better than low-educated unemployed mothers. Nevertheless, they have in common the joint concerns of having children to raise and support alone, which put them in a more vulnerable situation than other mothers. However, even after taking into account previous hospitalisation (either by exclusion of the previously hospitalised or making adjustments in the multivariate analyses) and controlling for various socioeconomic circumstances, increased risks remain for most outcomes. This argues against the marginalisation interpretation as the only explanation.

In-depth interviews with 85 Swedish children in connection with their parents’ divorce (both immediately after the event, and when 50 of the subjects were followed-up 20 years later) revealed the common feature among parents that they feared that their children would be damaged by the breaking-up of the family in some way [110]. However, the authors of the study came to the conclusion that for almost all children of divorce (or, at least among their interviewees), life had actually turned

out quite well, even if there had been difficulties along the way.

This dissertation has undeniably focused on the difficulties associated with lone parenthood. However, registry data of the kind we have employed will inevitably cover severe negative outcomes rather than favourable ones (on which information is not available). Although the difficulties found among lone parents are real and often extreme, it must not be forgotten that many thousands of lone parents manage day after day to provide positive, loving and enjoyable environments for themselves and their children.

The importance that should be attached to the health-damaging effects of lone parenting may, at least to some extent, be a matter of whether the glass is regarded as half empty or half full. This is well illustrated by the academic battle between two prominent researchers in the field, Judith S. Wallerstein and E. Mavis Hetherington, referred to in *Time Magazine* (January 29, 2002). Whereas Wallerstein, on the basis of intimate interviews, concludes that divorce among parents and its aftermath leave scars that can linger in afflicted children throughout adolescence and into adulthood, Hetherington paints a far more optimistic picture, pointing out that 75-80% of children recover without harm. Our analyses reveal that an overwhelming majority of adults and children in lone-parent families escape such rare outcomes as death and hospitalisation. However, they are still (varying according to the outcome studied) several times more common in lone-parent than intact families. Further, other studies suggest that less severe outcomes with a higher incidence are also more common among lone parents and their children [5, 7, 8, 54, 65].

Future research

Our studies have given a broad, albeit intermittently shallow, picture of lone parenthood, of the related

increased risks of mortality and severe morbidity among both children and grown-ups, and of the extent to which socioeconomic circumstances and health-selection mechanisms contribute to explaining differences between lone and partnered parents. To increase knowledge and understanding of underlying mechanisms future studies of the following kinds are needed:

- Further studies, addressing more specific research issues, on the basis of routinely collected registry data. More extensive investigation of whether lone mothers suffer from “time poverty” and role overload provides one example. Relation to the labour market is of specific interest in this context, as too is the incidence and prevalence of sick-leave. For this purpose, further refinement of the background variables would be necessary. Information on economic situation could be enlarged by employing data from several years. In this connection, linkages between Statistics Sweden’s Surveys of Living Conditions (ULF), comprising interview data based on annual nationally representative samples of 6000-8000 subjects, and the population-based health data registers might offer a practical way of increasing knowledge about the everyday-life circumstances that may cause ill-health in the lone-parent population.
- In-depth studies based on longitudinal interview data. These would shed further light on the multiplicity of phenomena and processes upon which routinely collected data do not bear, such as alternate living, conflict in the family, social networks, and experiences of the conditions by which life is controlled
- It has become commonplace, both in Sweden and elsewhere, for an individual to be part of a diverse family network, including half-brothers and half-sisters, and mother’s and father’s new spouses and their previous children. Relations within such a, sometimes, extensive network, may be of great

importance for health and well-being and ought to be addressed in future research.

CONCLUSIONS

1. Our findings suggest that lone motherhood entails health disadvantages with regard to mortality, severe morbidity and injury. Lack of household resources seems to play a major role in accounting for increased risks, but the risks are partly independent of socioeconomic circumstances and health selection into lone motherhood.
2. Our findings suggest that growing up in a lone-parent family is associated with increased risks of a variety of unfavourable outcomes, namely psychiatric disease, suicide/suicide attempt, injury and addiction, and also relatively low educational attainment. Poorer educational performance as well as health disadvantages are explicable to a large extent by socioeconomic disadvantage, especially a lack of financial resources.
3. Our findings suggest that cohabiting fathers living with their children, have the lowest risks of premature mortality from all causes, whereas lone fathers without custody of their children and lone childless men are worst off with regard to all-cause mortality, and death from ischaemic heart disease, violence, injury, suicide or addiction. Being a lone custodial father or a cohabiting childless man also seems to entail relatively increased risk, although generally to a much lesser extent than for single men. These increased risks of mortality are explicable to a large extent by health-selection mechanisms, and even more by socio-economic disadvantage, mostly for non-custodial fathers and lone childless men.

ACKNOWLEDGEMENTS

Many people have helped and encouraged me throughout my work. My warm thanks to all of you, whether acknowledged below or not:

First, special thanks go to my principal supervisor *Måns Rosén* for your continuous and immeasurable support. Your encouragement, your profound knowledge about public health matters, and the great joy and deep interest you have shown for this work has made my learning process truly enjoyable. The positive attitude that surrounds your leadership and also yourself brings out the best in people.

Bengt Haglund, my informal co-supervisor, for your extraordinary knowledge about SAS-programming, statistical and epidemiological methods. Your great generosity in sharing this and other knowledge also makes you an extraordinary person. It has truly been a privilege to work with you.

My co-author *Anders Hjern*, for generously sharing time and your vast knowledge. For always being kind, encouraging and also inspirational through all those good ideas that you somehow manage to realise.

Magnus Stenbeck, head of the Unit for Analysis, Centre for Epidemiology, for your excellent methodological competence and for offering a stimulating and very pleasant work-environment. I owe much to your leadership, which encourages an open and friendly atmosphere, although never promoting simplified solutions and political correctness.

Anders Gullberg, because long ago you employed me to do a stimulating work with the “Social database” and also encouraged me to start my doctoral studies.

Bo Burström my co-author, for valuable help in writing the last manuscript and for kind encouragement.

Bosse Vinnerljung for giving me valuable comments on the dissertation and for kind encouragement.

Birgitta Åström for being kind and helpful and formatting the final manuscript with great skill.

Jon Kimber for excellent review of my English.

Friends and colleagues at the Centre for Epidemiology, National Board of Health and Welfare – Many thanks for all support and for making it possible to finish this dissertation within the scope of my work! In particular, I am grateful to colleagues and former colleagues at the Unit for Analysis – *Susanne Holland, Danuta Biterman, Emil Löfroth, Gudrun Persson, Martin Börjeson and Gunnel Boström* for all support, for good times and for making it possible for me to complete this dissertation by periodically relieving me from other working tasks. *Petra Otterblad Olausson, Lotti Barlow, Max Köster, Ingalill Paulsson Lütz and Marie Hasselberg* for being good supportive friends in doing this work.

My family, my husband Peder, my children Arvid and Sofie for love and support and giving me energy to continue and complete this dissertation.

REFERENCES

1. Nyman H. An economic analysis of lone motherhood in Sweden (doctoral thesis). Göteborg: Department of Economics, University of Göteborg; 1998.
2. Gähler M. Life after divorce. Economical, social and psychological well-being among Swedish adults and children following family dissolution (doctoral thesis). Stockholm: Swedish Institute for Social Research; 1998.
3. Torége J. Inkomstutvecklingen 1975-1995. Vogel J, Häll L (eds.). In: Valfärd och ojämlikhet i 20-årsperspektiv 1975-1995. (Income development 1975-1995. In: Living Conditions, Report 91, Living Conditions and Inequality in Sweden - a 20-Year Perspective 1975-1995. In Swedish with an English summary). Stockholm: SCB, Valfärdsprogrammet 1997, pp 125-36.
4. Vogel J. Ekonomiska problem m.m. Vogel J, Häll L (eds.). In: Valfärd och ojämlikhet i 20-årsperspektiv 1975-1995. (Economic problems etc. In: Living Conditions, Report 91, Living Conditions and Inequality in Sweden - a 20-Year Perspective 1975-1995. In Swedish with an English summary). Stockholm: SCB, Valfärdsprogrammet 1997, pp 179-96.
5. Burström B, Diderichsen F, Shouls S, Whitehead M. Lone mothers in Sweden: trends in health and socio-economic circumstances, 1979-1995. *J Epidemiol Community Health* 1999;53:750-6.
6. Gähler M. Bara en mor - ensamstående mödrars ekonomiska levnadsvillkor i 1990-talets Sverige. Bergmark Å (ed.). In: Ofärd i valfärden. Kommittén Valfärdsbokslut. (Only a mother - living conditions among lone mothers in Sweden during the nineties. In Swedish). Stockholm: Fritzes 2001, (SOU 2001:54), pp 15-99.

7. Shouls S. The health and socio-economic circumstances of British lone mothers over the last two decades. *Popul Trends* 1999;95:41-6.
8. Benzeval M. The self-reported health status of lone parents. *Soc Sci Med* 1998;46(10):1337-53.
9. Popay J, Jones G. Patterns of health and illness amongst lone parents. *Jnl Soc Pol* 1990;19(4):499-534.
10. Macran S, Clarke L, Joshi H. Women's health: dimensions and differentials. *Soc Sci Med* 1996;42(9):1203-16.
11. Beatson-Hird P, Yuen P, Balarajan R. Single mothers: their health and health service use. *J Epidemiol Community Health* 1989;43:385-90.
12. Elstad J. Inequalities in health related to women's marital, parental, and employment status - a comparison between the early 70s and the late 80s, Norway. *Soc Sci Med* 1996;42(1):75-89.
13. Sogaard A, Kritz-Silverstein D, Wingard D. Finnmark heart study: Employment status and parenthood as predictors of psychological health in women, 20-49 years. *Int J Epidemiol* 1994;23(1):82-90.
14. Whitehead M, Burström B, Diderichsen F. Social policies and the pathways to inequalities in health: a comparative analysis of lone mothers in Britain and Sweden. *Soc Sci Med* 2000;50:255-70.
15. Forssén A, Janlert U. Ensamstående mödrar har ökad risk för ohälsa (Lone mothers are at increased risk of ill health. In Swedish). *Allmänmedicin* 1991;12:72-76.
16. Barn och deras familjer 1999. SCB Demografiska rapporter 2000:2 (Children and their families 1999. In Swedish). Stockholm: Statistiska centralbyrån; 2000.
17. Berkman L, Syme S. Social networks, host resistance, and mortality: a nine-year follow-up study of Alameda County residents. *Am J Epidemiol* 1979;109(2):186-204.

18. Macintyre S. The effects of family position and status on health. *Soc Sci Med* 1992;35(4):453-64.
19. Koskinen S, Martelin T. Why are socioeconomic mortality differences smaller among women than among men? *Soc Sci Med* 1994;38(10):1385-96.
20. Gove W. Sex, marital status, and mortality. *American Journal of Sociology* 1973;79:45-67.
21. Wyke S, Ford G. Competing explanations for associations between marital status and health. *Soc Sci Med* 1992;34(5):523-32.
22. Arber S. Class, paid employment and family roles: making sense of structural disadvantage, gender and health status. *Soc Sci Med* 1991;32(4):425-36.
23. Verbrugge L. Marital status and health. *J Marriage Family* 1979;41:267-85.
24. Hope S, Rodgers B, Power C. Marital status transitions and psychological distress: longitudinal evidence from a national population sample. *Psychol Med* 1999;29:381-9.
25. Goldman N, Hu Y. Excess mortality among the unmarried: a case study of Japan. *Soc Sci Med* 1993;36(4):533-46.
26. Gove W. Sex, marital status and suicide. *J Health Soc Behav* 1972;13(2):204-13.
27. Rosengren A, Wedel H, Wilhelmsen L. Marital status and mortality in middle-aged Swedish men. *Am J Epidemiol* 1989;129:54-64.
28. Verbrugge L. Multiple roles and physical health of women and men. *J Health Soc Behav* 1983;24(1):16-30.
29. Riessman CK, Gerstel N. Marital dissolution and health: do males or females have greater risk? *Soc Sci Med* 1985;20(6):627-35.

30. Hu Y, Goldman N. Mortality differentials by marital status: an international comparison. *Demography* 1990;27(2):233-50.
31. Umberson D. Family status and health behaviors: social control as a dimension of social integration. *J Health Soc Behav* 1987;28(3):306-19.
32. Hemström Ö. Is marriage dissolution linked to differences in mortality risks for men and women? *J Marriage Fam* 1996;58:366-78.
33. Durkheim E. *Suicide: A study in Sociology*. New York: The Free Press; 1951.
34. Ross C, Mirowsky J, Goldsteen K. The impact of the family on health: the decade in review. *J Marriage Fam* 1990;52:1059-78.
35. Mastekaasa A. Parenthood, gender and sickness absence. *Soc Sci Med* 2000;50:1827-42.
36. Kotler P, Wingard D. The effect of occupational, marital and parental roles on mortality: the Alameda County Study. *Am J Public Health* 1989;79(5):607-12.
37. Vogel J. Konflikter mellan privatlivet och arbetet. Vogel J, Kindlund H, Diderichsen F (eds.) In: *Arbetsförhållanden, ohälsa och sjukfrånvaro 1975-1989*. (Conflicts between private life and work. In: Working conditions, illness and sickness absence in 1975-1989. In Swedish). Stockholm: SCB 1992.
38. Martikainen P. Women's employment, marriage, motherhood and mortality: a test of the multiple role and accumulation hypotheses. *Soc Sci Med* 1995;40(2):199-212.
39. Ringbäck-Weitof G. Chapter 9. Social differences, vulnerability and ill-health. Health in Sweden: The National Public Health Report 2001. *Scand J Public Health* 2001;Suppl 58:199-218.

40. Bäckman O. Chapter 4. Livelihood and poverty. Social report 2001. The National Report on Social Conditions in Sweden. *Int J Soc Welfare* 2002;11 (SUPPLEMENT):41-60.
41. Kindlund H. Chapter 6. Risk of exposure to social problems. Social report 2001. The National Report on Social Conditions in Sweden. *Int J Soc Welfare* 2002;11(SUPPLEMENT):67-77.
42. Estrada F, Nilsson A. Brottslighet som välfärdsproblem - Utsatthet för brott och oro för brott 1988-1999. Bergmark Å (ed.). In: Ofärd i välfärden. Kommittén Välfärdsbokslut. (Crime as a welfare problem. In Swedish). Stockholm: Fritzes 2001 (SOU 2001:54), pp 223-63.
43. Burström B, Bernhardt E. Social differentials in the decline of child mortality in nineteenth century Stockholm. *Eur J Public Health* 2001;11:29-34.
44. Modin B. Born out of wedlock and never married - it breaks a man's heart. Setting the scene for life (doctoral thesis). Stockholm: Centre for Health Equity Studies, Stockholm University/Karolinska Institutet; 2002, pp 117-45.
45. Östberg V. Social structure and children's life chances. An analysis of child mortality in Sweden (doctoral thesis). Stockholm: Swedish Institute for Social Research; 1996.
46. Amato P, Keith B. Parental divorce and the well-being of children: a meta-analysis. *Psychological Bulletin* 1991;110:26-46.
47. Wallerstein JS, Kelly JB. Children and divorce: a review. *Soc Work* 1979;24:468-75.
48. Wadsworth J, Burnell I, Taylor B, Butler N. Family type and accidents in preschool children. *J Epidemiol Community Health* 1983;37:100-4.

49. Hetherington EM, Cox M, Cox R. Effects of divorce on parents and children. Lamb ME (ed.). In: *Nontraditional families: parenting and child development*. London: Hillsdale New Jersey: Lawrence Erlbaum 1982, pp 233-88.
50. Edwards J. Changing family structure and youth well-being. Assessing the future. *Journal of Family Issues* 1987;8:355-72.
51. Krantz S. Divorce and children. Dornbusch S, Strober M (eds.). In: *Feminism, children and the new families*. New York: Guilford Press 1988, pp 249-73.
52. Wallerstein JS. The long-term effects of divorce on children: a review. *J Am Acad Child Adolesc Psychiatry* 1991;30(3):349-60.
53. Hansagi H, Brandt L, Andréasson S. Parental divorce: psychosocial well-being, mental health and mortality during youth and young adulthood. A longitudinal study of Swedish conscripts. *Eur J Public Health* 2000;10:86-92.
54. Lundberg O. The impact of childhood living conditions on illness and mortality in adulthood. *Soc Sci Med* 1993;36(8):1047-52.
55. Mäkikyrö T, Sauvola A, Moring J, Veijola J, Nieminen P, Järvelin M-R et al. Hospital-treated psychiatric disorders in adults with a single-parent and two-parent family background: A 28-year follow-up of the 1966 northern Finland birth cohort. *Fam Process* 1998;37(3):335-44.
56. Sauvola A, Räsänen P, Joukamaa M, Jokelainen J, Järvelin M-R, Isohanni MK. Mortality of young adults in relation to single-parent family background. A prospective study of the northern Finland 1966 birth cohort. *Eur J Publ Health* 2001;11:284-6.
57. Hjern A, Bremberg S. Social aetiology of violent deaths in Swedish children and youth. *J Epidemiol Community Health* 2002;56(9):688-92.

58. Agerbo E, Nordentoft M, Mortensen PB. Familial, psychiatric, and socioeconomic risk factors for suicide in young people: nested case-control study. *BMJ* 2002;325:74-8.
59. Neighbors B, Forehand R, Armistead L. Is parental divorce a critical stressor for young adolescents? Grade point average as a case in point. *Adolescence* 1992;27:639-46.
60. Guidubaldi J, Cleminshaw H, Perry J, Mcloughlin C. The impact of parental divorce on children: report of the nationwide NASP study. *School Psychology Review* 1983;12(3):300-23.
61. Krein S, Beller A. Educational attainment of children from single-parent families: differences by exposure, gender, and race. *Demography* 1988;25(2):221-34.
62. Blum HM, Boyle MH, Offord DR. Single-parent families: child psychiatric disorder and school performance. *J Am Acad Child Adolesc Psychiatry* 1988;27(2):214-19.
63. Dunn J, Deater-Deckard K, Pickering K, O'Connor TG. Children's adjustment and prosocial behaviour in step-, single-parent, and non-stepfamily settings: findings from a community study. *J Child Psychol Psychiatry* 1998;39(8):1083-95.
64. Jonsson J, Gähler M. Family dissolution, family reconstitution, and children's educational careers: recent evidence for Sweden. *Demography* 1997;34:277-93.
65. McLanahan S, Sandefur G. The role of money. Growing up with a single parent, What hurts, what helps. Cambridge, Massachusetts, London, England: Harvard University Press; 1994, pp 79-94.
66. Amato P, Keith B. Parental divorce and adult well-being: a meta-analysis. *J Marriage Fam* 1991;53:43-58.

67. Lewis J, Hobson B. Introduction. Lewis J (ed.). In: Lone mothers in European welfare regimes. Shifting policy logics. London and Philadelphia: Jessica Kingsley Publishers 1997, pp 1-20.
68. Hobson B, Takahashi M. The parent-worker model: lone mothers in Sweden. Lewis J (ed.). In: Lone mothers in European welfare regimes. Shifting policy logics. London and Philadelphia: Jessica Kingsley Publishers 1997, pp 121-39.
69. Wong Y-L, Garfinkel I, McLanahan S. Single-mother families in eight countries: economic status and social policy. *Soc Serv Rev* 1993;67:177-97.
70. Stoltz P. Single mothers and the dilemmas of universal social policies. *J Soc Policy* 1997;425-43.
71. Macintyre S. The patterning of health by social position in contemporary Britain: directions for sociological research. *Soc Sci Med* 1986;23(4):393-415.
72. Wilkinson RG. *Unhealthy Societies*. New York: Routledge; 1996.
73. Judge K, Mulligan J, Benzeval M. Income inequality and population health. *Soc Sci Med* 1998;46:567-79.
74. Ojämlighet i hälsa - ett nationellt forskningsprogram (Inequality in health - a national research programme. In Swedish). Stockholm: Socialvetenskapliga forskningsområdet; 1998.
75. Goldman N. Social inequalities in health. Disentangling the underlying mechanisms. *Ann N Y Acad Sci* 2001;954:118-39.
76. Goldman N, Hu Y. Excess mortality among the unmarried: a case study of Japan. *Soc Sci Med* 1993;36(4):533-46.

77. Hemmingsson T. Explanations of differences in alcoholism between social classes and occupations among Swedish men - a register based follow up study (doctoral thesis). Stockholm: Department of Public Health Sciences Division of Occupational Health, Karolinska Institutet; 1999.
78. Nyström-Peck M. Childhood class, body height and adult health (doctoral thesis). Stockholm: Swedish Institute for Social Research, University of Stockholm; 1994.
79. Power C, Matthews S. Origins of health inequalities in a national population sample. *Lancet* 1997;350:1584-9.
80. Ben-Shlomo Y, Davey Smith G. Deprivation in infancy or in adult life: which is more important for mortality risk? *Lancet* 1991;337:1489-90.
81. Östberg V, Vågerö D. Socio-economic differences in mortality among children. Do they persist into adulthood? *Soc Sci Med* 1991;32(4):403-10.
82. Claussen B, Davey Smith G, Thelle D. Impact of childhood and adulthood socioeconomic position on cause specific mortality: the Oslo Mortality Study. *J Epidemiol Community Health* 2003;57:40-5.
83. Vågerö D, Illsley R. Explaining health inequalities: beyond Black and Barker. *European Sociological Review* 1995;11:219-41.
84. Folk- och Bostadsräkningen 1990. Del 4. Hushåll. (Population and Housing Census 1990. Part 4. Households. In Swedish with an English summary). Stockholm: Statistiska Centralbyrån; 1992.
85. The Multi-Generation Register 2001:5 (Swedish and English version). Örebro: Statistics Sweden; 2001.

86. Causes of Death 2000. Official statistics of Sweden. Health and diseases 2002:4. Published at internet <http://www.sos.se/fulltext/42/2002-42-4/2002-42-4.pdf> (2002-06-12). National Board of Health and Welfare; 2002.
87. Utskrivningar i slutenvård 1964-1997. Kvalitet och innehåll. (Discharges from in-patient care 1964-1997. Quality and content. In Swedish). Stockholm: Socialstyrelsen EpC; 2000.
88. Wallgren A, Wallgren B. Registerstatistik – administrativa data för statistiska syften. (Register-based statistics – routinely collected administrative data for statistical purposes. In Swedish). Manuscript. Stockholm: Statistiska Centralbyrån; 2002.
89. Blomqvist P. On the use of administrative databases in health care analyses (doctoral thesis). Stockholm: Department of Medical Epidemiology, Karolinska Institutet; 1998.
90. Cancer Incidence in Sweden 2000. Official Statistics of Sweden. Health and diseases 2002:5. Published at internet <http://www.sos.se/fulltext/42/2002-42-5/2002-42-5.pdf> (2002-07-04). National Board of Health and Welfare; 2002.
91. Rosén M. National Health Data Registers: a Nordic heritage to public health. *Scand J Public Health* 2002;30:81-5.
92. Eriksson R. Social class of men, women and families. *Sociology* 1984;18(4):500-514.
93. Socioekonomisk indelning. Meddelande i Samordningsfrågor 1982:4 (Swedish Socio-economic classification, SEI. In Swedish). Stockholm: Statistiska centralbyrån; 1983.

94. Svensk utbildningsnomenklatur (SUN) Del 1. Systematisk version. Meddelanden i samordningsfrågor 1988:4. (Swedish standard classification of education. Part one: numerical order. In Swedish). Örebro: Statistiska Centralbyrån; 1996.
95. Lokala arbetsmarknader och förvävsregioner. Nya geografiska indelningar för regionala analyser. (Local Labour Markets and Employment Regions. A new Division of Labour Market Areas in Sweden grounded on Commuting Statistics. In Swedish with an English summary). Stockholm: Statistiska Centralbyrån; 1992.
96. Halleröd B. Fattigdom i Sverige. Rapport från arbetsgruppen för ekonomisk trygghet till Nationella folkhälsokommittén. (Poverty in Sweden. In Swedish). Stockholm: Nationella folkhälsokommittén; 1999.
97. Macintyre S, Ellaway A, Geoff D, Ford G, Hunt K. Do housing tenure and car access predict health because they are simply markers of income or self esteem? A Scottish study. *J Epidemiol Community Health* 1998;52:657-64.
98. Sundquist J, Johansson S-E. Indicators of socio-economic position and their relation to mortality in Sweden. *Soc Sci Med* 1997;45(12):1757-66.
99. Sundquist J, Johansson S-E. Self-reported poor health and low educational level predictors for mortality: a population based follow up study of 39 156 people in Sweden. *J Epidemiol Community Health* 1997;51:35-40.
100. Dunn JR. Housing and health inequalities: review and prospects for research. *Housing Studies* 2000;15(3): 341-66.
101. Dunn JR. Housing and inequalities in health: a study of socioeconomic dimensions of housing and self-reputed health from a survey of Vancouver residents. *J Epidemiol Community Health* 2002;56:671-81.

102. Hope S, Power C, Rodgers B. Does financial hardship account for elevated psychological distress in lone mothers? *Soc Sci Med* 1999;49:1637-49.
103. Ben-Shlomo Y, Smith GD, Shipley M, Marmot MG. Magnitude and causes of mortality differences between married and unmarried men. *J Epidemiol Community Health* 1993;47:200-5.
104. Lipman E, Boyle M, Dooley M, Offord D. Child well-being in single-mother families. *J Am Acad Child Adolesc Psychiatry* 2002;41(1):75-82.
105. Fleming DM, Charlton JR. Morbidity and healthcare utilisation of children in households with one adult: comparative observational study. *BMJ* 1998;316:1572-6.
106. Barnombudsmannen & SCB. Upp till 18. Fakta om barn och ungdom. (Up to 18. Facts about children and youth. In Swedish). Örebro: Statistiska centralbyrån; 2001.
107. Jonsson JO, Östberg V, Evertsson M, Brodin Låftman S. Barns och ungdomars välfärd. Kommittén Välfärdsboks-lut. (Welfare among children and youth. In Swedish). Stockholm: Fritzes; 2001:(SOU 2001:55).
108. Landgren Möller E. En gång förälder-alltid förälder. (Once a parent, always a parent. In Swedish). Välfärdsbulletinen nr 1. Stockholm: SCB; 2001, pp 6-8.
109. Zaslow MJ. Sex differences in children's response to parental divorce: 1. Research methodology and postdivorce forms. *Am J Orthopsychiatry* 1988;58:355-78.
110. Öberg G, Öberg B. Vuxna skilsmässobarn berättar. (Narratives of grown-up children of divorce. In Swedish.). Stockholm: Prisma; 2002.

111. Bradshaw J, Millar J. Lone parent families in the UK. Department of Social Security report no. 6. London: HM Stationery Office; 1991.
112. Soydan H, Vinnerljung B. Några problem i utvärdering av sociala interventioner och utfallsstudier. (Some problems in evaluation of social interventions and outcome studies. In Swedish with an English summary). *Socialvetenskaplig tidskrift* 2002;9(2-3):160-74.