Dynamics of well-being inequality: Changing disparities between local and migrant elderly in Shanghai over the last decade

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Abstract. Tremendous socio-economic transition during the last three decades has brought the post-socialist Chinese cities not merely economic prosperities but also socio-spatial inequity. Enlarging residential segregation between locals and migrants, especially for the physically and economically disadvantaged elderly group, exerts substantial influences over their well-being inequality. This paper aims to analyse the dynamic implication of residential segregation for the well-being inequality between local and migrant elderly in Shanghai since 2000 to 2010. Well-being is conceptualized and evaluated based on availability of and accessibility to relevant social and physical resources. Then segregation and well-being inequality are analysed and compared between 2000 and 2010 over different communities and travel modes. This paper concludes that the residential segregation between local and migrant elderly, slightly alleviated in peripheries but strengthened in center during the last decade, continues to produce evident inequality in well-being, making migrant elderly more disadvantaged in their urban life.

Key words: well-being, inequality, dynamics, migrant elderly, Shanghai

1 Introduction

Over the last three decades the unprecedented political-economic transition, from a planned and state-dominated to a market-oriented economy, has brought the Chinese cities not merely great economic prosperity but also intensified social stratification and social inequality (Bian, 2002; Wu and Li, 2005). The Chinese cities, once characterised by socialism and egalitarianism, seem to become the most unequal cities in the world (Li and Wu, 2008). This is for example expressed in the development of a two-class urban society comprising local residents and migrants (Li and Huang, 2006). Due to institutional barriers, rural migrants are not entitled to full citizenship and benefits enjoyed by local residents of cities (Liu, 2005; Wu, 2002). As a consequence, the local-migrant disparity has become a major inequality in transitional Chinese cities, jeopardizing social stability and social sustainability (Zhao and Howden-Chapman, 2010).

The local-migrant inequality has also been translated into social space, creating socio-spatial segregation in cities (Wu and Li, 2005). Empirical studies on housing and residential segregation (Wu, 2008; Huang and Jiang, 2009; Wang et al, 2010) have shown that migrants are distributed over private rental housing, factory dormitories, construction sites and urban villages, mostly located in the urban fringe. The locals however primarily inhabit public and commercial housing in the central city. The segregation of locals and migrants is largely a consequence of the *Hukou*

system which excludes migrants from state-sector employment and state-offered housing welfare (Fu and Tang, 2008; Logan et al, 2009).

The implication of this local-migrant residential segregation for their well-being and life quality has been hardly studied (Wu, 2008) in cross-sectional or longitudinal study. One can wonder whether the residential segregation also lead to inequality in well-being, making migrants even more disadvantaged in their urban life. Residential segregation might imply uneven access to facilities, services, opportunities, healthy and safe environments, and supportive social relationships (Bullard, 1995), which might cause unequal well-being effects on locals and migrants. In particular for the elderly, the local-migrant residential segregation can have serious consequences. Due to declining health conditions, physical capabilities and mobility, and limited income after retirement, the elderly in the final stage of their life course have less opportunities to overcome the negative consequences of segregation. This might jeopardize their well-being of the elderly, especially of those more disadvantaged migrants.

This paper aims to analyse the dynamic implication of residential segregation on the distribution of well-being of the local and migrant elderly over the last decade. Shanghai is selected because of its highest aging population rate in China (Chai, 2010) and its role as major migration destination. For the analysis, the mechanism of housing inequality and residential segregation, their influence on resource distribution, and the associated well-being theory will be firstly elaborated upon (section 2). Thereafter, the methodological part (section 3) will discuss the specific assessment methods of the elderly's well-being. Further, residential segregation and well-being inequality between the local and migrant elderly in Shanghai in 2000 and 2010 will be analysed, interpreted and compared (section 4). Conclusions and planning suggestions will be discussed in the final section.

2 Theoretical framework

Human well-being is inevitably influenced by the characteristics of urban space itself and its associated amenities and social environment (Oswald and Wu, 2010). Residential segregation between the local and migrant elderly implies differentiations to spatially enjoy and access to those needed resources, which are valuable for their well-being. This part will discuss the relationships of residential segregation, resource distribution, needs satisfaction and well-being production.

2.1 Housing inequality and residential segregation between locals and migrants

The *Hukou* (household registration) system is considered as the crucial institutional factor in the local-migrant segregation (Li and Wu, 2008; Logan et al, 2009; Wu, 2004). It was designed in the 1950s under Mao's policy of rapid industrialization, originally aiming at restricting rural-urban migration and maintaining social order in cities (Ning, 1997). Each individual is registered in only one place of residence in terms of either urban or rural *Hukou*. Except for very few channels for instance being recruited by state-owned enterprises and university, the rural-urban migration was

strictly controlled before the 1980s (Liu, 2005). It thus shaped an urban-rural dual society. Because of the absence of migratory population and the homogeneity of residents and housing in the socialist era, local-migrant segregation wasn't observable in the pre-reform Chinese cities (Wu, 2008). Since the planned-to-market economic transition in 1980s, the *Hukou* system has been gradually relaxed and reformed to facilitate economic growth in terms of encouraging migration and granting migrants urban *Hukou* and rights. Since then Chinese cities have witnessed a massive influx of migrants. The reforms, however, are majorly developed to attract and benefit wealthy and highly educated migrants, rather than the great majority of rural migrants. Particularly in prosperous cities and regions like Shanghai and Beijing, *Hukou*'s effect on local-migrant disparity still remains potent and intact, denying rural migrants many citywide social benefits, services and housing welfare (Chan and Buckingham, 2008).

Non-(urban)*Hukou* migrants are excluded from municipal and work-unit public housing, economic and affordable housing, and low-rent housing (Wu, 2004), the major types of welfare housing provided by the work-units and municipality and located mainly in the city center. They also couldn't enjoy the commodity housing subsidies offered by many work units to their local employees, during the transition from state-led allocation system to market-led housing system. During such transition, the local tenants of public housing are allowed to purchase their housing with very cheap price, which upgrades their housing tenure from renting to ownership and transfers public housing welfares into their assets. Such policy, however, doesn't benefit migrants, but only makes local residents more advantaged in housing market. Thus, the rental market and dormitories remain as the key housing choices for migrants (Wu, 2002). In addition, the *Hukou* system also leads to unequal distribution of educational resources between rural and urban areas, and employment discrimination against rural migrants in cities. Migrants are restricted to jobs undesirable to the locals (e.g. construction, factory, domestic and commercial services). These disadvantages in education level and urban labor markets consequently lead to lower income level and worse housing achievement of the migrants (Huang et al, 2013). All the housing disadvantages of migrants, as a result, are reflected by their segregated situation of living in the rental housing of the dilapidated areas of the central city and migrant enclaves in the peripheries. This also applies to the elderly migrants. After retirement, elderly migrants, except those with children having a higher socio-economic status, have less economic ability to improve housing condition and to change their segregated situation, but have to remain in the same or similar places.

2.2 The elderly's well-being based on Lindenberg's SPF theory

To what extent does the residential segregation mentioned have impact on the well-being of local and migrant elderly? Well-being generally refers to a good life, which is primarily conceptualized based on one's subjective evaluation of life and feeling (Gasper, 2005; Ettema et al, 2010). It expresses individuals' cognitive and emotional well-being, directly measured by means of psychometric scales (Diener and Suh, 1997). Lindenberg's theory (Lindenberg, 1996; Ormel et al, 1999; Nieboer et al,

2005) builds a theoretical and assessment framework for subjective well-being, in which concepts like well-being, goals, needs and resources are well integrated under his social production function (SPF).

Table 1. Lindenberg's theory of Social Production Functions (SPF)

Top level	Subjective Well-being				
Universal goals	Physical Well-being		Social Well-being		
First-order instrumental goals	Stimulation/ Activation (optimal level of arousal)	Comfort (absence of physiological needs; pleasant and safe environment)	Status (control over scarce resources)	Behavioral Confirmation (approval for "doing the right things)	Affection (positive inputs from caring others)
Activities and endowments (means of production for instrumental goals) (examples)	Physical and mental activities producing arousal	Absence of pain, fatigue, thirst, hunger; vitality; good housing, appliances, social welfare, security	Occupation, life style, excellence in sports or work	Compliance with external and internal norms	Intimate ties, offering emotional support
Resources (examples)	Physical and mental effort	Food, health care, money	Education, social class, unique skills	Social skills, competence	Spouse, empathy, attractiveness

Source: Lindenberg (1999)

In this theory, it is stated that people strive to improve their subjective well-being (Table 1) by optimizing two universal goals: physical and social well-being. The two universal goals can be produced by five instrumental goals or basic needs: stimulation and comfort for physical well-being, status, behavioural confirmation and affection for social well-being (Nieboer et al, 2005). The five basic needs can be further fulfilled and produced by lower level of resources. Those physical and social resources as well as the five basic needs are fundamental and of significance to people's well-being production. They will be further specified for the elderly. Retirement, abundant leisure time and declining health condition will conjointly change their behavioural pattern, needs, needed resources and understanding of well-being (Chai and Li, 2005; Gui, 2004; Chow, 2010).

First, stimulation needs are related to the drive for producing arousal, including mental and sensory stimulation, physical effort and competitive sports (Ormel et al, 1999). Stimulation needs of the elderly can be fulfilled by the cultural and education facilities (e.g. culture centre and elderly university), entertainment facilities (e.g. elderly activity centre), public space (e.g. park), and facilities for non-daily consumption (e.g. retail stores) (Gui, 2004). Education facilities are of relevance, since they provide the elderly opportunities to enjoy their life, by attending their favorite courses such as music, painting, computer, foreign language and health care.

Second, comfort needs respond to the inner drives of seeking tension reduction against the somatic and psychological state such as hunger, thirst, fatigue, pain and fear (Ormel et al, 1999). They are related to activities such as eating, drinking, sleeping, seeking for personal and property safety. Comfort needs of the elderly can be produced by physical resources related to food (e.g. market, supermarket and

restaurant), health care (e.g. hospitals, clinic, sanatorium and nursing home), housing and money (e.g. post office and savings bank) (Gui, 2004; Zhao, 2009). Post office and savings bank are of relevance, since they are the particular places for the elderly to receive and withdraw pension, the main sources of income after retirement.

Third, the status needs refer to a relative ranking mainly based on one's control over scarce resources such as political power, social and economic capital (Lindenberg, 2001). The status can be translated into urban space, represented by one's control over privileged living conditions such as superior location and neighbourhood quality. By having a good housing location, for instance, the elderly have better control over limited public services, liveable and healthy environments, perceived privileged urban space, and thus have a better status needs fulfilment. By habituating in a physically and socially superior neighbourhood, characterized by good housing quality and high socio-economic status of its inhabitants, the elderly's status needs are satisfied better.

Fourth, behavioural confirmation needs refer to the experience of doing the right thing, having the right thoughts and agreeing the right norms in the eyes of relevant others (Lindenberg, 2001). People would seek for social approval by obeying certain social norms for appropriate action, thoughts, attitudes and performance of their age and social group. From a spatial perspective, people belonging to the same social group tend to have similar spatial preferences for instance for housing and residential location. In this sense, living adjacent to one's own social groups (one's relevant others and social resources) and consequently forming a relative homogeneous community, facilitates one's behavioural confirmation. This also applies to the elderly, who can satisfy their needs by living close to and socializing with the other elderly. Fifth, the affection needs refer to feelings of love and caring between people in close relationship and feelings of being accepted and belonging with regard to who one is. In this respect, family and friends can be regarded as affective social resources of the elderly.

We expect that the physical and social resources for well-being production are not equally but heterogeneously distributed over different residential communities in Shanghai due to differential building ages, locations, qualities and developers. It is expected that the elderly's residential segregation between different communities may exert a significant influence on the inequality of their resource availability and accessibility, and consequently on the inequality in their well-being level.

3 Methodology

Since physical and social resources produce five types of basic needs, which in turn produce physical, social and overall well-being of the elderly, resources are employed as the proxy of well-being in our assessment. The assessment methods are based on the accessibility to and availability of physical and social resources (Table 2). Shanghai economic and population census (2000 and 2010) provide information of these resources on sub-district level. In general, the road-network based and location-based accessibility measure is employed for physical needs assessment,

whereas social needs are measured by the availability of social and physical resources within the evaluated spatial units. The satisfaction of affection needs requires not only the social resources such as core family members but also, more importantly, the quality of relations. This paper will not evaluate affection need due to its intangible and complex attribute, as well as the absence of such data for our research.

3.1 Measuring basic needs satisfaction

Table 2. The assessment methods for four types of basic needs

Well-being	Needs	Methods	Equations	
Physical	Comfort	Shortest time accessibility measure	$C_i = 1/\mathrm{d}_i$	$\mathrm{C_j}$= Satisfaction level of comfort needs d_i= Shortest distance to nearest service
	Stimulation	Potential accessibility measure	$S_i = \sum_{j=1}^{n} \frac{D_j}{d_{ij}^{\beta}}$	S_j= Satisfaction level of stimulation need $\mathrm{D_j}$= Destination opportunities $\mathrm{d_{ij}}$= Distance between i and j β= Distance decay coefficient
Social	Behavioural Confirmation	Availability of similar social groups	$B_i = D_i + P_i$	B_i= Satisfaction level of needs D_i= Density of elderly population P_i= Proportion in total population
	Status	Availability of good location & neighbourhood quality	$St_i = \mathrm{L}_i + N_i$	St_j= Satisfaction level of status needs L_i= Location N_i= Neighbourhood quality

First, comfort needs (Ci) are measured by the reciprocal of the shortest time to the nearest facility. Comfort needs refer to the most fundamental, urgent and frequently used facilities during the daily life of the elderly, for instance banks, markets and hospitals. The nearest one is far more useful and meaningful than the distant ones, since the service quality is usually similar and there is no need to spend time, money and energy on extra distances.

Second, stimulation needs (Si) are evaluated by the potential accessibility measure, which takes cumulative opportunities and distance decay coefficient into consideration. This is because stimulation related resources such as cultural, leisure and non-daily shopping facilities are more concerned with the overall cumulative opportunities provided in the surroundings. For instance, the shopping districts instead of the nearest shop provide more and better opportunities for the elderly to compare and buy things like clothes, electronic products and jewelry. Besides, by assigning higher weight to closer resources based on a distance decay law, potential measure can cover all the spatial interactions and reveal the aggregated accessibility level of a place.

Third, satisfaction level of behavioral confirmation needs (Bi) equals the sum of scores of standardized density and proportion in total population of the elderly. Behavioural confirmation from a spatial perspective can be fulfilled by similar housing preference and locational behaviour. The similarity of locational behaviour can be reflected by the proximity (or density) and homogeneity (or proportion) of the elderly in certain spatial units, which in turn stimulates the elderly's interaction and other behavioural confirmation. Specifically, a place with higher density and

proportion of the elderly doesn't only reflect higher similarity of their locational behaviors and thus better fulfilled behavioral confirmation needs in such place, but also means more convenience to meet, socialize with and receive social approval from other elderly.

Fourth, status needs (Sti) are equal to the sum of the values of location and neighbourhood quality. Location of status is reflected in the housing price. The areas with higher housing price are interpreted as having a better status. As to the neighborhood quality, it usually consists of both physical and social aspects. The former is concerned with the housing size and housing facilities (e.g. kitchen and bathroom) (Logan et al, 1999), while the latter refers to the education status (e.g. graduates and high school) and occupation status (e.g. chief and manufactory) of the inhabitants.

3.2 Measuring well-being and assigning weights

The well-being of the elderly, including physical and social dimensions, is measured by aggregating the scores of various basic needs. Each type of basic needs is made up of several sub-indicators, and their values are calculated by summing up the standardized scores of their sub-indicators. Based on two weighing principles, weights are assigned to each sub-indicator to perform the calculation (Table 3). The first principle is to weight the general indicators and sub-indicators at the same level equally, since they are considered as having equal importance. For instance, behavioral confirmation, status, comfort and stimulation needs get the same weights, while two sub-indicators (location and neighbourhood quality) of status are weighted equally, and seven sub-indicators (e.g. market and grocery stores) of food share equal weights. The second principle is to adjust the weights of the sub-indicators of comfort and stimulation needs in accordance with the empirical activity-based evidence such as travel frequency. Travel frequency reflects the costs in terms of time, energy and money that the elderly are willing to spend, which implies the relative importance of various activities in their daily lives. Chai conducted a detailed survey on the elderly's travel behaviors, which covered five representative neighborhoods in Shanghai central city. The travel frequencies of Shanghai elderly on pension withdrawing, health care, food shopping, culture and education, exercise and entertainment, and non-daily consumption are about 0.25, 0.6, 5.2, 1.1, 4.4, and 2.6 times per week respectively (Chai, 2010). Consequently their relative weights can be brought in line with these relative shares of frequences (Table 4).

Table 3. Weights among basic needs and their sub-indicators

Well-being	Basic Needs	Weight	Sub-indicator	Weight
Physical (0.5)	**Comfort**	0.5	**Money**	**0.04**
			Post office	0.08
			Bank	0.08
			Health care	**0.1**
			General hospital	0.017
			Specialist hospital	0.017
			Clinic	0.017
			Other hospital	0.017
			Sanitariums	0.017
			Nursing home	0.017
			Food	**0.86**
			Market	0.12

			Supermarket	0.12
			Primary food stores	0.12
			Subsidiary food stores	0.12
			Grocery stores	0.12
			Fast food restaurant	0.12
			Snack shop	0.12
	Stimulation	0.5	**Culture and education**	**0.14**
			Library	0.047
			Culture centre	0.047
			Elderly university	0.047
			Entertainment	**0.54**
			Elderly activity centre	0.18
			Cinema and theatre	0.18
			Park	0.18
			Non-daily consumption	**0.32**
			Non-daily shopping	0.16
			Retails stores	0.012
			Culture, sporting goods	0.012
			Watch, spectacles and camera	0.012
			Other daily necessities	0.012
			Textiles, clothing and footwear	0.012
			Household goods	0.012
			Hardware	0.012
			Drugs and medical devices	0.012
			Book and newspaper	0.012
			Furniture	0.012
			Computer, software and office goods	0.012
			Ornament	0.012
			Other retails	0.012
			Restaurant	0.16
Social (0.5)	**Behavioural confirmation**	0.5	**Density**	**0.5**
			Proportion	**0.5**
	Status	0.5	**Location**	**0.5**
			Housing price	0.5
			Neighbourhood quality	**0.5**
			Housing facilities	0.25
			Education and occupation status	0.25

Table 4. Travel frequency (times per week) and weights of sub-indicators for Shanghai elderly

	Comfort				**Stimulation**			
Sub-indicators	Money	Health	Food	Total	Culture & Education	Entertain -ment	Non-daily consumption	Total
Frequency	0.25	0.6	5.2	6.05	1.1	4.4	2.6	8.1
Weights	0.04	0.1	0.86	1	0.14	0.54	0.32	1

Source: adapted from Chai (2010)

Travel modes are of importance for the assessment of physical well-being, as various modes influence the accessibility to the physical resources differently. However, since the social needs (behavioral confirmation and status) are reflected by the attributes of the specific living environment rather than the accessibility to distant resources, they will not be included in analysis of travel modes. The satisfaction levels of comfort and stimulation need are analysed for five travel modes: walking, cycling, metro, bus and car. By assigning different weights to each travel mode and integrating their values, the composite needs satisfaction and physical well-being can be calculated. The weights for various travel modes are derived from Chai's empirical study on Shanghai elderly's travel behaviors for shopping, leisure and health care related daily activities (Table 5). Generally, walking is the main travel mode for shopping (75.5%), leisure (63.4%) and health care (62.4%), and the bus is the secondary major travel mode. The average values are proposed to be the weights for each travel mode.

Table 5. Modal split of the elderly in Shanghai (%)

Activities	Walking	Cycling	Bus	Metro	Car	Total
Shopping	75.5	11.9	9.7	2.7	0.2	100
Leisure	63.4	11.8	21.5	2.8	0.5	100
Health care	62.4	9.3	25.7	2.1	0.5	100
Average	67.1	11.0	19.0	2.5	0.4	100

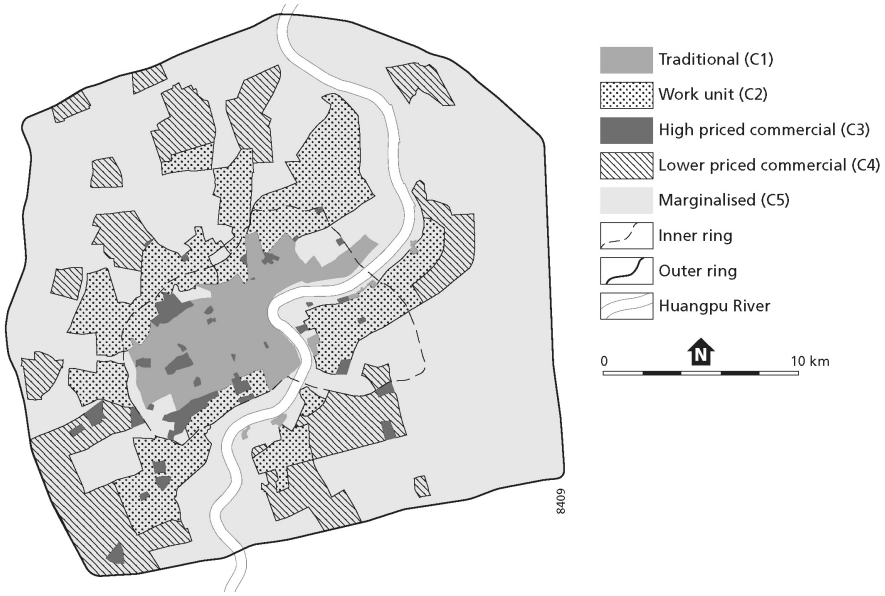
Source: adapted from Chai (2010)

4 Results

According to 2000 and 2010 census respectively, Shanghai central city contains 1.56 and 2.26 million local elderly, and 47.95 and 149.32 thousand migrant elderly, accounting for more than 60% of both local (2.46 and 3.40 millions) and migrant elderly (76.58 and 229.86 thousands) population in Shanghai. During the 10 years, the migrant elderly population in central city compared to the local elderly has increased more rapidly, 3 times more than a decade ago. This part will first analyse and compare the residential segregation between local and migrant elderly in 2000 and 2010, based on five community types in Shanghai central city. Thereafter the well-being inequality caused by this segregation will be analysed and compared.

4.1 Residential segregation between local and migrant elderly

Figure 1. Five types of residential communities in Shanghai central city



Source: Wang (2002)

Residential segregation between local and migrant elderly can be described and analysed at a detailed community level. Based on Wang's (2002) typology (Figure 1), residential communities in Shanghai central city consist of five types: (C1) traditional, (C2) work unit public housing, (C3) high priced commercial, (C4) lower priced commercial, and (C5) marginalized communities. Distinctive differentiations between public and commercial, expensive and cheap, central and peripheral housing are reflected in this typology, which helps to reveal residential segregation and unequal resource distribution caused by *Hukou*.

The traditional communities (C1) are highly concentrated in the city core (within the inner ring), which had been built before 1949. The dominant housing tenure in such communities is rental public housing in 2000 (Li and Wu, 2008). Single houses (villa), lane houses (Li-Long), and shanties are the three major housing types at that time, the facilities and quality of which are mostly poor. Yet the central location and abundant services make these communities quite lively and convenient. The work unit (or *Danwei*) communities (C2), built for associated staffs in the socialist era between 1950s and 1980s, closely surround the traditional communities and lie along the inner ring. Purchased public housing is the main type of housing tenure (Li and Wu, 2008). These communities are fairly good in terms of housing quality and fundamental services. The commercial communities, high priced (C3) and lower priced (C4), emerge mainly since 1990s after the housing marketization reform, which gradually changes the housing from welfare provided by the state to commodity purchased in the housing market. The high priced ones are mostly located in the city core, developed from the renewal projects, while the lower priced ones are distributed between the inner and outer ring, outside the work unit communities. The commercial communities, high priced ones in particular, are usually well-equipped by services and well-served by public facilities. The last type is the marginalized community (C5), which appears in recent decades and is mainly dispersed in the outer fringe of the central city, the rural-urban continuum. Such communities consist of urbanized villages, resettlement and informal housing, shaping a cheap private rental market. They normally have poor level of quality, security and accessibility, and deficient public services.

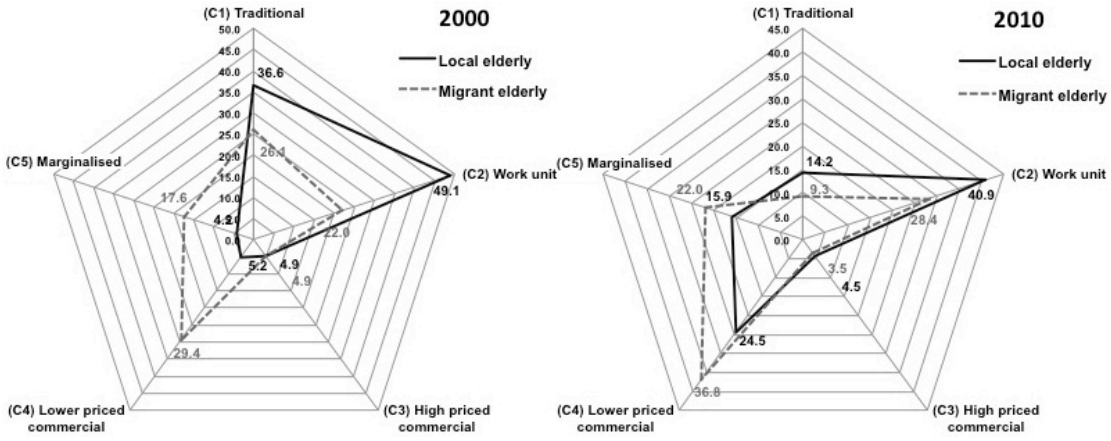


Figure 2. Proportional difference between the local and migrant elderly in 5 types of communities

Within the five types of residential communities, the dynamic of spatial differentiation of the local and migrant elderly is analyzed. First, in terms of population distribution, a higher percentage of locals than of migrants are concentrated in traditional and the work unit communities near the city core, while more migrants are distributed over the periphery lower priced commercial and marginalized communities in 2000 (Figure 2). This indicates the residential segregation among elderly group and the migrants' disadvantages, which, however, has been alleviated in 2010. In 2010, a large proportion of local elderly distributed in traditional communities have been shifted to lower-priced commercial and

marginalized communities. This largely mitigates the disparity of population distribution. Second, location quotient is employed to show the distributive pattern of the elderly. Location quotient scores higher than 1 means higher than Shanghai average level. The sub-districts with such scores are selected to represent the elderly concentration clusters. A concentric structure is exhibited in 2000 at the sub-district level, with local elderly and part of the migrants concentrating in the core area surrounded by the migrant elderly (Figure 3). From 2000 to 2010, both the local and migrant elderly have experienced a decentralization process, expanding from the central to the peripheral areas. However, this process has more severe consequence on the migrant elderly, since the traditional community shows no longer a concentration area for the migrant elderly where local elderly still have their dominance.

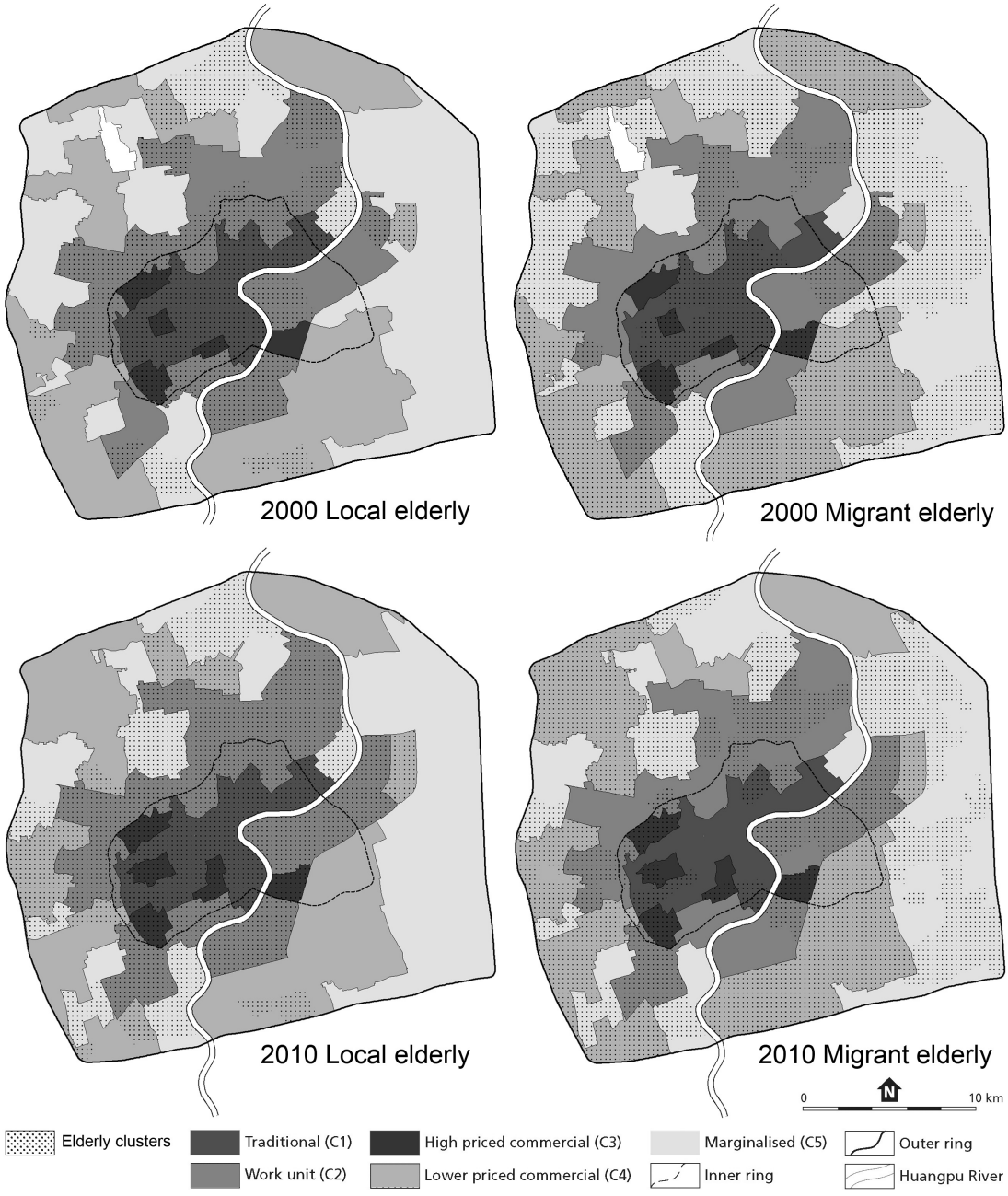


Figure 3. Local (left) and migrant (right) elderly clusters in five types of communities

The general central-periphery pattern of residential segregation between local and migrant elderly can be interpreted primarily by the constraints of migrants. Migrant elderly, compared to the locals, face institutional constraints of *Hukou* while reaching the similar housing resources. Non-*Hukou* migrant elderly have no access to the ownership and use right of public housing primarily located in the historical and work unit communities (Wu, 2002), provided as welfare by the state in the socialist era. This excludes the migrant elderly from living in the traditional and work unit communities to some extent. As state holds no responsibility of migrants' housing welfare, it is shifted to the market. In the housing market, in theory there are still many housing resources available for migrants (Wu, 2004), for instance those newly constructed commodity housing, re-commoditized public housing and private housing. However, they are restricted to purchase those private and re-commoditized public housing, and to get bank mortgages for the purchase of new commodity housing. That means the majority of migrant elderly have little option but to rent private, commodity and public housing by themselves, or live in the purchased or rental housing of their children. In the rental market, due to the high rent of Shanghai, migrant elderly are either trapped in the dilapidated areas of city center or dispersed in the cheap rental housing in the peripheries.

Besides, the preferences of migrants have also contributed to such segregation. Low cost and proximity to existing or potential workplaces are migrant's major residential preferences, served for their primary objectives of income generation (Wu, 2008). Since 1990s, substantial construction and manufacturing job opportunities have been generated for migrants in the city fringe and inner suburbs of Shanghai, due to fast urban expansion, industry relocation and foreign direct investment (FDI). The industry restructuring in central city, from manufacturing to service sector, causes a gradual relocation of most factories from the city center to the periphery, where in the meantime many new export-orientated and labor-intensive factories and industrial parks are built by FDI. Many migrant elderly are found concentrated for instance in marginalized communities on the east river bank, where Zhangjiang Hi-Tech Park, Jingqiao Export Processing Zone, and Waigaoqiao Free Trade Zone are located. And many are clustered in the lower priced commercial communities in the southwest corner of central city, near the Caohejing Hi-Tech Park. The fragmentation of Shanghai's industrial land use contributes to the general scattered distribution of migrant elderly, and the decentralization of industries and residence leads to the marginalization and segregation of migrants (Wu, 2008). However, during the last decade, this local-migrant segregation has been largely alleviated due to the suburbanization and decentralization of local population in Shanghai. The expansion of local population in peripheral communities leads to less segregated living condition between local and migrant elderly. However, in the traditional communities, the renewal project and fast rising housing price have also forced many migrant elderly moving out. This enlarges the residential segregation between two elderly groups in the city core area.

4.2 Well-being inequality among the elderly

The residential segregation between local and migrant elderly is expected to result in their unequal well-being. The average well-being and needs satisfaction values of the location quotient clusters are calculated to represent the values for both the local and migrant elderly in five types of communities. The values are the standardized score of the whole Shanghai city. For instance, 0 means the Shanghai average level, and 1 means one standard deviation higher than the Shanghai average. In general, the overall well-being (Figure 4) exhibits spatial differentiation over five types of communities in both 2000 and 2010. The highest values are obtained by the traditional, work unit and high priced commercial communities, the former two of which conjointly are the most populated types of communities for both the locals and migrants. The bad and fairly poor areas are normally where the lower priced commercial and marginalized communities are located. From 2000 to 2010, the well-being levels in all types of communities have been improved.

Considering the inequality between the two elderly groups, several general conclusions can be made for both 2000 and 2010. On average the local elderly have better well-being levels than the migrants. In addition, a general feature is demonstrated that the inequality gap between locals and migrants becomes larger and larger from the communities in the historical city center to those in the outer city fringe. Moreover, almost in each type of basic needs, local elderly gain the advantages over the migrants (Figure 4).

More specifically, the degrees and types of inequality vary among different communities. Looking into the traditional communities (C1), the similar high scores for both elderly groups in 2000 shows their equal enjoyment of the high well-being level. The poor neighborhood quality seems to be the only disadvantage for those elderly in the historical communities. In 2010, the neighborhood quality has been improved and even higher scores are observed for migrant elderly. This indicates that despite most migrant elderly being excluded from the traditional communities, the remaining migrant elderly and their households may have higher socio-economic status than the averages locals, which allows them to live in better place and enjoy higher well-being. For the elderly living in the work unit communities (C2), they generally have slightly worse physical well-being, concerning the comfort and stimulation related services, compared to those in the historical communities in both 2000 and 2010. However, they are distributed in communities with better housing and neighborhood quality, in comparison to those in the historical communities. Among the two elderly groups, the local elderly have higher values (the difference is about 0.2) than the migrants in terms of the physical well-being produced by all types of services. The largest difference exists in their behavioral confirmation needs, which reflects the migrant elderly's disadvantage in approaching and socializing with similar elderly people. The migrants only surpass the locals on their housing location and environment, and the associated status needs.

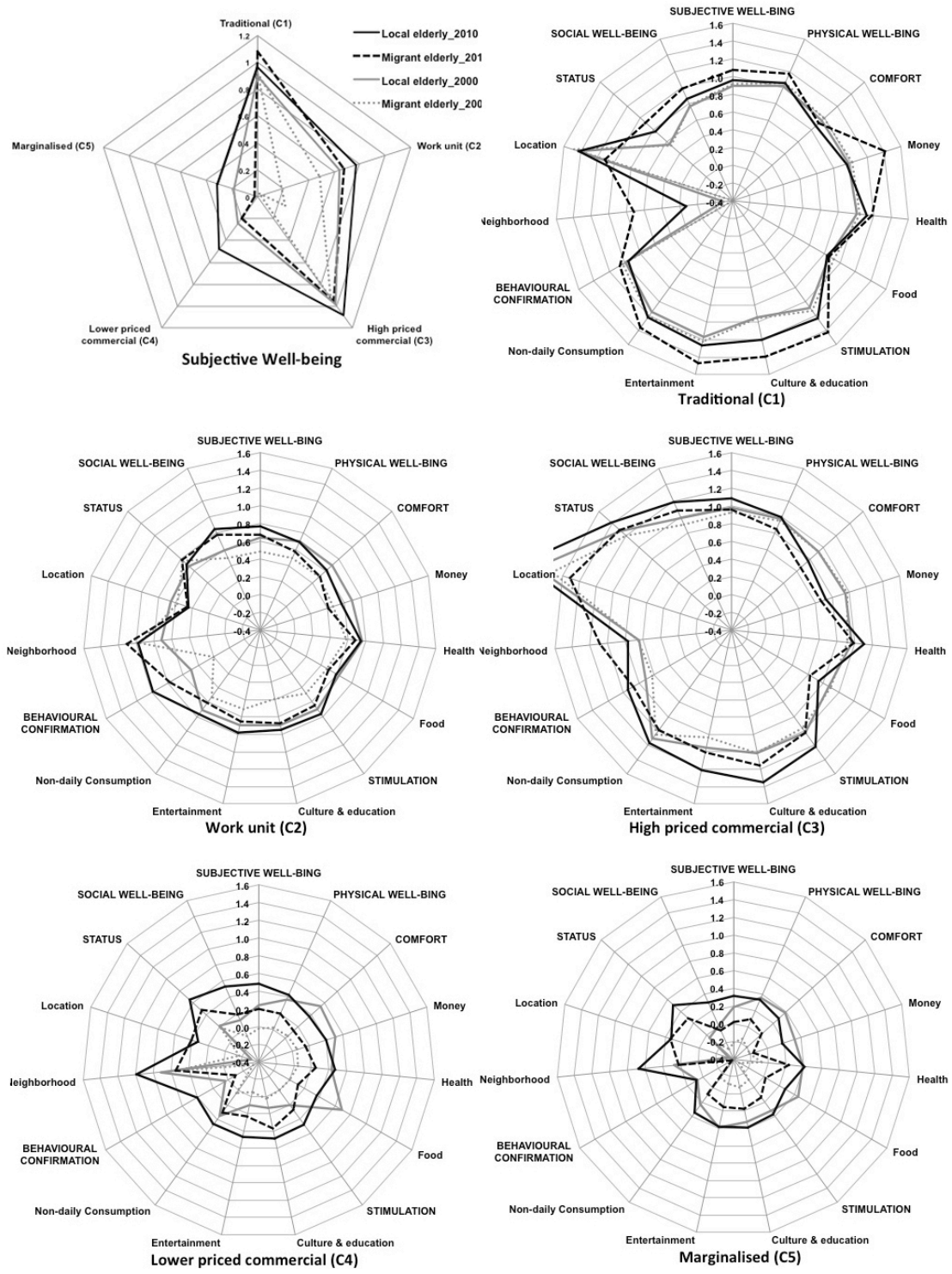


Figure 4. Inequality in well-being and needs satisfaction in 5 types of communities in 2000 and 2010
Note: the standardized value means how many times of standard deviation higher or lower than the Shanghai average value, e.g., 1, 0, and -0.4 mean one time higher, the same as, and 0.4 time lower.

The elderly who inhabit the high priced commercial communities (C3) on average have a high well-being level, similar as those in traditional communities. But the difference is that the commercial communities enable status needs gratification much better in terms of their very good location (e.g. near metro station), social and physical neighborhood quality. For instance, most of the communities are located in

Jin An and Xu Jia Hui, where the people with high socio-economic status in Shanghai are concentrated. In addition, the inequality gap between two elderly groups is on average larger than the one in historical communities, and it grows larger during the 10 years. The elderly in the lower priced commercial (C4) and the marginalized communities (C5) have poorer well-being than the above 3 types of communities, since these communities are mostly located in the fringe areas relatively far from the historical city center. And the service quantity and quality provided by both developer and city government are generally limited. The inequality between locals and migrants is evident in both 2000 and 2010.

4.3 The effect of different travel modes on the well-being inequality

Not only residential segregation (the origins) and service allocation (the destinations), but also travel modes (ways to overcome spatial separation) could lead to the well-being inequality. Different travel modes might have different effects on the formation of the inequality gap between the locals and migrants. Their effects can be measured and further compared by the difference of well-being scores between the two elderly groups. Although the migrant elderly are disadvantaged in all kinds of travel modes (differences between the locals and migrants are all above zero), a general feature is exhibited that the travel mode with higher speed would have better effect on mitigating the inequality gap. For instance, the overall physical well-being difference caused by the car is smaller than by bus, metro, cycling and walking. The metro is less important than the bus in 2000, which is influenced by the rather underdeveloped metro system compared to the abundant bus networks: only 3 metro lines lying mostly within the inner ring are constructed. However, in 2010 the metro's importance has been largely increased, since totally 13 metro lines have been built and under operation. Moreover, the above feature for five travel modes is more evidently present for the stimulation needs than for the comfort needs. This is because comfort needs are measured by the time to the nearest facility, which are less sensitive to the improvement of mobility than the stimulation needs measured by the accessibility to cumulative opportunities.

The travel modes play different roles in generating well-being inequality in different communities. In general, there is a characteristic for all travel modes that the further the communities are from the city core the larger the inequality gap between the two elderly groups is. Besides, the function of faster travel modes on narrowing the inequality gap is reflected better in the peripheral communities than the ones in the core. This can be explained by the degree of residential segregation of the elderly. In the communities close to the city center, migrant elderly are located in similar areas as the locals. Hence the various travel modes exert similar effects on both elderly groups, and their difference is small. Nevertheless, the spatial segregation in the peripheral communities is larger, which provides more opportunities for faster travel modes to mitigate the inequality gap. Compared to the year of 2000, in 2010 the inequality gap in the peripheral communities has been narrowed partially due to the great improvement of public transport in suburbs.

5 Conclusions and discussion

The tremendous political, social and economic transition in China has brought a prominent socio-spatial differentiation and segregation between the urban locals and migrants (Li & Wu, 2008). Such segregation is particularly hard to overcome for the physically and economically disadvantaged elderly group, jeopardizing their life quality and well-being. This paper aimed to analyse the dynamic implication of residential segregation on the well-being distribution between the local and migrant elderly in Shanghai over the last decade. The results show that despite the decentralization of local elderly mitigates the local-migrant segregation over the last ten years, local elderly still dominate the traditional and work unit communities in the city center, while migrant elderly relatively segregated in the peripheral communities hindering their access to various physical and social resources for well-being production. In the historical communities, the residential segregation is even deteriorated since the renewal project and uprising housing price have exclude large proportion of migrant elderly. This paper concludes that the residential segregation between local and migrant elderly during the last decade, slightly alleviated in peripheries but strengthened in center, continues to produce evident inequality in well-being, making migrant elderly more disadvantaged in their urban life.

The degree of well-being inequality, however, differs between community types, and depends on the specific type of basic needs and travel modes. From centrally located traditional communities to peripherally located marginalised communities, the residential segregation and inequality gap of well-being between two elderly groups increase gradually. Only traditional communities, containing the most and finest physical and social resources, present relatively equal or even higher well-being levels of migrant elderly compared to local elderly. Further, migrant elderly are not always disadvantaged regarding all types of basic needs. Migrant elderly for instance in the traditional and work unit communities on average enjoy better neighborhood quality and status needs fulfillment than the locals inhabiting the work-unit and traditional communities. Public transport including the bus and metro has proven to be effective to overcome the negative impact of segregation and narrow down the inequality gaps in well-being during last ten years.

This paper has used resources as proxies for subjective well-being. According to Lindenberg's theory, physical and social resources are closely associated with the conceptualization of subjective well-being. However, the subjective experience may not always be in accordance with the objective obtainability of resources (Gasper, 2005). In addition, it should be realized that although the elderly's subjective pursuits and definitions of resources for well-being production may exhibit homogeneity within the same city and country, they could become more heterogeneous at lower spatial levels and in different contexts. Affected by personalities, perceptions, beliefs, the well-being of other people (Gasper, 2005; Ettema et al, 2010), as well as social, cultural, geographic and institutional contexts, the elderly's specific pursuits may be more diversified.

This paper discussed the *Hukou*'s constraints in Shanghai. However, contextual differences of *Hukou* reform between Chinese cities also generate differentiations of constraints and available resources for the migrants, which should be paid attention on by future research. Less developed cities are more willing to attract migrants for fueling economic growth, by relaxing *Hukou*'s constraints and granting the migrants citizenship and associated benefits (Huang et al, 2013). The prosperous cities like Shanghai and Beijing only selectively grant richer and well educated migrants local *Hukou* and welfares, maintaining the constraints for the foremost disadvantaged rural migrants (Chan and Buckingham, 2008). The quality and quantity of available resources associated with local *Hukou* also vary between developed and less developed cities. With larger revenue available, developed cities usually set higher standards for providing public good and social welfares, which makes their *Hukou* more functional and valuable.

Suggestions from both institutional and planning perspectives can be further proposed to mitigate local-migrant residential segregation and well-being inequity. First, the *Hukou* system needs to be further reformed and removed, which, with its segregating effects on housing, employment and welfares, is the root for migrants' spatially exclusion in poor served communities. This is the prerequisite for the further planning proposals. For instance, by offering migrant elderly housing opportunities (e.g. social mixed and public rental housing) in the service concentrated areas (e.g. historical communities), their availability of and accessibility to resources can be improved. Since 2010 Chinese government has been promoting new 'public rental housing' policy, which for the first time allows the qualified non-*Hukou* migrants with stable jobs and residence to apply (Huang, 2012). Yet, the poor location, inappropriate rent level (not cheaper than rental market) and insufficient supply of Shanghai's pilot projects (Zhao et al, 2012) fail to really benefit the migrants. Further reforms and better implementations are still required.

Second, by reducing spatial separation effect caused by the river or the long distance, migrant elderly's accessibility to resources can be enhanced. It can be achieved through the improvement of infrastructure (e.g. bridges and roads) and public transportation (e.g. metro and bus), and the provision of transportation subsidies. The improvement of metro system for instance from 3 lines in 2000 to 13 lines in 2010 has played an important role in improving the well-being of migrant elderly. In addition, it is expected that the recent policy (since July 2013), granting the 'senior citizen card' (free public transportation) equally to migrant elderly in Shanghai, will also improve elderly migrants' ability to overcome spatial separation. These Shanghai experience can be also introduced to other Chinese cities.

Finally, the accessibility can be increased directly by the amendment and provision of services in the migrant elderly concentrated areas. This can be accomplished by the adjustment of existing land use planning or detailed planning, in terms of for instance increasing commercial and public service land use or facilities. Such planning depends not only on a detailed analysis of the existing mismatch between population (demand) and service (provision) distributions, but also on the prediction of the

dynamic and aging population structure (Zhao, 2009). China is now one of the most rapidly aging countries in the world (Han et al, 2012). More supports and attentions no matter from public policy or academic fields are needed for this disadvantaged and fast growing elderly group.

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