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# Increased incidence of coronary heart disease associated with "double burden" in a cohort of Italian women

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ABSTRACT

Objective of this study was to assess the risk of coronary heart disease (CHD) associated with the combination of employment status and child care among women of working age, also examining the sex of the offspring. Only two previous studies investigated the effect of double burden on CHD, observing an increased risk among employed women with high domestic burden or providing child care, although the relative risks were marginally or not significant.

The study population was composed of all women 25–50 years old at 2001 census, living in Turin in families composed only by individuals or couples, with or without children (N = 109,358). Subjects were followed up during 2002–2010 for CHD incidence and mortality through record-linkage of the cohort with the local archives of mortality and hospital admissions. CHD risk was estimated by multivariate Poisson regression models.

Among employed women, CHD risk increased significantly by 29% for each child in the household (IRR = 1.29) and by 39% for each son (IRR = 1.39), whereas no association with the presence of children was found among non-employed women or among employed women with daughters. When categorized, the presence of two or more sons significantly increased CHD risk among employed women (IRR = 2.23), compared to those without children.

The study found a significant increase in CHD risk associated with the presence of two or more sons in the household, but not daughters, among employed women. This is a new finding, which should be confirmed in other studies, conducted also in countries where the division of domestic duties between males and females is more balanced, such as the European Nordic countries.



## 1. Introduction

During the last decades, participation of women in the labor market has greatly increased in developed countries (Jaumotte, 2003). From 1977 to nowadays employment rate in Italy has increased by 17%, mainly as a direct consequence of the growth among women, who passed from 31.5% to 41.3% of the total employed population (ISTAT, 2013). In contrast with these radical changes in women's labor market participation, women continue to carry out most domestic work and child care, and such an unequal division of domestic activities between women and men overburdens employed women (Gershuny, 2000; Anxo et al., 2011). From the Italian Multipurpose Survey on Time Use, carried out in 2002–2003, it was found that domestic work was entirely accomplished by Italian women in 41% of the interviewed couples (Mencarini, 2012). In 2008, approximately 64% of the employed women in Italy was engaged in paid and domestic work activities for more than 60 h per week overall, and in presence of children the proportion increased to 68% (ISTAT & CNEL, 2013). A recent study by the Organisation for Economic Cooperation and Development (OECD) has shown that gender differences in domestic work in Italy are the highest among the 28 EU countries, with women performing 11 h more domestic work than men per week (OECD, 2013). Furthermore, the Italian Survey on the Time Use 2002–2003 showed that support to mothers provided by children differs by gender, with female children more engaged in domestic

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work than male ones. For example, in the age group 11–17 years: 65% of daughters were engaged in domestic work, against 44% of sons; also, females devoted 44 min per day to domestic work, whereas sons only 22 min (Romano, 2012).

It has been hypothesized that the double burden posed by the combination of work and domestic activities on women may affect their health (Waldron et al., 1998). Different theoretical approaches exist in this research field. According to the "Role Accumulation" hypothesis, multiple roles would contribute to women's better health because they provide more sources of social and economic support, self-esteem and personal satisfaction (Sieber, 1974; Thoits, 1983; Waldron and Jacobs, 1989; Moen et al., 1992; Lahelma et al., 2002). On the opposite side, there are theories predicting worse health for women sustaining multiple roles. According to the "Role Strain" hypothesis (Gove, 1984; McLanahan and Adams, 1987; Ross et al., 1990), women who combine multiple roles (wife, mother and/or worker) may experience « role overload and role conflict, which contribute to increased stress and excessive demands on time, energy and psychological resources – resulting in poorer heath» (Waldron et al., 1998). The "Negative Spillover" hypothesis is a more recent theory which assumes that the transfer of negative feelings from work to the family environment, and vice versa, may have harmful effects on health (Grzywacz and Marks, 2000).

A Swedish (Krantz and Ostergren, 2001; Krantz et al., 2005) and a Finnish (Väänänen et al., 2004) cross-sectional studies have shown that women who combine child care and paid work report more psychological and physical symptoms than employed women without children. However, most longitudinal studies on the "double burden" have found either no effect or a beneficial effect of these multiple roles on women's general health or mortality (reviewed by Waldron et al., 1998).

In contrast, the only two studies investigating specifically the effect of double burden on cardiovascular health observed an increased risk among employed women with high domestic burden or providing child care (Haynes and Feinleib, 1980; Lee et al., 2003). The first one is a prospective cohort study conducted by Haynes and Feinleib (1980) within the Framingham Heart Study, which found a CHD risk among employed women with children almost double than that of employed women without children. The second one, also a prospective study, was performed by Lee et al. (2003) within the Nurses' Health Study and showed that nurses caring for non-ill children 21 h or more per week (and caring for non-ill grandchildren 9 h or more per week) had a CHD risk 50% higher than nurses not caregiving. In support of these results, Brisson et al. (1999) observed a significantly higher systolic (SBP) and diastolic blood pressure (DBP) in white-collar women reporting large family responsibilities, but only in presence of exposure to high « job strain», defined according to the demand-control model (Karasek, 1979).

Considering the scarcity of evidence on the effect of the double burden posed by paid work and child care on the risk of CHD in women, main purpose of this study was to examine this relationship in a large Italian urban population, using number of children in the household as a proxy measure of child care. This study took into account also the sex of the offspring, in the light of the observed differences in terms of participation in domestic activities between sons and daughters in Italy (Romano, 2012).

## 2. Materials and methods

### 2.1. Data collection

The study population was composed of all women 25–50 years old at 2001 census, resident in Turin and living alone or in nuclear families (with their partners), with or without children (n = 109,358). Women living with people other than the partner or the children were excluded because of the uncertainty on their child care support in the household. For example, grandparents, uncles or aunts could be a burden or a resource for women in performing domestic work and child care, depending on their personal choices or their health status. Baseline information on demographics, marital status, family typology, presence and number of children in the household, employment status and educational level was drawn from 2001 census data. Records from census data were linked, by means of a shared unique identification number, with those of the Municipality Registry and through this, with the local archives of mortality (registry of all residents' deaths since 1970) and of hospital admissions (which include records of all residents in Piedmont admitted to a hospital in Italy since the 1980s, with a satisfactory level of completeness since 1996). As a significant proportion of individuals affected by acute coronary disease usually die before hospital admission, the outcome of the study was represented by a binary variable, where subjects affected by CHD were identified through either first hospitalization or death from CHD during the observation period 2002–2010, as done in other studies using secondary data (Silventoinen et al., 2005; Netterstrøm et al., 2006). Women who underwent hospitalization for CHD from 1996 to the start of follow-up (January 1st 2002) were excluded from the study (n = 94). During the follow-up period, eventual dates of emigration out of Turin or death were reconstructed. Each subject contributed to person-years from January 1st 2002 until emigration, death, first hospital admission for CHD or end of follow-up (December 31st 2010).

CHD admissions and deaths were identified in the corresponding archives through the presence of ICD-IX codes 410–414 in the field of main diagnosis: acute myocardial infarction (n = 170), other acute and subacute forms of coronary heart disease (n = 71), previous infarction (n = 1), angina pectoris (n = 79) and other forms of chronic ischemic heart disease (n = 27).

### 2.2. Analysis

CHD risk was estimated by multivariate Poisson regression models, stratified by employment status (employed or non-employed) and adjusted for age (5-year groups), marital status (married or cohabiting; unmarried; previously married, including separated, divorced and widowed) and education level (primary, secondary, higher and graduate education). The analysis was stratified by employment status, after checking by test for interaction that the risk of CHD associated with having children in the household was significantly different between employed and non-employed women (test for interaction: $p = 0.03$). The relationship between CHD incidence and child care was assessed by operationalizing the workload linked to child care in different ways: 1) number of children in the household (continuous), overall and by sex; 2) combinations of number and sex of children in the household (one son, one daughter, one son and one daughter, >= 2 sons, >= 2 daughters, >= 2 sons and ≥ 2 daughters); 3) cumulative age of children in the household, computed as the sum of the age of all children at 2001 census, also distinguished by sex, as a proxy indicator of cumulative dose of child care. In multivariate Poisson regression models, all risk estimates for a given sex of the children (e.g. male) were also adjusted for the presence (or number) of children of the opposite sex.

The association between CHD risk and cumulative age of the children was examined treating the latter either as a continuous or a categorical variable (up to 14 years, 15–29 years, 30 years or more). Furthermore, given that the effects of the double burden are expected to be stronger in women who work long hours, a test for interaction between presence of children in the household and