

**SOCIAL INTEGRATION AND ITS ASSOCIATION WITH  
MORTALITY AMONG OLDER PEOPLE IN CHINA**

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MORTALITY AMONG OLDER PEOPLE IN CHINA**

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# **Social Integration And Its Association With Mortality among older people in China**

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**Summary** This thesis examines the pattern of the association between social integration and mortality of older people (age 55+) in Beijing, China. China is a rapidly aging population and there is increasing concern that family support for older adults may be decreasing thus negatively impacting the well-being of this population. I examine the relative importance of family and non-family related social relationships and activities in protecting against mortality for Chinese elderly. Social integration is defined as involvement in social networks and social activities. The data are from three waves of longitudinal data from Beijing Multidimensional Longitudinal Study on Aging project (BMLSA). I employ pooled logistic regression model in order to better handle the time-varying nature of social integration and health status variables in the longitudinal data. One of my main findings is that, contrary to expectations, the commonly assumed protective effects of intergenerational relationships and family support are not significant for older adults. Compared

to family-centered activities, engaging in activities outside the home plays a more important role in protecting against mortality among healthy elderly. The implications of the dramatic social and demographic changes on the pattern of the association between social integration and mortality for older people in contemporary China are discussed.

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# Chapter 1

## Introduction

### 1.1 Study aims and significance

#### 1.1.1 Examining the association between social integration and mortality for older people in contemporary China

The aim of this thesis is to examine the association between social integration and mortality among older people in contemporary China. This research interest arises out of the concern regarding the implications of dramatic demographic changes as well as rapid modernization and urbanization taking place in China in the past several decades for the situation of social integration of older people and its impact on their health and well-being.

The particular interest of this thesis is to examine the relative importance of family and non-family related social integration components in affecting mortality for older people in contemporary China. It has been increasingly recognized that the characteristics of social integration and its health impacts are greatly influenced by social and cultural settings (Berkman et al. 2000; Litwin 2010; Seeman et al. 1993). It is important to investigate whether the traditional extended family arrangement and the Chinese elderly's family-centered social integration persist or are declining under rapid demographic

and social changes.

Social integration is a classic concept in sociology. Since Durkheim's examination of the association between the level of social integration and suicide rate in his classic study *Suicide* (Durkheim 1951), there has been considerable interest in the impacts of social integration on mental and physical health. In particular, there has been a concern regarding health consequences of low level of social integration (or social isolation) among older people. Due to compulsory retirement system, empty nest and deterioration of health with age, late life in modern society has been often described as a life stage characterized by a decline of social networks and disengagement from many important social roles and activities (Berkman et al. 2000; Berkman and Syme 1979; Cohen and Syme 1985; Rosow 1967; Shaw et al. 2007). Studies in the past several decades have widely documented that lack of close relationships, low quality of social ties or social support, smaller or homogeneous social networks, and low level of engagement in social, productive, religious or other kinds of activities are associated with poorer physical and mental health and higher risk of mortality among older adults across different societies (Berkman and Syme 1979; Cohen and Wills 1985; House, Robbins and Metzner 1982; Kaplan et al. 1988; Kawachi and Berkman 2001; Liang et al. 1999; Orth-Gomer and Johnson 1987; Pennix et al. 1997; Schoenbach et al. 1986; Seeman et al. 1987; Shye et al. 1995; Sugisawa, Liang and Liu 1994).

However, there is a lack of universally accepted definition of social integration in these empirical studies. As seen in the above-mentioned studies,



various measurements such as social relationships, features of social networks, social support, and activity engagement were used. More importantly, the level of social integration of older people may not necessarily be fully reflected by the level of involvement in the network of social relationships. Active engagement in meaningful social roles and fulfilling activities has been increasingly recognized to be an important way for older people to remain socially integrated (Lemon, Bengtson and Peterson 1972; House, Umberson, and Landis 1988).

As Rowe and Kahn (1998) have pointed out, maintaining social relationships and remaining engaged in activities that are meaningful and purposeful are both crucial components of successful aging. However, previous studies of social integration among older people mainly focus on the health effect of social relationships that older adults are involved in, particularly the effect of social support received from these relationships, whereas they paid less attention on the situation of older people's engagement in social, productive and other kinds of activities and their impacts on health and well-being. This bias in research focus seems more remarkable in the studies conducted in China and some other Asian societies where old-age social integration has a family-centered nature. In these societies, the presence of close and supportive family relationships is culturally assumed to be the primary component of successful aging and crucial to the well-being of older people, whereas social participation outside home is not culturally encouraged. Consequently, Asian studies put focus predominantly on the health effects of family relationships

and support. Till now, few studies in China have examined the impacts of engagement in social, productive and recreational activities on the health and well-being of older people.

In the current study, drawing on the theoretical frameworks postulated by several researchers (Berkman et al. 2000; House and Kahn 1985), social integration of older people is conceptualized into two main domains: social networks and social engagement. Specifically, the level of social integration of an older individual is defined as the level of being embedded in a network of social relationships and the level of engaging in social, productive, or recreational activities. I examine whether social networks and social engagement exert significant protective effects on survival status among older people in China. Particularly, is social engagement associated with lower risk of mortality independent of social networks?

Furthermore, I am particularly interested in examining the relative importance of family and non-family related social integration components in affecting mortality for the current Chinese elderly. This specific research interest arises out of the concern regarding the possible decline in the role of traditional extended family and close intergenerational relationships in maintaining the health and well-being of older people in China, a society undergoing dramatic demographic and socioeconomic changes.

Variation in social and cultural norms with regard to family and intergenerational relationships may lead to differences in the characteristics of social networks and their associations with health and longevity among older

people. The importance of family ties, especially intergenerational relationships, in influencing the health and well-being of older adults in China and other East Asian societies, stems from Confucian-based social expectations on extended family arrangement and filial obligations. By Confucian cultural standard, older people who live with children, especially a son and his family, are considered to live an ideal and happy later life, whereas those who have fewer family members or do not live with them are believed to be lonely or even abandoned. Being raised and socialized in this culture, older people tend to attach a lot of meaning and expectations to the extended family arrangement and relationships with children. Lack of presence of children or low quality of intergenerational relationships may exert disastrous impacts on their mental and physical health. In addition, pension, health, and insurance systems are poorly developed in China. Family support may continue to be the primary source of support for older adults. Therefore, in a society with a family-centered traditional culture and underdeveloped social welfare system, it is anticipated that compared with non-family social relationships such as friends or other relatives, family relationships, especially intergenerational relationships, have stronger impacts on the health and well-being of older people in China.

However, Chinese people are aging in a social setting characterized by rapid industrialization and urbanization, family nuclearization and massive rural-urban migration of younger generations. These dramatic changes occurring in the past several decades have resulted in an unfamiliar social context

that the current Chinese elderly are facing. On one hand, the social status of older people has been declining both at home and in society, family size is decreasing, living arrangements are changing, the way of intergenerational interaction is adapting. On the other hand, older people's economic status is improving. At the same time, their late-life expectations and perceptions on quality of life may be also transforming. All of these changes are likely to directly and indirectly affect Chinese elderly's actual as well as preferred social networks and activities. Do family ties and family-related activities remain crucial in affecting the health and well-being of older people in China? Or, are the current Chinese elderly developing their social networks and social engagement outside the home in order to manage increased geographic dispersion of children and other family members? If that is the case, are those non-family related relationships and activity engagement becoming important in influencing the health and well-being of older people in contemporary China?

In this thesis, I investigate the assumed importance of family and kin relationships and engagement in family-related activities in protecting the health of older people in China. Does the relative importance of family and non-family related social integration components maintain a family-centered nature? Specifically, are family relationships more important in protecting against mortality compared to non-family relationships? Does engaging in family-related activities have a stronger protective effect against mortality than engaging in non-family activities outside the home?

### **1.1.2 Examining gender differences and urban-rural variations**

In the current study, I also examine whether the pattern of the relative importance of social integration components among Chinese elderly varies by gender and urban-rural areas.

Gender differences in the association between social integration and mortality have been consistently found in Western older populations (Berkman and Syme 1979; House, Robbins and Metzner 1982; Schoenback et al. 1986; Shye et al. 1995). As Shye and colleagues (1995) have summarized, gender differences in this association could be a result of gender differences in the characteristics of social networks and activities as well as their health impacts. Most older Chinese women in this sample were born and grew up in traditional society. Compared to their male counterparts, women, especially those older-old and oldest-old, are much more likely to be illiterate, economically dependent, and have no pension or other social security. In addition, women in traditional China were socialized as family caregivers. They spent most of their life time and effort to take care of family members. Such substantial gender differences in social roles and socioeconomic status suggest that it may be more appropriate to examine the association between social integration and mortality separately for men and women .

Similarly, urban-rural differences in China are also remarkable at both social and structural level such as the extent of industrialization, pension and health care system development as well as individual level such as health status, health-related behaviors, and features of social networks and activity en-

agement. These urban-rural differences are a result of historical reasons and reinforced by biased policies and unbalanced social and economic development in contemporary China. Thus, it is reasonable to hypothesize that the pattern of the association between social integration and mortality varies for urban and rural elders.

Separate examinations for different subgroups of older people in China have crucial practical implications. The current aging policies failed to differentiate the heterogeneity of older population. Identifying which social ties and activities significantly reduce mortality risk for different older subgroups will help formulate efficient and specific intervention policies.

### **1.1.3 Disentangling the confounding effect of health**

It has been suggested that the confounding effect of health status needs to be carefully controlled in the association between social integration and mortality because health status is not only a strong predictor of mortality but also associated with social integration in a reciprocal way. Specifically, the level of social integration affects mental and physical health. At the same time, health status also influences the level of social integration. Previous longitudinal studies have documented both causal directions in this association (Johnson 1990; Umberson et al. 1996).

However, most studies in China examining the health effects of social relationships and activity engagement are based on cross-sectional data which are unable to identify the causal direction in the association between social

integration and health (Chen and Short 2008; Chen and Silverstein 2000; Li et al. 2006; Liu, Liang and Gu 1995; Silverstein, Cong and Li 2006). In the current study, a longitudinal panel dataset is used. In addition, separate analyses according to health status are conducted. In doing so, the confounding effect of health can be better disentangled. Moreover, the possible differences in the patterns of the association between social integration and mortality among older people with different health conditions could be observed directly.

## **1.2 Data and analysis method**

Data used in this study are from Beijing Multidimensional Longitudinal Study on Aging (BMLSA) project (1992-2000). The target respondents are a random sample of older adults aged 55 years and older in three districts of the Beijing municipality. I use three waves of data in this longitudinal dataset because the survey questions regarding the social relationships (such as the presence of children, the frequency of contact with children, living arrangements, social support) and social engagement in activities (such as working status, participation in social activities) have remained almost unchanged across these waves.

To handle the time-varying nature of social integration as well as health status in old age, I employ pooled logistic regression model. In later life, people are more likely to experience loss of social roles and social relationships as a result of retirement, children's moving-out, and death of a spouse, close friends or relatives. Moreover, the onset of diseases or functional disabilities

also occurs more commonly during older age. By pooling every observation of the same individuals together, the time-varying value of social integration variables, health status and other risk factors can be updated at each time unit.

### **1.3 Thesis structure**

This dissertation is divided into seven chapters. Following this introduction, Chapter 2 is a literature review focusing on the conceptualization of social integration of older people and the distinctive characteristics of social integration and its health impacts for older people in China compared with older people in Western countries. I also review the literature on gender differences and urban-rural variations in the features of social integration as well as its association with health and mortality. In addition, the confounding effect of health in the association between social integration and mortality is reviewed. In this chapter, a conceptual framework of social integration of older people used in the current study is developed. The hypotheses to be examined are also formulated.

In Chapter 3, the background of China is presented. I first describe the traditional family culture as well as the current dramatic demographic, economic and cultural changes, focusing on their implications for the characteristics and health effects of social integration among older people. Then, I present the remarkable gender and urban-rural differences in China, indicating the necessity to investigate subgroup variations in the pattern of the



association between social integration and mortality.

Chapter 4 deals with a few key issues regarding data and sampling, measurements of key variables, and analysis model selection. I first describe the data, sampling, and the available information on social integration to be used in the current study. Then I present how the multidimensional concept of social integration is operationalized. In previous studies there are two main ways of measuring social integration: using a summary index or a list of disaggregated single components. Pros and cons of these two ways are discussed. Then I choose to measure social integration using a list of disaggregated single variables in the current study on the basis of my research focus as well as the nature of data. I present how these social integration variables are constructed using Kaplan-Meier Survival Analysis (KMSA) in the final section. I also present how I select analytic method between *pooled logistic regression model* and *extended Cox proportional hazards model*, two survival analysis methods capable of dealing with longitudinal dataset containing a number of time-varying risk factors.

In the first analytical chapter (Chapter 5), analyses are conducted among the total sample. First, I present a description of the distribution of mortality and social integration components. In bivariate and multivariate analyses, pooled logistic regression models are fitted for total sample and then separately for those with different health status. Social networks and social engagement items are examined in separate models first and then combined together in one model. In doing so, a better understanding is possible of

whether social engagement has a significant protective effect against mortality independent of social networks, and of the relative importance of social networks and social engagement. The final step of analyses of this chapter involves comparisons between older people with and without functional limitations to understand whether the pattern of the association between social integration and mortality varies across older people with different health status.

The second analytic chapter (Chapter 6) examines the gender and urban-rural differences in the relative importance of social integration components in affecting mortality. In descriptive analyses, gender differences and urban-rural differences in mortality as well as in the characteristics of social integration are examined. In multivariate analyses, gender-specific models and region-specific models are employed to examine gender differences and urban-rural differences in the relative predictive power of social integration components. If the effect of a particular social integration component was found to be remarkably different by gender or by urban-rural areas in terms of magnitude and significance, an interaction term of this social integration component with gender or urban region would be added into the model of the total sample to further examine the statistical significance of the difference.

In the conclusion chapter (Chapter 7), I review the aim and main findings of the current study. The implications for policy and future research, the strength and limitation of research methods, as well as future research plans are discussed.

# Chapter 2

## Literature Review

### 2.1 Introduction

First, I review how social integration is conceptualized and operationalized in previous studies of the association between social integration and health and mortality among older adults. The review emphasizes that social integration is a multi-dimensional concept. For older people, being socially integrated involves more than being embedded in a network of supporting social ties. Engaging in social activities may be another important facet of social integration functioning to benefit their health and well-being. A conceptual framework of social integration for the current study is presented.

Second, the influence of broader social context such as cultural and structural settings as well as social changes on shaping the pattern of the association between social integration and health outcomes is highlighted. Variations in the characteristics of social integration and its impacts on health and mortality among older adults of different social and cultural settings are reviewed. Due to the unique nature of social and cultural settings and social changes in China, the characteristics of social integration and its impacts on mortality among Chinese elderly could differ from what was generally found

among the elderly in Western societies. Hypotheses regarding the unique pattern of the association between social integration and mortality for the Chinese elderly are developed.

The literature review also suggests that the association between social integration and mortality may not be uniform across different subgroups of the older population. Gender differences in the characteristics of social integration and its health impacts have been widely documented in many Western and Eastern studies. Moreover, urban-rural differences, although less examined in previous studies, can not be ignored when studying older people in China. Differences between urban and rural China in terms of social and economic environment as well as individual characteristics are remarkable. Consequently, I develop specific hypotheses regarding gender and urban-rural differences in the pattern of the association between social integration and mortality based on previous research findings as well as possible influences of distinctive sociocultural setting in China. Finally, the confounding effect of health in the association between social integration and mortality are reviewed.

## **2.2 Developing conceptual framework of social integration**

### **2.2.1 Social integration of older adults**

Social integration is a classic concept in sociology. Attention on social integration was initially raised among social scientists when they observed the break-down of traditional norms and stable communities and institutions through which people used to be tied together (*Gemeinschaft*) during modernization. Their main concern is that in modern society which is based on labor division and contractual relationships (*Gesellschaft*), lack of social integration (social isolation, social alienation) may exert adverse impacts on people's social behaviors and attitudes, as well as their mental and physical health.

However, there is no specific, universally accepted definition of social integration. One problem that empirical studies of social integration (social isolation, alienation) have been confronting is the multidimensional facets of this concept. How social integration is defined and operationalized has been found to be different in studies focusing on different groups of subjects. For instance, social integration has been a prominent focus of studies of various minority groups, including immigrants, ethnic minorities, refugees, ex-convicts, and elderly people. Generally, these groups of people face the risk of being alienated or marginalized from mainstream of societies because they cannot gain access to rights, resources and opportunities as much as the members of the mainstream do. However, the crucial issues which inhibit these groups of people from being socially integrated may be different. For immigrants and

ethnic minorities, language and culture differences, as well as underprivileged access to education, labor market, and political participation may be the main reasons for their alienation from mainstream society, even though they can integrate into their own subcultures very well (Burbach and Thompson 1971; Dean 1961; Middleton 1963). However, for ex-convicts, social stereotypes and discrimination against them, and the sequent limitation on working opportunities could be the main barriers to their rehabilitation. Thus, the main facet of social integration to which researchers pay attention is different for different groups of people. The main concern about social integration of immigrants and ethnic minorities might be cultural and political integration. However, for ex-convicts, the main issue might be economic integration. This difference, in turn, leads to variance in the operationalization of this concept.

For older people, lack of meaningful social roles and loss of long-term social relationships have long been considered main barriers to their continued social integration. It is often assumed that in modern society entering later life involves a process of disengagement. Older people, especially older men, are normally forced to leave the formal labor market due to the compulsory retirement system. Grown-up children may leave home to pursue education or careers. In addition, older people are more likely to experience the loss of a spouse, close friends and siblings. At the same time, decline in health status with advancing age may restrict them from maintaining social networks and engaging in social and productive activities (Benjamins et al. 2003). Moreover, negative stereotypes regarding the elderly discourage older people

from remaining active in social or productive activities.

Consequently, one main concern in studies among older people is that disengagement from main social roles and activities as well as the shrinking of social networks may result in a lower level of social integration, or even social isolation in later life (Campbell and Barrett 1992; Marsden 1987; Krause 1999; Shaw et al. 2007). Although Rosow (1967, pp1) has pointed out that “problems of old age are of two general kinds: those that older people actually have and those that experts think they have”, and a few studies have documented that not all older adults experience shrinking social networks or a decline in activity participation (Glass et al. 1995), it is worth noting that the implications of both personal socioeconomic and health characteristics and social structural forces for social integration of older people are forceful. Lack of meaningful social roles, decline in social networks and social engagement in productive, social activities are general experiences of older people in modern society (Herzog et al. 1989).

### **2.2.2 Mechanisms through which social integration affects health**

“The meaning of a scientific concept is really defined by its place in a theoretical system of relationships with other variables (Cronbach and Meehl 1955, cited from House and Kahn 1985:86).” The focus of the current study is to examine the relationship between social integration and mortality. In this relationship, social integration is defined as an explanatory social variable of mortality, an ultimate health outcome, which guides the conceptualization

and operationalization of social integration.

The health effect of social integration (or social isolation) among older adults has been a prominent focus in gerontology and the sociology of aging. Interest in the impact of social integration on health and mortality has mainly been initiated by Durkheim's classic study *Suicide*. Durkheim found that there was a higher suicide rate among those with lower level of integration into family, institutions, and society (Durkheim 1951). He proposed that being socially integrated was related to the psychological well-being of individuals. Although Durkheim did not provide a clear definition of social integration, his research has stimulated a large body of research over the past several decades focusing on empirically examining or theoretically explaining the effect of social integration or social isolation on health outcomes, including mental and physical health, as well as survival status. It has been widely documented that lack of close relationships, low quality of social ties or social support, smaller or homogeneous social networks, and low level of engagement in social, productive, religious or other kinds of activities are associated with poorer physical and mental health and higher risk of mortality among older adults in different societies (Berkman and Syme 1979; Blazer 1982; Cohen and Wills 1985; Cohen and Syme 1985; House, Robbins and Metzner 1982; Kaplan et al. 1988; Kawachi and Berkman 2001; Liang et al. 1999; Orth-Gomer and Johnson 1987; Pennix et al. 1997; Schoenbach et al. 1986; Seeman et al. 1987; Shye et al. 1995; Sugisawa, Liang and Liu 1994).

The mechanisms through which social integration affects health and



mortality are complex. Several pathways have been proposed and supported with empirical evidence. One of the most obvious pathways is that the presence of and contact with social relationships may indicate a higher level of access to material resources, as well as emotional, instrumental, and informational support which in turn benefits health. Moreover, it has been found that social integration benefits health through psychosocial pathways. Being embedded in a network of social relationships and participating in social, religious or productive activities can provide a sense of belonging, assurance of self-efficacy, locus of control, or a feeling of meaningfulness and purpose. These psychosocial features, in turn, have positive effects on emotional and physical health and survival status (Barlow and Hainsworth 2001; Fischer, 1995; Fisher and Specht 1999; Gruenewald et al. 2009; Henderson, Byrne and Duncan-Jones 1982; Lemon, Bengtson and Peterson 1972; Knapp 1977; Williams et al. 1981). In addition, being involved in social networks or engaging in activities may buffer or attenuate the detrimental effects of stressful life events such as retirement, bereavement and illness (Eaton 1978; Krause and Liang 1993; Liang et al. 1999; McIntosh et al. 1989; Silverstein and Parker 2002). Another pathway through which social integration affects health and longevity involves social influences on health-related behaviors. For example, the presence of a spouse or contact with friends may influence an individual's health-related behaviors like smoking and drinking, exercising, and utilizing medical service (Berkman and Breslow 1983; Lewis and Rook 1999; Mermelstein et al. 1986; Umberson 1987, 1992a). More recently, the physiologic

pathways have been increasingly documented. That is, being socially integrated or isolated affects immune system, neuroendocrine and cardiovascular activity, which in turn affects health and longevity (see Seeman (1996) for a review).

These direct and indirect pathways are not mutually exclusive. Being socially integrated may affect health through more than one of these pathways simultaneously. For example, married people are generally found to have better mental and physical health status and longer life expectancy than unmarried people (Manzoli et al. 2007; Murray 2000). Marriage may lead to an enhancement of financial status, which in turn benefits health and survival status (Lillard and Waite 1995). It is also possible that having a spouse has a social influence on the behaviors and activities of a husband or a wife (Umberson 1987, 1992a; Umberson and Liu 2006). Moreover, marriage may provide a sense of belonging, intimacy and emotional support, which benefits the mental well-being (House, Umberson and Landis 1988). In addition, in many cultures, being married provides a sense of identity and self-worth, which has crucial effects on an individual's mental health (Gove et al 1990).

The various pathways through which being married influences health may not be easily empirically differentiated. More cross-disciplinary studies may be needed in future research to better understand the pathways through which being married affects health. However, one more important message revealed from previous studies is that the association between social integration and health has been consistently found to be significant and independent

of many known confounding variables including socio-demographic characteristics, health-related behaviors, stressful life events, and health conditions. Such robust association has led to an increasing emphasis on the fundamental mechanism through which being socially integrated benefits health. As Sabin (1993) argued, “social relationships are an end by themselves as opposed to their tangible support function.”

### **2.2.3 Measurements of social integration in studies of its association with health among older adults**

Various measurements of social integration have been found to be used in the studies of its association with health or mortality among older populations. Different terms such as social integration, social relationships, social networks, social support, and social engagement have been used interchangeably (Berkman et al. 2000; House and Kahn 1985).

Generally, these measures include the presence of social relationships including family ties, friends, relatives and other extended relationships, as well as frequency of contact with them, support received from these relationships (Antonucci and Akiyama 1987a; Blazer 1982; Campbell, Connidis, and Davies 1999; Cohen and Syme 1985; Crohan and Antonucci 1989; House, Robbins and Metzner 1982; Gove 1973; House 1981; House and Kahn 1985; Kaplan et al. 1988; Kawachi and Berkman 2001; Kobrin and Hendershot 1977; Liang et al. 1999; Matt and Dean 1993; Orth-Gomer and Johnson 1987; Pennix et al. 1997; Schoenbach et al. 1986; Seeman et al. 1987; Shye et al. 1995; Sugisawa,

Liang and Liu 1994; Wake and Sporakowski 1972). Some studies have also measured the structural properties of the network of social relationships such as size, range, homogeneity, density, reciprocity (Berkman and Syme 1979; Berkman et al. 2000; Silverstein and Bengtson 1994). Engaging in social activities such as working status, religious attendance and participating in voluntary activities has also been examined in a few studies (Bassuk, Glass, and Berkman 1999; Glass et al. 1999; Kiely et al. 2000; Luoh and Herzog 2002; Mendes de Leon, Glass, and Berkman 2003).

Variations in the measurements of social integration used in previous studies reveal the nature of multiple dimensions of this concept as well as the multiple pathways through which social integration affect health. Employing different measures of social integration may reflect the differences in the focus and perspective of studies.

However, it is worth noting that most studies examining the association between social integration and mortality among older adults have focused on the health effect of social relationships that older adults are involved in, particularly the effect of support function of these relationships, while fewer studies have focused on the situation of older people's engagement in social, productive and other kinds of activities as well as its impact on elders' health and well-being.

In this section, I will review the different measures of social integration in the literature focusing on its association with health outcomes among older adults. Drawing on the theoretical framework postulated by several researchers

(Berkman et al. 2000; House and Kahn 1985), I will develop a conceptual framework of social integration for the current study examining the association between social integration and mortality for older people in China.

### **2.2.3.1 Social networks**

Early-stage research of the health effects of social integration among older people has mainly focused on family ties and intimate kinships as it is anticipated that close family ties and kinships are the primary sources of companionship and emotional and instrumental support for an older adult (Gove 1973; Kobrin and Hendershot 1977; Shanas 1961; Wake and Sporakowski 1972). For example, the association between marital status and health outcomes has been widely examined (Berkman and Syme 1979; House, Robbins and Metzner 1982; Hu and Goldman 1990; Lillard and Waite 1995; Ross and Mirowski and Goldstein 1990; ).

Gradually, extended relationships beyond family members, including friends, other relatives, organizational members, and neighbors, have been increasingly realized as important components of social networks of an individual (Crohan and Antonucci 1989; Matt and Dean 1993; Seeman et al. 1987). The presence of and having contact with extended social relationships have been found to be associated with health and well-being.

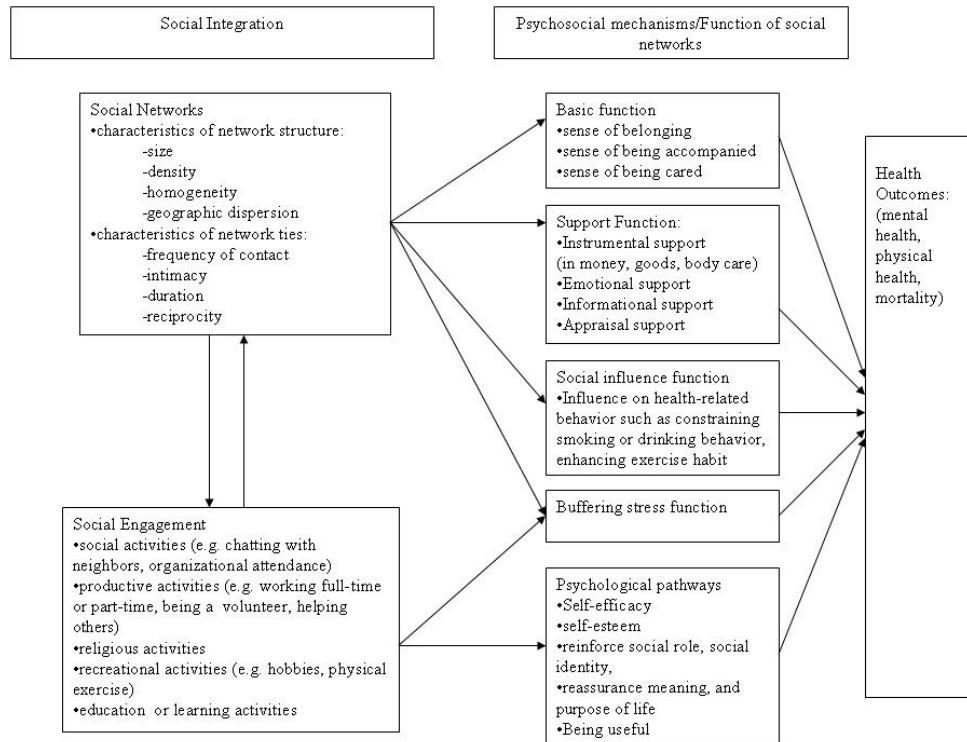
More importantly, the mechanisms through which extended relationships affect health may be different from those of family relationships. For example, friendship, established normally based on shared values and life ex-

periences, often acts as confidants and a crucial source of emotional support and companionship. It has been documented that friends are important in fulfilling emotional needs, reducing loneliness, and improving life satisfaction (Gurung, Taylor, and Seeman 2003). Likewise, siblings and other extended relatives have also been found to be source of confidants and emotional and tangible support, which in turn benefits the health and well-being of older people, especially the elderly (Campbell, Connidis, and Davies 1999; Scott 1990).

A study examining age differences in the relative importance of various kinds of social relationships in protecting against mortality found that, for older adults, having close friends was more important in predicting lower mortality compared to having a spouse which was the predominant protective tie for younger adults (Seeman et al. 1987). As Kahn and Antonucci presented in Convoy model (1980), members of the social network of an individual may have different levels of closeness to this individual and have various roles and functions. It is important to examine the health impacts of different types of relationships in the social networks of older people.

With the development of research on the health effects of various kinds of social relationships, it has been gradually realized that the structural properties of the network of social relationships of an individual in terms of size (number of social members), homogeneity (similarity among members), density (ties among all members), frequency of contact, as well as geographic dispersion are also related to health (Berkman and Syme 1979; Berkman et al.

Figure 2.1: Conceptual framework of social integration



2000; Silverstein and Bengtson 1994). In their classic study among Alameda County residents, Berkman and Syme (1979) developed a social network index to examine the association between the overall level of social networks and mortality. Basically, it is a summary index by adding up different types of social relationships and social participation that an individual is involved in, including marital status, frequency of contact with friends and other relatives, religious attendance, and membership in other social or community organizations. Higher index value indicates larger or heterogeneous social networks, lower index value indicates smaller or homogeneous social networks. Using this

index, Berkman and Syme (1979) found that individuals with higher values of social network index had significantly lower mortality risk compared with those with lower index values. The health effect of the size or heterogeneity of social networks suggests that there may be cumulative effects among some different social relationships.

Therefore, both specific social relationships and structural properties of social networks have been found to be associated with health and mortality. However, it is not easy to determine or differentiate what exact feature of a specific social relationship or social networks accounts for the effects on health and mortality (Berkman et al. 2000; Penninx et al. 1997).

### **2.2.3.2 Social support provided by network members**

In more recent studies, there has been an increasing emphasis on the health impact of social support provided by members in social networks (Antonucci and Akiyama 1987a; House 1981; House and Kahn 1985; Lin, Dean and Ensel 1981; Lin and Dean 1984; Penninx et al. 1997; Sarason, Sarason and Pierce 1990). The assumption in many of these studies is that the health benefit of social networks stems mainly from the support provided by members of the social networks (Berkman et al. 2000). In these studies, social support was generally measured by different kinds of support, including emotional support, informational support, as well as various kinds of tangible support (also referred to as instrumental support) such as money, goods, housekeeping and body care (House 1981). Some studies also measured subjective perceptions of



support such as satisfaction with the quality and adequacy of support, or anticipation of support receiving (Blazer 1982; Chen and Silverstein 2000; House and Kahn 1985; Krause, Liang and Gu 1998).

However, it has been found that receiving social support is not always positively related to health. Some studies have found that receiving instrumental support is negatively associated with health and survival status (Forster and Stoller 1992; Silverstein, Chen and Heller 1996). Some researchers have also noticed that a perception of excessive support has an adverse effect on health (Penninx et al. 1997). One explanation for these findings is that receiving support, in particular instrumental support, and a perception of receiving excessive support (too much of a good thing) may undermine one's sense of independence and self-efficacy, or lead them to feel that they are a burden on others (Seeman, Bruce and McAvay 1996; Silverstein, Chen and Heller 1996). Another explanation is that receiving support may encourage dependence and reduce the chances of practicing physical and cognitive functions, which ultimately results in a loss of these functions. As what Hultsch et al. (1999) has described, "use it or lose it".

Studies of social support and its health impact have enhanced our understanding on the pathways through which social networks may influence health outcomes. However, it may not be appropriate to assume that social networks are associated with health mainly through social support. As Krause (2006) has pointed out, social support is one construct of social relationships. There are also other constructs of social relationships. For example, the pres-

ence of social relationships and interaction with other people may reassure a sense of belonging and being socially connected and integrated, which in turn benefits one's mental and physical health (Rook 1987, 1990). In fact, social relationships do not always involve support behaviors. Relationships may also involve conflict and stress (House and Kahn 1985; Seeman and Berkman 1988).

Given that older people tend to need more financial and instrumental help than younger people, it is important to examine to what extent the health impacts of social networks of older adults are obtained through receiving emotional and instrumental support. A study conducted by Stoller and Pugliesi (1991) revealed that support provided by informal network members was more strongly associated with the well-being of older adults than that of younger adults (Stoller and Pugliesi 1991).

This examination is especially relevant to the study of older people in China. Generally, policymakers in China assume that family support is essential in protecting the well-being of Chinese elderly. As a result, many existing aging policies aim to protect older people's access to family support and facilitate the provision of family support.

To have a better understanding of the health effect of social networks as well as the extent to which the effect stems from social support for Chinese elderly, both the structural features of social relationships (such as the presence of social relationships and frequency of contact) as well as social support (emotional and instrumental support) provided by network members will be examined in the current study. By including them hierarchically into a multi-

variate model, I can test whether the assumption that for Chinese elderly the health effect of social networks is mainly obtained from social support holds. This examination has practical implications for aging and family policy design in the future.

### **2.2.3.3 Social engagement**

Social integration of older adults may not be fully reflected only by the level of involvement in the network of social relationships. As Rosow (1967) has emphasized, the concept of social integration in sociological tradition is broader and more comprehensive. Social engagement in meaningful social roles and fulfilling activities could be an important way for older people to retain continued social integration in society. Rowe and Kahn (1998) have also emphasized that maintaining social relationships and remaining engaged in activities that are meaningful and purposeful are both crucial components of successful aging.

The emphasis on social engagement may be especially relevant to the studies of the health effects of social integration among older people as they are much more likely to experience disengagement from social roles and activities due to the compulsory retirement system, health deterioration with age as well as social stereotypes toward older people.

There was a debate in the 1960s and 1970s: whether disengagement from social roles and activities is a normal process and benefits both older adults and society as proposed by Cumming and Henry (1961); or rather, as

other researchers asserted, continued activity and role fulfillment benefit the mental and physical health and well-being of older people (Lemon, Bengtson and Peterson 1972). Recent prospective studies have provided empirical evidence supporting the health benefits of activity engagement among older adults. Specifically, it has been found that participating in productive activities such as working and being a volunteer, engaging in recreational activities like outdoor physical exercise and cultural entertainment, and social activities such as being a club member, religious attendance, are associated with better physical, mental and cognitive health, perceived improvement in quality of life, and lower mortality risk among older adults across different societies (Bassuk, Glass, and Berkman 1999; Glass et al. 1999; Kiely et al. 2000; Luoh and Herzog 2002; Mendes de Leon, Glass, and Berkman 2003; Rowe and Kahn 1998; Schwingel et al 2009; Silverstein and Parker 2002; Wlinsky, Stump, and Clark 1995; Yamashita et al. 1993). These findings cast doubt on the argument proposed by Cumming and Henry (1961) that growing old is a process of disengagement which benefits both older adults and society. Rather, they support that continued engagement and participation in social activities benefits health and longevity of older adults.

The mechanisms through which social engagement affects health seem complex and have not been well understood till now. One proposed pathway is so-called “use it or lose it” (Hultsch et al. 1999). A higher level of social engagement (“use it”) may help older adults remain physically, socially, and cognitively active and slow the decline of body functions as people get old.

Another proposed explanation is that engaging in social, productive, and recreational activities may enhance social roles and fulfill role expectations, improve feelings of self-efficacy and accomplishment, which in turn benefits health, in particular mental health (Baker et al. 2005; Herzog et al. 1998; Krause, Herzog and Baker 1992; Lemon, Bengtson and Peterson 1972). In addition, it is also possible that engaging in social activities may help establish and maintain social networks, reinforcing of a sense of attachment and embeddedness, and enhancing the flow of social support (Barnas, Pollina, and Cummings 1991). These theoretical explanations for the association between social engagement and health outcomes suggest that different types of activities may influence health and survival through various pathways. Cross-disciplinary research is needed to better understand the biological and physiological mechanisms in this association.

In sum, as House, Umberson, and Landis (1988) have suggested, it is important to assess the situation of social engagement in later life and its effect on health. However, to date little attention has been paid to this dimension of social integration in aging studies. Most researchers mainly concern about whether older people are surrounded by a web of social relationships or whether these social relationships are supportive. It should be acknowledged that although being involved in social networks is an important way for older people to remain socially integrated, it is not the only way. For those elders who experience retirement, empty-nest of children or loss of spouse or close friends, engaging in social, productive, or recreational activities could be an

important way for them to avoid the risk of being socially isolated, or in other words, to achieve continued social integration, which may lead to better health and survival status.

#### **2.2.3.4 The relationship between social engagement and social networks**

As reviewed in the previous section, literature emphasizing the importance of social engagement among older adults tends to consider it as another dimension of social integration independent of social networks. However, there are different opinions holding that social engagement is sequentially related to social networks. That is, individuals who have bigger and heterogeneous social networks are more likely to engage in social and leisure activities, whereas those who have fewer social relationships have lower level of engagement in various activities. However, some studies have revealed contrasting evidence. For example, Michael et al. (2001) found that older women who lived alone had a similar level of participation in social or leisure activities outside the home compared with those women who lived with family members. In addition, activity engagement involves interaction with other individuals, which help establish and strengthen the network of social relationships and reinforce support exchanges or emotional sharing with network members (Barnas, Polina, and Cummings 1991).

Moreover, the pathways through which being embedded in social networks and engaging in activities affect health and mortality are different even

though they are not mutually exclusive. As some researchers have noted, the pathways through which social networks, especially social support provided by close or family ties, affect health might be more passive or need-based. In contrast, the pathways through which social engagement affects health might be more active and expressive (Shye et al. 1995). Specifically, being surrounded by a network of close and extended ties, individuals may be more likely to meet their basic needs of being accompanied, loved, being cared, and receive resources and support when they are in need or under stress, all of which, in turn, are beneficial to their mental and physical health. Whereas active engagement in social, productive, and leisure activities may help individuals reassure their social identity, purpose of life, and achieve a sense of usefulness and meaningfulness, which in turn, benefits mental and physical health. Therefore, although they could correlate with each other to some extent, social engagement is not necessarily sequentially related to social networks.

More importantly, it is possible that the health benefit of engaging in social and recreational activities may compensate for the detrimental impact of decline of social networks or loss of close ties on the health and well-being of older people. In a longitudinal study conducted among the oldest old in Sweden, Silverstein and Parker (2002) found that the beneficial effect of increasing activity participation on perceived quality of life was particularly strong among those who became widowed and those who had lower level of contact with family. This finding is important as it indicates that compared with those who have many social relationships but lower level of social engagement, older

adults who have lower level of social networks but actively engage in social activities may not necessarily have higher risk of morbidity or mortality.

#### **2.2.4 Conceptual framework of social integration for the current study**

In sum, the theoretical and empirical studies of association between social integration and health outcomes among older people have demonstrated that social integration is a broader and comprehensive concept referring to the level to which an individual is embedded in interpersonal relationships and engage in social roles and activities. Social networks and social engagement are two important facets of social integration. They may correlate to some extent, but at the same time they are independent of each other enough in terms of their ways of affecting health and well-being. This acknowledgment is reflected in the conceptual framework of social integration developed for the current study. As Figure 2.1 shows, social integration includes two main dimensions: social networks and social engagement. Their associations with mortality for Chinese elderly are examined. Furthermore, to what extent the health effects of social networks are obtained through receiving emotional and instrumental support from network members is also examined.

Specifically, the hypotheses regarding the multi-dimensional nature of social integration I test are:

*Being involved in social networks is protective against mortality for older people in China (Hypothesis 1).*



*Engaging in social, productive and recreational activities is protective against mortality for Chinese elderly (Hypothesis 2.1). The effect of social engagement is independent of social networks (Hypothesis 2.2).*

*Receiving support from network members accounts for a significant part of the health effect of social networks for Chinese elderly (Hypothesis 3).*

In the next section, I review differences in the pattern of the association between social integration and mortality found in different social and cultural settings. Based on this review, I develop hypotheses regarding the relative importance of different social network relationships and social activities in affecting mortality for older people in China.

### **2.3 Social and cultural differences in the association between social integration and health for older adults**

Although the inconsistency in the association between social integration and mortality in previous studies can be partially attributed to the different measurements of social integration, it has been increasingly recognized that another important factor is the differences in broader social and cultural contexts which may shape the characteristics of social networks and activities as well as their associations with health and mortality (Berkman et al. 2000; Fiori, Antonucci and Akiyama 2008; Litwin 2010; Seeman et al. 1993). As Berkman and her colleagues (2000) have emphasized, social and cultural settings have a determining influence on the characteristics of social networks and activities that individuals are involved in, as well as the psychological and

physiological pathways through which social integration affects health. An empirical study comparing the nature of the association between social isolation and 5-year mortality among older adults from three communities (East Boston, New haven, and Iowa (rural counties)) in USA may provide a direct support to the view. Employing the same measures of social ties, researchers found that the strength of association varied by communities after controlling for age, smoking behavior, body mass, chronic conditions, physical and cognitive disability (Seeman et al. 1993). Specifically, a significant association between social isolation and mortality risk was found for men and women in New Haven, for women in Iowa, but not for men and women in East Boston. Likewise, using the baseline Survey of Health, Ageing and Retirement in Europe, Litwin (2010) found that there were differences in various features of social networks between older adults from five Mediterranean and those from seven non-Mediterranean countries. Specifically, older people from these two groups of societies were different in the structure of network, interaction and exchange among network members, and quality of social relationships even after adjusting for their differences in social background characteristics and health status. Moreover, Litwin found that the effects of social network variables on the well-being of these two groups of older people were different. These studies provide evidence that the features of social network and activity engagement as well as their impacts on health may be different across various social and cultural settings.

Till now, studies regarding the association between social integration

and mortality have been conducted predominantly in Western countries. In China, a society with culture, values and social norms remarkably different from those in Western countries, it is possible that social networks and social activities that older people are involved in may have unique features, and their associations with mortality may have different patterns from what has been found in Western older populations.

### **2.3.1 Social and cultural differences in the health effect of social networks: family ties versus non-family ties**

As seen from the literature review in the previous section, social networks - the web of social relationships - that an individual is involved in, have been consistently found to be associated with mortality for older adults. However, it has been found that the health effects of specific social relationships may vary across older adults from different societies.

The differences in the relative importance of family ties and non-family ties in affecting health observed in studies conducted in different societies could be one important demonstration of the socio-cultural differences in family preference. In studies conducted in Western countries including America, Australia and some societies in Northern Europe, both family and non-family relationships in the social networks of older adults have been investigated for their impacts on health and mortality. Most Western studies have shown that having a spouse has a beneficial effect on the health and survival of older people (Gove 1973; Lillard and Waite 1995; Murray 2000). And its effect has often

been found to vary by gender (Berkman and Syme 1979; Lillard and Waite 1995; Williams and Umberson 2004).

Moreover, having friends has been found to be an important source of emotional support for Western older people (Crohan and Antonucci 1989; Fiori, Antonucci and Akiyama 2008; Gurung, Taylor, and Seeman 2003). It has been consistently found that the presence of friends and support provided by friends are beneficial to the psychological and physical health of older people (Crohan and Antonucci 1989; Fiori, Antonucci and Cortina 2006; Matt and Dean 1993). Indeed, Western elders are often found to have a friend-focused social network (Fiori, Antonucci and Cortina 2006). In their study comparing the impacts of different types of social networks (diverse, family-focused, and friend-focused social networks) on the mental health of older Americans, Fiori et al. (2006) found that those who had no friends but had family relationships had lower level of mental health than those who had friends but lacked family relationships (Fiori, Antonucci and Cortina 2006).

However, the findings on the health effects of intergenerational relationships for Western elders are much less consistent. Although some studies have shown that intergenerational relationships significantly buffer the deleterious impact of widowhood or onset of health problems and diseases among older people (Silverstein and Bengtson 1994), many studies have found that intergenerational relationships and intergenerational support exchanges do not have significant positive effects, or even exert negative effects, on older people's mental and psychological well-being (Dunham 1995; Lee, Netzer and Coward

1995). In Alameda County Study, Seeman and her colleagues (1987) compared the relative importance of four types of social ties as predictors of mortality and found that among respondents aged 70 and older, relationships with children were relatively less important in protecting against mortality than having a spouse and the ties with close friends and relatives. Also, Lee, Netzer and Coward (1995) found that intergenerational support exchanges (both receiving from adult children and providing help to them) were related to higher level of depression. Such lack of significant positive effect of intergenerational relationships on late-life well-being could result from Western culture's emphasis on independence and autonomy (Cohler 1983; Lee, Netzer and Coward 1995; Pyke and Bengtson 1996). Older people in Western countries prefer to live an independent and autonomous life as long as possible. Receiving support from adult children or the perceived excessive involvement of children in their later life may cause a sense of distress among older people in Western countries (Pyke and Bengtson 1996; Silverstein, Chen and Heller 1996).

In contrast, many societies including China and some other Asian countries have a family-centered culture. In these societies, older people are often found to have a family-focused social network, "characterized by close ties with spouse, children, and siblings but little contact with friends and organizational participation" (Fiori, Antonucci and Akiyama 2008, pp.714). In the societies with family-centered culture, the presence of and quality of family and kin relationships, such as having a spouse, having children, living with children or frequent contact with them, and receiving support from them, have often

been found more important in protecting the well-being and mortality of older adults compared to those non-family relationships such as friends and other extended relationships (Chen and Silverstein 2000; Ho 1991; Rodriguez-Laso 2007; Silverstein, Cong and Li 2006). For example, in a study conducted among older adults in Spain, a country where family relationships are highly valued, Rodriguez-Laso (2007) found that family ties were significant protectors against mortality, whereas friends did not have a significant beneficial effect. Likewise, a study conducted in China found that support from children significantly buffered the negative effect of widowhood on the mental health of older people, whereas support from friends did not make a difference (Li et al. 2005).

Indeed, in Asian studies examining the effects of social integration on old-age health and well-being, focus has been put predominantly on family relationships, especially intergenerational relationships. The health effects of the structural and functional features as well as subjective appraisal of intergenerational relationships have been thoroughly examined. Measurements of intergenerational relationships used in Asian studies often include the presence of children, household types, living arrangements or geographic proximity to children, frequency of contact, support provided by children, as well as perceived satisfaction of emotional cohesion with children (Chan 1997; Chen and Short 2008; Chen and Silverstein 2000; Krause, Liang and Gu 1998; Liu, Liang and Gu 1995; Silverstein, Cong and Li 2006). For example, Chen and Silverstein (2000) found that satisfaction with children was significantly related to

higher morale for older people in China. In another study in rural China, Silverstein and his colleagues found that compared with those who lived alone or with spouse only, those older people who lived with children or lived with grandchildren in generation-skipped households while receiving remittances from geographically separated adult children had better psychological well-being (Silverstein, Cong and Li 2006).

Relationships with friends, however, have not even been included in many Asian studies examining the association between social networks, social support and old-age mortality. In a few Asian studies which have included relationships with friends as one component of social networks of older adults, the measures of the presence of and contact with friends are generally crude. For example, the measure may only be a dummy variable indicating having friends or not. Little attention has been paid to the quality of this relationship in terms of closeness and interaction, as well as its impact on emotional and physical health and well-being.

Variation in social and cultural norms with regard to family and inter-generational relationships results in the differences in characteristics of social networks of older adults and their patterns of association with health and longevity. For older adults in China and many other East Asian societies, the importance of family and kin ties, especially intergenerational relationships, in their impacts on well-being and health stems from Confucian-based traditional extended family arrangement and close bond between generations. By Confucian cultural standard, older people who are surrounded by children

and grandchildren, in particular son and his family, in the same household are assumed to live an ideal and happy later life, while those who have few family members or do not live with family members are believed to be lonely or even abandoned. Older people who were raised and socialized in this culture tend to attach a lot of meaning and expectations to the extended family arrangement and relationships with children. Lack of the presence of or low quality of intergenerational relationships may have disastrous impacts on their mental and physical health and well-being. In addition, pension and national health and insurance systems are underdeveloped in China. Family support continues to be the primary source of support for older adults (Martin 1988). Therefore, in a society with a family-centered tradition as well as underdeveloped social welfare systems, family relationships, especially intergenerational relationships, are expected to have stronger protective effect on the health and well-being of the Chinese elderly compared to non-family social relationships such as friends and other extended relationships.

#### **2.3.1.1 Inconsistent findings on the importance of family relationships in protecting the health and well-being of older people in contemporary China**

The dramatic sociodemographic and economic changes occurring in the past several decades have prompted concerns on the persistence of extended family arrangement and family-centered later life style among older people in contemporary China. Over the past decades, the sharp decline of fertility rate as well as the achievement in mortality and life expectancy have great im-



plications for family structure, living arrangements and availability of old-age family support. At the same time, rapid but uneven economic development as well as the release of household registration system have led to mass internal migration, especially rural-to-urban migration, resulting in increasing geographic dispersion of working-age children from their older parents. In addition, as a result of the enhancement of gender equality and the spread of education since the establishment of the People's Republic of China, the younger cohorts of Chinese women, in particular rural women, enjoy much greater improvement in their social status and access to labor market.

The changes in social and household context have resulted in an unfamiliar late-life experience for the current Chinese elderly and are directly and indirectly affecting their actual as well as preferred social networks and activities. In recent years, China has witnessed declines of the prevalence of co-residential living arrangement as well as changes in the pattern of intergenerational interaction and support exchange (Chen 2005; Lively and Ren 1992; Lee and Xiao 1998; Logan and Bian 1999, 2003; Logan, Bian and Bian 1998). Many researchers are asking whether traditional extended family arrangement and close intergenerational relationship persist or adapt in the changing social environment. This concern has motivated many studies in recent years.

The findings of recent studies indicate that the impacts of family relationships on the health and well-being of Chinese elderly are less conclusive than expected. Some studies have documented the beneficial effects of extended family arrangements in forms of the presence of children, living with

children and receiving support from children. For example, the number of children was found to be positively related to the level of social support received (Zimmer and Kwong 2003). A few recent studies in rural China found that living separately from children was adversely associated with physical health and psychological well-being among older people (Chen and Short 2008; Cui 2002; Silverstein, Cong and Li 2006). Receiving emotional support was found beneficial to the psychological well-being of Chinese elderly (Liu, Liang and Gu 1995). The protective effect of receiving instrumental support, however, was less consistent.

In contrast, the findings of quite a few recent studies do not accord with the assumed importance of family relationships in protecting the health and well-being of Chinese elderly. For example, a study conducted in the city of Wuhan found that the size of household measured by the number of persons living in one household did not show any significant effect on mortality risk among older people (Liang et al. 2000). Some studies found that receiving instrumental support was negatively associated with the health and well-being of older people (Chen and Silverstein 2000; Krause, Liang and Gu 1998).

It is possible that lack of protective effects of receiving instrumental support and household size found in these studies are the result of the health-related selection effect. That is, older people with poorer health are more likely to live with children or receive instrumental support. However, in a longitudinal study which can better control for the confounding effect of health, researchers found that co-residing with children was associated with better self-

rated health but poorer functional capability among Chinese oldest old even after controlling for baseline health status, sociodemographic characteristics and the availability of children (number of children and residential proximity to children) (Li, Zhang and Liang 2009). According to the authors' explanation, traditional co-residential living arrangement may fulfill the traditional expectations of the Chinese oldest old, leading to a sense of pride and a better self-assessment on health and well-being. However, depending on the instrumental support and care from co-residing children may result in fewer chances of performing activities of daily life and a gradual decline in physical capability. It should also be acknowledged that although longitudinal study is capable of better controlling the confounding effect of health, it cannot fully eliminate this selection effect.

Another possible explanation for the lack of protective effect of household size, living with children, or receiving support from children for Chinese elderly observed in these recent studies is that it could be an indicator of the implications of rapid industrial development and urbanization in the past several decades for the family arrangements and intergenerational relationships. It has been well understood that modernization and urbanization are often accompanied by family nuclearization. In the past several decades, living arrangements in China have been undergoing pronounced changes. The proportion of older adults living with spouse only or living alone has been gradually increasing, whereas the proportion of those living with children has been declining, especially in urban China (Lavelly and Ren 1992; Logan, Bian

and Bian 1998).

A few recent studies suggests that the dynamics of intergenerational interaction and living arrangements have been undergoing changes in recent years. For example, some researchers have noticed that co-residing living arrangement is becoming a practical strategy to cope with the needs of family members rather than simply a performance of traditional family norms (Chen 2005; Logan and Bian 1999, 2003). Using a cross-sectional data collected from nine large cities of China in 1987, Logan and Bian (1999) found that only 29 percent of older parents reported that they preferred to live with a married son, whereas a larger share of older respondents (44 percent) had more modern attitudes toward an independent living arrangement. As Logan and Bian pointed out, “Parents can choose from a broad array of cultural models. They tend to express more traditional values if these meet their needs and otherwise to adopt a more modern outlook” (Logan and Bian 1999, p1256). A recent longitudinal study using three waves of the China Health and Nutrition Survey data provided further empirical evidence. Chen (2005) found that the transition of living arrangements of older parents and their adult children during the 6-year period responded to the needs of both adult children as well as older parents. Specifically, adult children’s needs for child care, as well as older parents’ needs after experiencing widowhood and functional limitation are all determinants of the transition of living arrangements. As the researcher pointed out, rather than merely reflecting cultural continuity, “extended family living arrangements serve as a beneficial family adaptive strategy” (Chen

2005, p143).

The research regarding the predictors of living arrangements has shown that both practical considerations including housing space and cost, health status, needs for assistance, as well as preferences for coresidence versus separate living arrangements are all factors influencing and restricting choice of living arrangements (DaVanzo and Chan 1994). A similar shift from traditional cultural ideology toward practical concerns of both generations has also been found in some other Asian societies (Frankenberg, Chan and Ofstedal 2002; Takagi and Silverstein 2006). In a longitudinal study examining the stability and change in living arrangements in Indonesia, Singapore, and Taiwan during 1993 to 1999, researchers found that a sizable proportion of older people in all three countries experienced transition in living arrangements. Moreover, they found that although older parents' needs were related to co-residing living arrangement, adult children's needs were also important determinants of co-residence (Frankenberg, Chan and Ofstedal 2002).

A short-term pattern in support exchange between older parents and their adult children has also been found in recent studies. In a study examining the determinants of receiving support from children for older people in China, Lee and Xiao (1998) found that the urban elderly who helped children with their housework were significantly more likely to receive financial support from their children. Moreover, similarly with what was found in Western older populations, some recent studies in China found that receiving financial and instrumental support from children had a detrimental effect on the health and

well-being of older people (Chen and Silverstein 2000; Krause Liang and Gu 1998).

These contradictory findings of recent studies may indicate the coexistence and interaction of tradition and modern changes. On one hand, the deep-rooted traditions regarding family arrangement and intergenerational relationships remain influential. On the other hand, the rapid social and demographic changes have great implications for family arrangements and intergenerational interaction and may have led to some significant adaptation. Under such a rapidly changing social setting, the characteristics of traditional extended household arrangement and intergenerational relationships as well as their health influences may be changing as well.

Therefore, it is necessary to examine the assumed important role of family relationships, especially intergenerational relationships in the form of co-residential living arrangements and filial support provision, in protecting the health and well-being of older people in contemporary China.

The following hypothesis will be tested:

*Compared with non-family relationships such as having contact with friends and other extended relationships, family relationships such as having a spouse, having more children, co-residing with children, and having frequent contact with non-resident family members have stronger effects on mortality for older people in China (Hypothesis 4).*

### **2.3.2 Social and cultural differences in the health effect of social engagement: family-centered activities versus activities outside the home**

Similarly, the health effects of engaging in various kinds of activities for older people may also differ across different social and cultural settings. As mentioned earlier, one proposed explanation for the health benefit of social engagement is that engaging in activities helps fulfill social roles, foster a sense of meaningfulness and usefulness (Barlow and Hainsworth 2001; Lemon, Bengtson and Peterson 1972; Fisher and Specht 1999; Knapp 1977). However, social roles and activities that older adults tend to take and attach meaning to are significantly determined by the prevailing social norms and values in a society.

In the West, social norms emphasize independence, self-efficacy and mastery over one's environment, which partially explains the prevalence of continuing to work, being a volunteer, and participating in community, club activities and outdoor-exercise among older people as well as the significant benefit of these activities on their mental and physical health and survival status (Baker et al. 2005; Berkman and Syme, 1979; Lemon, Bengtson and Peterson 1972; Luoh and Herzog 2002; Musick, Herzog and House 1999; Silverstein and Parker 2002).

In contrast, in China and some other Asian societies which emphasize the centrality of family, older people are found to generally actively engage in helping children and kin in housework, grandchild care and meal prepara-

tion (Cornwell, Casper and Chou 1990; Hermalin et al. 1998; Liang, Gu and Krause 1992; Liu 1991; Verbrugge and Chan 2006), whereas participating in activities outside home is not a common practice for them (Cheung and Kwan 2000; Li et al. 2006). According to a survey report on senior volunteer service participation in Hong Kong, less than 5 per cent of older people reported that they actively participated in voluntary activities (Cheung and Kwan 2000). Likewise, a study using a cross-sectional, community-dwelling older population in Shanghai, one of the most urbanized area in China, found that only around one out of ten respondents reported they participated in social and leisure activities including participating in recreational or religious activities, communicating with friends, and visiting family members (Li et al. 2006). Guided by social norms on extended family arrangements and strong intergenerational linkage, older people in China attach meaning to helping family members, especially children, for example, providing material and instrumental support to children, or helping them establish their own family. Performing these activities has been found to be associated with better mental well-being among Chinese elderly. Using the baseline data of BMLSA survey, Chen and Silverstein (2000) found that providing instrumental support to children was significantly associated with better morale among older parents in Beijing.

Whereas, being active in social participation is not culturally expected, or even discouraged in societies with family preference norms. As Hashimoto (1996) described the social assumptions and expectations on older people in Japan, a society with similar culture on family and intergenerational relation-



ships with China, an older person living alone is normally considered as being isolated (or abandoned), no matter how active, content, or self-sufficient he or she might be.

With the increasing attention on successful aging (Rowe and Kahn 1997), it has been increasingly recognized among scholars in China and many other Eastern Asian societies that active engagement in society and being productive is one important indicator of successful aging. In a descriptive study examining the situation of successful aging among the Chinese elderly in Hong Kong, productive involvement status was recognized as one important dimension of successful aging. Specifically, it was measured based on two survey questions: employment status and whether older people provided help to their family members or friends with household chores like shopping, preparing meals or providing child care, and listening when others had problems (Chou and Chi 2002). Similarly, in the above-mentioned Shanghai study which investigated the situation of successful aging and its related factors, authors found that participating in more leisure activities was related to successful aging (Li et al. 2006). In another study conducted among rural and urban elderly in Wuhan, a big city in the middle part of China, researchers found that working status and social participation were significantly beneficial to self-rated health (Liu, Liang and Gu 1995).

These studies which either presented a descriptive analysis or examined the correlates of successful aging or self-rated health provide evidence that participation in activities outside the home may benefit the health and well-being

of Chinese elderly as well. However, mainly based on cross-sectional data, these studies are unable to disentangle the causal direction in the association of social engagement and health.

Till now, little is known about the characteristics of social engagement and its health impact for older people in China. In the current study, two questions regarding social engagement of the Chinese elderly were addressed: Does social engagement have a protective effect on the survival status of Chinese elderly? What is the relative importance of engaging in family-centered activities and activities outside home?

The hypotheses are:

*Engaging in social, productive or recreational activities has protective effects against mortality for older people in China (Hypothesis 2.1). Its effect is independent of social networks (Hypothesis 2.2). (as developed in the previous section)*

*Engaging in family-centered activities (providing help to family members and relatives) has a stronger protective effect against mortality than engaging in those activities outside the home (such as working, participating in recreational activities, and attending organizational activities) (Hypothesis 5).*

## **2.4 Is the association between social integration and mortality uniform across different subgroups of older population?**

Despite the general evidence that being involved in social networks and engaging in social activities are associated with health and mortality among older adults, the strength and direction of the association may vary across different subgroups of older population. In this section, I will review the literature regarding gender differences and urban-rural differences in the characteristics of social integration and its association with health and mortality. Hypotheses regarding gender and urban-rural differences will be developed.

### **2.4.1 Gender differences**

Gender differences in the pattern of the association between social integration and mortality have been widely acknowledged in previous studies (Berkman and Syme 1979; House, Robbins and Metzner 1982; Schoenbach et al. 1986; Shye et al. 1995). It has been found that the health effects of both specific social relationships as well as the overall level of social integration which is measured by a summary index of various kinds of social ties and activities vary according to gender. For example, marital status has often been found to exert a greater effect on health and mortality for older men than women (Berkman and Syme 1979; Lillard and Waite 1995; Williams and Umberson 2004). Using a summary index of social interaction including social relations and activities, Orth-Gomer and Johnson (1987) found that the effect

of social interaction on six-year mortality risk was stronger for Swedish men aged 65 and above than for women of this age. Likewise, in a study conducted among men and women aged 60 and above in Evans County, Schoenbach and his colleagues (1986) also found that the association between the level of social networks and 13-year mortality risk was stronger for men than women.

To a large extent, the gendered pattern of the association between social integration and mortality attributes to the demographic as well as socially-constructed differences between men and women. These gender differences may not only result in gendered features of social networks and activity engagement but also contribute to differences in the strength of effect as well as the pathways through which social integration affects health (Shye et al. 1995; Ghuman et al. 2004).

Demographically, women tend to have longer life expectancy than men and tend to marry men who are older than them, which results in a higher prevalence of widowhood among older women than men. With regard to gender differences in socially-constructed characteristics including socioeconomic status and social roles, women in many societies are discriminated against in education, labor participation, and social status. In China, despite a great enhancement in gender equality since the establishment of socialist state<sup>1</sup>, the current cohorts of older women who were raised up in a traditional agricul-

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<sup>1</sup>According to UNDP report in 2010, the gender inequality index, a new measure designed and introduced in 2010 report to measure the negative effect of social and economic gender disparities on human development, China was ranked at the 38th out of 169 countries.

tural society remain remarkably disadvantaged in social and economic status as well as health condition. It has been widely documented that socioeconomic status such as education and income level has a substantial influence on the characteristics and level of social integration. For example, people with lower socioeconomic status are more likely to have homogeneous social networks or lower level of social integration compared with those with higher socioeconomic status (Campbell, Marsden and Hurlbert 1986; Cutler and Lleras-Muney 2008; Turner and Marino 1994). Given that socioeconomic status is often found to have determining effects on health status (Hayward, Pienta and McLaughlin 1997; Marmot and Shipley 1996; Martelin 1994; Lianget al. 2000), it is reasonable to anticipate that the remarkable gender differences in socioeconomic status may result in gendered patterns of the association between social integration and mortality.

Gender difference in social roles is another socially-structured difference between men and women, which may shape the feature of social networks and meaning of activities they are involved in. Women, especially those in traditional societies, are socialized to take caregiving roles as their primary social roles. They take the primary responsibility of taking care of husband, children and parents in their everyday-life and health-related needs (Logan and Spitze 1996). As a result, their social life is mainly circumscribed by the primacy of their family obligations. In contrast, men, being a family breadwinner, have their main social roles and identities in the work place and tend to develop their social networks outside the home (Jacobs and Gerson

2004). And they are found to make less effort to establish close personal social relationships beyond the working field.

In addition, as some researchers pointed out, feminine nature tends to be socioemotional and expressive. Their interactions with network members mainly fulfill expressive and supportive purposes (Shye et al. 1995). In contrast, men tend to conform to masculine role norms such as being independent and instrumental. Their interactions with network members mainly fulfill practical purpose (Buhrke and Fuqua 1987).

These demographic and socially-constructed differences between men and women contribute significantly to the gender differences in the features of social networks. Generally, older men are often found to have smaller and less heterogeneous social networks compared to older women. It has also been found that men tend to depend emotionally on a single close social tie. Antonucci and Akiyama (1987a) have found that men are more likely to mention spouse as their confidantes compared to their female counterparts. By contrast, women tend to report having more friends, and consider more social ties important and intimate to them (Chen and Silverstein 1995). Studies have found that when being asked about who are their confidantes, women often mention close friends and relatives instead of their husbands (Antonucci and Akiyama 1987a; Vandervoort 2000). In addition, it has been found that compared to men, women tend to have a higher level of support exchanges with the members of their social networks (Antonucci and Akiyama 1987a, Umberson et al. 1996).

Consequently, these gender differences likely result in gendered pattern of the association between social networks and health outcomes. For example, men's tendency of heavily depending on wives for their instrumental and emotional support may lead to stronger benefit of having a spouse as well as a stronger negative health consequences when experiencing loss of a spouse (Umberson, Wortman and Kessler 1992). In contrast, for women, especially those living in societies with a patriarchal family system like traditional China, they were socialized and internalized as a primary caregiver of family and tended to spend most of their effort and time in taking care of husband, parents and children. As a result, they may benefit less from marriage than their husbands do. But their caregiving roles may lead to stronger and closer relationships with their children. Moreover, as a result of lack of economic independence, women tend to have a higher expectation on children's support in their later life. It has been found that older women in China, especially those widowed women, are more likely to live with children than older men (Logan, Bian and Bian 1998). In the current study, it is hypothesized that having a spouse has a stronger protective effect against mortality for older Chinese men than women. For women, relationships with children are of primary importance in protecting against mortality.

Socially-constructed roles of men and women also shape the way they define and perceive the meaning of the activities they engage in. Being socialized to take caregiving role as their primary social roles, older women in the current study who were raised up in traditional China may consider that

taking care of members in their social networks, especially significant family members, is an essential way to fulfill their social roles and identities. Older women in China have been found to be more likely to be involved in helping family members and kinships in cooking and babysitting (Liu 1991). They tend to attach a lot of meaning to providing help to family members and facilitate their personal development and achievements. Failing to perform these activities may have an adverse effect on their mental and physical health. Thus, it is hypothesized that the effect of providing support to family and kin have a stronger beneficial effect on survival status for older Chinese women than for men.

In summary, the consistently observed gender differences in demographic and socially-constructed characteristics as well as in social roles may result in gendered pattern of the association between social integration and mortality. It is more appropriate to examine men and women separately.

Hypotheses regarding gender differences in the pattern of association between social integration and mortality for Chinese elderly are as follows:

#### *SOCIAL NETWORK DIMENSION*

*For men, having a spouse has a greater protective effect on mortality than other social relationships (Hypothesis 6.1). The protective effect of having a spouse is greater for men than for women (Hypothesis 6.2).*

*For women, intergenerational relationships (having more children, living with children and contact with them) are of primary importance in pro-*



*tecting against mortality compared with other social ties (Hypothesis 7).*

#### *SOCIAL ENGAGEMENT DIMENSION*

*For women, providing help to family and kin, a family-related activity, has a greater protective effect against mortality than engaging in social or recreational activities outside the home (Hypothesis 8.1). The protective effect of providing help to family and kin is greater for women than men (Hypothesis 8.2).*

#### **2.4.2 Urban-rural differences**

Rural and urban China are different in both social and community environment as well as individuals' characteristics in socioeconomic status, lifestyles, values and attitudes. These differences may result in different characteristics of social integration and the pathways through which it affects survival status between urban and rural elders. Some studies in China have demonstrated that urban and rural elderly are different in mortality distribution and the characteristics of social networks and activities they are involved in (Clifford and Brannon 1985; Joseph and Cloutier-Fisher 2005; Smith et al. 1995; Zimmer, Kaneda and Spess 2007). However, to date few studies have investigated whether the association between social integration and mortality is different between urban and rural elderly.

Due to the long-lasting differences in economic development as well as recent policy bias in pension and health care programs, urban-rural differences in social and cultural environments are distinct. Older adults living in

these two regions have different life course experiences in family, work, and community. First, urban and rural elderly are remarkably different in individual socio-demographic characteristics including education, occupation, income level, health status and life expectancy. For example, education attainment is one of the most fundamental and remarkable differences. Compared with their urban counterparts, rural elderly have much lower level of education. It has been widely documented that education is not only associated with the characteristics of social networks and activity engagement but also related to health through various pathways. People with higher educational level tend to have larger and more heterogeneous social networks and receive more support from network members (Campbell, Marsden and Hurlbert 1986; Cutler and Lleras-Muney 2008; Turner and Marino 1994). Education level has also been found to be positively associated with a sense of personal control which encourages healthy lifestyles. Moreover, educational differences in health-related behaviors including smoking and drinking habits, diet and health-care facility utilization have also been consistently found (Cohen, Kaplan and Salonen 1999; Mirowsky and Ross 1998; Turner, Wheaton and Lloyd 1995).

In addition, better economic status as well as attitudes favoring privacy and independence that are associated with higher educational level may lead to a higher level of capability and willingness of living separately from children. In some Asian societies, it has been found that older people with higher educational level are more likely to live independently of children (live with spouse only or live alone) (Knodel and Ofstedal 2002). A recent study in

urban China found that, compared with those with lower than middle school education level, older parents with higher education were much less likely to favor co-residence with children (Logan and Bian 1999). In short, given the remarkable differences in educational attainment as well as other basic individual socio-demographic characteristics between urban and rural elderly, it is reasonable to anticipate that the characteristics of social networks and activity engagement as well as their associations with mortality may vary across these two subgroups of Chinese elderly.

Besides individual differences in socio-demographic characteristics between urban and rural elders, there are also remarkable urban-rural differences in social structural environment which contextualizes the impact of social integration on health and survival status. For example, pension and health care policies are different between urban and rural China. Unlike older people living in urban China, older people in rural China are much less likely to be covered under pension programs and have much less health care subsidies, indicating that for rural elderly there is no alternative to family support. Lee and Xiao (1998) found that rural Chinese elderly received more help from children compared to their urban counterparts. In a study conducted in rural China, Silverstein, Cong and Li (2006) found that for those living with grandchildren in generation-skipped households while receiving remittances from geographically separated adult children, their psychological well-being was better than those living alone or living with spouse only. This finding indicates that children's support, in particular economic support, is critical to the health and

well-being of rural Chinese elderly who have lower economic status and lack of formal welfare support.

Moreover, agricultural economy reinforces the patriarchal and patrilineal family norms and living arrangements in rural China. Extended families are more common in rural areas. Compared with their urban counterparts, rural elderly tend to adhere to the traditional extended family arrangement and filial piety to a stronger extent (Lee et al. 1994). Some studies in rural China found that older people coresiding with children had better psychological well-being compared with those living alone or living with spouse only (Cui 2002; Silverstein, Cong and Li 2006). In contrast, a few recent studies conducted in urban China have shown that traditional extended family norms are weakening (Logan and Bian 1999; Logan, Bian and Bian 1998; Logan and Bian 2003). For example, in a study conducted in nine large cities in China, Logan and Bian (1999) found that a sizable proportion of urban elders reported that they preferred to live independently of children.

It has also been found that the dynamics of intergenerational interaction are different between urban and rural families. In a study examining children's support for older parents in urban and rural China, Lee and Xiao (1998) found that even although parents' needs were important determinants of receiving support from children in both urban and rural China, there was a pattern of short-term intergenerational support exchanges in urban families. Specifically, they found that the urban elderly who provided housing and other services were more likely to receive support. However, for rural elderly,

the level of receiving support from children was not affected by whether or not they provided support to children. This urban-rural difference indicates that for urban families, intergenerational support exchanges may be more likely to involve a practical and strategic orientation. For rural families, however, the fact that intergenerational support exchanges do not necessarily achieve a short-term reciprocal balance may reflect a stronger evidence of the persistence of traditional family norms on support exchanges and mutual interdependence.

The phenomenon of stepping-away-from-tradition in urban areas, exemplified by the preference for independent living arrangement and short-term patterns of intergenerational support exchanges, may not only result from urban elderly's better socioeconomic status which may lead to a lower level of dependence on children, but also from their attitude changes toward favoring independence and autonomy under the influence of greater extent of modernization. There is an gradually increasing recognition on the importance of active social engagement for successful aging among urban elderly. However, a study conducted in the city of Shanghai revealed that the number of older people participating in social activities outside home remained sparse (Li et al. 2006).

Conducting an urban-rural comparative analysis may shed light on the implications of different social and economic settings for the characteristics as well as the health effects of social networks and activities that older people in these two regions are involved in. Moreover, a better understanding of which social ties and activities are more important in protecting against mortality for

rural and urban elders respectively can help design more specific and effective aging policies in the future.

Specifically, the hypotheses regarding the relative importance of social integration components in affecting mortality for urban and rural elderly are as follows:

#### *SOCIAL NETWORK DIMENSION*

*For rural elderly, intergenerational relationships (i.e. having more children, living with children, and frequent contact with them) have greater protective effects against mortality than other social relationships (Hypothesis 9.1). The protective effects of intergenerational relationships are greater for rural than urban elders (Hypothesis 9.2)*

*For urban elders, having a spouse plays an important role in protecting against mortality (Hypothesis 10).*

*For urban elders, having contact with friends and relatives is beneficial to their survival status (Hypothesis 11).*

#### *SOCIAL ENGAGEMENT DIMENSION*

*For rural elderly, providing helping to family and kin has a greater protective effect against mortality than engaging in activities outside the home (Hypothesis 12.1). The effect of providing help to family and kin is greater for rural than urban elders (Hypothesis 12.2).*

## 2.5 Disentangling the confounding effect of health status in the association between social integration and mortality

Many demographic and social factors may confound or mediate the association between social integration and mortality. Based on previous theoretical and empirical studies, these variables mainly include the following domains: demographic and socioeconomic status, health condition, behavioral risk factors, and stressful life events. These potential confounding variables have been found to be either associated with social networks and activity engagement or predict mortality. Most of these variables have been noted in previous sections of this chapter with regard to the way they may confound or intervene in the association between social integration and mortality.

Among these potential confounders, health status deserves more attention not only because it is one of the strongest determinants of mortality but also, more importantly, it is associated with social integration in a reciprocal way, that is, the direction of causality between social integration and health could be bidirectional. Specifically, the level of social integration may influence health (*social causation*). Being involved in supportive social networks and participating in meaningful activities may benefit mental and physical health and longevity, while being isolated may be detrimental to health. At the same time, health may also influence the level of social integration (*social selection*). Individuals with good health are more likely to maintain and develop their social networks and the level of social engagement, while those

with poor health tend to experience shrinking of social networks and social contacts as well as decline in the level of activity engagement as a result of their functional limitation. Supporting evidence of both causal directions has been found in previous studies (Johnson 1990; Umberson et al. 1996).

Moreover, the causal direction in the association between social integration and health status may vary in importance across different life stages. For example, among younger or working-age adults, social selection (health status influences the level of social integration) could be the dominant causal direction in the association between social integration and health . Young people with poor health tend to get fewer opportunities in the labor market as well as other dimensions of social life, which in turn exerts a significant adverse impact on the development of their social networks or social engagement. In the studies among older adults, both social selection and social causation have been observed.

What makes things more complex is that both health status and characteristics of social networks and social engagement are dynamic in old age (Minkler 1985). Compared to younger generations, the onset of a disease or a functional disability occurs more commonly among older people, which may result in a decline in the level of social networks and activity engagement. Conversely, children's moving-out, death of a spouse, close friends or relatives are the experiences that older adults are more likely to face, which may negatively affect their mental and physical health. In addition, longitudinal studies have shown that health trajectory in older age does not necessarily involve an uni-



directional decline. Rather, it is not uncommon for older people to experience recovery from functional limitation and disability (Crimmins and Saito 1993; Rogers, Rogers and Belanger 1992). Social integration and health condition may be dynamically related to each other over time, that is, changes in one may foster changes in the other.

Given the complex correlation between social integration and health among older adults, studies focusing on the association between social integration and old-age mortality need to carefully disentangle the potential confounding effect of health. Cross-sectional study can not deal with this problem. Using longitudinal data with baseline health condition controlled is a common practice. For example, in a study carried out among a nationally representative sample of the oldest old in Sweden, Lennartsson and Silverstein (2001) found that after health condition variables were controlled, the protective effects on survival status of most social and leisure activities lost their significance, suggesting that the lower mortality among the oldest old who have higher level of social integration could be partially attributed to their better health or functional capability.

In addition, the pattern of the association between social integration and mortality may vary across people with different health status. For example, compared with those with better health status, those with poorer health status may benefit more on their survival status from being embedded in social networks and engaging in social activities. Simply including health condition variables in multivariate analysis may have limitation in examining the spe-

cific pattern of the impact of social integration on survival among people with different health status. Some researchers decided to conduct research only among those respondents with similar health status at baseline (e.g. those who are free of functional limitation, or those have certain chronic disease) in order to better understand the effect of social networks or activity engagement on their survival status. Eventhough in doing so the effect of social integration on mortality are net of the variation in baseline health status, the sample selection according to health status may limit generalization of these study findings. Some other studies took extra steps by conducting analyses among the total sample and then separately among subgroups with different health status at baseline.

In the current study, besides controlling for health status variables in multivariate analyses, separate analyses among those older adults with different health status will also be conducted. It is hypothesized that *the pattern of association between social integration and mortality varies across Chinese elderly with different health status (Hypothesis 13)*.

## Chapter 3

### Background of China

The characteristics of social integration and its association with health and mortality among Chinese elderly cannot be adequately understood without taking into account the traditional family culture as well as the current social setting characterized by dramatic demographic, economic and cultural changes in the past several decades in China. This chapter describes the tradition of extended family arrangements and filial piety, as well as the demographic, sociocultural and economic situation and recent changes with a focus on their implications for the features of social integration and mortality for the current Chinese elderly.

#### **3.1 Characteristics of social networks and social engagement of older people in traditional China**

In traditional China, older people live a family-centered life which is characterized by co-residing with younger generations in extended family household and actively engaging in family-related activities. This family-centered life style in old age is mainly a result of extended family arrangement in agrarian economic society and reinforced by Confucian-based family value. In agricultural society, family is the basic economic unit. Extended family

makes the gathering and allocation of labor and material resources more efficient and wise as well as facilitates the continuity of the family. Co-residence of older parents and married children is a dominant living arrangement in traditional China. Generally, older people are the head of extended household. They hold control on property and resources, and possess productive knowledge and skills. They are actively involved in family issues and have the authority in decision-making.

Confucianism-based family values reinforce the extended family structure and guide the pattern of intergenerational interaction. Confucian value emphasizes the higher social status of older generations and filial responsibility of children. It is the obligation of children, usually eldest son, to live with parents and provide support and care to them in their old age. In addition, filial piety emphasizes children's respect for and obedience to older parents' opinions and wishes. As Chow (2001) has pointed out, filial piety is not merely in the form of co-residence and providing instrumental and financial support to older parents. More importantly, it is about respecting and obeying parents.

The culturally ideal later life of older people in China involves living with children and being respected and supported by younger family members, which is considered as 'Tian lun zhi le' (The happiest and most satisfied lifestyle of elderly). Those who achieve such cultural ideals tend to be considered as living a successful later life. However, failing to meet these social-cultural norms - living separately or lack of support from adult children - may lead to mental stress among Chinese elderly (Chen and Short 2008; Li et al.

2005; Silverstein, Cong and Li 2006). In addition, Confucian-based family norms result in a cultural discouragement of active social engagement outside the home in later life. For example, continued working in later life is not culturally expected as it tends to be interpreted as an indicator of children's failing to provide filial support.

The low level of social mobility in agricultural society allows the proximity of family members. Older people normally spend their later life in familiar villages and communities where they have lived for a life-time and keep frequent contact with children and siblings who live together or close by. Therefore, older people in traditional China are mainly involved in family-centered social networks and activities.

### **3.2 Demographic, social and political settings and changes and their implications for the features of old-age social integration**

Rapid demographic, economic and social changes over the past several decades, however, have brought substantial influence on traditional family structure, living arrangements, and the nature of intergenerational relationships, which in turn affects the family-centered social networks and activity engagement among older people in China.

First of all, the sharp decline of fertility rate as well as the achievement in mortality and life expectancy over the past several decades have direct influence on family structure and availability of old-age family support. At the

same time, rapid but uneven economic development and increasing income inequality have led to mass migration, especially rural-to-urban migration, which have resulted in increasingly geographic dispersion of working-age children from their older parents. This means that older parents who would normally live with adult children are increasingly likely to live alone by themselves or with grandchildren. In addition, due to the enhancement of gender equality and the spread of education, the current cohorts of young women have their social status greatly improved and are more likely to participate in labor market compared to previous generations. This change has great implications for the preferred and actual living arrangements as well as the availability of family caregivers, the primary role of daughters or daughters-in-law in patriarchal family in traditional China. Indeed, China has witnessed decline in the prevalence of co-residence living arrangement and transformation in the pattern of intergenerational interaction and support exchange (Chen 2005; Lively and Ren 1992; Logan and Bian 1999, 2003; Logan, Bian and Bian 1998). The rapidly changing social settings and household context present unfamiliar later-life experiences to the current Chinese elderly and are likely to directly and indirectly affect their actual and preferred social networks and activities.

In the remainder of this chapter, I will first describe the major demographic changes in the past several decades and their impacts for family structure and living arrangements. Second, I will also present the social, cultural and economic situation and changes in contemporary China with a focus

on their implications for the characteristics of family and extended social relationships as well as social and productive activities that the current Chinese elderly are involved in. Moreover, the gender and urban-rural differences in China will be described to justify the importance of treating and examining the Chinese older population as a heterogeneous group. The final section presents a brief background of Beijing municipality where the longitudinal data used in the current study were collected.

### **3.2.1 Implications of demographic changes for family structure and living arrangements**

In the past several decades, Chinese population has been undergoing some significant demographic changes. Specifically, China has achieved remarkable decline in mortality and improvement in life expectancy. At the same time, the total fertility rate (TFR) has experienced a great fluctuation by reaching as high as around six in the 1950s and 1960s and then sharply declining to below replacement level in the late 1970s as a result of different forceful birth control policies. These demographic changes have led to rapid population aging in China and the aging process is projected to accelerate in coming decades mainly as a result of the sharp fertility decline since 1970s.

Mortality rate has declined remarkably across different age groups of both sexes in China over the past half century, except for the period of Great Leap Forward famine from 1959 to 1961. From the 1950s to 1970s, mortality rate dropped from 14 deaths per 1,000 people to below 8. The sharp decline

of mortality during this period was mainly due to the improvement of hygiene and health service provision as well as the enhancement in living standards. Since 1970s, mortality further declined but with a slower pace <sup>1</sup> . By the late 1990s, the mortality rate had reached 7 deaths per 1,000 people or lower. During this period, decline in old-age mortality was the main contributor of the mortality decline because chronic and degenerative diseases, rather than infectious diseases, were the major causes of death (Hsiao and Liu, 1996).

As a result of decline in mortality rate across all age groups, life expectancy has been increasing gradually. According to Basic Statistics on National Population Census in 1953, 1964, 1982, 1990 and 2000 provided by National Bureau Of Statistics of the Peoples Republic Of China (BSNPC), life expectancy has increased from around 50 years in 1950s to 68 in 1982, 69 in 1990, and 71 in 2000. UNICEF has provided figures that life expectancy at birth has reached 73 in 2008 (unicef.org).

Over the past half century, fertility rate has experienced dramatic fluctuation due to the strict implementation of various family planning programs with different orientations. During the early decades after the founding of PRC, the total fertility rate (TFR) has reached around five or six in the 1950s and 1960s as a result a pro-natalist policy as well as the remarkable decline in the infant mortality due to the improvement in living condition and

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<sup>1</sup>In general the information of mortality in China is limited. The main sources of nationwide information of mortality include: 1973-1975 Cancer Epidemiology Survey, the census of 1982, 1990 and 2000.



health services provision. However, it has experienced sharp decline since the launching of only-child birth control policy in the late 1970s and have fallen to below replacement level (China Population Information and Research Center ([www.cpirc.org.cn](http://www.cpirc.org.cn)); U.S. Census Bureau ([www.census.gov/ipc/www/idbnew.html](http://www.census.gov/ipc/www/idbnew.html))).

The marked and rapid declines in fertility and mortality have resulted in a rapid population aging in China. The proportion of people aged 65 and above has reached 7 percent of the total population in 1999 and is projected to approach 20 percent of the population in 2025 and over 30 percent by 2050 (United Nations Population Division 2008).

It is worth noting that the aging process in China will become even faster in the coming few decades when the baby-boomer cohort enter later life. The high level of fertility rate and the low infant mortality rate during the 1950s and 1960s have resulted in a baby boom cohort in China. Moreover, the one-child policy was launched in the late 1970s when this baby boom cohort were entering their childbearing ages. Consequently, when the baby boomers, parents of the first cohorts of the only child, are reaching 60 years old in the 2010s and 2020s, the proportion of old people in the total population will increase dramatically and accelerate the population aging process in China.

The dramatic demographic changes and rapid population aging have remarkable influence on the kinship network of older people in China. As Bengtson and his colleagues (1990) have described, multi-generational families are changing from a “pyramid structure” characterized by many children and grandchildren supporting few grandparents to a “beanpole structure” charac-

terized by fewer children and grandchildren but relatively more living grandparents. Such transformation in family structure is accelerated in China due to the sharp change in the fertility policy orientation from pro-natalist policies to birth control policies in the late 1970s. The 4-2-1 family structure, an adult couple with their only child and four elderly parents, is emerging as Chinese baby boom cohorts born in 1950s and 1960s are entering later life and their only children are entering marriage age and having their own only child.

At the same time, increasing life expectancy may lead to a decrease in widowhood in old age and allow older generations spend more years with children and grandchildren. There is evidence in China that the role of older people as grandparents is becoming important (Chen, Short and Entwisle 2000; Silverstein, Cong and Li 2006). The future cohorts of Chinese elderly may have fewer but long-lasting kinship relations.

Also, these changes in family structure and kinship structure will inevitably change the traditional co-residential living arrangements. Indeed, China has witnessed a decline in the prevalence of co-residence living arrangement and an increase in the proportion of non-traditional household arrangements including living with a spouse only, living alone, and living with grandchildren in generation-skipped household (Bian, Logan and Bian 1998; Goldstein, Ku and Ikels 1990; Lavelly and Ren 1992; Wu 1991).

### **3.2.2 Implications of economic development, urbanization, and migration for family arrangements, intergenerational relationship and family-centered later life**

Along with the fundamental demographic changes, the remarkable social and economic changes in contemporary China also have implications for the nature of social integration of older people. The rapid economic development, urbanization and associated social changes have been influencing older people's social position, their perceived and actual living arrangement, as well as their relationships and interaction with younger generations.

Similar to what has occurred in many other societies, the status of older people has declined during modernization in China. In traditional China dominated by Confucian value system, older people are respected in family and society. When people get old, their position as the head of household remains, and family relationships are extended when sons and daughters get married and have their own children. They are also actively involved in family issues and decision-making process. During the process of modernization and industrialization, however, the role of family as a basic economic unit is collapsing. Younger people are gaining economic independence as their labor, education, and skills are required in industrial sectors. Moreover, during the Mao era, the dominant Confucian patriarchal family system which emphasizes older men's supremacy in family has been criticized for its conflict with the ideological principle of the socialist state. The subordinate position of younger generation and women in family has been rejected. Consequently, the practice of filial piety and women's caregiving responsibility are deemphasized, even

though not being abandoned.

Being entitled to equal opportunities in education and employment, women's social and economic status has been greatly improved since the founding of socialist state. In urban China, the labor force participation rate among the working-age women is high (Zhu and Guang 1991). Even though rural China has lagged far behind in the effort of enhancing women's status, the development of rural industry since economic reform has greatly improved the economic situation of younger women there (Ma et al. 1994). The establishment of industrial sectors in many rural areas in the 1990s has provided a lot of job opportunities for rural younger women, even though these jobs are mainly low paid and labor intensive.

The changes in the relative social position of younger and older generations as well as the enhancement of women's social and economic status in modern China have presented challenges to the performance of filial piety in its traditional form. Recent studies in the main cities in China have shown that some virtues of filial piety, such as absolute obeying parents' wishes and the supremacy of men in patriarchal family system, are becoming less and less popular (Kwan, Cheung and Ng 2003). Younger people in contemporary China are more likely to emphasize authority, independence and privacy even although they do not disagree with many other virtues of filial piety such as showing respect and providing emotional and instrumental support to older parents. In addition, the increasing participation in labor force among women who are the primary source of family caregivers in traditional extended family

indicates a possible decline of the availability of family care and support.

Facing these changes in both willingness as well as capacity of performing traditional family support, Chinese elderly's attitudes and expectations on the forms of filial piety and the pattern of intergenerational interaction have been adjusting as well. For example, a few recent studies found that a sizable proportion of Chinese elderly, especially those urban elderly, prefer to live separately from their adult children (Logan and Bian 1999; Zhang 2004).

Higher level of social mobility and mass rural-urban migration have been also challenging the extended family structure and the family-centered social integration of older people in China. As a result of rising income inequality and the release of household registration system since the market-oriented economic reform, there is a mass migration of younger people from poorly developed rural areas to urban cities as well as from smaller to larger cities in recent years. According to the report of State Statistical Bureau, the rural-to-urban migrant population has reached around 80 to 100 million people and is projected to grow faster in the coming years. As more and more younger people leave hometown to pursue job opportunities and higher wages in urban areas or bigger cities, traditional extended living arrangement and family support have been interrupted. The remarkable migration of younger people from rural to urban China has led to an increasing proportion of rural elderly living alone or living with grandchildren in generation-skipped households (Silverstein, Cong and Li 2006). Although migrant children send remittances back to support their elderly parents left at hometown, the geographic dispersion

between adult children and elderly parents may result in a lack of emotional support and personal care. It is the concerns of many researchers and ordinary people that these elderly parents left behind are more likely to experience social isolation.

In addition, it is becoming a common practice in contemporary China for working-age migrants to leave their kids behind with their elderly parents (Zhang 2004). More and more Chinese elderly found themselves occupied with taking care of grandchildren (Chen, Short and Entwisle 2000). Extended family culture emphasizing intergenerational support and collective family goals makes this family arrangement normative among older people. However, taking this grandparent role has great implications for the social relationships, life styles and activities that older people are involved in (Crosnoe and Elder 2002).

In sum, fewer children, increasingly geographical dispersion among family members, and changing nature of intergenerational relationships have been presenting challenges to the traditional co-residential living arrangements and intergenerational interaction, which in turn remarkably affects the family-centered later life style of older people in contemporary China.

It has been noticed that Chinese families have been creating adaptive but practical strategies to meet the needs and benefits of family members in this changing social and demographic setting. For example, it is increasingly prevalent in rural and urban China that elderly parents and their adult children live close but under separate roofs, referred to as “quasi-coresidence”, or

as some researchers have described, “network family” (Chen 2005). Married children and their elderly parents choose to live separately but close to each other in order to facilitate support exchanges and retain close bonds while remain independence and privacy (Chen and Silverstein 2000; Unger 1993). There is evidence that despite living in separate households, elderly parents and their children maintain frequent interaction and financial and instrumental support exchanges (Bian, Logan and Bian 1998; Unger 1993).

Moreover, daughters are playing an increasingly important role in supporting older parents in contemporary China (Whyte and Xu 2003). A study conducted in urban China found that older people having no son received as much help from daughters as those having sons did (Bian, Logan and Bian 1998). In urban China, the emergence of another kind of non-traditional living arrangement - young couples living with wife’s parents - can be understood as a coping strategy when younger generation are not able to buy a house or live with husband’s parents (Davis 2000). These changes and adaptations in family arrangements inevitably affect the family-centered social networks and activities that Chinese elderly are normally involved in.

### **3.2.3 Implications of underdeveloped formal support system**

Besides the trend of family nuclearization during the rapid economic development and urbanization, the level of development of formal support system is another strong force influencing and restricting people’s options of choosing the form of family structure and life style in old age.

During the Mao era after the establishment of the People's Republic of China, the socialist state emphasized the assurance of social welfare of citizens. Most urban employees and retirees of state-owned companies were protected by an 'iron rice bowl' working and pension system in this era. Their immediate kin and themselves were also covered by the extensive health care system. In rural areas, most residents were covered by the community-financed Cooperative Medical Systems although the benefit was much more modest compared to urban residents (Wu 2003). Despite the enhancement of extensive social welfare during this period, the importance of family as the primary source of old-age support, especially instrumental support and long-term care for frail elders, has never been deemphasized.

Since the late 1970s when the market-oriented economic reform started, however, a large amount of urban workers had their "iron rice bowls" broken (lay-off or lost their jobs) when many state-owned enterprises which were formerly protected and subsidized by government during planned economy era lost their market and went bankrupt. The medical care programs in urban and rural areas were also eroded during this period (Tang and Wu 2000). Till the early 2000s, the proportion of people covered by various health insurance schemes remarkably declined to less than one third (Wu 2003; Tang and Wu 2000). As a result, there is a trend of moving away from extensive state protection to privatization of old-age support toward individual and family responsibility (Tang and Wu 2000). Family's primary responsibility of taking care of older family members has been reemphasized.



However, family support is becoming increasingly uncertain under the influence of demographic, social and economic changes. The mass lay-off and unemployment has resulted in many Chinese families struggling in poverty. At the same time, the erosion of health insurance system and the increasing cost of health care in market economy have led to an increasing proportion of people who did not receive adequate medical treatment. According to the National Health Services Survey in 2003, around one third of urban residents and half of rural residence who had illness or diseases did not seek treatment because of financial difficulty (Zhao 2006).

It has been gradually realized the potential negative consequences of exclusively relying on family old-age support on the well-being of older people as well as families. The Chinese government has been seeking ways to deal with the new welfare demands of aging populations with lower cost. Generally, limited formal support is provided by government as a supplement for family old-age support. However, debate over the principles in the design of old-age formal support programs in China continues. Consequently, it has often been found that the aging policies and family programs in China are implemented with poor management and lacking of consistency. For example, in recent years, urban China has witnessed the development of community-based services which aim to relieve family's burden to some extent (Di and Rosenbaum 1994; Leung 2001). In rural China, the Chinese government also started a pilot pension program aiming to supplement family old-age support. However, in general, these programs and services are underdeveloped, poorly organized,

and lack government financial support (Leung 2001). This phenomenon may be a result of the persistence of traditional social norms among policy makers as well as ordinary people. For them, family support is valued, whereas public institutionalized care should be discouraged and reserved as the last resort for the family and the needy elders.

In sum, due to the underdevelopment of formal support in China, family remains to be the main source of old-age support despite the impacts of the demographic and socioeconomic changes on family structure and inter-generational relationships. The network family form and generation-skipped household emerged in recent years are practical strategies of Chinese families to deal with the changed social settings. Given the importance of household context to the level and feature of social integration for Chinese elderly, these changes in family structure and kinship relationships indicate that the nature of social networks and social activities of older people in China may be undergoing great transformations.

### **3.3 Heterogeneous older population in China**

#### **3.3.1 Gender differences**

The older people in China is not a homogeneous group. Despite the socioeconomic development in the recent decades, urban-rural differences and gender differences have been persistent.

Under the patriarchal family system in traditional China, men hold authority over women and organize extended family structure around men's

kinship, whereas women are subordinate and have no authority on family resources and property (Mason 1992). After getting married, sons, usually the eldest son, remain living with their parents. Daughters-in-law move into husband's family and are responsible to take care of parents-in-law. Since the establishment of the socialist state, the Chinese government has been promoting gender equality. Women's Union was established to help protect women's rights. Women's social status has been greatly enhanced. Women, mainly those in urban areas, are gaining equal access to education and labor market.

Despite these improvements, most women in the current cohorts of Chinese elderly, born and grew up in traditional society, remain disadvantaged in social and economic status. In fact, compared with their male counterparts, the current cohorts of old women, especially those older-old and oldest-old, have much lower level of education, economic status, and benefit from pension or other social security programs. In addition, being socialized as family caregivers, women in traditional China spend most of their life time and effort in taking care of family members (Logan and Spitze 1996). It has been found that older Chinese women are much more likely to be involved in helping family members and kin in cooking and babysitting (Liu 1991). Therefore, they tend to adhere to the traditional extended family arrangement and have a high expectation on filial support from children in their later life. At the same time, they would like to contribute to the children's family by taking care of grandchildren, cleaning house and preparing meals as these activities enhance their sense of purposefulness and self-worth in family.

### 3.3.2 Urban-rural differences

The remarkable urban-rural difference is another unique societal feature of China. In the early years after the founding of PRC, the Chinese government implemented two different kinds of policy systems in urban and rural areas respectively and restricted internal migration through household registration program, resulting in remarkable urban-rural disparities which involve almost all areas of life including education attainment, mode of production, income level, as well as social and welfare benefits (Whyte 2010).

In rural China, nearly 90 per cent of older adults are illiterate, much higher than the average national level of around 65 per cent (Statistics in U.S. Bureau of Census 1999). Despite the implementation of compulsory primary education all over the nation since the founding of PRC, there are remarkable urban-rural differences remaining in access to higher education. Compared to their rural counterparts, urban residents normally work in state-owned factories or government units in which they earn fixed salaries and are covered under pension programs. Moreover, a much higher proportion of urban residents are covered by health insurance programs. In addition, they have access to better treatment and health care facilities (Gu et al. 1995). By contrast, rural people mainly work on farm till when they are too old to handle the farm working. Their income is mainly from agricultural products, much lower and unstable compared to their urban counterparts. Different from urban elders, rural elders have no pension income. The medical insurance program in rural China is based on a community-financed cooperative system. The ben-

efits provided to rural residents are much more moderate compared to those provided to urban residents (Sidel 1993; Wu 2003). Therefore, rural elders in China mainly depend on their children for financial support (Gu and Liang 1994; Shi 1994). As some researchers have pointed out, the Chinese government's policy orientation involves a discrimination against rural residents and has resulting in a reinforcement and even a widening of disadvantages in social and economic status as well as welfare benefits among rural residents (Shi 1993; Whyte 2010).

In addition, rural elderly tend to adhere to traditional family norms such as living with son, being supported by children in old age, while urban elderly are found to be less likely to hold a son-preference attitude ((Lee et al. 1994; Zhang 2004). It is more commonly in urban areas that daughters and sons share similar filial responsibilities in supporting older parents financially and instrumentally (Bian, Logan and Bian 1998).

During market-oriented economic reform era, to narrow the rising income inequality between urban and rural areas and release the pressure of mass rural-urban migration, the Chinese government implemented two new policies: establishing the household responsibility agriculture system and developing township and village industrial sectors. These policies improved the economy and income level in rural areas to some extent. However, the employment provided by newly-developed rural industries is less formal without standard formal pension and health insurance program. Moreover, during the era, health care has been increasingly becoming privatized. The urban-rural

gap in medical care benefits in terms of quality of medical services as well as access to medical treatment has also become even greater (Li and Martin 1999; Shi 1993). In urban areas, the current employees and retirees of many state-owned enterprises have experienced the reduction in health care benefit as the enterprises collapsed during marketization. In rural areas, the collective health care systems had collapsed more remarkably. Most rural residents have to pay the full cost of health care by themselves. Although the quality of medical care and treatment facilities have been improved during the market-oriented reform of hospitals and medical care, such improvement has been found to disproportionately occur in urban areas, whereas in rural areas there is no equivalent improvement due to the inadequacy of government investment. Moreover, it has been noticed that in recent years, the cost of health care has risen much faster than the improvement of income level in China, particularly in rural China. In a field study conducted among 100 Chinese elders in four rural villages in 1999, researchers found that around two thirds of the respondents reported that they had their needs for health care unmet due to the high health care cost (Li and Tracy 1999).

In sum, as a result of different social and economic conditions as well as the distinct social and welfare policies, older people in urban and rural China may have different experiences of aging.

### **3.3.3 Data setting: the Beijing municipality**

The market-oriented economic reform has intensified the regional variety. As cities, towns, and villages located at coastal areas and suburban areas are becoming prosperous, many interior areas, especially rural interior areas, are lagging behind in economic development and even struggle with poverty (Khan and Riskin 1998).

Beijing, the capital of the People's Republic of China, is located in the Northern East region of China and recognized as the political and cultural center of Northern China. As an independent municipality, Beijing, together with three other metropolitan cities (Shanghai, Tianjin and Chongqing), is entitled with the same administrative level as 31 provinces are and directly governed by the Chinese central government. Beijing is one of the most developed areas in China. The level of industrialization and urbanization of Beijing is higher than the average level of mainland China. According to the National Bureau of Statistics of China (2009), the gross regional product (GRP) per capita in Beijing is ranked the second out of a list of 31 provinces and other metropolitan cities provincial-level units in mainland China (NBS 2009). According to statistical yearbooks, the gross domestic product (GDP) per capita in Beijing has reached around US dollar 10,000 in 2009.

The urbanization process in Beijing is much faster compared with other areas in China. In the past three decades, Beijing has witnessed its urban areas rapidly extended to the surrounding rural areas where the farmlands have been transformed into new urban and suburban districts. According

to the National Population and Family Planning Commission of China, the population in Beijing has exceeded 22 million, and more than one third of them are temporary residents migrating from rural areas and other cities (NPFPC 2010).

There is remarkable urban-rural regional inequality in Beijing Municipality. Being a huge city and the center of Northern China, Beijing is the center of many large state-owned companies and factories as well as foreign investments. However, these industrial and financial units tend to concentrate in urban areas rather than in remote and mountainous rural areas in outlying districts.

Currently, Beijing municipality is divided into fourteen urban and sub-urban districts and two rural counties. The survey respondents of the current study are those older adults living in three districts of Beijing municipality. These three districts are considered to be representative of the average sociodemographic characteristics of people in urban, rural and mountain rural areas of Beijing municipality in the early 1990s. Xuanwu is an urban district, located inside the second ring road. Daxing, located at suburban areas, is one of the outlying districts (satellite towns). Huai Rou is a mountainous rural district which is further away from the urban area than Da Xing.



## Chapter 4

# Data, measures of social integration, and analytic method

### 4.1 Data

Data used in this study are from the Beijing Multidimensional Longitudinal Study on Aging (BMLSA) project sponsored by the United Nations Population Fund (UNFPA) and conducted by the Capital University of Medical Sciences. The aim of this project is to examine the sociocultural, economic, functional, and environmental consequences of population aging. The target population is older adults aged 55 or above in Beijing municipality. The first survey was conducted in 1992 and the original sample was comprised of 3,257 persons (Beijing 1995). To date, six waves of interviews have been conducted in 1992, 1994, 1997, 2000, 2004 and 2009<sup>1</sup>.

In each wave, the information on their sociodemographic characteristics, social networks (the presence of social ties, frequency of contact, living arrangements, and social support), participation in social and leisure activities, health-related behaviors, and physical and emotional health status was

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<sup>1</sup>In the latest wave conducted in the fall of 2009, the sample was expanded to include a new cohort of younger-old individuals. However, the information on the design of the 2009 wave are not available yet. The data of this wave are not ready for use.

collected. Before conducting the baseline survey in 1992, a pilot study was carried out among a group of subjects to test the reliability of the questionnaire as well as the practicality of the survey administration (Beijing 1995; Zhe 1999).

In addition, twelve year mortality information of this sample from 1992 to 2004 were also recorded. Therefore, BMLSA survey provides an opportunity to examine the social and health characteristics of older people in China. Moreover, the longitudinal panel data allow for a better examination of the impact of social factors on health and mortality.

#### **4.1.1 Sampling and interview process**

Based on a list of 10 per cent sample of Beijing's total population obtained from the fourth national census conducted in 1990, potential participants were identified through multistage random sampling procedure that targeted older adults living in three districts of Beijing municipality: Xuan Wu, Da Xing, Huai Rou. Figure 4.1 displays a map of Beijing municipality with these three districts highlighted. Xuan Wu is an urban district, Da Xing is a rural district and Huai Rou is a mountain rural district which is further away from the urban area than Da Xing.

According to the BMLSA survey reports (Beijing 1995; Liu et al. 1994), the sampling procedure is designed to yield a sample that was representative of the non-institutionalized elderly population of Beijing municipality. Unfortunately, the report does not elaborate the criteria and consideration of choosing

these three districts. According to some researchers who participated in previous wave of interview and remain involved in this project, the three areas were selected because they were considered to be representative of the average sociodemographic characteristics of people in urban, rural and mountain rural areas of Beijing municipality respectively.

Figure 4.1: Three districts of Beijing municipality



Specifically, streets in urban and towns in rural areas were randomly selected from these three areas first. Then, neighborhood committees in ur-

ban areas and villages in rural areas were randomly selected, from which 3343 potential respondents were recruited. Older-old and male respondents were oversampled to get enough cases for analysis. The interviews (as well as physical health examinations) were conducted face-to-face by trained interviewers in respondents' homes.

#### **4.1.2 Sample size and mortality information**

Out of 3343 potential respondents recruited at baseline in 1992, 3257 completed the questionnaire. They were followed up in 1994, 1997, 2000 and 2004. In each follow-up survey, death information of this sample were obtained from family members or relatives, or ascertained by death records in neighborhood committees and village committees. Death records could also be verified with the death record office of local hospitals (Beijing 1995). The date (year and month) of death was also recorded. As shown in Table 4.1, 1458 deaths out of 3257 were identified from 1992 to 2004. 359 died between 1992 and 1994. 401 died between 1994 and 1997, 358 died between 1997 and 2000, and 301 died during 2000 to 2004. Those lost to follow-up were assumed to be alive and traced in follow-up surveys if their survival status could not be identified through the several ways mentioned above.

The response rate at baseline was 97.4 per cent ( $3257/3343=0.974$ ). The response rate in the follow-up waves was calculated as the percentage of the respondents who completed follow-up surveys among all of the eligible respondents, that is, those who participated in the baseline wave and survived

till that follow-up wave.

Table 4.1: Sample size in each wave of BMLSA survey

Year	Number been traced	Valid Sample	Number of Deaths	Response rate (%)
1992	3343	3257	0	97.4
1994	2984	2703	359	93.3
1997	2583	2043	401	81.8
2000	2064	1705	358	79.7
2004	1030	1000	301	54.4

- By 1994, as 359 of the baseline respondents were identified to have died, there were 2898 surviving subjects who are assumed to be alive and to be traced. 2703 of them responded with a complete questionnaire. The response rate in 1994 was 93.3 per cent ( $2703/2898=0.933$ ).
- By 1997 there were 760 deaths being identified. Thus, 2497 ( $3257-760$ ) were traced and 2043 out of them completed the third-wave questionnaire. The response rate in 1997 was 81.8 per cent ( $2043/2497=0.818$ ).
- By 2000 there were 1118 deaths, 2139 ( $3257-1118$ ) were traced and 1705 responded with a completed the questionnaire. The response rate in 2000 was 79.7 per cent ( $1705/2139=0.797$ ).
- By 2004 there were 1419 deaths, 1838 ( $3257-1419$ ) were traced and 1000 respondents completed survey questions. The response rate in 2004 was 54.4 per cent ( $1000/1838$ ).

Because the response rate in 2004 was as low as 54 per cent, much lower than those in the previous waves, the data of the 2004 wave was not included in the analyses of the current study.

#### **4.1.3 Who are non-respondents?**

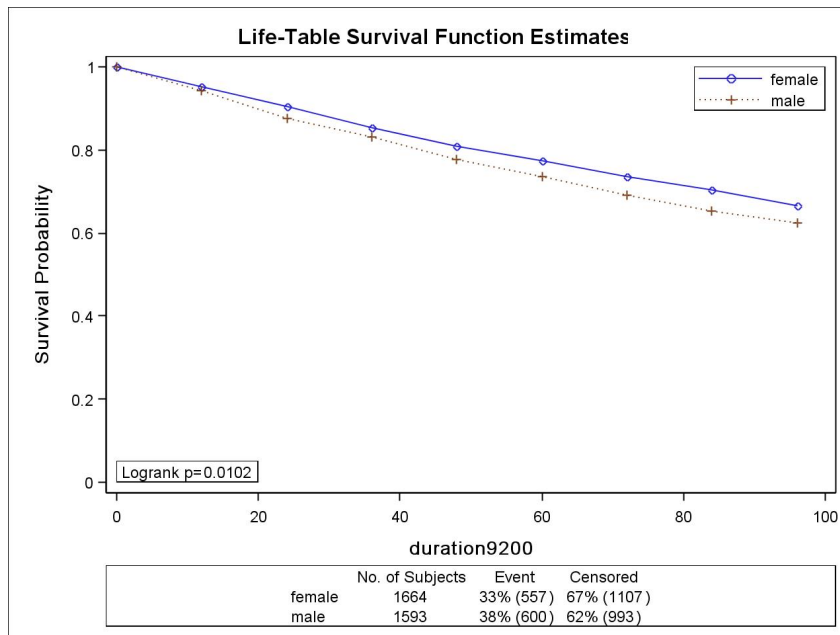
To identify who were more likely to be the lost to follow-up, I conducted multivariate logistic regression to examine the response status at the follow-up as a function of respondents' characteristics in the previous wave. It was found that compared with those who responded in 1994, the lost to follow-up in 1994 were significantly more likely to live in urban areas, have higher education level and poorer health condition at baseline (1992). But no significant differences were found in gender, age, SES, social relationships, social support, and health-related behaviors. Indeed, two thirds of the dropped out were from urban areas. One main reason could be that many urban respondents changed their residence address during city construction in Beijing in 1990s and thus made them difficult to track. It was found that the predictors of the lost to follow-up at different waves were quite similar. Compared with those who remained in the study, the non-respondents were not significantly different in the characteristics of social relationships, social support, social and leisure activity engagement, and health conditions.

## 4.2 Characteristics of the sample

### 4.2.1 Mortality differentials: survival curves by gender, age, and urban-rural residence

Year and month of all-cause mortality (survival time) of the sample members during the follow-up period of BMLSA project from 1992-2004 were recorded except for those who were lost to follow up. Survival time was coded as the number of months between the time of baseline interview and the time of death occurrence or the last follow-up interview a respondent participated in. Figure 4.2, 4.3 and 4.4 present the Kaplan-Meier survival curves from 1992 to 2000 by gender, age group, and urban-rural residence.

Figure 4.2: Kaplan-Meier survival curves by gender



It is worth noting that there is almost no gender difference in their

8-year survival curves in this sample (Figure 4.2). This is different from what was consistently found among Western older populations in which men had a higher mortality rate and shorter life expectancy than women generally. The absence of significant advantage in survival status among older Chinese women in this sample may reflect the health consequences of Chinese women's cumulative disadvantages in social status, economic conditions and access to education and labor market. More importantly, such a unique epidemiological characteristic among older population in China indicates that the association between social determinants and mortality found in Western older populations may not necessarily be applicable to the Chinese elderly.

Figure 4.3: Kaplan-Meier survival curves by age group

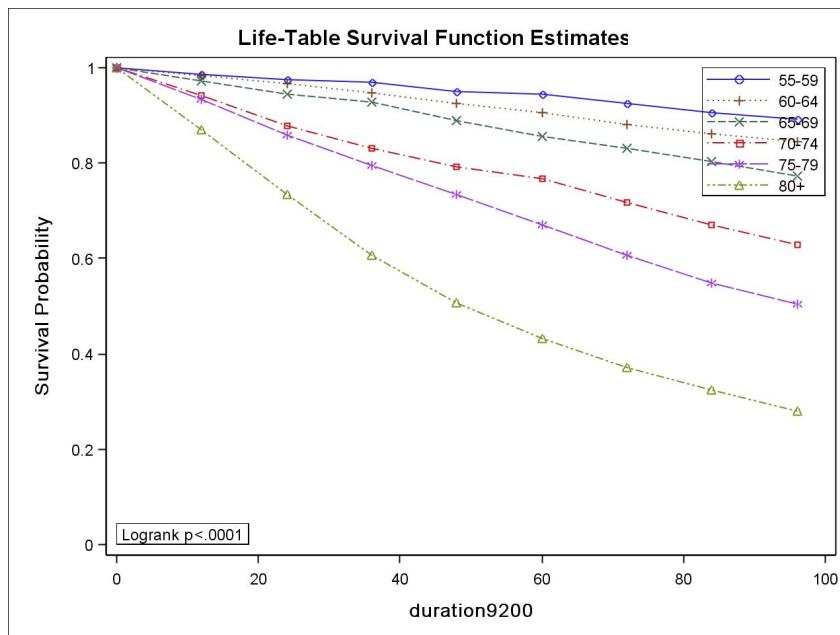


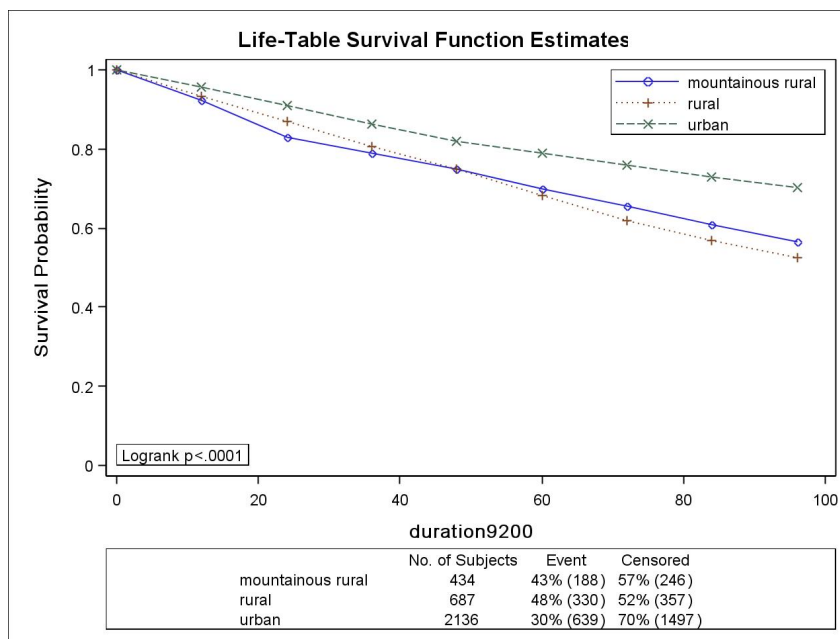
Figure 4.3 presents age difference in mortality. Unsurprisingly, people



in younger age group had higher survival curves. Till 2000, almost 90 per cent of those aged 55-59 and 80 per cent of those aged 65-69 were alive, while only around 50 per cent of those aged 75-79 were still alive. For those aged 80 years old or above, only around 3 out of 10 survived after eight years since 1992. The survival curves declined more sharply among those aged 70 years older or above, indicating an accelerated increase in mortality rate as age increases.

As Figure 4.4 shows, urban elders had better survival status, while there is no significant mortality difference between two rural areas. Till 2000, around 70 per cent of urban elders remained alive, while less than 60 per cent of those living in two rural areas were alive.

Figure 4.4: Kaplan-Meier survival curves by urban-rural residence



#### **4.2.2 Sociodemographic and health characteristics by gender, age, and urban-rural residence**

Table 4.2 and 4.3 present a brief description of demographic, social, economic, and health status characteristics of 3257 respondents aged 55 or above in Beijing Municipality in 1992. The distributions by age, gender and urban-rural groups were examined.

As shown in Table 4.2, the age structure of this sample was relatively younger compared to older population in developed countries. Over 74 percent of the respondents were aged between 55 and 69, 20 per cent were in their 70s, and only 6 per cent were in their 80s. Notably, different from what was often found in many Western older populations, women only accounted for half of the respondents in this sample after weighting. It is consistent with the similar survival curves between men and women observed in the previous subsection. The urbanization level of Beijing is much higher than the national average level. Half of the sample lived in rural areas (after weighting). Thirty three percent resided in Da Xing, the suburban areas. And 18 per cent resided in Huai Rou, the mountainous rural area.

The education level of this sample of Chinese elderly was very low. 50 per cent of the respondents were illiterate. The proportion of the illiterate was disproportionately high among the older old, women, and rural elderly. More than two thirds of women were illiterate compared to one third of men. Among rural and mountainous rural elders, the proportion of the illiterate reached 77 per cent and 66 per cent respectively, while among urban elders,

Table 4.2: Percentage distribution of sociodemographic and health characteristics of the elderly in Beijing, China, 1992 (weighted)

	<b>Age</b>		<b>Gender</b>		<b>Residential area</b>			<b>Total</b>
	55-69 (1595)	70+ (1662)	Male (1593)	Female (1664)	Urban (2136)	Rural (687)	Mountain rural (434)	
<b>Age (Mean,SD)</b>	–	–	64.8 (7.5)	65.2 (7.9)	64.7 (6.6)	65.2 (9.6)	65.6 (9.2)	65.0 (7.7)
55-59	–	–	32.8	30.9	32.3	31.3	31.4	31.8
60-69	–	–	43.1	42.6	25.1	42.7	40.6	42.9
70-79	–	–	19.6	20.0	18.7	20.1	22.2	19.8
80+	–	–	4.5	6.5	11.7	5.9	5.8	5.5
<b>Female</b>	49.6	52.7	–	–	50.9	50.7	48.3	50.4
<b>Educational level</b>								
No education	43.8	68.5	30.4	69.3	26.7	76.8	66.3	50.0
Primary school	32.0	20.4	40.8	17.5	34.1	20.0	31.5	29.0
> Primary school	24.3	11.1	28.8	13.2	39.2	3.2	2.2	20.9
<b>Residential area</b>								
Urban	50.6	46.9	49.2	50.2	–	–	–	49.7
Rural	32.3	33.4	32.3	32.7	–	–	–	32.5
Mountainous rural	17.1	19.7	18.5	17.0	–	–	–	17.8
<b>Household electrical appliances (Mean, SD)</b>	2.8 (1.7)	2.4 (1.0)	2.7 (1.4)	2.7 (1.4)	3.7 (0.6)	1.8 (1.4)	1.4 (1.3)	2.7 (1.4)
0	6.6	14.7	9.4	7.9	0.7	13.6	21.9	8.7
1	15.7	16.5	15.5	16.3	1.9	25.4	38.0	15.9
2	16.7	19.2	16.6	18.0	4.7	34.1	22.0	17.3
3	11.4	17.5	12.7	13.3	9.2	20.2	10.3	13.0
4	49.6	32.1	45.8	44.5	83.6	6.8	7.9	45.1
<b>Income is enough</b>	52.1	49.9	53.1	50.0	64.2	43.0	31.7	51.2
<b>Financially dependent on</b>								
Self	66.4	35.7	77.0	40.6	85.8	27.8	39.2	58.7
Spouse	10.3	7.2	0.5	18.4	6.0	10.4	17.5	9.5
Children	22.8	54.1	21.5	39.8	7.5	60.8	40.6	30.7
Others	0.5	3.0	1.0	1.2	0.7	1.0	2.7	1.1
<b>Need financial help</b>	33.0	62.2	28.5	82.4	15.5	65.9	63.2	40.4

Table 4.3: Percentage distribution of sociodemographic and health characteristics of the elderly in Beijing, China, 1992 (weighted) *continued*

	Age		Gender		Residential area			Total
	55-69	70+	Male	Female	Urban	Rural	Mountain rural	
<b>Stressful life events</b>	30.1	21.9	27.2	28.8	26.2	28.9	38.7	28.0
<b>Health-related risk behaviors</b>								
Smoking	34.4	27.3	50.8	14.7	28.7	33.1	42.6	32.6
Former smoker	12.2	17.9	18.8	8.5	14.8	15.1	7.7	13.6
Drinking	25.6	21.3	42.4	7.0	17.3	29.7	35.3	24.5
Former drinker	6.4	8.4	12.1	2.1	6.3	7.0	9.3	7.0
<b>Self-rated health</b>								
Very good/good	48.9	46.7	55.0	41.9	46.7	57.7	36.1	48.4
Fair	31.0	27.5	27.6	32.7	34.5	23.5	30.1	30.1
Poor/very poor	19.6	20.7	15.4	24.2	17.5	17.3	31.2	19.8
DK/no answer	0.5	5.0	2.0	1.3	1.4	1.5	2.7	1.6
<b>Functional limitation</b>								
No	86.4	51.6	83.4	71.9	85.3	67.3	75.0	77.6
At least one IADL limitation, no ADL limitation	11.0	36.6	12.4	22.4	10.6	26.7	19.8	17.5
At least one ADL limitation	2.6	11.8	4.2	5.7	4.1	6.0	5.2	4.9
<b>Chronic diseases</b>								
0	45.5	52.4	45.8	48.6	34.7	62.1	54.9	47.2
1	29.5	26.9	30.5	27.2	30.7	24.6	31.6	28.8
$\geq 2$	25.6	20.7	23.7	24.2	34.6	13.4	13.5	24.0

this proportion was as low as 27 per cent.

Information on the economic condition of older people in this sample were collected by the questions regarding their annual income, main source of income, perceived income adequacy, and the number of electrical appliances in their households. The reported amount of annual income was not presented here because a sizable proportion of respondents did not answer this question. As shown in Table 4.2, Chinese elderly generally had low level of economic independence. Around 40 per cent of the respondents reported that they were financially dependent. Out of them, around three quarters (30 per cent of total sample) reported children as their main source of financial support, one quarter (10 per cent of total sample) mentioned spouse. Gender and urban-rural differences in economic status were remarkable. Female, rural and the older old respondents were much more likely to report spouse, children, or government support as their main income source. Specifically, three quarters of men said they were financially independent while only 40 per cent of women reported so. Among the urban elderly, only 8 per cent reported that they economically depend on children, while 86 per cent reported that they had their own pensions or salary as the main source of income. In contrast, 61 per cent of the suburban elderly and 41 per cent of the mountainous rural elderly relied on children as their main financial source, while only 28 per cent of the suburban elderly and 39 per cent of the mountainous rural elderly were economically independent. Among those aged 55-69, around two thirds (66 per cent) reported they were financially independent, while only around one

third (36 per cent) of those aged 70 years old or above reported so.

Perceived adequacy of income was also measured (the perception of whether the income is enough). As Table 4.2 shows, on average around half of the respondent in this sample (51 per cent) reported perceived adequacy in income. Rural elderly were more likely to perceive their income as inadequate to cover their daily living expenses than their urban counterparts. Interestingly, there were no significant age and gender differences in the perception of income adequacy.

Table 4.3 shows that on average around 30 per cent of respondents experienced stressful life events. Notably, the younger old and those living in mountain rural areas were more likely to report such experiences. Smoking and drinking behaviors seem to be common practices among older people in China. Nearly half of respondents mentioned they were either currently smoking (33 per cent) or former smokers (14 per cent). Around one third mentioned they were either currently drinking or former drinkers. However, this group was mainly comprised of men. Seven out of ten of men were either currently smoking or former smokers. In contrast, only less than one quarter of women did so. More than half of men were either currently drinking or former drinkers, while less than ten per cent of women did so. Compared with their rural counterparts, urban elders were also found to be less likely to take these health risky behaviors.

Health differences by age, gender, and urban-rural regions were also observed. As shown in Table 4.3, female, the older old, and rural elderly were

more likely to report functional limitations. As for self-rated health, consistently with other studies, women tended to rate their health poorer than men. Old respondents living in mountainous areas were least likely to rate their health as good or very good compared to those in other two districts. However, no age difference in self-rated health was found, which is at odds with the evidence that much more respondents aged 70 and above had functional limitations compared to their younger counterparts. One possible explanation is that those older-old and oldest-old tend to assess their health more optimistically than those younger-old. As for chronic diseases, it is interesting to find that rural elders were much less likely than their urban counterparts to report that they had at least one chronic diseases, which is inconsistent with the observed higher proportion of having functional limitations among rural elders. This may be a result of the neglect of chronic diseases among rural elders due to lack of preventive medical care in rural China.

The descriptive statistics presented in Table 4.2 and Table 4.3 show that there are remarkable differences by age, gender and urban-rural residence in socioeconomic and health characteristics, suggesting that it is necessary to examine the pattern of the association between social integration and mortality among the subgroups of Chinese elders separately.

The next section presents the available information of social integration in BMLSA survey to be used in the current study based on the conceptual framework developed in the literature review chapter. In section 4.4, the measurements of social integration in the current study are presented after

discussing the pros and cons of two main ways of measuring social integration: a summary index or a list of disaggregated single components. In section 4.5, I present how I select analytic method between pooled logistic regression model and extended Cox proportional hazards model, two survival analysis methods capable of dealing with longitudinal dataset containing a number of time-varying risk factors. In the final section, social integration variables are constructed based on Kaplan-Meier Survival Analysis (KMSA).

### **4.3 Survey information on social integration**

In the current study, social integration refers to social networks that older adults are embedded in and social activities that they engage in. A series of questions regarding social integration characteristics in the baseline survey are organized according to these two domains and displayed in Table 4.4 and 4.5.

As shown in Table 4.4, the information about both the structural feature of social networks and social support are covered in survey questions. The information with regard to the structural aspect of social networks includes marital status, number of children, contact with non-resident family members (including children, parents, spouse) and the frequency of contact, contact with friends and relatives and the frequency of contact, and with whom older adults are living together. The information regarding social support include receiving emotional and three kinds of instrumental supports (in housework, money and goods, and body care). Moreover, living arrangements could be



an important indicator of social integration of Chinese elderly given the fact that co-residing with children is an important practice of the traditional family values and filial piety as well as an important way for Chinese elderly to get instrumental and emotional support and avoid social isolation.

Table 4.4: Questions regarding social integration information in BMLSA, 1992

<b>Social Networks</b>	
<b><i>Structural Aspect</i></b>	
Marital status	What is your marital status? Response choices: 1) married, 2) widowed, 3) separated, 4) divorced, 5) never married
Number of children	How many children do you have at present (including those adopted)?
Having contact with non-resident family members	Please tell me about following situations of your major relatives (closest such as spouse, parents and children) who are not living with you? How frequent do you visit or meet them? (categorical response)
Having contact with friends and relatives	Except children, how many persons (relatives and friends) have kept contact with you (more than twice of visits or correspondence) in the past 12 months?
Living Arrangements	Whom do you live with? What is the household type? (e.g. two-generation household, three-generation household)
<b><i>Support Function</i></b>	
Receiving emotional support	Do you have anyone that you feel very close and intimate with? (1yes 2 no). if yes, who is he or she?
Receiving instrumental support	
in housework	Did you receive help in running housework, such as cleaning the house, cooking, shopping, in the past 12 months?
in financial help	Did you receive any financial help (money and goods) in the past 12 months?
in body care	Did you receive body care, such as grooming, eating, dressing, toileting, etc. in the past 12 months?

Table 4.5: Questions regarding social integration information in BMLSA, 1992  
(continued)

<b>Social Engagement</b>	
Working status	(Question for urban elders) At present would you say you are: 1 not retired from your work 2 retired but not reemployed, 3 retired (or off the job) but reemployed, 4 off the job, 5 never formerly employed, but now doing some kind of work such as running your own business or temporary job 6 never formerly employed and do nothing now (Questions for rural elders) At present, are you still working? 1)yes 2) no
Providing help to family and relatives	Did you help your relatives (those who are both inside and outside of the house) in doing xxx in the last 12 months? (The questions was repeated by asking about providing three kinds of help: housework, babysitting, money and goods.
Participating in recreational activities	The frequency of doing the following activities were asked: watching TV or listening to radio; reading newspaper books, magazines; playing cards, chess, Mahjong; gardening or rearing pets; going to the movies, listening to the opera; calligraphy, painting; playing musical instrumental, singing; fishing, stamp collecting antique collecting; chatting with neighbors; going for a walk in the park; others. The answer options are 1) never, 2) less than once a week, 3) 1-2 times /week, 4) almost everyday
Organizational attendance	Have you participated in the activities organized by the neighborhood (village) committee, Senior Citizens Station or your former working unit? How often?

With regard to social engagement (Table 4.5), a series of questions were asked about the social, productive and recreational activities that respondents may engage in: working status; providing help to family and kin in housework, babysitting, and money or goods; participating in recreational activities such as playing mahjong or listening to the opera, and participating in activities organized by communities or former working units.

There are some limitations on the available measurements of social integration in BMLSA data. First, as Table 4.4 and 4.5 show, there is limited information about non-family social relationships. Survey questions regarding social networks mainly addressed the characteristics of family relationships including their presence, contact frequency and exchanging support with them. Also, those respondents who reported receiving and providing emotional or instrumental support were found to mainly mention children, sometimes spouse, rather than non-family relations. Only one question was asked about the frequency of contact with friends and relatives.

Second, although it is acknowledged that subjective perceptions of social relationships such as closeness and satisfaction are important predictors of physical and mental health (Blazer 1982; Chen and Silverstein 2000; House and Kahn 1985; Krause, Liang and Gu 1998), this kind of subjective measures were not included in the current study. There are two main reasons for doing this. First, for various kinds of social ties covered in BMLSA survey, some were collected for respondents' subjective perception while some were not. Second, guided by family-centered norms and values, Chinese elderly

generally hesitate to talk about conflicts within the family or their negative feelings towards spouse, children, or other family relationships. As a result, they tend to give socially desirable answers when they are asked to appraise family relationships and support. In the BMLSA baseline survey, 82 per cent of the respondents reported that they were satisfied with the relationship with children. Moreover, perception is subject to the influence of both sociocultural environment as well as personal experience. It takes more effort to develop reliable measures of perception of social relationships for the current Chinese elderly.

#### **4.4 Two ways of measuring social integration: a summary index versus a list of disaggregated social integration components**

There are two main ways of measuring social integration in empirical analysis. One is to construct a summary index by summing different components of social integration. The other is to keep these components as separate variables. Both ways have advantages as well as limitations. The decision on whether to employ a summary index or a list of disaggregated single variables of social integration is ultimately dependent on research focus and the nature of data.

Given that social integration is a term conceptualizing a complex and multidimensional social phenomenon, using a summary index measuring the overall level of social integration provides an important way to examine the

health impact of the overall level of social integration. For example, Berkman and Syme (1979) developed a social network index. It is a summary index that is created by summing a number of social ties and activities that an individual is involved in, including having a spouse, having children, having frequent contact with close friends and relatives, participating in religious group activities, and membership in other social or community organizations. A higher index value indicates a greater extent of social integration, while a lower index value indicates a lower level of being involved in social networks or participating in activities. Findings of this study, as well as many others studies using a summary index, supported the theoretical proposal that the overall level of social integration is associated with health outcomes and this association is independent of many known social and demographic factors. In addition, studies utilizing a summary index are able to investigate the structural characteristics of social networks such as the size and heterogeneity of social networks. For example, studies using a summary index of social networks have found that women tend to have larger and more heterogeneous social networks compared to men. This gender difference would not be directly observed if the study employed a list of disaggregated social integration variables.

However, a summary index may mask the relative importance of different social integration components. For instance, studies using a list of single measures for each social relationship have found that marital status tends to be one of the most important social ties in protecting health and survival status (Gove 1973; Lillard and Waite 1995). Moreover, it has been found

that different kinds of social support affect health in different ways. Receiving emotional support has consistently been found to be beneficial to health (Chen and Silverstein 2000; Krause and Liang 1993), while receiving instrumental support has often found to be associated with greater risk of disability and mortality (Seeman, Bruce and McAvay 1996; Silverstein, Chen and Heller 1996). A summary index of the level of social integration is unable to detect these differences in the relative importance or effect direction of various kinds of social integration components.

Moreover, one technical problem when constructing a summary index of social integration is how to take into account the relative importance of different components. One way is to give different weights to different components based on their relative determining power and then sum them into an index. This method may enhance the reliability of the summary index, but it makes the interpretation of research findings more difficult. It may be the main reason why many studies using summary index prefer to give all components equal weight. In addition, high inter-correlation among index components may also threaten the reliability of a summary index.

The decision on whether to employ a summary index or a list of disaggregated single variables of social integration is ultimately dependent on research focus and nature of data. One main aim of the current study is to examine the relative importance of family and non-family-related social relations and activities in protecting against mortality for older people in contemporary China. As the literature review in Chapter 2 has revealed, social and cultural

setting plays an important role in not only shaping the characteristics of social relationships and activities that older adults are involved in but also conditioning the relative importance of these relationships and activities in terms of their effects on health. For instance, in the studies examining the health impact of social engagement among older people in Western countries, engaging in volunteering job and participating in religious activities have often been found to be important in protecting health and well-being (Baker et al. 2005; Berkman and Syme, 1979; Luoh and Herzog 2002; Musick, Herzog and House 1999). However, these two kinds of activities are not common practices among older adults in societies with family-centered culture. Had I used a summary index of social engagement in the current study, I would only reach a conclusion that activity engagement did or did not significantly protect against mortality for Chinese elderly. But I would not know which specific activity was more important among Chinese elderly.

Thus, in the current study I chose to use a list of disaggregated social integration variables rather than a summary index. This way of measuring social integration provides information on the relative importance of family and non-family related social relationships and activities in protecting survival status of the current Chinese elderly. Moreover, even though using disaggregated variables of social integration has limitation in directly displaying the association between the overall level of social integration and health outcomes, examining the correlation among these social integration components and whether their health effects are significant and independent of one another

will also reveal some information on whether these different components have cumulative effects. For example, if both having children and having friends are significantly and independently associated with decreased mortality risk, it indicates that the presence of children and friends have a cumulative protective effect against mortality. It is important to investigate the assumed importance of family relationships in protecting the health and well-being of older people in contemporary China. The findings of the current study will help policy makers to design health intervention policies and family policies for the current and future cohorts of Chinese elderly.

#### **4.5 Selecting analytic method: Pooled logistic regression model versus Extended Cox proportional hazards model - survival analysis methods dealing with time-varying covariates**

Traditional survival analysis methods typically examine the association between risk factors measured at baseline and the subsequent mortality. However, the values of many risk factors change over time. This type of variables are called time-varying variables. The BMLSA survey data show that the characteristics of social integration of older people change over time. For instance, a sizable proportion of respondents who were married at baseline became widowed in the following 8 years. Some respondents who reported that they did not receive instrumental support at baseline started receiving support in the follow-up. In addition, for older people, socio-demographic and health status characteristics such as economic condition and functional capability are



unlikely to remain stable over time.

In BMLSA dataset, the characteristics of social integration and other potential risk factors of mortality were measured in 1992, 1994, 1997 and 2000. The time of death occurrence was recorded during the follow-up period between these waves. Instead of merely using the baseline values of social integration variables to predict occurrence of mortality in the follow-up eight years, the repeated measures of the time-varying values of social integration can be utilized to better understand their effects on the death occurrence in the follow-up intervals.

Basically, there are two survival analysis methods which are capable of dealing with time-varying risk factors. One is *extended Cox proportional hazard model*, the other is *pooled logistic regression model*. Extended Cox regression model is popular compared to other survival analytic methods because employing this method does not require knowing the shape of the hazard. Moreover, it is able to deal with time-varying variables. In Cox model, the time-varying values of risk factors can be updated at each time unit. However, it has been found that when there are too many time-varying variables, the way of computation is inefficient (Allison 1995).

Pooled logistic regression method is the other choice. To employ this model, "Each individual's survival history is broken down into a set of discrete time units that are treated as distinct observations" (Allison 1995, pp211-212). Then the multiple observations of the same individuals are pooled into a single sample. A logistic regression is employed to predict the occurrence

of the event in each time unit. In doing so, “covariates are allowed to vary over time from one time unit to another” (Allison 1995, pp211-212). This method has been employed in a few previous studies. For instance, in the Framingham Heart study, the data were collected every two years on a cohort of 5209 subjects over 18 years to examine the association between potential risk factors and the incidence of cardiovascular disease (D’Agostino, Lee and Belanger 1990). To utilize this panel data with repeated measurements of risk factors, the pooled logistic regression model was conducted. Specifically, observations of multiple intervals of the same respondent were pooled into one dataset. After transforming data in this way, logistic regression model was employed to examine whether the potential risk factors were associated with the development of cardiovascular disease in the follow-up.

As seen from the previous example, to employ pooled logistic regression model, data transformation is required. Specifically, the repeated observations of an individual should be broken down and then pooled together. In doing so, episodes (person-period) rather than individuals are the unit of analysis. Therefore, conducting a pooled logistic regression analysis can be understood as using an ordinary logistic regression to analyze the pooled dataset in which episodes rather than individuals are the unit of analysis.

The following presents the logistic regression model used to analyze the pooled data:

$$\log\left[\frac{p_i}{1-p_i}\right] = \alpha_i + \beta_1 x_1 + \dots + \beta_n x_n$$

The model is written as an ordinary logistic regression model estimated by maximum likelihood.  $p_i$  refers to the conditional probability that an individual has an event at the  $i$ th interval of time, given that the event has not already occurred to that individual. Similar to ordinary logistic regression models,  $x_i$  ( $i=1 \dots n$ ) is risk factors and  $\beta_i$  is the coefficient of  $x_i$ . The beta coefficient indicates log of the odds ratio of the effect of a predictor. The antilogarithm of the coefficient estimate ( $e^b$ ) is odds ratio, which is interpreted as the ratio of the odds of an event occurring in one group compared with the odds of it occurring in the reference group while controlling for the different distributions of other covariates in these subgroups.

Moreover, one variable or a list of dummy variables indicating time intervals can be included in the pooled logistic regression model to represent changes of mortality rate over time that cannot be fully captured by other covariates (Allison 1995). Thus, in the pooled logistic regression model shown above, the intercept  $\alpha_i$  is an estimate of ( $\alpha_1$ ), which is the coefficient estimate of the reference time interval. For example, if the first interval (1992-1994) of the BMLSA data is the reference time interval, the intercept is the log-odds of mortality for an individual during 1992 and 1994 with value of 0 on all covariates. The coefficient of third time interval (1997-2000) is an estimate of  $\alpha_3 - \alpha_1$ , the difference between the log-odds of mortality in the third time interval and the log-odds of mortality in the first time interval (the reference group).

By pooling the repeated observations of the same individuals into one

dataset, pooled logistic regression model is able to handle large numbers of time-varying variables. The computations are more manageable even with a large dataset compared to the extended Cox regression model (Allison 1995).

Previous studies have provided supporting evidence that the results obtained from pooled logistic regression model using episodes (interval observations of an individual) as analysis units are very close to those obtained from extended Cox model using individuals as analysis units (Abbott 1985; D'Agostino et al. 1990; Green and Symons 1983). For example, in Framingham Heart study mentioned above, D'Agostino and his colleagues (1990) found that the results of pooled logistic regression model had a close agreement with the results obtained from the Cox regression model with time-varying variables (extended Cox regression model). In order to make a comprehensive comparison between these two methods, D'Agostino and his colleagues (1990) further compared these two methods by employing them on several real data with different features in sample size, frequency and distribution of event occurrence, length of follow-up period, number of repeated measures (intervals), and significance of risk factors. It was found that the results from the pooled logistic regression and those from the extended Cox regression agreed well with each other in these various kinds of data, especially in those with short lengths of follow-up period and slow rate of event occurrence. Although these comparisons should not be viewed as a conclusive interpretation, as the researchers suggested, "the asymptotic agreement of the models appears to be applicable for a variety of situations" (D'Agostino, Lee and Belanger 1990, pp.1512).

Therefore, the pooled logistic regression model can be considered to be an alternative to the extended Cox proportional hazards model when data and event occurrence are grouped into intervals. However, whether it is suitable to employ a specific analysis model is ultimately dependent on the nature of data and the features of both the independent and dependent variables. In BMLSA data, the date of death was recorded in months. Observations of independent variables, however, were NOT repeated by month. The time-varying social integration variables and other potential covariates were measured every two years or three years (in 1992, 1994, 1997, 2000, and 2004). Theoretically, one advantage of Cox proportional hazard model compared to ordinary regression model is that it enables to model not only the occurrence of event but also the timing of the occurrence as a function of independent variables. In doing so, the estimates of effects of mortality predictors are more precise. However, even though monthly repeated measurements of social integration were available in BMLSA data, it may not be necessary to utilize time unit as fine as month because social integration characteristics are unlikely to change so frequently and their impacts on health are not likely to occur in such a short-term pattern. In other words, despite that the timing of death is as precise as by month in BMLSA data, the choice of time unit of analysis needs to consider both the time-varying characteristics of social integration and the nature of its health effect as well as the availability of data. Therefore, based on the characteristics of BMLSA data, it may be a more appropriate practice to employ pooled logistic regression model through pooling the three observations

of social integration and other covariates in 1992, 1994 and 1997.

The second reason for choosing pooled logistic regression model in the current study is that many social integration variables are found to have their values change over time among older adults of this sample. In order to examine whether the sample of older respondents in this study have their social integration characteristics change over time, in preliminary analysis I merged the follow-up waves into the baseline data. In doing so, the prevalence of changes in the state of social integration components across waves can be traced. It was found that most of social integration components changed over time. Moreover, many covariates including health status and social and economic characteristics also changed from one time interval to another. To handle a sample of over 3000 respondents with many time-varying variables, employing pooled logistic regression model may make computation more efficient compared with extended Cox model.

However, one concern using pooled logistic regression model is that the length of three intervals of the panel data used in the current study varied: 2 years (1992-1994), 3 years (1994-1997), and 3 years (1997-2000). If the probability of death occurrence varies over time across these three follow-up intervals, the estimates of the effects on mortality will show the average effects during the follow-up period. In the current study, I followed what Allison (1995: 225-226) suggested, “If there are only two distinct interval lengths, a single dummy variable will work. If there are a small number of distinct lengths, construct a set of dummy variables”. Therefore, in this study, two

dummy variables were created to indicate the second (1994-1997) and the third (1997-2000) intervals with the first interval (1992-1994) acted as reference group. By adding these interval indicators in model, the changes of mortality rate over time that could not be full captured by measures of other covariates can be controlled. Results of analyses show that there was no significant difference in mortality rate during the second and third intervals. The coefficients of interval indicators in all the bivariate and multivariate analyses revealed that both the odds of mortality in the second and third intervals were around 50 per cent higher than the odds of mortality in the first interval. This is an important finding because this ratio is equivalent to the ratio of the length of interval (3 years/2 years=1.5), indicating that the probability of death occurrence did not significantly vary over time during the 8-year follow-up period. More importantly, the current study focuses more on the relative importance of various social integration components in a society with unique social and cultural settings rather than the exact strength of the health effects of these social integration components. Given these considerations, pooled logistic regression model was employed in the current study.

## **4.6 Constructing social integration measures**

In preliminary analyses, a list of social integration variables was constructed. To keep analysis models simple, social integration variables were constructed into dummy variables. The cut-off points of variables were mainly based on the survival status differences across available categories of each so-

cial integration variable (see in Table 4.6 and 4.7). Those categories with too small cases yet similar survival curves were combined together. Kaplan-Meier Survival Analysis (KMSA) was employed in order to make full use of the detailed mortality information as well as deal with censored cases (those subjects who lost to follow-up for some reasons during longitudinal survey).



Table 4.6: Distribution of available social network components at baseline

<b>Social networks</b>	<b>%</b>
Marital status	
Married	76.4
widowed	21.8
Separated/divorced/never married	1.8
Number of children (mean (Std.dev), range)	3.8 (1.7) (0-11)
0	2.2
1	5.6
2	15.3
3	21.2
4	22.9
$\geq 5$	32.9
Number of non-resident family members with whom elders contact at least once per month (mean (Std.dev), range)	5.8(4.1) (0-15)
0	14.6
1-2	8.8
3-5	25.1
6-8	24.5
9-15	27.0
Having contact with friends and relatives (mean (Std.dev), range)	2.1 (3.4), (0-40)
0	46.7
1-2	24.6
$\geq 3$	28.7
Living Arrangements	
Living alone	4.9
Living with spouse only	24.3
Living with children	63.2
Living with others (not child or spouse)	7.6
<b>Support function of social networks</b>	
Receiving Emotional support	74.8
Receiving Instrumental support (in kinds)	
in housework	77.6
in bodycare	7.5
in finance or goods	57.3
Receiving Instrumental support (in number of kinds) (mean (Std.dev), range)	1.4 (0.7), 0-3
0	9.3
1	45.0
2	39.7
3	6.0

Table 4.7: Distribution of available social engagement components at baseline

<b>Social Engagement</b>	<b>%</b>
Working	37.0
Helping family and kin (in kinds)	67.6
In housework	56.0
In money or goods	15.2
Babysitting/taking care of young children	32.5
Helping family and kin (in number of kinds)	
0	32.7
1	32.2
2	31.5
3	3.6
Organizational attendance	15.0
Participating in recreational activities	21.5

#### 4.6.1 Social network components

##### *Marital status*

As seen in Table 4.6, in this sample three quarters of older adults were married, one fifth were widowed, and those who were divorced, separated and never married only accounted for 2 per cent of the sample. Figure 4.5 shows the Kaplan-Meier survival curves of the married, the widowed, and the separated, divorced, and never married during the 144 months from 1992 to 2004. *It was found that marital status' effect against mortality was very strong.* The married elderly enjoyed the highest level of survival probability (the blue line), whereas the widowed elderly were the most disadvantaged in survival status (the green line). Those who were divorced, separated, and never married, although a bit better than the widowed, had their survival curve consistently lower than those who were married (the red line). Till 2000 (after 96 months

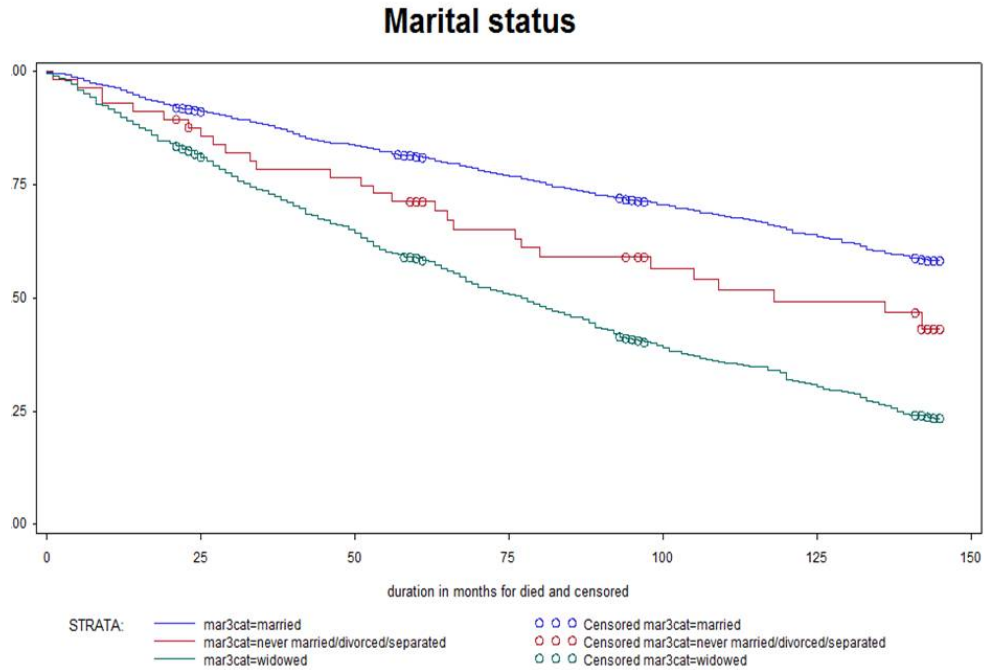


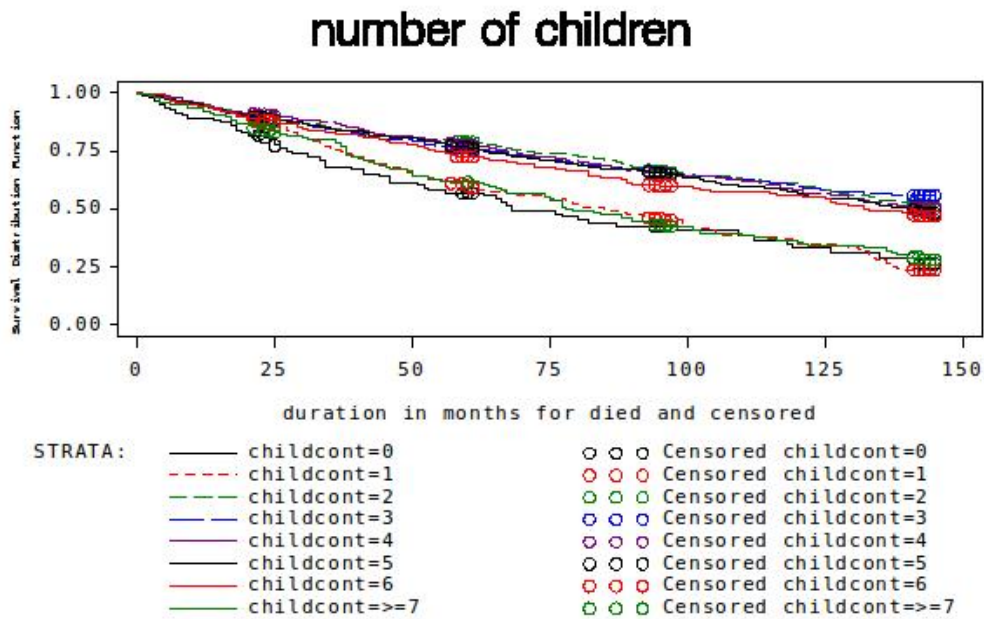
Figure 4.5: Survival curves by Marital Status

after the first interview in 1992), for the married, around seven out of ten survived; for those who were divorced, separated, and never married, around six out of ten survived; while for the widowed, only around four out of ten survived. Thus, in the current study, being married was coded as 1. Those divorced, separated, and never married were combined with the widowed due to their small sample sizes as being unmarried and coded as 0.

***Number of children*** As Table 4.6 shows, the average number of children that respondents had in 1992 was 3.8, the median was 4. Only around six per cent of them had one child, and two per cent of them had no child.

Around 15 per cent of older adults had two children, one fifth of them had three children, and one fifth of them had four children. Those who had five or more children accounted for around one third of the sample.

Figure 4.6: Survival curves by Number of children



However, the survival curves for the respondents with different number of children shows that *number of children was not strongly related to mortality during the 8-year follow-up period*. As shown in figure 4.6, the survival curves of older adults with different number of children were generally grouped into two levels. Those with no children or only one child had similar survival curves, and consistently lower than survival curves of those elderly with two to six children. It is interesting to find that older adults with more than six children had similar survival curves with those who had no children or only one child.

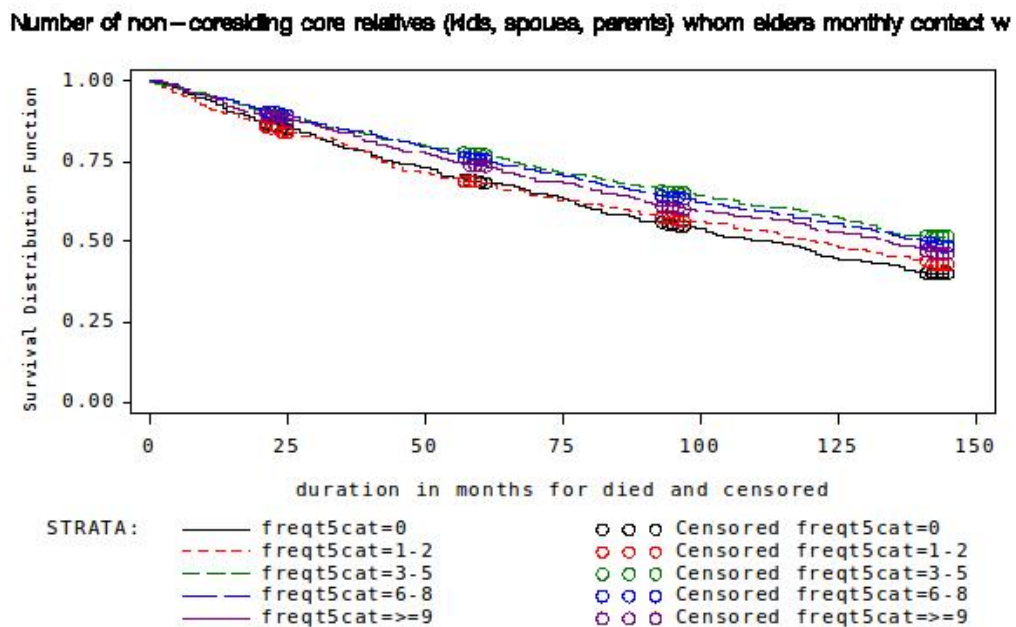
Such a curvilinear association between number of children and survival status may indicate that having children but not too many children is beneficial to the survival status of older adults. Among those who had two to six children, no gradient effects were observed as the number of children increased. Given that older adult with seven or more children only accounted for 5 per cent, they were not considered as a separate group. Thus, a dichotomous variable was developed : having two or more children =1, having no or one child=0.

***Having frequent contact with more non-resident family members*** Based on survey questions which collected the number of non-resident family members (including children, spouse, and old parents) with whom that older respondents have contact as well as the frequency of these contacts, a measure of having frequent contact with non-resident family members was developed, indicating the number of non-resident family members with whom older adults have contact at least once per month. As shown in Table 4.6, 15 per cent had no such frequent contact and 9 per cent reported only one or two, one quarter of respondents reported that they had three to five such contacts, one quarter reported six to eight such contacts, and one quarter reported nine or more such contacts.

Kaplan-Meier survival analysis (Figure 4.7) shows that there are no substantial differences in survival curves for older people having different numbers of frequent contact with non-resident family members, suggesting that *the impact on survival status of the number of non-resident family members with whom an older person contact at least one time per month was not strong.*

Those who did not have frequent contact with any non-resident family members (the black line), and those who had one or two such contacts (the red line) were found to have their survival curves slightly but consistently lower than those who had three or more such contacts. However, there were no observable gradient effects as the number of such contacts further increase. Thus, those who had three or more non-resident family members with whom older adults have contact at least once per month was coded as 1, else coded as 0. .

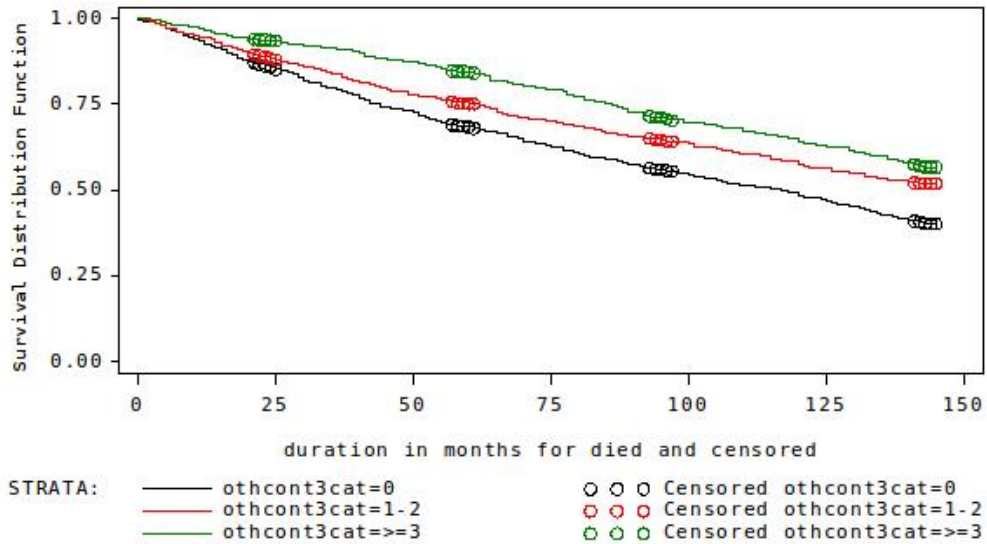
Figure 4.7: Survival curves by the number of non-resident family members with whom older respondents have contact



***Having contact with friends and relatives*** The measure of having contact with friends and relatives was constructed from responses to the question asking how many persons (friends or other relatives) had kept con-

Figure 4.8: Survival curves by having contact with friends and relatives

**Number of friends and other relatives whom older adults contact with**



tacting with you (more than two visits or contacting through correspondence) in the past 12 months. As Table 4.6 shows, notably, nearly half of respondents reported that they did not have such contacts, a quarter reported one or two such contacts, and one quarter reported three or more such contacts (ranging from 3 to 40). Kaplan-Meier survival analysis (Figure 4.8) shows that *the number of friends and relatives with whom older adults have contact has a modest association with mortality*. Those having contact with three or more friends and relatives at least twice in the past 12 months had their survival curves consistently higher than those having contact with one or two friends and relatives. Those having no contact with friends and relatives were found to have lowest level of survival curves. Having or not having contact with

friends and relatives was chosen to be the cut-off point to examine the association between this type of non-family related relationship and mortality. Thus, having no contact with friends and relatives was coded as 0, else as 1.

***Living arrangements*** Based on the questions asking about household types and with whom older respondents were living with, variables of living arrangements were created. As Table 4.6 shows, two thirds of the older adults in this sample lived with children (either living with children only or living with children and spouse). One quarter of them reported that they lived with spouse only. Only 5 per cent of the sample lived alone and 8 per cent lived with others.

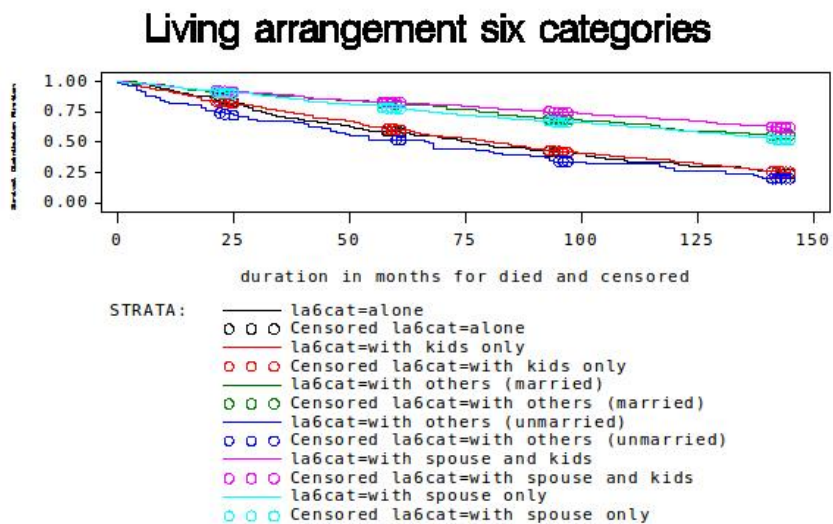
Table 4.8: Distribution of living arrangements by marital status

<b>Living arrangements</b>	<b>Marital status</b>		<b>Total</b>
	Unmarried	Married	
Living alone	20.6	–	4.9
Living with spouse only	–	31.9	24.3
Living with children	71.4	60.7	63.2
Living with others (not children or spouse)	8.0	7.5	7.6
Total	23.6	76.4	100.0

As previous research in Asian countries has indicated, marital status determines living arrangements that are available to an older person (Knodel and Ofstedal 2002). Table 4.8 shows that living arrangements were strongly correlated with marital status in this sample. Among those who were married, none of them was found to live alone, while one fifth of those unmarried lived alone. Therefore, in preliminary analysis, I took marital status into account



Figure 4.9: Survival curves by Living arrangements



and temporarily categorized living arrangements into six kinds: living alone, living with spouse only, living with children and spouse, living with children but no spouse, living with others (but married), living with others (but unmarried). I examined their differences in survival curves in order to better differentiate whether it was marital status or living with children that was related to mortality.

As shown in Figure 4.9, the survival curves of six living arrangements roughly divided into two groups along with marital status. Specifically, those living with spouse only, those living with spouse and children, and those living with others (being married) had similar survival curves which were consistently higher than the survival curves of those unmarried who either lived alone, lived with children only, or with others. There were no substantial differences

among three survival curves of those unmarried. This suggests that *the mortality differences across these six subgroups of older people with different living arrangements were actually a result of their differences in marital status*. For married and unmarried older people, their mortality risk was not significantly affected by whether they lived with children or not, or with others. However, given the important social meaning of co-residence of older parents and adult children in China, further examination is needed to better understand the impact of co-residing with children on mortality after controlling for other covariates.

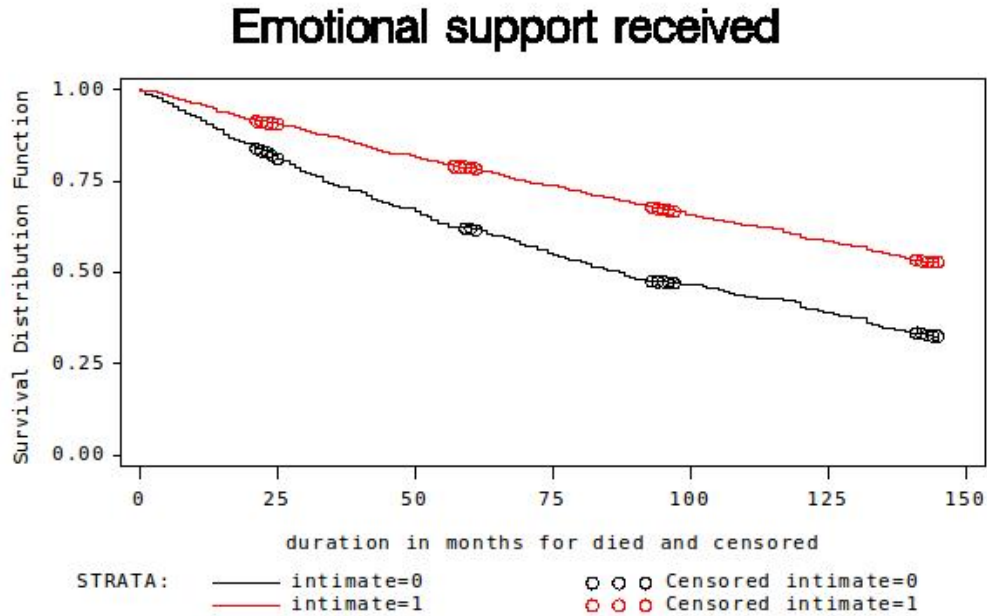
Thus, due to its correlation with marital status, the analysis of the effect of living arrangements were conducted among the married and the unmarried separately. Among those who were married, living arrangements were coded as two dummy variables, living with spouse only and living with others. Living with children were omitted as reference group. Among those who were unmarried, living arrangements were also coded as two dummy variables, living alone and living with others. Living with children was the the omitted reference group.

#### **4.6.1.1 Support function of social networks**

***Receiving emotional support*** As seen in Table 4.6, around 75 per cent in the sample said yes (coded as 1) when they were asked whether they had anyone they felt very close and intimate with, while 25 per cent said no (coded as 0). Figure 4.10 shows that *those who received emotional support had a consistently higher survival probability than those who did not receive*

*emotional support.*

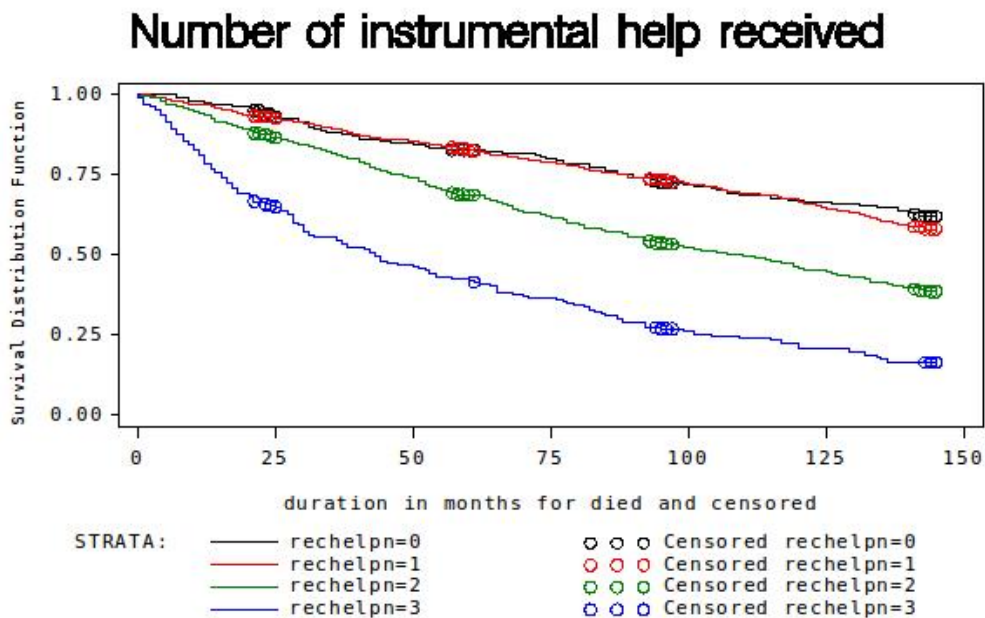
Figure 4.10: Survival curves of by Receiving emotional support



***Receiving instrumental support*** There are three questions asking if respondents received each of three kinds of help in the past 12 months: running housework (such as cleaning the house, cooking, shopping); financial help, and bodycare help. In the current study, the effect of receiving instrumental support was examined based on how many kinds of help older people received (ranging from 0-3) rather than what specific type of help they received. There are several reasons for doing so. The main reason for coding in the number of kinds of help is that the kind of help received was found to be gender related and age related. For example, it was found that 67 per cent of women reported that they received financial help while 48 percent of men did so. Half

of the younger old (aged 55-69) reported that they received financial help while three quarters of the older old (aged 70 and above) did so. Moreover, it was found that there was correlation among the different kinds of help received. A measure of how many kinds of instrumental support that older adults received was developed and it was found that only 10 per cent of the sample reported that they did not receive any kind of instrumental support from others in the past 12 months. 45 per cent received one kind, 40 per cent received two, and 6 per cent received all three kinds of instrumental support.

Figure 4.11: Survival curves by Number of instrumental help received



Different from receiving emotional support, Figure 4.11 shows that *the number of instrumental support older adults received was negatively related to survival probability*. Those who received no help (black line) or only one help

(red line) in the past 12 months enjoyed consistently higher survival curves compared to that of those who received two kinds of instrumental help. And those who report receiving all the three kinds of helps (housework, money or goods, and body care) had the lowest survival curve.

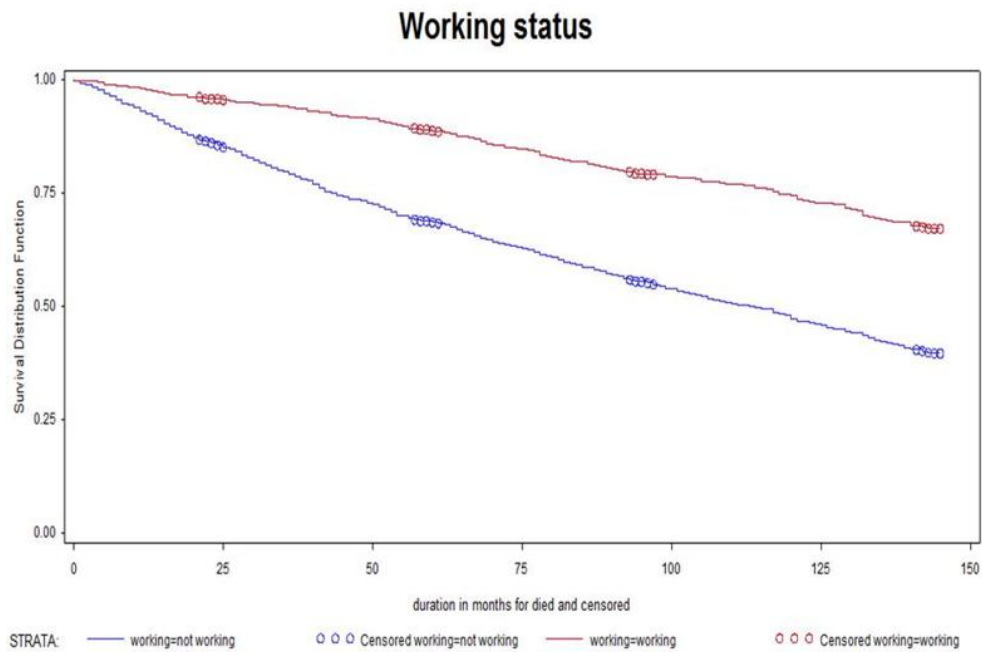
The negative association between receiving instrumental help and health or survival status for older adults was also found in previous studies. As reviewed earlier, one possible reason is the correlation of receiving help and health status. Older adults with poorer health condition tend to receive more instrumental help. Whether receiving help, one important function of social networks, has a significant impact on mortality for the Chinese elderly, and whether the effect is beneficial or detrimental were further examined in multivariate analyses by carefully controlling for the confounding effects of health status. Moreover, older adults with and without functional limitations were examined respectively in order to better understand whether the health effect of receiving instrumental help varies by older people's health status.

Based on the survival curve differences across these four groups (Figure 4.10), I combined those who received no help and one kind of help into one group as they had relatively similar level of survival curves and higher than those who received two or three helps who were also combined into one group. Receiving two or three kinds of instrumental helps was coded as 1, receiving no help or only one help was coded as 0.

#### 4.6.2 Social engagement components

**Working status** As Table 4.7 shows, one third of older adults mentioned they were currently working. They were coded as 1, those who were not working were coded as 0. Figure 4.12 shows that *those who were working had a better survival status compared to those who were not working.*

Figure 4.12: Survival curves by Working status



**Providing help to family and kin** Three questions were asked: in the last 12 months, did you help your relatives (those who are both inside and outside of the house) in doing housework? Did you providing financial support (money or goods)? Do you providing babysitting support? Following

the similar way of constructing measures of receiving instrumental support, providing help to family and kin was measured based on how many kinds of help (ranging from 0-3) rather than specific kind of help provided by the elderly because the kinds of help older adults provided were closely related to gender and economic situation.

Figure 4.13: Survival curves by providing help to family and kin

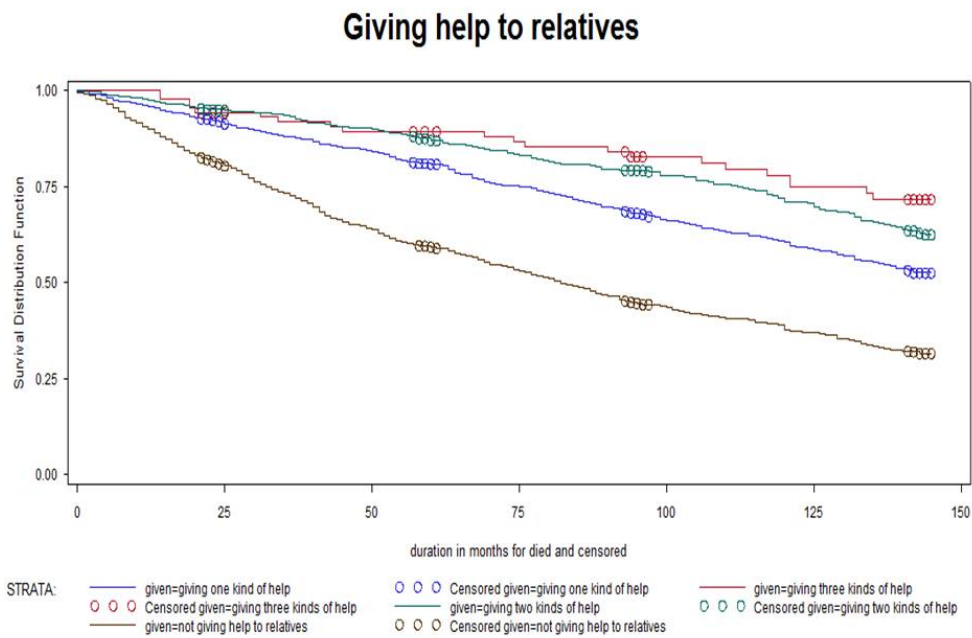
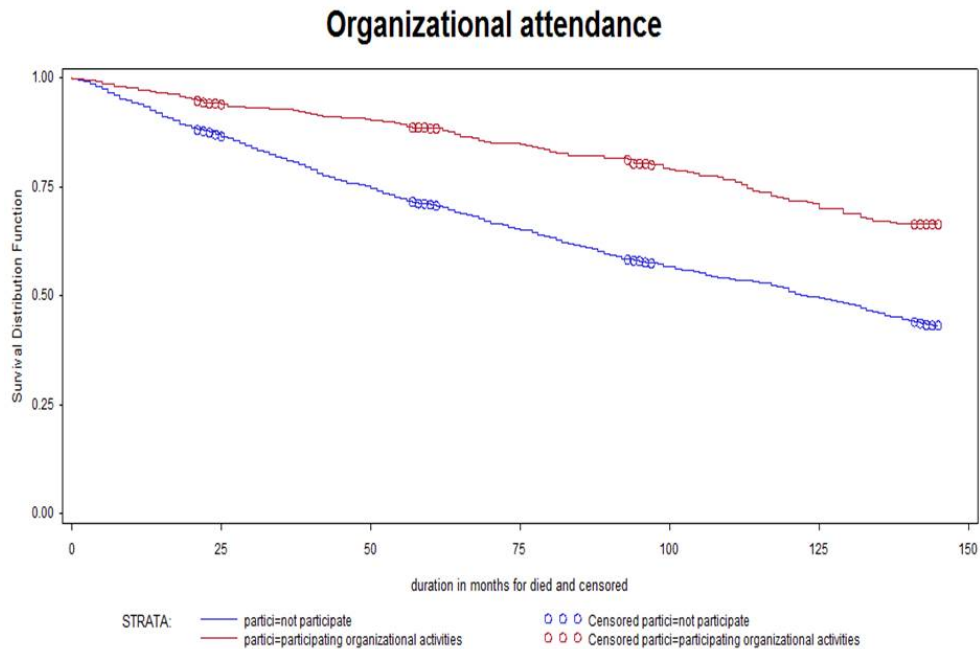


Figure 4.13 shows the survival curves of those who provided no help to family and kin and those who provided one, two, or three kinds of help. The figure reveals that *those who provided no help to family or kin (dark brown line) in the past 12 months had their survival curve much lower than those who*

provided at least one kind of help to family and kin. The more kinds of help older adults provided to others, the higher their survival curves were. Given the substantial disadvantage of the survival curves for those who provided no help to family and kin compared to those who did, providing at least one kind of help to family and kin was coded as 1, providing no help to family and kin was coded as 0.

Figure 4.14: Survival curves by organizational attendance

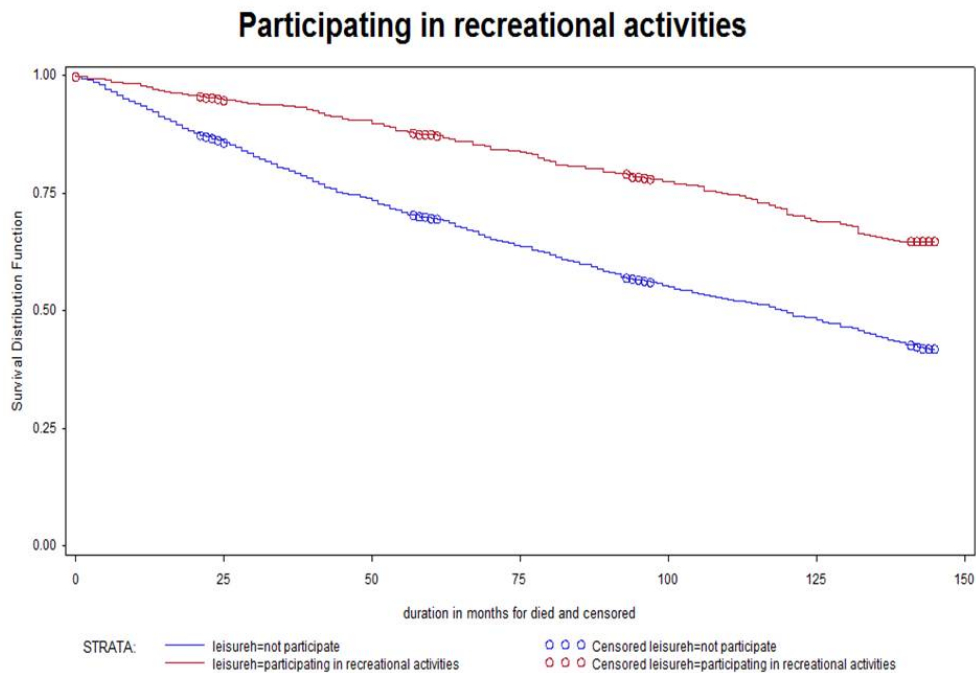


**Organizational attendance** Have you participated in activities organized by the neighborhood (village) committee, Senior Citizens Station or your former working unit? How often? As Table 4.7 shows, 15 percent said yes



(coded as 1) and 85 percent said no (coded as 0). Figure 4.14 shows that *older adults who attended organizational activities had consistently higher survival probability than those who did not.*

Figure 4.15: Survival curves by participating in recreational activities



***Participating in recreational activities*** Among those recreational activities listed in questionnaire, 7 of them were more active and socially recreational activities such as playing cards, chess, mahjong; gardening or rearing pets; going to movie, listening to the opera; calligraphy, painting, playing musical instruments, singing; fishing, stamp collecting, antique collecting; chatting with neighbors; going for a walk in the park. They were included to construct

this variable. More passive and relatively solitary kinds of leisure such as watching television or listening to radio, reading newspaper, books, magazines were not included. The frequency options of participating the recreational activities included never, less than once a week, 1-2 times per week, and almost everyday. Given that only a small proportion of respondents reporting as frequent as 1-2 times per week or almost everyday, each item was dichotomized as participating or not. The 7 items were included into a summary score by adding individual items to measure the number of recreational activities that respondents participated in. The ranging of the variable is from 0-7. As shown in Table 4.7, 78 per cent of respondents reported that they participated in none of these activities. Thus, the summary score of participation in recreational activities were dichotomized: 1=participating in at least one, 0=participating in none of 7 leisure activities. Figure 4.15 shows that *older adults who participated in recreational activities had their survival probability consistently higher than those who did not.*

#### **4.6.3 Checking the correlations among social integration components**

Before including social integration components in models predicting mortality and examining their independent effects and relative importance, the inter-correlations among these components need to be checked because high correlations among independent variables in multiple regression model leads to multicollinearity which erratically distorts the coefficient estimates of individual social integration components. The correlations among all social

Table 4.9: Correlations among these components of social integration components

	SN1	SN2	SN3	SN4	SN5	SN6	SN7	SE1	SE2	SE3	SE4
(SN1)Married	1.00										
(SN2)Having two or more children	0.16	1.00									
(SN3)Having frequent contact with three or more non-resident family members	0.02	0.07	1.00								
(SN4)Having contact with friends and relatives	0.11	0.00	0.03	1.00							
(SN5)Living with children	0.07	-0.14	0.00	-0.01	1.00						
(SN6)Receiving emotional support	0.25	0.11	0.02	0.16	-0.00	1.00					
(SN7)Receiving instrumental help	-0.14	0.03	0.03	-0.01	-0.08	-0.01	1.00				
(SE1)Working	0.20	0.03	-0.02	0.06	-0.04	0.07	-0.17	1.00			
(SE2)Helping family and kin	0.10	0.06	0.01	0.12	-0.09	0.15	-0.05	0.00	1.00		
(SE3)Organizational attendance	0.09	0.02	0.00	0.12	0.04	0.12	-0.07	0.08	0.06	1.00	
(SE4)Participating leisure activities	0.11	0.04	-0.0	0.12	-0.0	0.15	-0.11	0.03	0.13	0.27	1.00

integration components were examined by Pearson correlation analysis. As shown in Table 4.9, *the correlations among all the social integration components were generally low*. Only the correlation between being married and receiving emotional support as well as the correlation between attending organizational activities and participating in leisure activities were slightly higher than 0.2 (0.25 and 0.27 respectively).

## Chapter 5

# Examining the association between social integration and mortality among older people in Beijing

### 5.1 Aims and hypotheses

The aim of this chapter is to examine the association between social integration and mortality among older people in China. As seen from literature review, social integration is a multidimensional concept. Being socially integrated can be achieved not only through being embedded in supportive social networks but also through engaging in social, productive or recreational activities. Moreover, cultural and social context may shape the characteristics of social integration and its effect on mortality.

Specifically, I examined six hypotheses in this chapter. The first three are related to the concept of social integration:

*Being involved in social networks is protective against mortality for older people in China (Hypothesis 1).*

*Engaging in social, productive or recreational activities is protective against mortality for older people in China (Hypothesis 2.1). Its effect is independent of social networks (Hypothesis 2.2).*

*Receiving support from network members accounts for a significant part of the health effect of social networks (Hypothesis 3).*

The following two hypotheses are related to the implications of family-centered culture for the nature of the association between social integration and mortality for the elderly in China.

*Compared with non-family relationships such as friends and other extended relationships, family relationships such as having a spouse, having more children, living with children, and having frequent contact with more non-resident family members, have stronger protective effects against mortality for older people in China (Hypothesis 4).*

*Engaging in family-centered activities (providing help to family and kin) has a stronger effect in protecting against mortality than engaging in those activities outside the home including working, attending organizational activities, and participating in recreational activities (Hypothesis 5).*

Finally, given that health status is not only a strong determinant of mortality but also associated with social integration in a reciprocal way, it is important to disentangle its confounding effect when examining the association between social integration and mortality. In the current study, separate analyses among those older adults with different health status were conducted.

It is hypothesized that *the pattern of the association between social integration and mortality varies across Chinese elderly with different health status (Hypothesis 13).*

## 5.2 Methods

### 5.2.1 Pooling Data

Pooled logistic regression model was employed in the current study to better utilize the repeated observations of the time-varying social integration variables. To do so, the first three intervals (1992-1994, 1994-1997, 1997-2000) of the BMLSA data were pooled into one dataset. Table 5.1 shows the variables in each wave and the number of observations in each wave that comprises the pooled dataset. As mentioned in the previous chapter, the 2004 wave was not included because of its low response rate (54.4 per cent).

Table 5.1: Variable information in each interval of the pooled dataset

Interval	Variable Information in each interval	Number of observations of each interval
1992-1994	Social integration variables and covariates in Wave 1992 + Survival status during 1992-1994	3257
1994-1997	Social integration variables and covariates in Wave 1994 + Survival status during 1994-1997	2703
1997-2000	Social integration variables and covariates in Wave 1997 + Survival status during 1997-2000	2043

In pooled dataset, episodes instead of individuals are the unit of analysis (Allison, 1995). Measurements of social integration components and covariates of the respondents need to be consistent across three waves so that they are able to be pooled. To make the data of each wave ready, as seen in Table 5.1, the information of social integration and covariates that was consistently collected and measured in every wave was selected first. Then, each observation's survival status during the follow-up period of each wave was merged into

that wave. After pooling waves of data, each episode has information of social integration, covariates and survival status. Specifically, as Table 5.1 shows, the 3257 observations at baseline (1992) with their survival status during 1992 to 1994 were pooled together with the 2703 observations in 1994 with their survival status during 1994 to 1997, and 2043 observations in 1997 with their survival status during 1997 to 2000 to get a sample of 8003 episodes in the pooled dataset. In doing so, the value of social integration at each wave was captured and could be used to predict the mortality in the follow-up interval.

Here is a simple example to illustrate how the information of a respondent who participated in this longitudinal survey was used when the panel data were pooled. An older male respondent participated in 1992 and 1994 survey and his date of death in 1996 was traced when the third wave was conducted in 1997. In this case, this respondent contributed two episodes in the pooled dataset: 1992-1994 interval, and 1994-1997 interval. As his death occurred during the second interval (1994-1997), his survival status in the first episode was ‘alive’, and ‘dead’ in the second episode.

As mentioned in the previous chapter, in pooled logistic regression model, interval indicators were also created to represent these three intervals. The first interval (1992-1994) acted as reference group. Two dummy variables indicating the second and third interval (1994-1997, 1997-2000) were created to represent changes of mortality rate over time that could not be fully captured by the measures of other covariates.



## 5.2.2 Measures

### 5.2.2.1 Survival status

As mentioned above, the survival status in pooled data is the occurrence of death in each episode of an individual. If a respondent's death date is known, the coding is simple. If death occurred during that episode, the survival status of that episode is coded as 1, if not, it is coded as 0. The example mentioned above is a simple case when the respondent's death data is available.

However, if the date of death is not available, the survival status of each episode is coded based on response status in the follow-up wave. For example, an older man participated in 1992, 1994 and 1997 survey but dropped out since then. Then his survival status after 1997 was unknown, which was considered censored. In this case, this respondent contributed three episodes in pooled data: 1992-1994 interval, and 1994-1997 interval and 1997-2000 interval. His survival status in the first two intervals was coded as 0 (alive). In the third intervals (1997-2000), his survival status was censored, and also coded as 0.

It is possible that in such longitudinal panel study, some participants dropped out in one follow-up wave and then responded again. In BMLSA study, those lost to follow-up whose dates of death were unknown were assumed to be alive and traced in the follow-up interview. Here are two more examples to illustrate how their information contributed to pooled data. For example, an older male respondent participated in 1992 and 1994 survey but did not respond in 1997 for some reason. In the fourth wave in 2000, he was traced and identified that he had died in 1999. In this case, this respondent contributed

two episodes in pooled data: 1992-1994 interval, and 1994-1997 interval. It is obvious that his survival status during these two intervals was 'alive' (coded as 0). However, if participants drop out during longitudinal study with their dates of death unknown - survival status can not be identified in the follow-up survey, their survival status will be considered censored and coded as 0. For example, an older man who responded in 1992 survey, then failed to participate in 1994. However, he was successfully traced and interviewed in 1997, but dropped out again since then. In this example, this respondent contributed two episodes in pooled dataset: 1992-1994 and 1997-2000 interval. His survival status was obviously 'alive' (coded as 0) during 1992-1994, but was censored ( coded as 0) during 1997-2000 as the information of his survival status was missing since 1997 interview.

#### **5.2.2.2 Social integration**

The measures of social integration, developed in the previous chapter, fell under two dimensions: social networks and social engagement. As displayed in Table 5.2, the variables of social network dimension included: having a spouse, having two or more children, living with children, having frequent contact with three or more non-resident family members (children, parents and spouse), and having contact with friends and relatives. Variables of social support were: receiving emotional support, receiving two or more kinds of instrumental supports. There were four Social engagement variables: working, providing help to family and kin, attending organizational activities,

and participating in recreational activities. All measures of social integration components in the current study were dichotomous variables. The cut-off point was mainly based on both their distribution at baseline and their correlations with mortality as the preliminary analyses in the previous chapter presented.

### **5.2.2.3 Potential confounders**

Previous studies in this area have demonstrated that a series of variables which may either predict mortality or intervene in the association between social integration and mortality need to be controlled in order to better understand the impact of social integration on mortality. These potential confounders mainly include the following domains: demographic and socioeconomic status variables, health status, behavioral risk factors, and life-strain variables. Their measurements in multivariate analyses are briefly displayed as follows.

#### **Demographic and socioeconomic status variables**

*Age.* Age was a continuous variable. In pooled dataset, age was updated in each episode. For example, if the age of a female respondent in 1992 was 55, her age in 1994 was 57.

*Gender.* Being female was coded as 1, male was coded as 0.

*Educational level.* Participants' education was a three-categorical variable: no education, primary school, and secondary school or above.

*Urban/rural region.* Living in urban areas (Xuan Wu) was coded as 1,

Table 5.2: Social integration variables

Dimension of social integration	Variables	Coding scheme
<b>Social networks</b>		
<i>Structural aspect</i>	Having a spouse	having=1, not have=0
	Having two or more children	having two or more children=1, have no children or one child=0
	Having frequent contact with three or more non-resident family members	Having contact with three or more non-resident family members at least once per month=1, less than three of such contacts =0.
	Having contact with friends and relatives	having such contacts in the past 12 months=1, no such contacts=0
	Living arrangements	
	Living with children	Reference group
	Living with spouse (for the model of the married)/ living alone (for the model of the unmarried)	yes=1, no =0
	Living with others	yes=1, no =0
<i>Social support</i>	Receiving emotional support	receiving=1, not receiving=0
	Receiving instrumental support	receiving two or three kinds of instrumental supports=1, receiving no or one kind=0
<b>Social Engagement</b>		
	Working status	working=1, not working=0
	Helping family and kin	providing at least one kind of help =1, not providing any kind of help=0
	Organizational attendance	participating=1, not participating=0
	Participating in recreational activities	participating=1, not participating=0

living in rural areas (Da Xing, Huai Rou) was coded as 0.

*Number of electrical appliances in a household.* It is used as a measure of household income level in this study. Respondents were shown a list of electrical appliances and asked whether they had each of them at home <sup>1</sup>. A continuous variable was used to indicate the number of electrical appliances possessed by a household. The reported income level was not used as an indicator of socioeconomic status because there were a lot of missing responses for this survey question. The number of electrical appliances in a household may reveal more about household economic condition than an individual's economic status. Given the fact that the material resources of a Chinese family tend to be pooled together and be reallocated based on the needs of family members, this variable may indicate the socioeconomic status of Chinese elderly to some extent. Together with educational level and urban-rural residence area, these three socioeconomic indicators were included in multivariate analysis. In doing so, the potential confounding effects of socioeconomic status can be better controlled.

### **Health status variables**

Three dimensions of health status were controlled: self-reported general health status, functional limitations, and chronic diseases.

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<sup>1</sup>In 1992, the household electric items included television, washing machine, refrigerator, and electric fan. In 1994, the items included television, washing machine, refrigerator, electric fan, telephone, and air condition. In 1997, the items included television, hi-fi equipment, washing machine, refrigerator, electric fan, telephone, air condition, and desk computer.

*Self-reported general health status.* A five-point scale was the response categories of the question asking respondents to rate their health status: 1=excellent, 2=good,3=fair, 4=poor, 5=very poor. This variable was grouped into 4 categories: 1=very good/good, 2=fair, 3=poor/very poor, 4=failed to answer. There were 100 participants who failed to answer this question at baseline interview. Cross-tab analysis shows that they were much more likely to have functional limitations or die in the follow-up compared to those participants who answered this question. Therefore, they were grouped as a separate category to be controlled.

*Functional limitation.* Functional capacity was originally measured using six items of Activities of Daily Living (ADLs) and 6 items of Instrumental Activities of Daily Living (IADLs) in BMLSA survey. A three-category variable was created based on the level of severity in functional limitation. Respondents who had no difficulty in performing any items of either ADLs or IADLs were named as a group with no functional limitations (coded as 1). Respondents who had difficulty in performing at least one IADL item but no problem in performing ADLs were the group with moderate functional limitations (coded as 2). Respondents who had difficulty in performing at least one ADL item were the group with severe functional limitations (coded as 3).

*Chronic diseases.* Number of chronic disease was measured by reported diagnosis of 11 items of disease including heart attack, stroke, diabetes, and other chronic diseases. Given that the majority of participants had no (47.2%) or only one (28.8%) chronic diseases, a three-category variable was created to

assess the condition of chronic diseases (1= no chronic disease, 2= only one disease, and 3= two or more diseases).

**Health-related behaviors.** Health-related behaviors were measured by smoking and drinking behaviors. Smoking status was dummy coded into two variables: currently smoking, former smoker, with those never smoke as the omitted reference group. Similarly, drinking status was coded as two dummy variables: currently drinking, and former drinker, with those never drink as the omitted reference group.

**Life strain variables.**

*Stressful life events.* A list of stressful life events were asked in BMLSA survey. Respondents were asked if they had experienced each of these events in the past 12 months: children moving out, loss of contact with family members or friends, separation or divorce, death of a spouse, death of other family members, moving house, and victimization in a theft or robbery. These eight items were initially scored as 1=occurred and 0=not occurred, and then added up to a sum score ranging from 0-8. Given the skewed distribution (72 per cent of the respondents did not experience any of these stressful events), this variable was dichotomized as 1 indicating that at least one stressful life event occurred and 0 indicating no stressful life event had occurred in the past year.

*Perceived adequacy of income.* Perceived inadequate income could be another main source of life strain. Respondents were asked whether their income at present meets daily expenses. Those who answered ‘enough, with

money left', 'enough', or 'just enough' were coded as 1, those who answered 'not enough', 'far from enough' or 'hard to say' were coded as 0.

Table 5.3: Percentage Distribution of Socio-demographic and health status characteristics in each wave and in the pooled dataset

	1992 (n=3257)	1994 (n=2703)	1997 (n=2043)	Pooled (n=8003)
<b>Socio-demographic and economic characteristics</b>				
Age (Mean, SD)	65.0 (7.7)	66.4 (7.4)	68.6 (7.1)	66.5 (7.6)
female	50.3	50.8	50.6	50.6
Educational level				
No education	50.0	48.6	47.8	48.9
Primary school	29.0	30.0	31.0	29.9
Higher than primary	20.9	21.4	21.2	21.2
Urban	49.7	50.7	49.3	49.9
Household electrical appliances (Mean, SD)	2.7 (1.4)	3.2 (1.7)	4.3 (2.4)	3.3 (1.9)
<b>Life strain</b>				
Stressful life events	28.0	28.0	28.7	28.2
Income is adequate	51.5	59.4	63.5	57.5
<b>Health-related risky behaviors</b>				
Smoking	32.6	30.9	27.5	30.6
Former smoker	13.6	12.5	18.7	14.7
drinking	24.5	23.9	23.8	24.1
Former drinker	7.0	6.9	11.3	8.2
<b>Health status</b>				
Self-rated health				
Very good/good	48.4	48.9	45.4	47.7
Fair	30.1	29.2	29.5	29.7
Poor/very poor	19.8	19.7	20.3	19.9
DK/No answer	1.6	2.2	4.8	2.7
Functional limitation				
No	77.6	87.3	79.0	81.3
yes	22.4	12.7	21.0	18.7
Having Chronic diseases	52.8	17.3	69.4	45.2



The sociodemographic and health characteristics of this sample at baseline has been described in Chapter 4. Table 5.3 presents the distributions of sociodemographic and health characteristics in each wave and in the pooled dataset. It is noticeable that the distributions of age, gender and urban-rural residence did not vary significantly across different intervals, indicating that the deaths and a small proportion of drop-out during the follow-up period did not lead to a significant change in the sociodemographic characteristics of respondents in the follow-up waves. As a result, after pooling these three intervals together, the person-period data had similar distributions of the sociodemographic characteristics (the far right column) to those in the baseline interval.

Moreover, among these covariates, only gender, educational level, and urban-rural residence tend to have their values unchanged over time. The values of other covariates, such as health conditions or stressful life status, tend to change over time. By pooling data, their time-varying values can be captured so that their confounding effects can be better controlled.

### **5.2.3 Statistical Analysis**

First, descriptive analyses were conducted to present the distributions of mortality and social integration components during each interval and in the pooled data. Then I conducted pooled logistic regression models to assess the impact of social integration on mortality, first unadjusted (gross effect) and then adjusted hierarchically for several domains of potential covariates

(direct effect). The gross effects of social integration components on mortality were first examined using a series of pooled logistic regression models in each of which mortality was a function of each social integration component with only period interval indicator controlled. The gross effects of social integration components were presented as odds ratios by antilogging the coefficients of the effects of social integration components.

In multivariate analyses, several domains of covariates were adjusted hierarchically to examine whether social integration components have independent effects on mortality. Domains of social networks and social engagement were examined separately first in order to assess the effects of social networks and social engagement on mortality independently of potentially confounding variables. Then the variables of these two dimensions were included together in one model with all of the potential covariates adjusted in order to examine whether social engagement has a significant effect on mortality independent of social networks, and the relative importance of social networks and social engagement in protecting survival status for Chinese elderly. The correlation of social integration components has been checked to be low in Chapter 4. Thus, multicollinearity did not pose a problem in the current analysis.

Finally, given the complex causal association between social integration and health status, analyses separately among those who had functional limitations and those who were free of functional limitations were conducted to examine whether the impact of social integration on mortality has different patterns across Chinese elderly with different health status.

## 5.3 Results

### 5.3.1 Mortality

Table 5.4 presents mortality distributions during each interval of the survey and in the pooled dataset. The proportion of deaths in each interval increased slightly during the survey period, from 11.1 percent (359) in the first interval (1992-1994) to 14.8 percent (401) in the second interval (1994-1997), and 15.6 per cent (318) between 1997 and 2000. This is in accordance with the expectation that people are more likely to die as they are getting old. All together, a total of 1078 deaths were recorded during the 8-year survey period from 1992 to 2000. The mortality rate is 33.1 per cent (1078/3257). However, in the pooled data in which episodes rather than individuals are the unit of analysis, the occurrence rate of death is 13.5 percent (as indicated in the far right column).

Table 5.4: Mortality distribution in each interval and in the pooled data (unweighted)

Died	Time 1 92-94	Time 2 94-97	Time 3 97-2000	Pooled data
No	89.0% (2898)	85.2% (2302)	84.4% (1725)	86.5% (6925)
Yes	11.0% (359)	14.8% (401)	15.6% (318)	13.5% (1078)
Total	3257	2703	2043	8003

### 5.3.2 Social integration

Table 5.5 presents the distributions of social integration components at each wave and in the pooled dataset. As can be seen from the baseline data (the second column of Table 5.5), the general impression of the characteristics

Table 5.5: Percentage Distribution of social integration components in each wave and in the pooled data

	1992 (n=3257)	1994 (n=2703)	1997 (n=2043)	Pooled (n=8003)
Marital status				
Married	76.3	75.4	73.4	75.2
Widowed/ Separated/ Divorced/ Never Married	23.7	24.6	26.6	24.8
Number of children				
0, 1	7.9	7.7	7.0	7.6
$\geq 2$	92.1	92.3	93.0	92.4
Number of non-resident family mem- bers with whom elders contact at least once per month				
0-2	23.4	23.8	17.8	22.2
$\geq 3$	76.6	76.2	82.2	77.8
Having contact with friends and rel- atives				
No	46.7	52.6	47.5	48.9
yes	53.3	47.4	52.5	51.1
Living Arrangements				
Living alone	4.9	5.2	5.6	5.2
Living with spouse only	24.3	28.0	31.3	27.5
Living with children	63.2	59.9	55.9	60.0
Living with others(not child or spouse)	7.6	6.9	7.3	7.3
Social support				
Receiving emotional support	74.8	77.3	59.7	71.4
Receiving instrumental support				
0-1	54.4	58.2	47.0	53.6
2-3	45.6	41.8	53.0	46.4
Working	37.0	31.7	23.4	31.4
Helping family and kin	67.3	59.2	49.6	59.6
Organizational attendance	15.0	7.0	11.9	11.4
Participating in recreational activi- ties	21.5	18.1	45.8	27.1

of social integration of this sample of Chinese elderly is that compared to the elderly in Western countries, older people in China had more children and were more likely to live with children and have frequent contact with non-resident children, but less likely to contact friends. With regard to social engagement, older people in China were active in providing help to family and kin. However, participating in social and recreational activities outside home were not common practices for them.

Specifically, in 1992, three quarters (76 per cent) of the respondents were married, one quarter were widowed, divorced, separated or never married. Notably, more than 90 per cent had at least two children. Three quarters of the respondents reported that they have frequent contact (at least once per month) with three or more non-resident family members (mainly children, also including spouse and parents). Nearly two thirds of older people lived with children at baseline, much higher than what was found in many Western societies. Around one quarter of them lived with spouse only. Five per cent of them lived alone and 8 per cent of them lived with others (not spouse or children).

Table 5.5 shows that it is common for Chinese elderly to receive support from family members, which is consistent with the findings of other recent studies in China. Three quarters of them reported that they received emotional support at baseline (Answering yes when asked if you have someone that you feel close and intimate with). As for instrumental support, nearly half (46 per cent) of respondents received two or three kinds of instrumental supports.

Indeed, among the other half of respondents who received no or only one instrumental support, most of them received one (45 per cent), while only 9 per cent reported that they received none of these three kinds of instrumental supports.

With regard to social engagement, around one third (37 per cent) of the respondents were working at baseline. It is noteworthy that as many as two thirds of older people reported that they provided help in housework, money or goods, or child care to their family members and relatives. However, only 15 per cent of respondents reported participating in organizational activities in the past 12 months including those organized by neighborhood or village communities, Senior Citizen Stations, or former working units. Similarly, only one out of five (22 per cent) engaged in recreational activities. These distributions reflect that social engagement of Chinese elderly has family-centered characteristics.

Comparing the distributions of social integration components across waves in Table 5.5 shows that the distributions of many social network components stayed fairly stable across different intervals, while the prevalences of social engagement components changed over time. As expected, status of some social relationships, such as number of children, tend to be relatively stable over time. The prevalence of marital status was also quite stable across waves in this sample which may be due to the short period of intervals and the low prevalence of divorce among older people in China. However, many social integration components such as living arrangements, receiving and giving support,

and activity engagement were more dynamic and tended to change over time in later life. For example, as for receiving emotional and instrumental supports, compared to their prevalences at baseline, a much lower proportion of respondents at 1997 follow-up received emotional support, while more of them received two or three kinds of instrumental supports. As for living arrangements, the proportion of older people living with children slightly declined, while the proportion of those living with spouse only slightly increased in the follow-up waves. Nevertheless, in general, the prevalence of different living arrangements appeared to be fairly stable in the follow-up waves. However, additional analyses using merged data revealed that a sizable proportion of respondents experienced moving in, moving out or other kinds of transitions across different living arrangements over time, which is consistent with what was found recently in other Asian countries (Frankenberg, Chan and Ofstedal 2002). It is possible that movements from one type of living arrangement into another may complement one another so that the distribution in two time points appeared quite stable over time.

With regard to social engagement components, as expected, older people were less likely to work as age increased. The prevalences of participating in organizational and recreational activities also varied over the follow-up periods. Older people in this sample were less likely to give help as age increased. The proportion of older people providing help to family and kin declined gradually from 37 percent in 1992 to 32 percent in 1994 and 23 percent in 1997. One possible reason lies in the age difference in the behavior of giving support.

The age range of participants of BMLSA study is 55 and above in 1992. Previous studies have demonstrated that compared to older old parents (70+), the younger old parents (55-69) were more likely to provide support to children as their children were more likely in their 20's or recently married and thus not fully independent. However, this decline in the prevalence could also be partly due to cohort difference in the behavior of giving help. As a result of the rapid and dramatic demographic, social and economic changes occurring in the past several decades, Chinese elderly may have changed in many ways. For example, the younger old cohorts, especially women, have much higher level of education and better economic status than the older old cohorts as a result of the spread of mass education and economic development. These changes in individuals' socioeconomic characteristics accompanied by the changes in their attitudes and life styles may influence the kinds of activities they engage in. It is possible that compared with those who were born earlier in this sample, those younger old persons are less likely to engage in this kind of family-centered activities such as providing help to children and other kin. In the future when repeated cross-sectional data are available, it is of importance to investigate the possible cohort differences in the characteristics of social integration, such as receiving support, giving support, or social and leisure activities.

The descriptive analyses reveal that there is a substantial amount of individual-level transitions in the status of many social integration components, especially social engagement components. By pooling waves of panel



data, the current study is able to grasp the time-varying feature of social integration when examining its effect on subsequent mortality.

### **5.3.3 Gross effects of social integration components on mortality**

The bivariate association of each social integration component with mortality was examined by a series of logistic regression analyses in which each social integration component was included separately to predict mortality, with only interval indicators controlled. The gross effects of social integration components on mortality, in the form of odds ratio and 95 per cent confidence interval, are presented in the second column of Table 5.6.

The general impression is that most social integration components have significant gross effects in protecting against mortality. However there are a few unexpected findings. With regard to social networks, having a spouse, having two or more children, and having contact with friends and relatives were substantially associated with decreased mortality. The odds ratio of mortality for the married was 0.375. Put another way, without controlling for any covariates, those who were unmarried were over 2.5 times ( $1/0.375=2.67$ ) as likely to die as those who were married. Compared to those who had no or only one child, those Chinese elders who have two or more children were 47 per cent less likely to die. Similarly, those who reported that they had contact with friends and other extended relationships in the past 12 months also had a significantly lower mortality rate than those who reported no such contacts (OR=0.693). However, having frequent contact with three or more

non-resident family members (children, spouse, or parent) were not associated with mortality even before controlling for covariates, which is consistent with what was found using Kaplan-Meier survival analysis in the previous chapter.

Receiving emotional support and instrumental support were both significantly related to mortality but with different directions. Receiving emotional support was associated with decreased mortality (OR=0.405), while receiving instrumental support was related to increased mortality. Compared with those receiving no or only one kind of instrumental support, those receiving two or three kinds of instrumental supports were around 2.5 times as likely to die (OR=2.542). Similarly, Liu, Liang and Gu (1995) also found receiving emotional support had a positive effect, while receiving instrumental support had a detrimental effect on the self-rated health among older people in China. However, as their study was based on cross-sectional data, the causal direction in the association between receiving support and self-rated health could not be determined. It is highly likely that poorer health status leads to both a higher level of instrumental help receiving and higher odds of mortality. At the same time, it is also possible that receiving instrumental support has a negative influence on a sense of self-efficacy, the confidence of being independent, which in turn have an adverse effect on the physical and emotional health of older adults. In the current study, the longitudinal data were used so that the reciprocal linkages between social support and health were better controlled and the effects of social support on mortality could be better understood. In the following multivariate analyses, I further examined

whether the beneficial effect of receiving emotional support and the adverse effect of receiving instrumental help remained after controlling for potential confounders, especially health status.

As revealed in Kaplan-Meier survival analyses in Chapter 4, living arrangements were correlated with marital status for this sample of Chinese elderly. The bivariate association between living arrangements and mortality was examined separately among those married and unmarried. Among those who were married, compared with those living with children, the odds ratio of mortality was 1.082 (95 percent CI: 0.864, 1.355) for those living with spouse only; and 0.848 for those living with others (95 percent CI: 0.524, 1.371). This suggests that living arrangements had no effect on mortality among married elders. Among unmarried elders, compared to those living with children, the odds ratio of mortality was 0.826 (95 percent CI: 0.580, 1.176) for those living alone, and 1.444 (95 percent CI: 0.891, 2.340) for those living with others. Among the unmarried, only living with others showed a harmful effect on mortality compared to living with children with a marginal significance. However, this group only accounted for a small proportion (8.0 per cent of the unmarried; 7.6 per cent of the total sample). The examination separately among the married and unmarried provided further evidence on what was observed in KM survival curves (unadjusted) presented in the previous chapter: living with children did not lead to significant differentials in mortality compared with living without children. Thus, variables of living arrangements were not included in later multivariate analyses so as to avoid its influence on the estimate

of the effect of married status.

All social engagement variables, as Table 5.6 presents, had significant and substantial gross effects against mortality. Without controlling for covariates, working, providing help to family and kin, attending organizational activities, and participating in recreational activities, were found to decrease the odds of mortality by around 60 to 70 per cent.

#### **5.3.4 Multivariate analyses**

To examine whether the associations between social integration components and mortality are independent of those potentially confounding factors, multivariate analyses were conducted to control for several domains of covariates. First, social network and social engagement components were examined separately in two sets of logistic regression models and their associations with mortality were examined by controlling for covariates hierarchically. Four hierarchical models for social networks (model a1 - model a4) and four hierarchical models for social engagement (model b1 - model b4) are presented: Model a1 included all social network components simultaneously and Model b1 include all social engagement components simultaneously. Model a2 and b2 adjusted for age, gender, model a3 and b3 further adjusted for SES variables, life strain variables, and behavioral risk factors, model a4 and b4 (the fully-adjusted models) further controlled for health status variables. In model 5, both social network and social engagement components were included simultaneously with all of the potential covariates adjusted with the aim of assessing whether

social engagement had a significant effect on mortality independent of social networks. In addition, the relative importance of social networks and social engagement in protecting survival status for Chinese elderly could be observed. Finally, health-specific analyses were conducted separately among those who had functional limitations and those who were free of functional limitations in order to further disentangle the confounding effect of health status. Moreover, the possible different patterns of the impacts of social integration on mortality across older adults with different health status could be observed more directly.

#### **5.3.4.1 Results of social network model and social engagement model**

All of the six social network variables were included simultaneously in model a1, and all of the four social engagement variables were included in model b1 simultaneously. Time interval indicators were controlled. Their estimates of coefficients net of other dimensional components were compared with their gross effects. This step is important because in doing so, I can examine whether social integration components in each dimension have independent effects net of one another or they are substitutable by other dimensional components. For example, if the gross beneficial effects of being married and having contact with friends and relatives remain significant when all social network variables are included in the model a1 simultaneously, this indicates that an older person who is married and has contact with friends and relatives has a cumulative advantage in survival status compared with an older person who is married but has no contact with friends and relatives or an older person

Table 5.6: Bivariate association and multivariate association of social integration and mortality using pooled data (N=8003), BMLSA, 1992-2000a.

	Bivariate association	Model a1	Model a2	Model a3	Model a4	Model 5 Combined
Having a spouse	0.375*** (0.323,0.436)	0.536*** (0.456,0.631)	0.773** (0.642,0.930)	0.732** (0.606,0.885)	0.687*** (0.566,0.835)	0.702*** (0.577,0.854)
≥ 2 children	0.533*** (0.425,0.670)	0.629*** (0.495,0.800)	0.812 (0.634,1.041)	0.826 (0.641,1.064)	0.798† (0.615,1.036)	0.793† (0.610,1.031)
Contacting non-resident family members	0.937 (0.788,1.115)	0.977 (0.817,1.168)	1.057 (0.879,1.271)	1.049 (0.870,1.265)	1.015 (0.838,1.229)	1.019 (0.841,1.235)
Contacting friends & relatives	0.692*** (0.597,0.802)	0.758*** (0.651,0.882)	0.876† (0.749,1.025)	0.894 (0.761,1.050)	0.886 (0.752,1.045)	0.960 (0.813,1.135)
Receiving emotional support	0.405*** (0.350,0.470)	0.550*** (0.469,0.645)	0.620*** (0.526,0.731)	0.733*** (0.622,0.876)	0.869 (0.727,1.040)	0.893 (0.746,1.069)
Receiving instrumental support	2.542*** (2.179,2.966)	2.344*** (2.002,2.744)	1.861*** (1.579,2.193)	1.645*** (1.385,1.953)	1.337** (1.119,1.598)	1.355** (1.131,1.622)
Likelihood Ratio		389.36	663.58	789.85	1010.02	
		Model b1	Model b2	Model b3	Model b4	
Working	0.382*** (0.313,0.466)	0.375*** (0.307,0.458)	0.508*** (0.405,0.637)	0.531*** (0.420,0.671)	0.734* (0.575,0.935)	0.741* (0.579,0.947)
Giving help to family members	0.317*** (0.271,0.370)	0.330*** (0.282,0.386)	0.491*** (0.416,0.579)	0.498*** (0.421,0.589)	0.603*** (0.506,0.717)	0.606*** (0.509,0.723)
Organizational attendance	0.339*** (0.239,0.481)	0.476*** (0.333,0.681)	0.514*** (0.358,0.738)	0.588** (0.406,0.851)	0.672* (0.463,0.975)	0.689† (0.474,1.000)
Recreational activities	0.380*** (0.309,0.467)	0.433*** (0.350,0.536)	0.463*** (0.371,0.577)	0.597*** (0.470,0.758)	0.703** (0.550,0.898)	0.712** (0.556,0.910)
Likelihood Ratio		472.01	741.71	858.43	1029.54	1060.81

Odds ratio of mortality and 95 per cent confidence interval are presented.

Model a1, all social network components were included simultaneously; Model b1: all social engagement components were included simultaneously

Model a2 and b2: adjusted for age, gender; Model a3 and b3: further adjusted for SES variables, life strain variables, and behavioral risk factors; Model a4 and b4 (the fully-adjusted models): further adjusted for health status variables; Model 5: including both social networks and social engagement components in fully adjusted model

† $p \leq .10$ ; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;

who is widowed but has contact with extended relationships.

Model a1 in Table 5.6 presents the results of coefficients of social network variables when they were included simultaneously without adjusting for social and demographic and health status covariates. As shown in model a1, five social network variables remained significant although the magnitudes of their effects were reduced to some extent compared with their gross effects. The remaining significant effects suggest that the more social relationships and contacts older adults have such as having a spouse, children, and having contact with friends and relatives, the greater their advantage of survival status is.

Similarly, when social engagement variables were included simultaneously in model b1 of Table 5.6, the significant level of four social engagement predictors remained unchanged with the magnitudes of their effects slightly reduced compared with their gross effects in bivariate analysis models. This suggests that engaging in more social, productive, and recreational activities accumulates advantage in survival status for older people.

Given the assumption held by many aging studies, especially those studies in Asian societies, that social support provided by network members is one of the primary pathways through which social networks affect the health and well-being of older adults, one important investigation in the current study is to examine whether the health effect of being involved in social networks is mainly obtained from social support for older people in China. I included four components of the structural feature of social networks simultaneously first

(having a spouse, having two or more children, having frequent contact with three or more non-resident family members, and having contact with friends and relatives), then further included two social support items. In doing so, the changes of the coefficients of the structural components after controlling for two support function items will show to what extent that social networks influence mortality through support provided by network members. It was found that after including receiving emotional and instrumental support, the effects of having a spouse, having two or more children and having contact with friends and relatives remained stable with the significance level unchanged and magnitude slightly weakened, indicating that the benefit of social networks was not mainly obtained from receiving support from network members. *Hypothesis 3 that receiving support from network members accounts for a significant part of the health effect of social networks for Chinese elderly is not supported.* This result provided additional empirical evidence supporting the opinion that, as Rook (1987, 1990) pointed out, the presence of social ties itself may provide companionship or a sense of belonging. In addition, interaction between network members does not necessarily involve support exchanges.

From model a2 and b2 to model a4 and b4, age, gender, SES, behavior risk factors, stressful life events, and health status variables were included hierarchically to the social network model and social engagement model. As model a2 shows, the effects of social network components, especially structural components, diminished markedly after adjusting for age and gender. Specifically, the beneficial effect of having a spouse became weakened in both



magnitude and significance level. Notably, the strong protective effect of having two or more children diminished sharply to an insignificant level. Similarly, the beneficial effect of having contact with friends and relatives also declined remarkably to a marginal level. In the social engagement model (Model b2), controlling for age and gender substantially moderated the magnitudes of the effects of social engagement variables but the significance level remain unchanged. These changes in the effects of social integration components after controlling for age and gender indicate that their protective effects against mortality may vary by age and gender.

Indeed, age and gender are not only strong predictors of mortality, they also shape the characteristics of social integration and its health effect. It was found that the beneficial effect of having two or more children diminished remarkably and lost significance after age was controlled. To better understand the possible age and gender variations in the health effect of having more children, additional analyses were conducted to examine the interaction effect of having more children and age. It was found that the association between having two or more children and mortality differed significantly across age groups. Specifically, having two or more children had significant benefit on the survival status of those aged 55 to 69, but no effect for those aged 70 or above, indicating that the protective effect of having more children diminishes as people reach the age of older old and oldest old (aged 70 and above). Nevertheless, it should be recognized that this observed age difference could be a combination of age and cohort differences. That is, there may be a decline of influence of

the number of children on protecting mortality for the younger old cohort than the older old cohort.

In model a3 and b3, further controlling for socioeconomic status variables, behavior risk factors and stressful life events, especially the latter two domains of covariates, only led to slight decreases in the effects of the social integration components. This suggests that SES, behavioral risk factors and stressful life events are not the essential confounding covariates in the association between social integration and mortality among this sample of Chinese elderly. Although it has often been found in previous research that social integration is associated with socioeconomic status and behavioral characteristics, the barely changed coefficients of social integration components in model a3 and b3 indicates that for this sample of Chinese elderly, the effect against mortality of social integration was independent of their SES, behavioral risk and life strain characteristics. In the interest of parsimony, Model a3 and b3 presents the results after adjusting for these three domains of covariates. However, it is noticeable that in the social network model (model a3), receiving emotional and instrumental support had their effects reduced to a great extent, which probably reflects that in addition to their main effects (direct effect) on survival status, receiving support from children and others may also benefit survival status through a stress-buffering pathway.

Similarly, with regard to social engagement components (model b3), the protective effects of working status, providing help to family and kin were barely changed after socioeconomic status variables, behavior risk factors and

stressful life events were adjusted. The association between participating in organizational activities and decreased mortality was slightly moderated. The protective effect of participating in recreational activities was weakened to a greater extent. Its effect in lowering mortality by 53 per cent was reduced to 40 per cent (OR=0.463 in Model b2 versus OR=0.597 in Model b3).

However, when three health status variables (self-rated health, functional limitation, and chronic diseases) were controlled in social network model (model a4) and social engagement model (model b4), the effects of receiving social support diminished substantially. All social engagement components except for providing help to family and kin also changed remarkably in terms of significance level and magnitude. Specifically, in the social network model (Model a4 in Table 5.6), the effects of receiving social support diminished substantially. Receiving emotional support lost its significant protective effect. The detrimental effect of receiving instrumental support was also weakened. The protective effects of being married and having two or more children remained and even slightly strengthened. Being married continued to be the strongest protective relationship for Chinese elderly. Having two or more children had a marginally significant protective effect.

It is noticeable that in the social engagement model (model b4), except for providing help to family and kin, the effects of the other three social engagement components experienced substantial reduction in both magnitude and statistical significance level after controlling for health status variables. Older people who were working had the odds of mortality changed from nearly

half as low as those who were not currently working to around one-quarter lower than them. The significance level also declined. The protective effects of attending organizational activities and participating in recreational activities also declined in terms of both magnitude and significance level. Providing help to family and kin remained to be the strongest protective social engagement component at a statistical significance of  $\leq 0.001$ , even though the magnitude of its effect diminished to some extent.

Different from model b2 and b3 in which the effects of these social engagement components remained robust when demographic and social factors were controlled, controlling for health status variables in model b4 led to significant reduction in their protective effects, reflecting the crucial confounding effects of health status in the association between social engagement and mortality.

It is worth noting that the estimates of social integration coefficients changed in various patterns after health status variables were controlled. Specifically, the effects of social engagement variables and receiving emotional and instrumental support reduced more remarkably than those of the structural components of social networks after controlling for health status variables. This indicates that health status may have stronger correlations with the level of receiving support and social engagement for Chinese elderly. Further analyses among subgroups of older people according to their health status were conducted later so that it could be observed more directly whether the health effects of social integration varied across older people with different baseline

health status.

#### 5.3.4.2 The independent effect of social engagement

The analyses presented thus far have examined the effects of social networks and social engagement on mortality separately. Of particular interest, however, are the independence of the effects of social engagement in protecting against mortality for Chinese elderly. To do so, I included social network and social engagement components simultaneously in a fully-adjusted model (model 5). Notably, as the model 5 of Table 5.6 presents, the direction and strength of the effects of social network and social engagement components remained barely changed. The chi-square test using the differences of likelihood ratios of models shown in Table 5.6 indicates that the fitness of model 5 which included both social network and social engagement components was improved compared to that of model a4 and model b4. Specifically, comparing model 5 with model a4, the chi-square value difference of models with and without social engagement components was (1060.81-1010.02) with 4 d.f.. Comparing chi-square value of model 5 and model b4 (the models with and without social network components), the difference was (1060.81-1029.54) with 6 d.f..

These statistics support that social networks and social engagement were both significantly associated with mortality for this sample of Chinese elderly. *The hypothesis that social engagement has a significant protective effect against mortality independent of social networks is supported.* Three out of four social engagement components were significantly and substantially associated

with decreased mortality after controlling for covariates and social network components. Working elderly had the odds of mortality one-quarter lower than those who were not working (OR=0.741, 95 percent CI: 0.579,0.947). Those who provided help to family and kin had the odds of mortality nearly 40 percent lower than those who did not do so (OR=0.606, 95 percent CI: 0.509,0.723). It is worth noting that the protective effect of providing help to family and kin remained robust at  $< 0.001$  level even after all known covariates and social network components were controlled. Those participating in recreational activities had their odds of mortality around 30 per cent lower than those who did not (OR=0.712, 95 percent CI: 0.556,0.910). Organizational attendance was also associated with decreased mortality with marginal significance (OR=0.689, 95 percent CI: 0.474,1.000). The magnitude of its effect measured by points estimates was great but the 95 per cent confidence interval shows a wide range, indicating that the marginal significance of its effect may be due to the fact that there was only a small proportion (11.4 per cent) of older people in this sample reporting they participated in community activities in the past 12 months.

These findings are important. Till now, little is known about the health effect of social engagement for older people in China. The findings suggest that the theoretical emphasis on the important role of social engagement for old-age health and well-being proposed by Western researchers should also be supported in China. Not only being embedded in supportive social networks but also engaging in social, productive, and recreational activities benefit the

survival status of old people in contemporary China.

#### **5.3.4.3 Does the pattern of the association between social integration and mortality vary across older people with different health status?**

One concern about the association between social integration and mortality among older adults is whether the effect of social integration varies by health status. As displayed in model a4 and model b4, controlling for health status variables resulted in remarkable and complex changes in the associations between social integration components and mortality: a few lost their significance, some remained significant but declined in both significance level and magnitude of their effects, while some had their effects slightly strengthened. This suggests that the confounding effect of health status needs to be carefully disentangled when examining the health effects of social integration.

I conducted analyses separately among those who had no functional limitations and those who had functional limitations. In the pooled dataset, health status information was updated at each wave to predict mortality in the follow-up interval. Dividing the pooled dataset into sub datasets according to health status so that each sub dataset contains episodes with similar health status, the potential differences in the pattern of the association between social integration and mortality among older people with different health status can be observed directly. In preliminary analyses, the pooled dataset was initially divided into three sub datasets according to the three levels of functional limitations: those without functional limitations, those with one or more IADL

limitations only (moderate level of functional limitation), and those with one or more ADL functional limitations (severe level of functional limitations). Three models were conducted separately among them and it was found that the effects of social integration components on mortality were similar for those with moderate and severe level of functional limitations. Thus, they were combined into one group and the health-specific analyses were conducted separately among two sub datasets: those without functional limitations, those with one or more functional limitations. The results are presented in Table 5.7 .

As can be seen in Table 5.7, the relative importance of various kinds of social relationships and activities had different patterns for older people with different health status. For older people who were free of functional limitations, both having a spouse and number of children were related to decreased mortality, but their protective effects were moderate in strength. While among those with one or more functional limitations, surprisingly, those having two or more children did not show significant advantage in survival status compared to those having no child or only one child. Having a spouse was significantly beneficial to their survival status. For both groups, there were no significant protective effects of having frequent contact with more non-resident family members and having contact with friends and relatives.

Notably, the effects of receiving emotional and instrumental support also varied by health status. Surprisingly, for older people who were free of functional limitations, neither receiving emotional support nor receiving instrumental support was significantly associated with mortality. In contrast,



Table 5.7: Fully-adjusted models among those without functional limitations and those with one or more functional limitations separately

	Among those with- out functional limi- tations (N=5980)	Among those with functional limita- tions (N=2023)
Having a spouse	0.718* (0.550,0.936)	0.654** (0.484,0.883)
Having two or more children	0.686* (0.487,0.966)	0.975 (0.644,1.476)
Having frequent contact with three or more non-resident family members	1.039 (0.808,1.337)	0.936 (0.686,1.276)
Having contact with friends & relatives	0.963 (0.773,1.199)	0.967 (0.741,1.262)
Receiving emotional help	1.084 (0.845,1.391)	0.726* (0.551,0.956)
Receiving 2 or 3 kinds of instrumental help	1.189 (0.948,1.492)	1.564** (1.136,2.155)
Working	0.716* (0.541,0.948)	1.063 (0.579,1.949)
Giving help to family and kin	0.844 (0.675,1.055)	0.345*** (0.251,0.474)
Organization attendance	0.612* (0.391,0.958)	1.087 (0.530, 2.229)
Participating in recreational activities	0.756† (0.567,1.008)	0.707 (0.424,1.179)
Likelihood Ratio	341.07	311.68

Odds ratio of mortality and 95 per cent confidence interval are presented.

Fully adjusted for age, gender, socioeconomic status variables, life strain variables, behavioral risk factors, and health status variables

† $p \leq .10$ ; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;

for older people with one or more functional limitations, receiving emotional support had a significant beneficial effect, while receiving instrumental support had a significant adverse effect on their survival status. It has been increasingly recognized that receiving instrumental support may harm health and well-being through undermining one's sense of independence and self-confidence (Seeman, Bruce and McAvay 1996; Silverstein, Chen and Heller 1996). Impaired older people who tend to be recipient in support exchanges may be more sensitive to the sense of being a burden on others. In addition, depending on instrumental support provided by others may reduce the chances of practicing physical functions and then lead to further deterioration of functional capability, which is what Hultsch et al. (1999) described as "use it or lose it".

With regard to social engagement, the first impression is that the relative importance of family-centered activities and social engagement outside home had opposite patterns for these two groups with different health status. For those older people with one or more functional limitations, providing help to family and kin was significantly and substantially related to decreased mortality. By taking the reciprocal of the odds ratio ( $1/0.345=2.90$ ), it was found that those who did not provide help to family and kin had odds of mortality almost three times as great as those who did. However, social participation outside home had no effects. In contrast, for those who were free of any functional limitations, what was beneficial were activities outside home including working status and attending organizational activities and participating

in recreational activities although their effects were moderate at significance level. Surprisingly, providing help to family and kin had no significant association with the survival status of these healthier elders. By adding interaction terms into the fully-adjusted model for the total sample, it was found that the beneficial effect of providing help to family and kin was significantly stronger for older people who had one or more functional limitations than those who were free of functional limitations.

The more remarkable variations in the effects of social support and social engagement variables compared with those of social network variables may be due to the fact that the level of social engagement and receiving support tend to be related to physical capability more closely. Such different patterns of relative importance of social integration components across two groups suggest the underlying mechanisms through which social integration affects mortality may vary among older people with different health status.

## **5.4 Main findings and Discussion**

The goal of this chapter is to examine the pattern of the association between social integration components and mortality for older people in contemporary China, a social setting that has a tradition of extended family and strong intergenerational relationship and at the same time has been undergoing rapid social and demographic changes.

### **5.4.1 Characteristics of social integration of Chinese elderly**

Social and cultural norms shape the characteristics of social networks and activities and their associations with health and mortality (Berkman et al. 2000; Fiori, Antonucci and Akiyama 2008; Litwin 2010; Seeman et al. 1993). Different from older people in Western countries who tend to have a friend-focused, or diverse social network (Crohan and Antonucci 1989; Fiori, Antonucci and Akiyama 2008; Fiori, Antonucci and Cortina 2006; Gurung, Taylor, and Seeman 2003), Chinese elders in this sample were found to have their social networks mainly focused on family and kin relationships. As evidenced in the descriptive analysis, most older people in China had at least two children. The majority of old respondents (63 per cent at baseline) lived with children, a proportion much higher than what was found among many Western older populations. Moreover, most older people kept frequent contact with children who were not living together with them. However, nearly half of them reported that they had not been contacting friends or relatives in the past 12 months. It is also common for Chinese elderly to receive support from

family members. Three quarters of them received emotional support and nine out of ten received instrumental support.

With regard to social engagement, two thirds of older people reported they provided help to family and kin in cleaning house, taking care of grandchildren, or preparing meal, while a much smaller proportion of them reported that they engaged in activities outside the home, which is different from Western older people who are more likely to engage in social, recreational and productive activities such as being a volunteer or continuing being employed (Luoh and Herzog 2002; Musick, Herzog and House 1999).

However, the implications of rapid demographic and social changes for family structure and living arrangements have raised much concern on whether family-centered social networks, especially intergenerational relationships, remain to be important in protecting the health and well-being of older people in contemporary China; whether the activities circumscribed within household continue to provide self-fulfillment and a sense of achievement among them.

#### **5.4.2 The lack of effect of intergenerational relationships**

One important objective of this study is to examine the relative importance of family and kin relationships versus non-family relationships in protecting survival status for Chinese elderly. In a society with a family-centered tradition and underdeveloped formal social support, children are supposed to be a main source of later-life support of older people. It is assumed that having more children implies more resources and support which in turn benefits the

health and well-being of older people in China. Co-residing with older parents or frequently visiting parents are considered to be important ways for adult children to perform filial piety and provide support and care to older parents.

Surprisingly, the protective effect against mortality of having two or more children was only at a marginal significance. Living with children and having frequent contact with non-resident family members (mainly with children, also including parents and spouse) were not associated with mortality. Having a spouse, on the contrary, exerted a stronger protective effect on survival status for Chinese elderly. The assumed importance of protective effect of intergenerational relationships was not supported. Moreover, this less importance of children compared to spouse in affecting the health and well-being of older people is consistent with many study findings in Western societies where independence and autonomy are emphasized (Cohler 1983; Lee, Netzer and Coward 1995; Pyke and Bengtson 1996; Seeman et al. 1987).

The current study found that those living with children had no significant advantages compared with those living with spouse only, others or alone. Given the correlation between living with children and marital status, the effect of living arrangements was further checked among those married and unmarried separately. No association between living arrangements and mortality was found either for the married or the unmarried. This indicates that, even for those unmarried who are mainly widowed in this sample, it does not appear to be the case that living with children provides a greater protection than living alone or living with others. This finding is contradictory to some

previous studies in which living with children was found to be significantly related to better health and well-being compared to living alone for older people in China (Chen and Short 2008; Cui 2002; Silverstein, Cong and Li 2006).

It has been gradually realized that the nature of family and intergenerational relationships in contemporary China has been greatly influenced during the rapid sociodemographic and economic changes. Indeed, there were recent research findings which did not accord with the assumption of the advantage of co-residing with children compared with independent living arrangement. For example, in a study conducted among the Chinese oldest old, Chen and Short (2008) found that although those living with children or other immediate family members (spouse, daughters) had a significantly higher level of subjective well-being than those living alone, there were no significant differences in the subjective well-being between those living with children and those living with spouse. Furthermore, this study found that the oldest old living with a daughter had better subjective well-being than those living with a son.

The lack of variation in health outcomes across different living arrangements in the current study suggests that living independently (with spouse only, or alone) may not necessarily be disadvantageous for the current Chinese elderly. The rapid demographic and socioeconomic changes accompanied with urbanization have challenged the persistence of traditional coresidence and have great implications for its functions. Previous studies have reported that co-residing with children or sons was not a preferred living arrangement for a sizable share of the current Chinese elderly, especially those living in urban

areas (Long and Bian 1999). Non-traditional independent living arrangements have been increasing in recent years (Bian, Logan and Bian 1998; Lively and Ren 1992; Wu 1991).

These trends, however, do not necessarily mean that the norms of filial piety and close intergenerational bonds have been abandoned. They could be the adaptation of family which has benefits for both younger and older generations in this new social environment (Chen 2005). For example, Silverstein, Cong and Li (2006) found that a sizable proportion of rural elders living with grandchildren in generation-skipped households but receiving remittances from geographically separated adult children had a comparable psychological well-being with those rural elders living with children and better than those living alone or living with spouse only. Thus, modern societies with high social mobility may discourage stable co-residence on one hand while facilitating other forms of interaction and support exchanges between geographically separated generations. In a modern society, close and supportive intergenerational relationships may not necessarily be achieved through co-residing living arrangement. Emotional support through telephone communication or receiving financial support from geographically separated children are common practices in contemporary China, which may help maintain the bond between generations effectively while avoid the conflicts often occurring among household members.

At the same time, the insignificant effect of living arrangements found in the current study cannot be simply interpreted to mean that living with



children has no positive effect on the health for older people in China. In many Western studies, older people who live with children was consistently found to be disadvantageous in health and well-being compared with those who live with spouse only. Thus, the lack of significant disadvantages of living with children found in this sample of Chinese elderly may reflect the continuous influence of traditional culture of close intergenerational bonds in contemporary China.

Lack of health effect of living arrangements may also be partially due to the limited categories of this variable measured in the current study. As mentioned in Chapter 3 (Background of China), a sizable proportion of older people live close to their children but under a separate roof in contemporary China. The “networked families” (living separately but with strong intergenerational relationships) in urban China and ‘quasi-coresidence’ (living next door or living as neighbors) in rural China are becoming increasingly prevalent in recent years (Unger 1993). It has been found that quasi-coresidence often involves a high level of support exchange between older parents and their non-coresident children (Logan and Bian 1998). Moreover, such ‘intimacy-with-distance’ living arrangement can avoid tension and unpleasant interactions which tend to occur between household members. Thus, compared to those living with children, this group of Chinese elderly living separately from but close to children may have no significant disadvantages in terms of receiving family support and subsequent health outcomes. However, the investigation on this subgroup could not be conducted in the current study due to the lack of data. The third wave of BMLSA survey in 1997 no longer asked those living separately

whether they lived close to children or not as the previous waves did.

Similarly, in the current study, it was found that there was no significant association between mortality and having frequent contact with more non-resident children and other family members. The variable of ‘having frequent contact with three or more non-resident family members’ measured the number of non-resident family members (including their children, older parents, and spouse) with whom older respondents had contact with at least once a month. Indeed, respondents mainly referred to children because few of them mentioned older parents or spouse when answering this question. Having contact with non-resident children is considered to be an important way of retaining close intergenerational bonds and receiving emotional and instrumental support. However, this variable was not associated with mortality even before controlling for any other covariates. To exclude the possibility that the low association found in this study may be due to the way of coding, I conducted additional analyses with different ways of coding such as including this variable as a categorical variable instead of dummy one, or coding the number of weekly contacts rather than monthly contacts. However, the results show similarly insignificant effects on mortality.

#### **5.4.2.1 Beneficial effect of emotional support, adverse effect of instrumental support**

As a result of the cultural emphasis on informal social support combined with the underdevelopment of formal support, social support is assumed

to be crucial to the health of Chinese elderly and has been a consistent focus of aging studies in China. Unexpectedly, the current study found that receiving emotional support had a modest protective effect but failed to reach a statistically significant level, and receiving instrumental support was significantly and substantially associated with increased mortality for older people in China.

The opposite directions of the effects of emotional and instrumental support have also been found in previous aging studies. It has been widely documented in many Western and some Chinese aging studies that receiving emotional support benefits the elderly's health and well-being, especially psychological well-being (Chen and Silverstein 2000; Krause and Liang 1993). The adverse effect of receiving financial and instrumental support on their health and well-being were also found in other aging studies in China (Chen and Silverstein 2000; Krause, Liang and Gu 1998). Receiving instrumental support was found to undermine one's sense of usefulness and self-confidence in Western societies where emphasize independence and autonomy (Seeman, Bruce and McAvay 1996; Silverstein, Chen and Heller 1996). However, in China with a culture emphasizing filial piety and generational interdependence, it is anticipated that the older parents' expectation on filial piety may relieve their psychological burden of being a support recipient to some extent.

One possible reason for the adverse effect of receiving instrumental support found in the current study and other recent studies in China lies in the implications of changes in social and household context. The fast demographic and socioeconomic changes as well as underdevelopment of formal support in

China have witnessed the middle-aged adults (Sandwich generation) struggling to keep their jobs and taking care of older parents and children at the same time. Moreover, it has also been noticed that the motives for support exchanges are shifting away from performing traditional extended family values toward practical coping strategies. Under such a changed social circumstances, receiving instrumental support may intensify a feeling of being a burden among Chinese elderly, especially among those who are unable to achieve a reciprocal balance in support exchanges. This could also be an explanation for the finding in the current study that receiving instrumental support was significantly associated with increased mortality for those who had functional limitations but not for those who were free of functional limitations.

Notably, the hierarchical model analyses revealed that the health effect of social networks for Chinese elderly was not mainly obtained from social support provided by network members. As most respondents in this survey reported they received emotional and instrumental support from children, this finding is important for Chinese aging research and policy makers. It cannot be assumed that receiving support is beneficial to the health and well-being of Chinese elderly. Social support, especially support provided by adult children, should not be considered as an exclusive focus of research and policy-making in China. As Berkman and her colleagues (2000) pointed out, the effects and pathways through which social relationships influence health are shaped by the larger social and cultural context. The rapid change of the social context in contemporary China may have implications for the pattern of children's

performing filial support as well as elderly parents' perception of receiving support, which may lead to changes in the effects of social support on the health and well-being for the current Chinese elderly. Further research should carefully monitor the health effect of receiving social support and the kinds of social support, and investigate the mechanisms through which social networks exert effect on the health and survival status of older adults in contemporary China.

In sum, the assumption of the important role of children in protecting the health and well-being of older people in China through co-residential living arrangements and filial support provision cannot be taken for granted among the current cohorts of older people who are facing a changed social environment. Qualitative research including in-depth interviews is needed in the future to better understand the nature of the intergenerational relationships and co-residence and their health impacts in contemporary China.

#### **5.4.3 The significant and independent protective effect of social engagement**

An important objective of this investigation is to examine the impact of social engagement on the survival status of Chinese elderly. In Western studies, engaging in meaningful social roles and fulfilling activities has been increasingly recognized as an important way for older people to remain socially integrated (Neugarten, Havighurst, and Tobin 1968; Rowe and Kahn 1998). However, so far it has gained much less attention in studies conducted among

older people in China. The results in the current study show that Chinese elders who more actively engaged in social, productive, and recreational activities had lower odds of mortality compared with those who were less active in social engagement. Working, giving help to family and kin, and participating in recreational activities were significantly associated with decreased mortality. Organizational attendance had a protective effect with marginal significance. These findings suggest that the protective effect of social engagement on survival status found among the elderly in the West countries was also found among older people in contemporary China.

It has been suggested that the mechanisms through which social engagement affects health are complex and may involve physiological and psychosocial pathways. Although it is beyond the scope of this study to identify the underlying mechanisms, social engagement measured in this study include various kinds of activities, productive (working status, giving help to family and kin), recreational (participating in leisure activities), and social activities (organizational attendance), which indicates that the benefit of social engagement on survival status for Chinese elderly may involve a broad range of mechanisms, including those through improving physical and cognitive fitness, fulfilling social roles, and reinforcing a sense of meaningfulness.

It is important to point out that the protective effect of social engagement was independent of social networks. In the final fully-adjusted model (Model 5), the protective effects of social engagement components remained almost unchanged in both magnitude and significance after controlling for so-

cial network variables. This finding supports the theoretical opinion that social engagement is a dimension distinct from social networks in terms of affecting late-life health and survival status (Berkman et al. 2000). More importantly, this finding has great implications for future aging policy design in China. Although being involved in social networks, especially family and kin relationships, is assumed to be an important way for Chinese elderly to remain socially integrated, it should not be the only way. The current and future cohorts of Chinese elderly are likely to have fewer children and live geographically separately from their children. Active social engagement could become an important alternative way for older people to remain socially integrated and compensate for the potential negative consequences of the declining social networks and family support and the loss of close ties on the health and well-being in later life.

#### **5.4.4 The relative importance of engaging in family-centered activities versus social participation outside the home for Chinese elderly**

One main mechanism through which social engagement benefits health is through fulfilling social roles and a sense of meaningfulness and usefulness which, however, are shaped by social norms and values that vary across different societies. The hypothesis of family-centered cultural influence I tested in the dimension of social engagement is that giving help to family and kin, an activity contributing to family, has a more important effect on mortality for older people in China than engaging in those outside-home activities such as

working, organization attendance, and participating in recreational activities.

In the fully-adjusted model for the total sample (model 5), giving help to family and kin was found to have a stronger effect against mortality than engaging in other kinds of activities after covariates were controlled. However, it is tentative to interpret this finding as an evidence of family-centered culture because the further health-specific analyses revealed that this pattern of relative importance was applicable only for those who had functional limitations. Surprisingly, for those who were free of any functional limitations, engaging in outside-home activities had stronger protective effects than giving help to family and kin, which indeed failed to approach a significance level.

It has been documented that the behavior of giving help itself has a healing effect through establishing self-efficacy, and a sense of being useful and meaningful. And the benefit of giving support to others has been consistently found among different older groups, including those with poorer health and higher requirement of support. Lack of significant protective effect of giving help to family and kin among Chinese elderly who were free of functional limitations in the current study may indicate that the health effect of giving help to family members is different from the effect of giving help to others in general.

It is anticipated that giving help to family members tends to enhance the sense of being useful and purposeful among Chinese elderly, especially older women, as China's traditional family norms encourage close family bonds and interdependence of generations. However, rapid social and demographic



changes occurring in recent years have presented challenges to such extended family norms and arrangements. As women are much more likely to have higher educational level and participate in labor market and less likely to be full-time family caregivers, the younger generation now find it difficult to cope with work and household maintenance and child care. It has been noticed that providing help by elderly parents, especially in housekeeping and child care, is becoming an important strategy to cope with these new situations encountered by the Chinese family in contemporary China (Chen, Short and Entwisle 2000; Silverstein, Cong and Li 2006). Recent studies have shown that older people are increasingly becoming a source of support for their children by helping meal preparation, grandchild care, and the like (Hermalin, Roan and Perez 1998; Biddlecom, Chayovan and Ofstedal 2002). It has raised much concern that older parents in China are now under pressure to provide more help to their adult children. A recent study in China found that giving instrumental support to children exerted a negative effect on the health of older people although it is not statistically significant (Liu, Liang and Gu 1995).

If support flowing from older parents to adult children is a practical coping strategy to adapt to the new situation faced by families of younger generations, the healthier elderly may be more likely to be under pressure to provide help to children, which may become a heavy burden and in turn exert a harmful effect on their health. The BMLSA baseline data show that the healthier respondents (those without functional limitations) were more likely to give than receive two or more kinds of instrumental supports (72 per

cent v.s. 37 per cent). For those with functional limitations, half of them gave support while three quarters received two or three kinds of instrumental supports. For them, the significant protective effect of giving help to family and kin may indicate that being able to giving help back reduce their feeling of being a burden, achieve a sense of being useful, and enhance self-confidence.

The variation in the effect of giving help to family and kin across older people with different health status found in the current study raised a few research questions: are Chinese elderly, especially those healthy elderly parents, under pressure to give more to their adult children? What are the health consequences? Are the motivations of providing help to family and kin different for older people with different health status, which, consequently, leads to different effects on health? To answer these questions, further information on the perspective of older adults need to be collected by in-depth interview in future research.

#### **5.4.5 The pattern of the association between social integration and mortality varied by health status**

It has been suggested that the confounding effect of health status needs to be disentangled carefully in the association between social integration and mortality. In the current study, the effects of most social integration components on mortality were found to change in a remarkable and complex way when health status variables were controlled. This led to my decision to conduct separate analyses by health status. Findings of the separate analyses

show that the pattern of the association between social integration and mortality is different for older people with different health status.

First, the effects of receiving support and giving support on mortality were stronger for those who had functional limitations than those who were free of functional limitations. Specifically, the beneficial effect of receiving emotional support and adverse effect of instrumental support were only found among those having one or more functional limitations. Similarly, the protective effect of giving help to family and kin was also found much stronger among this group of older people with functional limitations. It is possible that for older adults with functional limitations, emotional support may comfort and reassure a sense of being accompanied and cared about, while receiving instrumental help from others may reinforce their sense of being dependent or useless. The stronger benefit of giving help to family and kin in this group may reflect that they tend to consider being able to help others as a rewarding experience through reinforcing a sense of being useful and self-efficacy.

The effects of social engagement on mortality also varied by health status. For those who were free of functional limitations, engaging in outside-home activities were significantly associated with decreased mortality, while giving help to family and kin failed to approach significant level. On the contrary, for those who had one or more functional limitations, the relative importance of outside-home activities and family-related activities was in the opposite direction. Giving help to others was the only activity with significant protecting effect against mortality for this group of elders. These different

patterns in the health effects of social engagement may partially result from the strong correlation between activity engagement and health status. Performing social engagement is more dependent on health and functional condition.

In sum, the different patterns in the effects of social integration components on mortality observed among Chinese elders with different level of functional limitations in the current study provide empirical evidence supporting the necessity to carefully disentangle the confounding effect of health status when examining the association between social integration and mortality.

## Chapter 6

# Gender and urban-rural differences in the association between social integration and mortality

### 6.1 Aims and hypotheses

The aim of this chapter is to examine whether the pattern of association between social integration and mortality observed in the total sample varies between men and women as well as between urban and rural elderly.

The previous chapter examined the relative importance of family and non-family relationships and activities among Chinese elderly to better understand the pattern of the association between social integration and mortality for older people in a society with a deep-rooted family-centered tradition while undergoing remarkable social changes. In general, the findings of the previous chapter revealed that there was no strong evidence of the influence of family-centered tradition. Although having a spouse was found to be strongly and significantly associated with decreased mortality, the protective effect of having two or more children was only marginally significant. Moreover, having frequent contact with three or more non-resident children and other family members, and having contact with friends and relatives were not associated with mortality. Receiving emotional support was protective but the effect was

not statistically significant. However, receiving instrumental support had a significant harmful effect on survival status even after health status variables and other covariates were controlled. Moreover, providing help to family and kin, a family-centered activity, had no significant protective effect on survival status for those elderly who were free of any functional limitations. For them, however, engaging in those activities outside home including working, participating recreational activities and organizational attendance significantly decreased the odds of mortality.

However, it is not known whether such pattern of relative importance of social integration components is uniform across different subgroups of older people in China. Gender differences in the pattern of the association between social integration and mortality have been found in previous studies (Berkman and Syme 1979; House, Robbins and Metzner 1982; Schoenback et al. 1986; Shye et al. 1995). As Shye et al. (1995) pointed out, such gender differences could be a result of both the gender differences in the characteristics of social networks and activities they are involved in as well as the gender differences in the health effects of these social integration components. These two kinds of gender differences mainly derive from their differences in social status, social roles and expectations. Chapter 2 and 3 have already shown that widespread gender differences exist in socioeconomic status, health-related behaviors, health conditions as well as the characteristics of social relationships and activities older Chinese men and women are involved in. This social fact leads to the gender-specific analyses in this chapter to understand what kind

of social ties and activities are important protectors against mortality for older Chinese women and men respectively.

Similarly, there are remarkable urban-rural differences in both social and structural level including the level of industrialization, and pension and health-care system development, and in individual level including health status, health-related behaviors, and features of social networks and activity engagement. These differences are a result of historical reasons and reinforced by biased policies and unbalanced social development in contemporary China. The current study also examines the potential differences in the association between social integration and mortality between urban and rural elders.

The following hypotheses are to be examined in this chapter.

**Gender differences:**

*SOCIAL NETWORK DIMENSION*

*For men, having a spouse has a greater protective effect against mortality than other social relationships (Hypothesis 6.1). The protective effect of having a spouse is greater for men than women (Hypothesis 6.2).*

*For women, intergenerational relationships (having more children, living with children, and having frequent contact with more non-resident children) are of primary importance in protecting against mortality compared with other social ties (Hypothesis 7).*

*SOCIAL ENGAGEMENT DIMENSION*

*For women, providing help to family and kin, a family-related activity,*

*has a greater protective effect against mortality than engaging in social or recreational activities outside the home (Hypothesis 8.1). The protective effect of providing help to family and kin is greater for women than men (Hypothesis 8.2).*

**Urban-rural differences:**

*SOCIAL NETWORK DIMENSION*

*For rural elderly, intergenerational relationships (i.e. having more children, living with children, and having frequent contact with more non-resident children) have greater protective effects against mortality than other social relationships (Hypothesis 9.1). The effects of intergenerational relationships are greater for rural than urban elders (Hypothesis 9.2)*

*For urban elderly, having a spouse plays an important role in protecting against mortality (Hypothesis 10).*

*For urban elderly, having contact with friends and relatives is beneficial to their survival status (Hypothesis 11).*

*SOCIAL ENGAGEMENT DIMENSION*

*For rural elderly, providing helping to family and kin has a grater protective effect against mortality than engaging in activities outside the home (Hypothesis 12.1). The effect of providing help to family and kin is greater for rural than urban elderly (Hypothesis 12.2).*



## **6.2 Methods**

### **6.2.1 Data and measurement issues in subgroup analyses**

The pooled data constructed in the previous chapter were divided into sub data by gender and urban-rural region. The sample size of the pooled data was 8003 person-periods. There were 2519 for urban men, 2657 for urban women, 1314 for rural men, and 1412 for rural women. The descriptive analyses and bivariate analyses were conducted among these four subgroups. In multivariate analyses examining gender differences, I divided the pooled data by gender and controlled urban-rural variable in gender-specific models. When examining urban-rural differences, I divided the pooled data by urban-rural region and controlled gender in region-specific models.

Measures of mortality, social integration components, and other covariates used in the previous chapter were followed in this chapter. Social integration components may have different distributions in subgroups. For example, the number of recreational activities rural elders participated in was highly skewed towards 0 or 1. By contrast, urban elders were more likely to participate in more kinds of recreational activities. Nevertheless, in order to make the subgroup comparison more direct and easier to interpret, I followed the same categorization of social integration components in analyses of different subgroups.

In the previous chapter, it was unexpectedly found that living with children had no significant protective effect against mortality for Chinese elderly. However, it is worthwhile to examine whether the effect of living arrangements

on mortality varies by gender and by urban-rural residence. It is possible that women's lower economic status may lead to a stronger protective effect of living with children for them than for men. It is also possible that rural elders are more strongly committed to co-residence tradition than their urban counterparts, which makes the effect of co-residing with children more important for them than for urban elders. Due to the small sample size in subgroup analysis models, living arrangement was coded as a dummy variable (living with children= 1, else=0) in this chapter to mainly examine whether living with children makes a difference in survival status across different subgroups of older people.

### **6.2.2 Analysis steps**

In descriptive analyses, gender and urban-rural differences in mortality as well as the characteristics of social integration were examined first. Then, gender differences and urban-rural variations in the relative predictive power of social integration components were examined using pooled logistic regression models. In multivariate analyses, I did not separate data by gender and urban-rural simultaneously as I did in descriptive analysis and bivariate analysis because in doing so, the subgroup sample size would be too small for analysis. When I examined gender differences, I just divided the pooled data by gender and controlled urban-rural variable in men's and women's models. When examining urban-rural differences, I divided the pooled data by urban-

rural regions <sup>1</sup>. In each region-specific model, I controlled gender variable.

In Model 1 of each subgroup analytic model, social networks and social engagement components were included simultaneously with the time interval indicator controlled. The relative importance of social integration components independent of one another was examined. Then, domains of covariates were included into subgroup models hierarchically from Model 2 to 4. As there are remarkable gender and urban-rural differences in most of these covariates including socioeconomic status, health-related risk behaviors, and health status, it is possible that the potential confounding effects of these control variables are different across subgroups. Moreover, when domains of covariates were controlled hierarchically, the coefficients of the effects of social integration components may change in magnitude and significance in different ways, which sheds light on the variations in the underlying dynamics of the association between social integration and mortality in different subgroups.

If the effect of a particular social integration component was remarkably different in terms of magnitude and significance by gender or by urban-rural residence, the significance of this difference was further checked by adding an interaction term of this social integration component with gender or urban region in the model of the total sample.

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<sup>1</sup>Rural respondents are from two different districts. One rural district is closer to urban area, and the other is mountainous rural area. In preliminary analyses, respondents from two rural areas were analyzed in separate models. The results of two models revealed similar patterns in terms of relative importance of social integration components in affecting mortality for elders from these two rural areas. Thus, they were combined into one model for rural elders.

## 6.3 Results

### 6.3.1 Descriptive analysis results

Table 6.1 presents the mortality rates of men and women in urban and rural areas during each follow-up period as well as in the pooled data. In urban areas, there was no big gender difference in mortality rates. In Rural areas, women had a higher mortality rate than men. Urban-rural differences in mortality were remarkable. As seen in Table 6.1, the mortality rates among rural elders, especially rural men, in each follow-up period were substantially higher than their urban counterparts. Given that mortality and life expectancy can be an indicator of living standard and health care condition, the remarkable disadvantages in social and economic environment for rural Chinese residents may result in their higher mortality rate.

Gender and urban-rural differences in the characteristics of social integration are presented in Table 6.2. There are several important findings. First of all, there were remarkable gender and regional differences in the prevalence of widowhood. About 38 percent of rural women and 21 per cent of rural men were unmarried (widowed, separated, divorced, and never married), both were higher than their urban counterparts (11 percent of urban men and 30 percent of urban women respectively). There were no significant gender differences or regional differences with regard to the number of children, having frequent contact with three or more non-resident family members, and having contact with friends and relatives. As for living arrangements, women were more likely to live with children than men in rural areas. And it is interesting to find that

Table 6.1: Mortality distribution in pooled sample and among men, women, urban, and rural elders (unweighted mortality rate)

Mortality	Time 1 92-94	Time 2 94-97	Time 3 97-00	Pooled data
<b>Urban Men</b>				
Alive	90.0% (896)	86.3% (754)	87.1% (565)	87.9% (2215)
Died	10.0% (100)	13.7% (120)	12.9% (84)	12.1% (304)
Subtotal	996	874	649	2519
<b>Urban Women</b>				
Alive	91.1% (956)	88.1% (811)	88.8% (610)	89.5% (2377)
Died	8.9% (93)	11.9% (110)	11.2% (77)	10.5% (280)
Subtotal	1049	921	687	2657
<b>Rural Men</b>				
Alive	82.1% (449)	79.5% (345)	76.3% (254)	79.8% (1048)
Died	17.9% (98)	20.5% (89)	23.7% (79)	20.2% (266)
Subtotal	547	434	333	1314
<b>Rural Women</b>				
Alive	87.9% (496)	82.7% (392)	79.1% (296)	83.9% (1184)
Died	12.1% (68)	17.3% (82)	20.9% (78)	16.1% (228)
Subtotal	564	474	374	1412
<b>Total Sample</b>				
Alive	88.6% (2797)	85.2% (2302)	84.4% (1725)	86.4% (6824)
Died	11.4% (359)	14.8% (401)	15.6% (318)	13.6% (1078)
Total	3156	2703	2043	7902

Table 6.2: Differences in the characteristics of social integration by gender and geography using pooled sample

	Urban		Rural		Pooled
	Men	Women	Men	Women	
<b>Social networks</b>					
Marital status					
Married	89.1	70.9	78.9	62.4	75.2
Unmarried	10.9	29.1	21.1	37.6	24.8
Number of children					
0-1	7.4	10.9	7.9	4.0	7.6
$\geq 2$	92.6	89.1	92.1	96.0	92.4
Number of non-resident family members with whom elders contact at least once per month					
0-2	26.0	20.8	22.3	19.6	22.2
$\geq 3$	74.0	79.2	77.7	80.4	77.8
Having contact with friends and relatives					
No	48.5	52.0	49.2	46.0	48.9
Yes	51.5	48.0	50.8	54.0	51.1
Living Arrangements					
Living alone	3.0	6.6	5.2	6.0	5.2
Living with spouse only	26.5	23.2	34.2	26.1	27.5
Living with children	62.4	59.8	55.1	62.8	60.0
Living with others (not children or spouse)	8.0	10.4	5.5	5.1	7.3
<b><i>Social support</i></b>					
Receiving Emotional support	82.7	79.8	62.8	60.3	71.4
Number of kinds of Instrumental support received					
0-1	70.3	62.5	41.7	40.3	53.6
2-3	29.7	37.5	58.3	59.7	46.4
<b>Social Engagement</b>					
Working	39.2	12.7	62.0	12.5	31.4
Giving help to family and kin	54.9	65.1	51.6	66.8	59.6
Organizational attendance	17.5	19.3	5.8	3.2	11.4
Participating in leisure activities	49.7	37.9	14.5	7.3	27.1

the proportion of living with spouse only was slightly higher among rural elders than urban elders, which may be due to the fact that quite a sizable proportion of rural Chinese elders living close to adult children but under separate roofs were categorized as living independently in the current study.

With regard to receiving social support, there were no distinct gender differences in receiving emotional support and instrumental support in both urban and rural areas. By contrast, urban-rural differences were distinct. Notably, rural men and women were much more likely to receive instrumental support, but much less likely to receive emotional support compared with their urban counterparts. Around four out of five urban men and women (82.7 per cent for urban men, 79.8 per cent for urban women) reported that they received emotional support, while only around three out five rural men and women (62.8 per cent for rural men, 60.3 per cent for rural women) reported so. With regard to receiving instrumental support, around 60 per cent of rural men and women reported that they received two or three kinds of instrumental supports in the past 12 months, while only around one third of urban men and women (29.7 per cent for urban men, 39.5 per cent for urban women) reported so.

The higher proportion of receiving instrumental support among rural elders indicates that they may be more likely to be in need due to their lower income or poorer health conditions compared with their urban counterparts. When further examining the specific kind of instrumental support they received, it was found that three quarters of rural elders (65 per cent for rural

men, 84 per cent for rural women) received financial support. By contrast, only one third of urban elders (28 per cent for urban men, 45 per cent for urban women) did so. Twelve per cent of rural elders reported that they received body care support compared to 5 per cent of urban elders.

It is noteworthy that nearly four out of ten rural elders did not receive emotional support (answering no when being asked whether there are someone that they feel very close and intimate with), a proportion much higher than that of urban elders. It seems that such a low proportion of rural elders receiving emotional support is not in accord with the traditions characterized by close family bonds and filial support and respect from younger generations. This finding suggests that for rural elderly, receiving instrumental help from family members and kin in terms of food, money or bodycare may not necessarily indicate the quality and intimacy of family relationships. Furthermore, in a modern society with the social status of older people declining, receiving more instrumental help among rural elders due to their poor economic status may lead to tension or conflict with younger generations. Further research is needed to understand the low level of receiving emotional help among rural Chinese elders. For urban elders, the much higher proportion of receiving emotional support while lower proportion of receiving instrumental support could be a result of their better economic status as well as their modern attitudes toward maintaining closeness in emotion but at the same time keeping independence and autonomy in daily life.

With regard to the four social engagement components, three of them



differed by gender in both urban and rural areas. Labor force participation was affected by gender as well as the level of industrialization. More than one third of urban men were still working for a part-time or full-time job and two thirds of rural men remained in farm labor or other kinds of job, whereas only one tenth of urban and rural women were currently working.

Compared to men, women were more likely to provide help to family and kin (66 per cent vs. 53 per cent). There was no significant urban-rural difference in this activity engagement. In the current study, giving help to family and kin was measured by three kinds of instrumental help older respondents provided to family members and relatives: helping in housework, in babysitting or taking care of young children, and in money or goods, which were comparable to the kinds of instrumental help older respondents received from children and other kin ties. It is noteworthy that an urban-rural difference appeared when comparing the proportion of providing instrumental help with that of receiving help. Specifically, urban elders, both men and women, were much more likely to provide help than to receive help. More than half of urban elders gave help, while only one third of them received two or three kinds of instrumental help. In contrast, for rural elders, these two proportions of giving and receiving help were relatively balanced.

The prevalence of participating in organizational and recreational activities was lower among women than men, rural than urban elders. Around 20 per cent of urban elders reported that they participated in the activities organized by the neighborhood or village committee, senior citizens status or

former working units, while among rural elders, the prevalence of this activity engagement was much lower to an ignorable level (around 5 per cent). Moreover, in urban areas, 50 per cent of men and 38 per cent of women reported that they participated in at least one recreational activities including playing cards, chess, mahjong, going to movie, chatting with neighbors and so on, compared to 15 per cent of men and 7 per cent of women in rural areas. The extremely low prevalence of social or recreational activity participation among rural Chinese elders indicates that their later life may be dominantly circumscribed within family. The fact that compared to their rural counterparts, urban elders were more likely to attend organizational activities or participate in recreational activities could be an indicator of the urban-rural difference in old-age life style.

The descriptive analyses of the characteristics of social integration in the four separate subgroups in Table 6.2 show that the pattern of gender differences in social integration components in urban areas was similar to that in rural areas. The pattern of urban-rural differences was also similar for men and women. Thus, rather than conducting multivariate analyses in four separate subgroups which may result in a very small sample for analysis, I chose to control for gender variable in regional-specific models, and control for urban-rural residence in gender-specific models in the following multivariate analyses.

Table 6.3 presents subgroup differences in sociodemographic characteristics and health status. Not surprisingly, there were significant gender and

Table 6.3: Differences in sociodemographic characteristics and health conditions by gender and urban-rural region

	Urban		Rural		Pooled
	Men	Women	Men	Women	
Age(Mean, SD)	66.1 (6.3)	66.3(6.8)	66.5(9.2)	67.0 (9.5)	66.5 (7.6)
Educational level					
No education	8.3	42.3	49.6	94.7	48.9
Primary school	37.9	31.7	46.0	4.7	29.9
Higher than primary school	53.8	26.0	4.5	0.6	21.2
Household electrical appliances(Mean, SD)	4.6(1.2)	4.5 (1.2)	2.0(1.7)	2.1(1.7)	3.3(1.9)
Income is enough	73.5	68.8	45.5	42.8	57.5
Stressful life events	23.6	29.1	31.5	28.6	28.2
Health-related risk behaviors					
Smoking	36.5	15.2	58.2	13.1	30.6
Former smoker	24.9	7.7	17.0	9.4	14.7
Drinking	30.4	3.9	52.1	10.8	24.1
Former drinker	12.3	1.0	14.5	5.2	8.2
Health conditions					
Self-rated health					
Very good/good	52.1	40.6	54.3	44.5	47.7
Fair	32.5	37.0	22.9	26.0	29.7
Poor/very poor	13.2	20.6	19.1	26.5	19.9
DK/no answer	2.1	1.9	3.8	3.0	2.7
Functional limitation					
No	89.7	86.4	82.5	67.1	81.3
Yes	10.3	13.6	17.5	33.0	18.7
Chronic diseases					
No	45.7	47.2	62.1	64.9	54.8
Yes	54.3	52.8	37.9	35.1	45.2

urban-rural differences in education level, health-related behaviors and health status. Given that these variables have been found in previous studies to be either predictors of mortality or strongly associated with the characteristics of social networks and social engagement, the observed remarkable differences of these covariates across subgroups indicates that their potential confounding effects may vary across subgroups. It is better to separately examine the association between social integration and mortality for different older subgroups.

Before conducting multivariate analyses, the correlations among all social integration components were examined for urban men, urban women, rural men and rural women respectively. In general, the correlations were low in all the four subgroups. Most correlations were at the level of  $< 0.1$  or  $< 0.2$ . The highest correlation was found between marital status and receiving emotional support (.31 for urban elders, .27 for rural elders, .33 for men, .28 for women). The slightly higher correlation between having a spouse and receiving emotional support for men than for women may be due to that fact that men were more likely to exclusively depend on wife for emotional support. It is noticed that out of those who reported receiving emotional support (having someone they feel very close and intimate with), around 87 percent of men in urban areas, 65 per cent of men in rural areas mentioned spouse was the one they felt very close and intimate with, compared to 63 per cent of women in urban and 45 per cent in rural areas. For rural women, more than half of them mentioned son or daughter as the one they felt very close and intimate with.

## 6.3.2 Multivariate analyses

### 6.3.2.1 Gender differences in relative importance of social integration components

#### *The effects of social network items for men and women*

The analysis results of gender-specific models are displayed in Table 6.4 (for men) and 6.5 (for women). Gender differences in the relative importance of social network components are described first. For men, as shown in Table 6.4, when all the social integration components were included simultaneously in Model 1, having a spouse and having two or more children were significantly associated with lowered mortality risk. However, living with children and having frequent contact with three or more non-resident family members were not associated with mortality. Having contact with friends and relatives had no effect on mortality. After age, socioeconomic status, health-related behaviors, life strain status and health status variables were included hierarchically (Model 2-4 of Table 6.4), the protective effect of having two or more children lost its significance. Having a spouse remained to be the only social network component with significant protective effect although the effect strength was declined. *This supports the hypothesis that having a spouse has a greater effect than other social relationships for old men.* Compared with unmarried men, the odds of mortality for married men were 26 per cent lower (OR=0.739, 95

percent CI: 0.553, 0.987).

For women, as Table 6.5 shows, when all the social integration components were included simultaneously in Model 1, it is unexpected to find that the protective effect of having two or more children was at marginal significance level. Moreover, neither living with children nor having frequent contact with more non-resident children and other family members was associated with decreased mortality. Having contact with friends and relatives had no effect on women's mortality. After all known covariates were controlled (Model 4 of Table 6.5), similar to men, having a spouse remained to be the only significant protective social tie for women. Thus, *the hypothesis that intergenerational relationships are of primary importance in protecting against mortality for women is not supported.*

The hypothesized primary role of children in protecting against mortality of older Chinese women is based on the social fact that older women in China, especially those older-old and oldest-old, are more likely to be emotionally and financially dependent on children than old men. Intergenerational relationship and filial support are assumed to be crucial to women's late-life health and well-being. However, the finding of the current study that the role of children in protecting survival status for older women is not as important as expected suggests that the nature of family arrangements and intergenerational relationships may be undergoing transformation in rapidly changing China. It is also possible that the objective measurements of intergenerational relationships used in this study have limitations on reflecting the quality of or

Table 6.4: The association between social integration and mortality using the pooled data for older men

	Model 1	Model 2	Model 3	Model 4
Married	0.646***	0.854	0.800†	0.739*
	0.500,0.834	0.651,1.119	0.604,1.059	0.553,0.987
Having $\geq 2$ children	0.645**	0.732†	0.780	0.756
	0.459,0.906	0.518,1.033	0.548,1.112	0.524,1.092
Having frequent contact with more or more non-resident family members	1.041	1.062	1.046	1.016
	0.812,1.334	0.826,1.365	0.810,1.350	0.781,1.320
Living with children	0.956	1.014	1.073	1.115
	0.760,1.204	0.802,1.282	0.844,1.364	0.866,1.435
Having contact with friends & relatives	0.914	0.974	0.973	0.933
	0.736,1.135	0.782,1.213	0.778,1.218	0.741,1.175
Receiving emotional support	0.611***	0.634***	0.723**	0.877
	0.486,0.769	0.503,0.799	0.569,0.919	0.682,1.128
Receiving 2 or 3 kinds of instrumental support	1.840***	1.620***	1.415**	1.160
	1.483,2.283	1.300,2.019	1.118,1.791	0.907,1.482
Working	0.378***	0.528***	0.555***	0.811
	0.300,0.477	0.411,0.679	0.425,0.726	0.609,1.079
Giving help to family and kin	0.531***	0.583***	0.613***	0.740*
	0.425,0.664	0.464,0.731	0.486,0.772	0.582,0.941
Organization attendance	0.552*	0.558*	0.589*	0.671
	0.346,0.880	0.349,0.891	0.366,0.950	0.415,1.085
Participating in recreational activities	0.543***	0.576***	0.729*	0.876
	0.414,0.711	0.439,0.756	0.542,0.981	0.646,1.188
Likelihood Ratio	325.63	376.89	443.97	536.80

Odds ratio of mortality and 95 per cent confidence interval are presented.

Model 1: all social integration components were included simultaneously

Model 2: adjusted for age; Model 3: further adjusted for SES variables, life strain variables, and behavioral risk factors; Model 4 (fully-adjusted models): further adjusted for health status variables

† $p \leq .10$ ; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;

Table 6.5: The association between social integration and mortality using the pooled data for older women

	Model 1	Model 2	Model 3	Model 4
Married	0.511*** 0.400,0.653	0.746* 0.576,0.986	0.726* 0.551,0.956	0.692* 0.522,0.916
Having $\geq 2$ children	0.723† 0.501,1.043	0.857 0.588,1.240	0.839 0.572,1.231	0.860 0.583,1.270
Having frequent contact with three or more non-resident family members	0.998 0.749,1.302	1.064 0.807,1.414	1.061 0.799,1.409	1.028 0.771,1.370
Living with children	0.928 0.722,1.193	0.946 0.734,1.220	0.942 0.728,1.218	0.926 0.706,1.215
Having contact with friends & relatives	0.962 0.7662,1.215	1.031 0.816,1.308	1.017 0.799,1.295	0.986 0.771,1.261
Receiving emotional support	0.744* 0.584,0.947	0.778* 0.607,0.989	0.867 0.673,1.118	0.936 0.721,1.215
Receiving 2 or 3 kinds of instrumental help	2.349*** 1.820,3.033	2.004*** 1.537,2.593	1.900*** 1.450,2.491	1.594** 1.209,2.103
Working	0.195*** 0.087,0.434	0.268** 0.119,0.601	0.279** 0.124,0.627	0.334** 0.148,0.755
Giving help to family and kin	0.310*** 0.244,0.394	0.410*** 0.317,0.524	0.402*** 0.311,0.520	0.481*** 0.369,0.626
Organization attendance	0.595† 0.332,1.067	0.614 0.345,1.106	0.649 0.358,1.176	0.729 0.399,1.331
Participating in recreational activities	0.367*** 0.244,0.553	0.402*** 0.270,0.611	0.420*** 0.271,0.651	0.490** 0.314,0.765
Likelihood Ratio	412.12	457.65	483.49	539.85

Odds ratio of mortality and 95 per cent confidence interval are presented.

Model 1: all social integration components were included simultaneously

Model 2: adjusted for age; Model 3: further adjusted for SES variables, life strain variables, and behavioral risk factors; Model 4 (fully-adjusted models): further adjusted for health status variables

† $p \leq .10$ ; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;



older people's subjective perception on the relationships with children. The interpretation of this unexpected finding will be elaborated more in the discussion section.

Having a spouse was the only social tie with significant protective effect against mortality for both men and women. And its protective effect was slightly greater for women (OR=0.739 for men and 0.692 for women). Further examination by adding interactive item of having a spouse and gender in the fully-adjusted model of the total sample (using Model 5 of Table 5.11 in Chapter Five) revealed that gender difference in the protective effect of having a spouse was not statistically significant. *The hypothesis that the protective effect of having a spouse is greater for Chinese men than women is not supported.* This finding is inconsistent with many aging studies among Western populations, in which a stronger protective effect of having a spouse was often found for older men than women (Berkman and Syme 1979; Gove 1973; Williams and Umberson 2004). Given the remarkable gender differences observed in various dimensions of basic sociodemographic characteristics as well as health status in this sample, it may not be appropriate to simplify the interpretation of this finding. Rather, it is possible that the similar effects for men and women conceal the counterbalance of different underlying mechanisms working toward opposite directions in the association between marital status and mortality for men and women. In the following discussion section, I will elaborate this point.

With regard to social support, when all of the social integration compo-

nents were controlled simultaneously, receiving emotional support and receiving instrumental support remained substantially and independently associated with mortality for both men and women. However, receiving emotional support was associated with decreased mortality, while receiving instrumental support was associated with increased mortality. The directions of their effects were similar for men and for women. After age, socioeconomic status, health-related behaviors, life strain status and health status were controlled hierarchically, their effects weakened gradually. In the fully-adjusted models (Model 4 of Table 6.4 and Table 6.5), neither receiving emotional support nor receiving instrumental support was associated with mortality for men. For women, the protective effect of receiving emotional support was not significant, but receiving instrumental support remained significantly associated with increased mortality. Women who received two or all three kinds of instrumental supports were nearly 60 per cent more likely to die than those who received no or only one kind instrumental support (OR=1.594, 95 percent CI: 1.209,2.103). It suggests that receiving instrumental support could exert a negative effect on the survival status of older women. However, it is also possible that women who have poorer health tend to receive more instrumental support and are more likely to die even though the confounding effect of health status has been carefully controlled.

It is noticeable that when health status variables were controlled, the effects of social support items became weakened in different patterns for men and women. For women, the effects of receiving emotional and instrumental

support were gradually diminished. However, for men, their effects remarkably declined to an insignificant level from  $p \leq .01$  significance level after health status variables were controlled. It is plausible that the significant associations between receiving emotional and instrumental support and mortality for men without controlling for health status is a spurious association as a result of the strong correlation between receiving more social support and poorer health status. It is poorer health status that is associated with receiving more social support as well as higher mortality rate. In other words, for men, it may not be receiving social support, but health status that predicts mortality. Additional analysis supports this speculation. Stratifying men into two subgroups according to their level of functional limitations (those having functional limitations versus those having no functional limitations) showed that there was no significant effects of receiving emotional and instrumental support for either subgroup. In contrast, additional health-specific analyses among women revealed that the effect of receiving emotional support varied according to their level of functional limitations. Specifically, the protective effect of receiving emotional support was significantly greater for those women who had one or more functional limitations than those who were free of functional limitations. This interaction effect of receiving emotional support with health status for women indicates that receiving emotional support may protect health mainly through a buffering pathway for older Chinese women.

It has been documented that men and women tend to experience health decline in old age in different patterns. Specifically, women are more likely to

report poor health, functional limitations and chronic diseases, while men are more likely to suffer from severe diseases (Verbrugge 1983, 1989). The gender differences in the patterns of the changes in the effects of social integration components after controlling for health status observed in the current study also suggests that the confounding role of health in the association between social integration and mortality may work through gendered mechanisms.

### *The effect of social engagement for men and women*

The results of the relative importance of social engagement items among men and women models are as follows. In the model without controlling for covariates, all of the four social engagement items, i.e., working status, giving help to family and kin, organizational attendance, and participating in recreational activities, were found to significantly and substantially decrease the odds of mortality for men. Similarly, for women, except for participating in organized activities which had only a marginally protective effect, all other three activities were also found to decrease the odds of mortality substantially. When age, socioeconomic status variables, health-related behaviors, and life stressful status were included, the beneficial effects of social engagement items remained quite robust for both men and women, suggesting that social engagement benefits the survival status of Chinese elders with different social and demographic characteristics.

However, when health condition variables were included, gender differences appeared. For men, the benefits of all social engagement items declined

substantially. As Model 4 of Table 6.4 shows, working, organizational attendance, and recreational activity participation were no longer significantly associated with decreased mortality. Giving help to family and kin had its gradient partially lost but remained significant (OR= 0.740, 95 percent CI: 0.582, 0.941).

Unlike men, the beneficial effects of social engagement components remained robust for women after health condition variables were controlled (Model 4 of Table 6.5). Specifically, working, giving help to family and kin, and participating in recreational activities were related to decreased mortality by at least fifty per cent. The strong and remarkable effects of social engagement items observed in women's model is an important finding. It suggests that engaging in social, productive, and recreational activities in later life has a strong protective effect on the survival status of older Chinese women. In addition, engaging in various kinds of activities benefits their survival status in a cumulative way. Moreover, in multivariate analyses, giving help to family and kin turned to be the strongest and most robust social engagement item for women (OR= 0.481,  $p \leq .001$ ). *The hypothesis that for older Chinese women providing help to family and kin, a family-centered activity, have a greater protective effect against mortality compared to engaging in other activities outside the home is supported.* Adding an interactive term of giving help to family and kin with gender in the model of the total sample with all known covariates controlled (Using Model 5 of Table 5.11 in Chapter Five), it was found that the interaction term (giving help to family and kin\*gender) was statistically

significant ( $p=0.0198$ ). *The hypothesis that the protective effect of providing help to family and kin is greater for women is supported.*

Gender differences in the change of the effect of social engagement after controlling for health status indicates that the confounding effect of health status in the association between social engagement and mortality varies by gender. The benefit of social engagement is more likely to be contingent on health condition for men than for women. Further analyses by stratifying men and women according to the existence of functional limitations provided supporting evidence. Activities outside the home (working, organizational attendance, and participating in recreational activities) were beneficial for men who were free of functional limitations, but not for men with one or more functional limitations. In contrast, giving help to family and kin exerted a strong and significant protective effect for impaired men but not for healthier men. This interaction effect between giving help to family and kin and the level of functional limitations among men reached significant level ( $p=0.0028$ ). For women, the beneficial effects of the outside-home activities (working, organizational attendance, and participating in recreational activities) were similar for those with and without functional limitations. However, the protective effect of giving help to family and kin was found to be significantly greater for impaired women than their functional counterparts ( $P=0.0023$ ).

### **6.3.2.2 Urban-rural differences in relative importance of social integration components**

Urban-rural differences in China are remarkable and widespread in different dimension of social life, which leads to my decision to conduct separate analyses by urban-rural region to investigate the nature of the association between social integration and mortality in these two regions. The analysis results of region-specific models are displayed in Table 6.7 and 6.8.

#### ***The effect of social networks for urban and rural elders***

For urban elders, when all of the social integration components were controlled simultaneously in Model 1 of Table 6.6, having a spouse and having two or more children were significantly related to decreased mortality. However, living with children and having frequent contact with three or more non-resident family members were not associated with mortality. Notably, having contact with friends and relatives showed a marginal beneficial effect.

After age, socioeconomic status variables, health-related behaviors, life stress and health status variables were controlled hierarchically (Model 2-Model 4 of Table 6.6), having a spouse remained significantly associated with decreased mortality although the effect diminished to some extent. It was noticed that its effect declined remarkably when age and gender were controlled (as Model 2 of Table 6.6 shows), suggesting that the effect of having a spouse may vary by age and gender among urban elders. Having two or more children lost its significance in protecting survival status after all covariates were controlled. However, notably, having contact with friends and relatives remained

Table 6.6: The association between social integration and mortality using the pooled data for urban elders

	Model 1	Model 2	Model 3	Model 4
Married	0.569*** 0.429,0.756	0.692* 0.500,0.958	0.669* 0.479,0.934	0.642* 0.454,0.906
Having $\geq 2$ children	0.660* 0.463,0.941	0.776 0.539,1.117	0.815 0.562,1.181	0.787 0.536,1.157
Having frequent contact with three or more non-resident family members	0.825 0.619,1.098	0.916 0.683,1.228	0.890 0.663,1.197	0.856 0.632,1.161
Living with children	0.848 0.644,1.118	0.925 0.698,1.224	0.940 0.708,1.248	0.899 0.666,1.213
Having contact with friends & relatives	0.792† 0.608,1.031	0.830 0.635, 1.084	0.839 0.639,1.101	0.764† 0.577,1.011
Receiving emotional support	0.682** 0.512,0.909	0.719* 0.537,0.963	0.801 0.594,1.080	0.967 0.704,1.328
Receiving 2 or 3 kinds of instrumental help	1.920*** 1.489,2.476	1.711*** 1.315,2.228	1.663*** 1.272,2.174	1.248 0.939,1.657
Working	0.488*** 0.325,0.732	0.567** 0.369,0.872	0.649* 0.420,0.999	0.820 0.526,1.280
Giving help to family and kin	0.456*** 0.350,0.594	0.589*** 0.448,0.775	0.602*** 0.457,0.795	0.814 0.608,1.090
Organization attendance	0.479** 0.299,0.766	0.494** 0.308,0.792	0.500** 0.311,0.804	0.590* 0.364,0.955
Participating in recreational activities	0.686* 0.515,0.914	0.686* 0.511,0.921	0.738† 0.543,1.004	0.929 0.675,1.278
Likelihood Ratio	232.44	292.22	318.53	413.80

Odds ratio of mortality and 95 per cent confidence interval are presented.

Model 1: all social integration components were included simultaneously

Model 2: adjusted for age, gender; Model 3: further adjusted for SES variables, life strain variables, and behavioral risk factors; Model 4 (fully-adjusted models): further adjusted for health status variables

† $p \leq .10$ ; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;



Table 6.7: The association between social integration and mortality using the pooled data for rural elders

	Model 1	Model 2	Model 3	Model 4
Married	0.694*** 0.560,0.859	0.872 0.688,1.105	0.817† 0.641,1.041	0.766* 0.598,0.981
Having $\geq 2$ children	0.589** 0.413,0.839	0.705† 0.490,1.013	0.762 0.528,1.101	0.793 0.545,1.155
Having frequent contact with three or more non-resident family members	1.104 0.868,1.404	1.151 0.901,1.471	1.171 0.913,1.502	1.141 0.886,1.469
Living with children	1.038 0.836,1.290	1.049 0.841,1.310	1.067 0.852,1.337	1.110 0.877,1.406
Having contact with friends & relatives	0.978 0.800,1.195	1.084 0.882,1.331	1.114 0.904,1.373	1.101 0.889,1.362
Receiving emotional support	0.680*** 0.553,0.837	0.723** 0.585,0.894	0.756* 0.609,0.939	0.894 0.680,1.061
Receiving 2 or 3 kinds of instrumental help	1.949*** 1.559,2.436	1.601*** 1.272,2.013	1.586*** 1.255,2.003	1.385** 1.090,1.759
Working	0.447*** 0.348,0.573	0.438*** 0.331,0.580	0.528*** 0.395,0.706	0.697* 0.515,0.942
Giving help to family and kin	0.316*** 0.257,0.389	0.436*** 0.351,0.541	0.445*** 0.357,0.554	0.514*** 0.410,0.644
Organization attendance	0.918 0.513,1.644	0.951 0.528,1.714	0.835 0.454,1.533	0.929 0.505,1.709
Participating in recreational activities	0.444*** 0.294,0.671	0.439*** 0.289,0.666	0.457*** 0.298,0.702	0.540** 0.350,0.832
Likelihood Ratio	385.09	492.53	553.59	619.30

Odds ratio of mortality and 95 per cent confidence interval are presented.

Model 1: all social integration components were included simultaneously

Model 2: adjusted for age, gender; Model 3: further adjusted for SES variables, life strain variables, and behavioral risk factors; Model 4 (fully-adjusted models): further adjusted for health status variables

† $p \leq .10$ ; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;

its marginal protective effect.

For rural elders, when all of the social integration components were controlled simultaneously in Model 1 of Table 6.7, having a spouse and having two or more children were significantly protective, whereas co-residing with children or having frequent contact with three or more non-resident children and other family members were not associated with decreased mortality. Unlike their urban counterparts, having contact with friends and relatives had no protective effect on rural elders' survival status. After all covariates were controlled (Model 2 - Model 4 of Table 6.7), having a spouse remained its significant protective effect although the strength of effect diminished. Unexpectedly, the protective effect of having two or more children was no longer significant. The effect declined remarkably after age and gender were controlled (Model 2 of Table 6.7), indicating that the effect of the number of children may vary by age and gender significantly for rural elders.

With regard to social support, when all of the social integration components were controlled simultaneously in Model 1 of Table 6.6 and Table 6.7, the beneficial effect of receiving emotional support and negative effect of receiving instrumental support were found for both urban and rural elderly, with a stronger beneficial effect of receiving emotional support found for rural than urban elders. After further controlling for other covariates, receiving emotional support was no longer associated with mortality for urban elders (OR=0.967, 95 percent CI: 0.704, 1.328). For rural elders, although its protective effect can be observed from the 95 per cent confidence interval, it failed to reach

significance level (OR=0.894, 95 percent CI: 0.680, 1.061).

With regard to receiving instrumental support, its association with increased mortality remained among rural elders but lost significance among urban elders after controlling for covariates. It is noteworthy that the adverse effect of receiving instrumental support for urban elders diminished suddenly after health condition variables were controlled (Model 3 of Table 6.6). This change in effect indicates two possibilities. First, it could be that receiving instrumental support has an indirect effect on mortality of urban elders through their health condition. Alternatively, the association between receiving instrumental support and mortality could be a spurious one as they were both correlated with health status. I conducted further analysis to evaluate the possible reasons for this urban-rural difference. By further stratifying the urban elders according to their functional limitations, it was found that there was no significant association either for the healthier urban elders or for those with one or more functional limitations, suggesting that the association between receiving instrumental support with increased mortality rate before health status was controlled may be spurious for urban elders. In other words, receiving instrumental support was not associated with mortality for urban elders. When rural elders were further stratified according to functional limitation condition, it was found that the association between receiving instrumental help and increased mortality was significant for those rural elders with one or more functional limitations, but not for those healthier rural elders, suggesting that the effect of receiving instrumental help on the mortality

of rural elders was mediated by their health status. These additional analyses suggest that the mechanisms through which receiving instrumental help is associated with mortality may be different between urban and rural elders.

In sum, *the hypotheses that having a spouse and having contact with friends and relatives are beneficial to the urban elders are supported, although the protective effect of having contact with friends and relatives was moderate in strength.* For rural elders, *the hypothesized importance of intergenerational relationships in protecting against mortality is not supported.* There were also urban-rural differences in the confounding effect of health status in the association between receiving support and mortality.

### ***The effect of social engagement for urban and rural elders***

The pattern of the association between social engagement and mortality was different between rural and urban elders. For urban elders, before controlling for any covariates (Model 1 of Table 6.6), all of the four kinds of activities were significantly associated with decreased mortality. When age, gender, socioeconomic status variables, life strain variables, and behavioral risk factors were controlled hierarchically in Model 2 and Model 3, it was found that the protective effects of activity engagement diminished gradually. When health status variables were further controlled in Model 4, organizational attendance remained to be only social engagement component with significant protective effect at 0.05 level. It is noteworthy that the effect of providing help to family and kin declined sharply to an insignificant level (OR=0.814,

95 percent CI:0.608,1.090) from a strong and substantial effect at significant level at  $p \leq .001$  (OR=0.602, 95 percent CI:0.457,0.795) when health status was controlled. This suggests that for urban elders the beneficial effect of providing support to family and kin on survival status could possibly be a result of its joint association with health status.

For rural elders, before controlling for covariates (Model 1 of Table 6.7), except for attending organizational activities, the other three social engagement components had significant protective effects. Unlike urban elders, the protective effects of social engagement components remained relatively robust when demographic and social characteristics variables were controlled in Model 2 and Model 3. However, when health status variables were further controlled (Model 4), the strong protective effects of working and participating in recreational activities diminished remarkably. In contrast, giving help to family and kin retained its robust and strong effect in protecting against mortality for rural elders (OR=0.514, 95 percent CI: 0.410, 0.644).

In sum, for rural elders, working, providing help to family and kin, and participating in recreational activities were related to decrease in the odds of mortality of rural elders by a range of 30 per cent to 50 per cent respectively after controlling for covariates. This suggests that engaging in social, productive, and recreational activities exerts independent protective effects on the survival status of rural elders regardless of their social and demographic characteristics and health status. Moreover, for rural elders, compared with engaging in activities outside the home, providing help to family and kin ex-

erted a stronger protective effect on survival status in terms of magnitude and significance. *The hypothesis that for rural elders, providing help to family and kin exerts a greater protective effect against mortality compared with engaging in activities outside the home is supported.* However, such family-centered style in activity engagement was not observed among urban elders. In contrast, the only significantly protective activities for urban elders was attending organizational activities. Further study by adding an interactive item of providing help to family and kin with urban-rural residence in the total sample model revealed that *the protective effect of providing help to family and kin was significantly greater for rural than urban elders.*

## **6.4 Main findings and Discussion**

The purpose of the analyses in this chapter is to examine whether the relative importance of social integration components in protecting against mortality are different by gender and by urban-rural regions among older people in China.

### **6.4.1 Gender differences**

The descriptive distributions show that gender differences of this sample in the characteristics of social integration were not remarkable. Although there was a higher proportion of widowhood among older women than men which is similar to what was found in many other countries, there were no gender differences in other social network components including number of children, living with children, having frequent contact with three or more non-resident family members, and having contact with friends and relatives. No remarkable gender differences were found in receiving emotional and instrumental support either. With regard to social engagement dimension, older women were more likely to provide help to family and kin, but less likely to work and participate in recreational activities than older men.

The general impression of the gender differences in the relative importance of social integration components is that for women, the effects of social engagement items are greater than those of social network items. However, for men, there is no observable difference in the relative importance of social network and social engagement. Social integration as a whole seems to be a

stronger determining factor of mortality for women than for men.

#### **6.4.1.1 Weak effect of intergenerational relationships in protecting against mortality for older Chinese women**

The older women participated in the current study were raised up in traditional China. They were socialized to take the responsibility of caring for family members as their primary social role. Moreover, they were much more likely than men to be financially dependent due to their disadvantages in social status and access to education and labor market. Thus, women are more likely than men to expect close and intimate relationships with children and the emotional and instrumental support from children. It is hypothesized that for older Chinese women, intergenerational relationships are of primary importance in protecting against mortality compared with other social ties. However, the findings of the current study do not support this hypothesis. Specifically, it was found that having more children, living with children, having frequent contact with more non-resident children and other family members, were not significantly associated with decreased mortality among older women.

These unexpected findings observed among women may provide further evidence of the changes in the features of intergenerational relationship as well as its health impacts among Chinese elders under the influence of rapid demographic and socioeconomic changes occurring in contemporary China. The nuclearization of family and higher social mobility have led to a decline of co-residence living arrangement and made it more difficult for family members



to retain frequent personal contact and support exchanges (Chen 2005; Lively and Ren 1992; Lee and Xiao 1998; Logan and Bian 1999, 2003; Logan, Bian and Bian 1998; Silverstein, Cong and Li 2006). These changes in family structure and intergenerational interaction may have more direct and stronger impacts on women than men as women are more likely to depend emotionally and financially on their adult children in later life.

Similarly, the observed trend toward strategic orientation in living arrangements and support exchanges may also affect older women more strongly than men. For example, some researchers have noticed that in contemporary China, older parents tend to provide a large amount of housekeeping, preparing food, child care in exchange for financial support (Lee and Xiao 1998). Being financially disadvantageous, older women are more likely to provide instrumental help and babysitting to adult children in exchange for the support they need.

In addition, some researchers have found that the strain and stress in relationships have a greater negative effect on psychological well-being for women than men (Umberson et al. 1996). As China is undergoing rapid social and economic changes, traditional content of filial piety in terms of obedience, respect and instrumental support has been questioned by the current younger generations. Some qualitative studies have shown evidence that the current younger generations tend to understand filial piety as showing polite and respect to parents rather than obeying parents. The change in the attitudes of younger generations may result in strain and stress in their relationships

with older parents who tend to adhere to the traditional family norms and values more strongly. Thus, the changes in the features of intergenerational interaction in contemporary China need to be carefully examined for its consequences on the health and well-being of Chinese elderly, especially older Chinese women.

At the same time, as mentioned in the previous chapter, the limitations of the measurement may also be one reason explaining the weak effects of the intergenerational relationship. The objective measures of intergenerational relationship used in the current study include number of children, living with children, and having frequent contact with non-resident children and other family members, which may not be able to capture the quality or subjective perception of the relationship with children.

#### **6.4.1.2 No gender difference in the protective effect of marital status**

Another unexpected finding is that the beneficial effect of having a spouse was similar for older Chinese men and women. This is inconsistent with many previous studies which have found that marital status has a greater effect on mortality for older men than women (Berkman and Syme, 1979; Lillard and Waite, 1995; Umberson, Wortman and Kessler 1992; Williams and Umberson 2004). There are several theoretical explanations for the often-observed stronger effect of marital status among men. Marriage tends to benefit men more than women as wives are more likely than husbands to provide their

spouses emotional and instrumental support as well as control their harmful health-related behaviors such as drinking, smoking, and unhealthy diet (Umberson and Liu 2006; Umberson, Wortman and Kessler 1992). However, for married women, the responsibility of taking care of their husband, children, and parents may lead to a health cost. Moreover, it has been found that men tend to exclusively depend on their spouses, while women are more likely to have larger social networks and have close friends and relatives rather than their husbands as their confidants (Antonucci and Akiyama 1987a; Vandervoort 2000). As a result, after losing a spouse, older men are more likely than women to be in the absence of compensating supportive relationships. In addition, the higher prevalence of widowhood among older women may result in their better emotional preparation for bereavement compared with men. Thus, losing a spouse may lead to greater detrimental impact on the health and well-being of older men than women (Umberson, Wortman and Kessler 1992).

Were the above-mentioned explanations enough, the greater effect of marital status would have been found among older Chinese men because the sample of older women in current study spent most of their life time in traditional society in China and being socialized to take on the role family caregiver as their main social role. Moreover, they were found to be more likely to be widowed (34 per cent vs. 16 per cent). Given the remarkable gender differences in various dimensions of basic sociodemographic characteristics as well as health status in this sample, it is plausible that such similar effects may

conceal counterbalance of many gendered mechanisms, some of which may be those generally found in other societies while some may be unique for older Chinese men and women. For instance, compared to older men, older women in China had much lower level of education and were much more likely to be financially dependent. These vulnerabilities may lead to a greater negative impact of losing a spouse on their health and well-being compared to men. Thus, further gender-specific studies are needed to explore gender differences in the mechanisms through which marital status is associated with health and mortality.

In addition, the gender differences in the association between marital status and mortality may vary across cohorts. The coming cohorts of older Chinese women will have their socioeconomic status greatly enhanced as the current cohorts of younger women, especially those in urban areas, are getting more access to education and labor market since the founding of PRC. At the same time, the divorce rate in younger generation has been increasing in recent years. Given these changes and trends, it is important to monitor the effect of marital status on the health and well-being of the future cohorts of older men and women in China.

#### **6.4.1.3 Greater benefit of providing help to family and kin for older Chinese women than men**

The current study found that providing help to family and kin had a greater beneficial effect on the survival status for older women than older

men in China (OR=0.481,  $p < 0.001$  for women versus OR=0.740,  $p \leq 0.05$  for men). Adding interaction term of providing help and gender in the total sample model revealed that this gender difference was statistically significant.

This gender variation in the health effect of giving help to family and kin could be partially the result of gender difference in social roles among Chinese elderly. Older women in this study who were raised up in traditional China were socialized to take caregiving role as their primary social roles. Thus, taking care of family members may be an essential way of performing their culturally sanctioned caregiving role. In their later life, continuously providing help to family and kin, contributing to adult children in their family establishment and personal development may bring women a sense of self-fulfillment and usefulness. Consistent with other Chinese studies (Liu 1991), this study found that older women were more likely than men to provide instrumental help to family members and kin including house cleaning, cooking, and babysitting. Furthermore, additional analyses by stratifying health status revealed that for men, providing help to family and kin was protective only for those who had one or more functional limitations, but not for those who were free of functional limitations. In contrast, for women, the protective effect of providing help to family and kin were found in both subgroups regardless of their health status, although greater for those with functional limitations. In addition, this study found that the adverse effect of receiving instrumental support was greater for women than men. It is plausible that due to their caregiving roles, women may benefit more than men from providing help to

family and kin. At the same time, they may also be more sensitive to receiving help from others because it could be perceived as an indicator of their failure to perform caregiving roles.

In sum, gender differences in the relative importance of social integration components found in this study could be a result of the remarkable gender differences in both social roles as well as in social and economic characteristics among the current cohorts of older Chinese men and women. Given that the coming cohorts of older people will be remarkably different from the current cohorts in terms of sociodemographic characteristics as well as social roles and identities, it is interesting to conduct cohort comparison study in the future when the repeated cross-sectional data are available.

#### **6.4.2 Urban-rural differences: evidence of the implications of urbanization and modernization**

Urban-rural differences in the characteristics of social integration are noteworthy. With respect to social networks, urban elders were more likely than rural elders to have a spouse but fewer children. Moreover, compared to their rural counterparts, urban elders were more likely to receive emotional support but less likely to receive instrumental support. But there were no significant urban-rural differences in having frequent contact with more non-resident family members and having contact with friends and relatives. The unexpected higher proportion of living with spouse only among rural than urban elders may be due to the fact that quite a sizable proportion of rural

Chinese elders living close to adult children but under separate roofs were categorized as living independently in the current study. With regard to social engagement, urban elders were less likely to work but much more likely to participate in organized and recreational activities. There is no urban-rural difference in providing support to family and kin.

In general, the patterns of association between social integration and mortality were different between urban and rural elders. Having contact with friends and relatives had a marginal benefit to survival status for urban elders but not for rural elders. In contrast, giving support to family and kin had a strong and substantial protective effect for rural elders but not for urban elders. For urban elders, participating in organizational activities was the only activity with significant protective effect. These findings of urban-rural differences may shed light on the differences in the influences of traditional cultural norms and of rapid modernization and urbanization between rural and urban China.

#### **6.4.2.1 Greater protective effect of having contact with friends and relatives for urban elders**

The first unique pattern of the association between social integration and mortality among urban elders is that having contact with friends and relatives was associated with decreased mortality with marginal significance. More interestingly, the further analysis by stratifying urban elders according to their health status revealed that for those urban elders who were free of

functional limitations, the protective effect of having contact with friends and relatives was significant and stronger than other social network components.

Friends have been consistently found to be an important source of companionship and emotional support for older people in Western countries (Crohan and Antonucci 1989; Fiori, Antonucci and Akiyama 2008; Gurung, Taylor, and Seeman 2003). Guided by a culture emphasizing on independence and autonomy, older people in Western countries have often been found to be involved in a friend-focused social network based on shared interest and experiences rather than being circumscribed in intergenerational and kin relationships (Cohler 1983; Fiori, Antonucci and Cortina 2006; Lee, Netzer and Coward 1995; Pyke and Bengtson 1996). In societies with a family-centered culture, however, friends have been consistently found to be less important than family ties (Rodriguez-Laso 2007; Silverstein, Cong and Li 2006). Older people in these societies have been often found to have a family-focused social network - having close relationships with spouse, children, and other kinships but few contacts with friends and other extended relationships (Fiori, Antonucci and Akiyama 2008). Indeed, the effects of having friends and contacting friends have been seldom examined in Chinese aging studies till now.

The greater protective effect of having contact with friends and other extended relationships found among urban elders, especially among healthier urban elders, is an unexpected but important finding. It may indicate the influence of a higher level of modernization and urbanization in urban China on the lifestyle and social networks of older people living there. There is



evidence that the attitudes and values of the contemporary urban elders are changing. A recent study conducted in nine large urban cities in China found that 44 percent of older respondents preferred to live independently of children, while only 29 per cent preferred to live with a married children (Logan and Bian 1999). With a higher level of education and financial independence and better coverage of pension and health care insurance, urban elders in China may not adhere to traditional extended family value as strictly as their rural counterparts do. Rather, they have shown some indication of adopting modern attitudes and many of them have expressed preference of living an independent and autonomous later life as long as possible (Logan and Bian 1999).

As a result of the decline in the number of children, the increasingly geographic dispersion between children and older parents, as well as the attitude changes toward autonomy and privacy in life occurring among both younger and older generations, the role of children in the social networks of Chinese elders may be declining. Friends and other non-family social relationships may increasingly become a compensatory source of accompanyship and support for Chinese elderly.

In future research, the health effect of having contact with friends and other extended relationships needs to be paid more attention to. Moreover, examination on the cohort differences in the relative importance of friends and family ties in older people's social networks will reveal more information on the implications of rapid social changes for the social networks and lifestyle that Chinese elders are involved in.

#### **6.4.2.2 Weaker effect of receiving and giving support for urban elders than rural elders**

Another unique pattern of the association between social integration and mortality among urban elders is that neither receiving emotional and instrumental help nor providing help to family and kin has significant impact on mortality. In contrast, for rural elders, giving help to family and kin exerted a significant and substantial beneficial effect on survival status. Receiving emotional support was also beneficial even though the effect failed to achieve a statistical significance.

The remarkable rural-urban differences in both social setting and individual's characteristics may lead to the differences in the dynamics of intergenerational support exchanges and their health effects. Due to the lower level of modernization and industrial development in rural China, rural elders tend to adhere to the traditional cultural norms on extended family arrangement and close intergenerational linkage to a greater extent compared to their urban counterparts. In addition, unlike urban elders, few of rural elders are covered by pension system or other formal support programs. Thus, they are more economically dependent and need more financial and instrumental support in late life. These features may lead to a higher level of intergenerational support exchange in rural areas and stronger health effects of receiving and giving support for rural elders.

In urban areas, in contrast, a higher level of modernization may contribute to the weakening of interdependence between older parents and their

adult children in terms of financial management as well as attitudes. These changes have been taking place not only among younger generations but also older generations. Along with the improvement of late-life financial security, urban elders are also more open to those modern attitudes such as independence, privacy, and autonomy. Consequently, urban elders could be less likely than rural elders to receive or expect to receive support from children. At the same time, they could be less likely than rural elders to engage or want to engage in providing support to adult children or other kins. A recent study comparing urban-rural difference in intergenerational support exchange in China found that the proportion of urban elders who engaged in intergenerational support exchange was much lower than that of rural elders (Lee and Xiao 1998). In the current study, the descriptive analyses show that, compared to their rural counterparts, urban elders were much less likely to receive instrumental support, but they were more likely to receive emotional support. With regard to giving help to family and kins, although the proportion of older people who engaged in this family-related activity was similar in urban and rural areas, its protective effect against mortality was much weaker, indeed insignificant, for urban elders.

The insignificant protective effect of giving help to family and kin among urban elders deserves special attention. It has been noticed that the current cohorts of Chinese elderly are under pressure to give more support to younger generations. When I compared the urban-rural difference in the reciprocal pattern of receiving and giving supports, it seems that urban elders are

more likely to have this experience. They were more likely to give help rather than receive help compared to their rural counterparts. As shown in Table 6.2, more than half of urban elders provided instrumental help to family members and kin (54.9 percent of urban men and 65.1 percent of urban women), while only around one third of them received two or three kinds of instrumental help (29.7 percent of urban men and 37.5 percent of urban women). In contrast, for rural elders, there was a relative balance in the proportions of those who were receiving and those who were giving. Specifically, 58.3 percent of rural women and 59.7 of rural men received two or three kinds of instrumental help from family members and kin, and 51.6 per cent of rural women and 66.8 per cent of rural men provided help to family and kin. Similar urban-rural difference in intergenerational support exchange has also been found in another study conducted in China by Lee and Xiao (1998). Based on the Support Systems for the Elderly survey conducted among urban and rural elders aged 60 or above in 1992, these two authors found that 32 per cent of urban elders reported that they provided support to their adult children. However, more than half of these urban elders (18 per cent) did not receive support from children at the same time. Among their rural counterparts, however, 15 per cent reported that they gave support to children. And two thirds of them received support from children at the same time, while only one third of them provide net support. It seems that compared to their rural counterparts, urban elders in contemporary China are more likely to provide support to children and have the experience of providing net support to children. The unbalanced

intergenerational support exchanges may lead to a high level of pressure of giving support, which may partially explain the insignificant protective effect of giving support among urban elders in the current study.

It should be noticed that the findings of the current study and the study cited above are both based on survey data conducted in the 1990s. More updated data are needed in future research to further investigate the changes in the feature of intergenerational support exchange and its health impact for Chinese elderly.

#### **6.4.2.3 Lack of protective effects of intergenerational relationships among rural elders**

It is hypothesized that the protective effect of intergenerational relationships is greater than other kinds of social ties for rural Chinese elders because they normally have no pension income or health care subsidies in later life and tend to adhere to traditional norms on extended family arrangements and filial support from children. However, it is unexpected to find that number of children, living with children and having frequent contact with more non-resident children and other family members had no significant effect in protecting the survival status of rural elders in contemporary China.

These insignificant effects of intergenerational relationship variables for rural elders could be the result of both the implications of rapid social changes and mass rural-to-urban migration as well as the limitations of measurements. The past several decades have witnessed remarkable changes in living arrange-

ments and the pattern of intergenerational interaction in rural China. Since the 1990s, the mass rural-to-urban migration of rural young generation has resulted in an increasing proportion of generation-skipped households (grandparents living with grandchildren) in rural areas. Moreover, it has been found that a sizable proportion of rural older people nowadays live next door or live close to adult children (quasi-coresidence) but under separate roofs. As mentioned in the discussion section of the previous chapter, the increasing prevalence of such quasi-coresidence may reflect the dynamic interaction of the persistence of traditional family norms and the adoption of more modern attitudes toward independence and autonomy. Quasi-coresidence, on one hand, has been found not remarkably different from co-residential living arrangement in terms of intergenerational interaction and support exchanges. There is evidence that elderly parents and their children living in separate households retain frequent interactions and financial and instrumental support exchanges (Bian, Logan and Bian 1998; Unger 1993). On the other hand, this “intimacy-with-distance” living arrangement may avoid tension and unpleasant interactions which are more likely to occur between household members.

Thus, the insignificant effect of living with children in protecting against mortality for rural elders found in the current study may be partially due to these changes in living arrangements in rural China in recent years. It may be more appropriate to separately categorize those rural elders living in generation-skipped households and those living closely to children but under separate roofs so as to examine their differences in health consequences com-

pared to those living with children and other kinds of living arrangements. However, the current study failed to do so because the survey in 1997 did not ask about the information on this group as did in 1992 and 1994.

In addition, the pattern of interaction and support exchanges between generations has also been changing and adopting new forms along with the mass migration of rural younger generations and changes in living arrangements. For example, those rural elders living in generation-skipped household were generally receiving regular remittances from migrant children. However, they had few chances to contact their children in person or receive body care or other kinds of instrumental support from them when they need.

Therefore, the measures of living arrangements and intergenerational interaction used in the current study have limitations in capturing the new forms of interaction between older parents and adult children in contemporary rural China. In a recent study conducted by Silverstein and his colleagues in rural China( 2006), it was found that those rural elders living with grandchildren in generation-skipped households while receiving remittances from geographically separated adult children had a similar level of psychological well-being to those living with children, and better than those living independently (living alone or living with spouse only) (Silverstein, Cong and Li 2006). Although this study is based on cross-sectional data which is unable to identify the direction of causal effect, its findings indicate the importance of investigating the new forms of living arrangements and interactions between rural elders and their geographically dispersed children and the health impacts

of these new forms among the current and future cohorts of Chinese elderly.



## Chapter 7

### Conclusions

#### 7.1 The aims and research design

There are two main focuses in the current study. The first focus is on the pattern of the association between social integration and mortality among older people in contemporary China. Specifically, the relative importance of family and non-family related social integration components were examined. The second focus is to examine whether there are gender differences as well as urban-rural variations in the pattern of relative importance of social integration components.

Based on the previous theoretical and empirical studies, I developed a conceptual framework of social integration of older people: being involved in social networks and engaging in social activities. Social networks were measured by six variables including the presence of various social relationships, frequency of contact, living arrangements, and receiving support from network members. Social engagement was measured by four kinds of activity engagement including working status, providing help to others, participating in recreational activities, and attending organizational activities.

A pooled logistic regression model was employed in order to make bet-

ter use of the longitudinal BMLSA data and better deal with the time-varying nature of social integration and many other social and health status of older respondents. Analyses were conducted among the total sample in the first analytic chapter (Chapter 5) and then among the gender and regional subgroups in the second analytic chapter (Chapter 6). In Chapter 5, social networks and social engagement items were examined in separate models and then combined together in one model in order to better investigate whether social engagement had a significant independent effect on survival status for Chinese elders. Analyses were also conducted separately among those older adults with and without functional limitations to investigate whether the association between social integration and mortality had different patterns across Chinese elderly with different health status.

In Chapter 6, gender differences and urban-rural variations in the characteristics of social integration as well as the relative importance of social integration components in affecting mortality were examined. For example, in gender-specific models, if the effect of a particular social integration component is found to be remarkably different between men and women in terms of magnitude and significance, an interaction term of this social integration component with gender will be added into the model of the total sample to further examine the statistical significance of this difference. Moreover, as domains of covariates were included into subgroup models hierarchically, the coefficients of social components effects may change in different patterns by gender or by urban-rural regions, which may reveal the differences in the underlying

mechanisms through which social integration affects mortality across different subgroups of Chinese elderly. For example, it was found that the effects of social support items became weakened in different patterns by gender when health status variables were controlled. Additional examination by further stratifying men and women subgroups according to their health status suggest that for men, the association between receiving social support and mortality seems to be a spurious relationship because of the high correlation between receiving more social support and poorer health status, whereas for women, receiving emotional support may protect health mainly through a buffering pathway.

## **7.2 Main research findings, contributions and their implications for policy design and future research**

### **7.2.1 Characteristics of social integration of older people in contemporary China**

The descriptive analyses show that older people in China have unique characteristics of social networks and social engagement. The general impression of the characteristics of social integration of this sample of older people is that Chinese elderly have a relatively higher prevalence of widowhood, more children, and are more likely to live with children and receive support from children, but less likely to contact friends compared to older people in Western societies. With regard to social engagement, Chinese elderly are active in providing help to family members and kin, whereas participating in social and

recreational activities outside home seem not to be common practices in their late life.

Subgroup analyses found that the characteristics of social integration were different by gender and urban-rural residence. Consistent with many findings in other societies, older Chinese women were more likely to be unmarried than older men. However, no significant gender differences were observed with regard to living with children and having frequent contact with more non-resident children and other family members. Unsurprisingly, older Chinese women were more likely to provide help to family and kin, but less likely to work or participate in recreational activities than older Chinese men.

Urban-rural differences in the characteristics of social integration were more remarkable. Urban elderly were more likely to be married but have fewer children than rural elderly. Notably, urban elderly were more likely to receive emotional support but less likely to receive instrumental support compared to their rural counterparts. There were no significant urban-rural differences in having frequent contact with more non-resident family members and having contact with friends and relatives. Unexpectedly, a slightly higher proportion of elders living with spouse only was found in rural areas. It may be partially due to a limitation on the measurement of living arrangements in the current study. Quite a sizable proportion of rural elders lived close to adult children but under separate roofs. Literally, this group of rural elders lived separately. And they were categorized as living apart from children rather than being grouped into those co-residing with children. However, they may share more

similarities with those living with children as this kind of living arrangement are often referred to as “quasi-coresidence”. With regard to social engagement, urban elders were less likely to work but more likely to participate in organized and recreational activities.

### **7.2.2 Significant protective effects of social engagement on survival status for Chinese elderly**

One contribution of the current study is the emphasis on the dimension of social engagement in the study of the health impacts of social integration among Chinese elderly. Analysis results show that engaging in activities, including helping others, working, and participating in social activities, had a significant and independent protective effect against mortality for Chinese elders. This finding is consistent with many studies conducted among older people in Western countries. Notably, it was found that for those who were free of functional limitations, engaging in activities outside the home had stronger protective effects against mortality than engaging in family-centered activities (providing help to family and kin).

To date, few studies conducted among Chinese elderly have focused on the situation of social engagement and little is known about the importance of continued engagement in social activities for older people in China. This finding based on a sample of non-Western older population provides additional empirical evidence supporting the theoretical opinion which emphasizes the importance of continued activity engagement in remaining social integration

of older people and in protecting their health and well-being.

This finding has important implications for policy makers as well as ordinary older people in China. Rather than simply being surrounded by family or close social relationships, Chinese elders can remain their late-life social integration through active social engagement, which in turn benefits their health and well-being. Moreover, compared to their predecessors, the current and future cohorts of older people in China tend to have fewer children and live apart from their migrated children. At the same time, they have better socioeconomic and health status . Engaging in social, productive, and recreational activities may act as an important compensatory way for them to avoid the risk of being socially isolated and its negative impact on their mental and physical well-being. .

Also, the strong and independent protective effect of social engagement on mortality found here should be brought to the attention of Chinese policy-makers. It should be noticed that the current aging policies are lagged and tend to consider aging population and growing number of older people as a social burden. Till now, little effort has been made to facilitate or improve the social engagement among older people despite the fact that it is the desire of many Chinese elders to remain active and productive. Thus, when designing intervention aging policies in the future, more emphasis should be placed on encouraging and facilitating Chinese elderly to engage in social, productive, and recreational activities.

### **7.2.3 Weak protective effect of intergenerational relationship**

One of the main findings is that, contrary to expectations, the commonly assumed protective effects of intergenerational relationships and family support for Chinese elderly were not significant for this sample of older people. In a society with a family-centered tradition and underdeveloped formal social support, children are supposed to be the main source of later-life support for Chinese elders. However, the analyses based on the total sample found that having two or more children was marginally associated with decreased mortality. Living with children and having frequent contact with more non-resident children and other family members relatives were not associated with mortality. Moreover, receiving emotional support had a modest protective effect but failed to reach a statistically significant level, whereas receiving instrumental support was associated with substantially increased mortality.

Despite these findings in the total sample, the effects of intergenerational relationships are expected to vary by gender and by urban-rural residence. Because women and those Chinese elders living in rural areas are more likely to be economically dependent and adhere to traditional norms regarding extended family arrangements and filial piety, it is hypothesized that intergenerational relationships were crucial to their health and well-being. However, the analyses conducted separately among men and women and by urban-rural regions in Chapter 6 further revealed that relationships with children and support provided by children were not significantly associated with decreased mortality for women and rural elders.

One possible explanation for the weak effect of intergenerational relationships is that children's role as the primary source of support may be declining in contemporary China, a society undergoing rapid demographic and socioeconomic changes which have brought great implications for traditional family arrangement and intergenerational interaction. The nuclearization of family and enhanced social mobility have led to a decline of co-residence living arrangement and made frequent personal contact as well as receiving instrumental support from children more difficult. Moreover, there is evidence that motives for co-residence and intergenerational support exchanges have been shifting away from a mere performance of traditional family norms towards practical considerations. Recent studies in China have shown that the choice of living arrangements are more likely to be coping strategies based on the needs of older parents as well as those of younger generations (Chen 2005; Logan and Bian 1999). A similar phenomenon was also found in some other Asian societies which have similar extended family traditions and are undergoing different levels of modernization and economic development (Frankenberg, Chan and Ofstedal 2002; Takagi and Silverstein 2006).

With the motives for co-residence and intergenerational support exchanges gradually transformed, older people may be more likely to be involved in mundane household works or short-term support exchanges with children rather than achieve a sense of usefulness or satisfaction through providing support to as well as receiving support from children. It has been noticed that older people's attitudes toward family arrangement and expectations on chil-



dren's support are also adapting. A study conducted among urban elderly in the major cities in China revealed that a sizable proportion of older parents expressed a preference for living separately from married children (Logan and Bian 1999).

Although the dramatic changes occurring in contemporary China have challenged the traditional extended family norms, it is too early to conclude that the roles of extended family and intergenerational relationships are declining in later life of Chinese elders. Another reason for the observed insignificant protective effects of intergenerational relationship variables in the current study may be due to the limitation in measuring intergenerational relationships. First, it is possible that the measures of quantitative characteristics of relationship with children, such as the number of children, living arrangements and frequency of contact may not necessarily imply the quality of or perceived satisfaction with intergenerational relationships. It has been found that perceived satisfaction with children was a significant predictor of mental well-being of older parents in China (Chen and Silverstein 2000). Taking the form of co-residing with children, its content as well as the perceived satisfaction on this living arrangement cannot be assumed.

Second, the commonly used indicators of traditional extended family arrangement such as number of children, co-residing with children, having contact with non-resident children may fail to reflect the new dynamics of intergenerational interaction in contemporary China. For example, as younger generations leave hometown to seek for better education and job in urban

areas or other cities, personal visits become less and less frequent. As a replacement, telephone communication and financial support through sending remittances back home may become increasingly important forms to retain the close bond between older parents and children (Lowry 2009; Silverstein, Cong and Li 2009). This change in the pattern of intergenerational interaction may partially explain the lack of effect of having frequent contact with more non-resident children on mortality in the current study. Modern society with high social mobility discourages stable co-residence on one hand, while facilitating other forms of interaction and support exchange between geographically separated generations on the other hand. Thus, it should be noticed that in contemporary China, close intergenerational relationships and support provision may not necessarily be assured by the number of children and their residential proximity. Instead, the pattern and forms of intergenerational interaction may have adapted in order to deal with the changed social and household context. Unfortunately, due to the limitation on BMLSA data information, the current study is unable to investigate these new forms and their health effects.

Therefore, the findings of the weak effects of the number of children and co-residing living arrangement cannot be simply interpreted as indicating that the norms of filial piety and close intergenerational bonds have been abandoned. First of all, having more children or taking a traditional living arrangement does not necessarily indicate a better performance of filial support. Moreover, taking new forms could possibly be an adaptive strategy to better

meet the needs of both older and younger family members in a rapidly changing social environment (Chen 2005). In future research, it is important to investigate whether the effect of intergenerational relationships in protecting the health and well-being of Chinese elders remains to be crucial or declining. Or, are there any transformations in the intergenerational relationship in terms of its features and interaction pattern? What are the influence of these changes on the health of older people?

On the other hand, such findings of insignificant effects of number of children and living with children are of importance in reshaping the mindset of policy makers and researchers. The current aging policies assume the importance of family relationships and support, especially relationships with children and their filial support. The priority of aging policy design is to seek approaches to maintain traditional extended family forms such as co-residence living arrangement. And one of their main concerns is that the coming cohorts of Chinese elders who have only one child and more likely to live separately from children would be likely to suffer from social isolation and lack of family support.

However, if the number of children and living with children turn out to have no strong influence on the health and mortality for old people in contemporary China as found in the present study, the implications of the declining fertility rate and co-residence living arrangement for the health and well-being of the coming cohorts of Chinese elders may not be as great as anticipated.

The findings of the present study suggest that rather than uncritically accepting the commonly held assumptions, it is necessary to take into account the implications of the rapid changes in social and demographic settings for the characteristics of late-life social networks and social engagement as well as their health impacts. Based on the findings of the present study, I suggest the aging policies in the future should put more effort in improving the quality of intergenerational relationships by facilitating various forms of interaction between older parents and adult children who are more likely to live geographically apart. In addition, the emphasis of aging policies should not exclusively focus on maintaining or improving intergenerational relationships and family support. The significant protective effects of social engagement variables on survival status found in the current study suggests that in future aging policy design, more effort should be made to encourage and facilitate Chinese elderly' engagement in social, productive and recreational activities outside the home.

#### **7.2.4 Subgroup variations**

The present study found that there were gender differences and urban-rural variations in the relative importance of social integration components. Moreover, it was found that the confounding effect of health status was different across different subgroups. Rather than targeting the whole older population with undifferentiated policies, it is necessary to acknowledge the diversity of older population in China and the specific characteristics and needs of sub-

groups. Differentiated intervention policies targeting specific groups of older adults are needed. For instance, the independent and substantial protective effects of social engagement items found among women indicate that policies facilitating and encouraging women's activity engagement may achieve significant improvement in the survival status of older Chinese women. Whereas for men, it is noticeable that the protective effects of social engagement variables either substantially weakened or lost significance after health status was controlled, revealing the high correlation between social engagement and health status for older Chinese men. Thus, specific policies regarding promoting social integration may need to be designed and implemented among older men with different health conditions.

With regard to urban-rural differences, it is interesting to note that there is a unique pattern in the relative importance of social integration components in affecting mortality for urban elders. Specifically, having contact with friends and relatives was found to be associated with decreased mortality with marginal significance for this subgroup of Chinese elderly. More interestingly, the further analyses by stratifying urban elders according to their health status revealed that for those urban elders who were free of functional limitations, the protective effect of having contact with friends and relatives was even stronger than those of family relationships such as having a spouse, or having two or more children. The importance of friends and other extended relationships for urban elders, in particular healthier urban elders, may reflect the influences of a relatively higher level of modernization and urbanism in ur-

ban China on the characteristics of social integration and its health impacts for older people living there. It has been widely documented in Western studies that friendship is an important relationship for older people (Crohan and Antonucci 1989; Matt and Dean 1993; Seeman et al. 1987; Fiori, Antonucci and Akiyama 2008; Fiori, Antonucci and Cortina 2006). In some Western studies, the beneficial effect of friendship was found no less important than the effects of having a spouse or having children (Seeman et al. 1987; Fiori, Antonucci and Cortina 2006). In future research, more attention needs to be paid to the role of friendship and other non-family related relationships in protecting the health and well-being of the current and coming cohorts of Chinese elders.

Another unique pattern of the association between social integration and mortality among urban elders is that there was no significant protective effect of providing help to family members. There is evidence that urban elders were more likely to give to rather than receive from their children compared to their rural counterparts in contemporary China. More research is needed to investigate the situation of intergenerational support exchanges in urban areas. Are contemporary urban elders experiencing great pressure of giving support? What is its health consequence for urban elders?

### **7.3 Strength and limitation of research methods**

First of all, the availability of 8-year longitudinal panel data with multi-dimensional information of social integration and health status as well as social and demographic characteristics of elderly respondents make it possible to

conduct a comprehensive analysis on the health effects of social integration for older people in China.

Another strength of this study is the use of pooled logistic regression model, which allows a better grasp of the time-varying values of social integration components as well as social, demographic, and health status variables. To further examine the reliability of pooled logistic regression model, several additional analyses were conducted in order to find out whether the effects of social integration components interact with time. Specifically, I replicated all the analyses in each wave of data separately before pooling them together. I predicted mortality of first follow-up period (between 1992 and 1994) using the information on social integration and other covariates at baseline (1992). Similarly, I predicted the mortality between 1994 and 1997 using the information of independent variables in 1994, and mortality between 1997 and 2000 using the information of independent variables in 1997. It was found that the coefficients of social integration components in these three models were similar to one another in terms of relative importance. However, the coefficients in the second and third wave models were a bit stronger than those in the first wave model, which could be due to the longer follow-up periods (three years) of the second and third intervals compared to the two-year long period of the first interval. These preliminary analyses reveal that the effects of social integration components are fairly stable over the whole follow-up period and suggest that the results presented in pooled regression model are not the average of

time-varying effects.<sup>1</sup> Moreover, as different waves of data were pooled and the follow-up period of each wave was as short as two or three years, it may not be critical to examine the possible interaction effect of social integration components with time in such short time period.

This analytic model, however, has its limitations. By pooling intervals, this method actually focuses on examining the short-term effects of risk factors on event occurrence in the follow-up interval. Taking the current study as an example, by employing pooled logistic regression model, the association between social integration and mortality was examined using the values of social integration components of each episode to predict the survival status in the subsequent time interval. If the long-term effect of social integration were examined, only those who have their social integration scenario unchanged across observations would be selected. Thus for those risk factors (i.e., bereavement) which may have their short-term and long-term effects significantly different, this limitation should not be ignored.

With regard to the measures of social integration in the present study, there are also a few limitations. First, BMLSA study was not designed to explore the health effect of social engagement. Questions asking about the four kinds of activities in BMLSA survey are not enough to provide representative information on the characteristics of social engagement of contemporary Chinese elders. Also, they are too limited to reflect the possible gender and

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<sup>1</sup>If the effect varied with time, the results of pooled regression model would be the average of the effects of these three separate models.



urban-rural differences in the features of social engagement. Nevertheless, based on the strong and robust associations between these four social engagement components and mortality observed in the analyses, it is reasonable to expect that more comprehensive and precise measures of social engagement of Chinese elders may lead to a stronger evidence of its protective effect on health and survival status.

Another limitation regarding the measures of social integration is that, as mentioned above, measures of the new forms of intergenerational interaction are not included in the current study. It is possible that conventional measurement of intergenerational relationships such as number of children, living arrangements and having contact with children, can not capture the dynamics of intergenerational interaction between Chinese elders and their adult children in contemporary China. Moreover, the measures of social integration used in the current study convey more information about the number (presence) of social relationships and activities in which people are involved in rather than the quality and closeness of social relationships as well as the extent of performing activities.

Finally, the pattern of the association between social integration and mortality found in the current study based on a sample of Beijing elders has limitations to be generalized to other regions of China.

## 7.4 Future research plans

### Comparing cohort differences using repeated cross-sectional data

Given the rapid social and demographic changes that have been taking place in contemporary China, it is unlikely that the pattern of the association between social integration and mortality found in a sample of Chinese elders interviewed in the 1990s is similar to what will be found among the future cohorts of older people.

The socioeconomic and health characteristics of the coming cohorts of Chinese elderly are different from those of the current cohorts. For example, the future cohorts of Chinese elders, especially older women, will have higher education level, better economic status and health condition than their preceding cohorts. Moreover, they may have fewer children and be less likely to live with children, while they may be more likely to experience divorce or remain single. However, it could be less predictable how these changes in the individual characteristics of future older cohorts influence the features of their social integration and its health impacts. A younger old cohort was included in the 2009 wave of BMLSA survey. As long as the data of this latest wave are available, it is interesting to examine the cohort differences in the characteristics of social integration as well as in the relative importance of family and non-family relationships and activities so as to investigate the transformation of social integration of older people and its health effect in a rapid-changing China. For example, is the role of children in protecting health becoming less

important while the importance of friends and other extended relationships is increasing for the future older cohorts? The comparison of cohort differences will provide more evidence to validate the proposed interpretation that the protective effect of intergenerational relationships has been declining in contemporary China. Or is it possible that Chinese elders absorb the benefit of both traditional and modern values and develop adaptive strategies to maintain close relationships with children and at the same time explore their social life outside home?

### **Examining the health impacts of social integration transition**

Given that the features of social integration of older persons are likely to change over time, I plan to extend the analysis to examine the health effects of the transition or change of the status of social integration characteristics. For example, in the current study, it is unexpected to find that living arrangement had no effect on mortality for Chinese elderly. It is possible that rather than the status, the changes of living arrangements (e.g. moving in or moving out) have impact on the health and well-being of older people (Davis et al. 1997). There is evidence that living arrangements are increasingly becoming a temporary arrangement as a practical strategy. In the current study, the preliminary analyses examining the transition across waves of BMLSA data also revealed that it was not uncommon for old participants to change their living arrangements during the 8-year period. Moreover, the behaviors of receiving and giving supports are also dynamic over time. As the next step of using this

longitudinal panel data, I will examine the influence of the transition of living arrangements and support exchanges on the health and mortality of Chinese elderly.

### **Measuring and modeling macro-level social and cultural factors**

Although the current study emphasized the role of social and cultural settings in conditioning the association between social integration and mortality, which indeed stimulated my investigation on the relative importance of the family and non-family related social integration components for Chinese elders as well as the gender and urban-rural variations, there is lack of measurable information of these macro-social forces. Thus, a direct examination of the confounding or conditioning effects of those macro-level social and cultural factors is not allowed. In future research, more effort should be made in operationalizing these macro-level factors, modeling and separating their impacts from those of individual-level factors.

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