Residential segregation and well-being inequality between local and migrant elderly in Shanghai

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Abstract

The tremendous political, economic and social transition in China has brought a prominent socio-spatial differentiation and segregation between the urban locals and migrants. Such segregation is particularly hard to overcome for the physically and economically disadvantaged elderly group. This paper aims to analyze the implication of residential segregation for well-being inequality between the local and migrant elderly in Shanghai. Well-being of the elderly is assessed by the availability of and accessibility to the social and physical resources, which are employed as the proxy of well-being based on Lindenberg's theory of social production function. Basic needs (as the sub-indicators of well-being) and different travel modes of the elderly are considered in the assessment. The results show that local elderly dominate the traditional and work unit communities in the city center, while migrant elderly are scattered and relatively segregated in the peripheral communities. This residential segregation leads to the migrant elderly's disadvantages in terms of poor availability of and accessibility to various resources for well-being production. The degree of well-being inequality, however, differs between community types, and depends on the specific type of basic needs and travel modes. Less well-being inequality is witnessed in the traditional communities in central city and in public transportation modes. This paper concludes that the residential segregation between local and migrant elderly in Shanghai, largely caused by *Hukou*'s institutional constraints, has produced evident segrega-

tion and inequality in well-being, making migrant elderly more disadvantaged in their urban life.

Keywords: residential segregation, well-being, inequality, 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 be becoming the most unequal cities in the world (Li and Wu, 2008). This is 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 (Liu, 2005; Wu, 2002). As a consequence, the local-migrant disparity has become a major inequity in transitional Chinese cities, jeopardizing social stability and social sustainability (Zhao and Howden-Chapman, 2010).

The local-migrant inequity has also been translated into social space, creating socio-spatial inequity in cities (Wu and Li, 2005). Empirical studies of housing inequity and residential segregation (Wu, 2008; Huang and Jiang, 2009; Wang et al, 2010) have shown that migrants are distributed in private rental housing, factory dormitories, construction sites and urban villages, mostly in the urban fringe. The locals however primarily inhabit public and commercial housing in central cities. The *Hukou* system, with its segregating effect on employment and housing, plays a crucial role in this residential segregation (Logan et al, 2009). *Hukou* excludes migrants from the state-sector employment and state-offered housing welfare, and offers them a disadvantaged position in urban labor market and housing market (Fu and Tang, 2008). The cheap rental housing in peripheral and dilapidated areas remains the best opportunity for migrants.

What is unknown in literature is the implication of this local-migrant residential segregation for their well-being and life quality (Wu, 2008). Does 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 produce unequal well-being between locals and migrants. In particular for the elderly, the local-migrant residential segregation can have serious consequences. Due to a declining health condition, physical capability 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 the well-being of the elderly, especially of those more disadvantaged migrant elderly.

This paper therefore aims to analyse the implication of residential segregation for well-being inequality between the local and migrant elderly. Shanghai is selected because of its highest aging population rate (Chai, 2010) and its role as major migration destination in China. For the analysis, the mechanism of housing inequity and residential segregation, its 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 inequity between the local and migrant elderly in Shanghai will be analysed and interpreted (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 inequity and residential segregation between locals and migrants

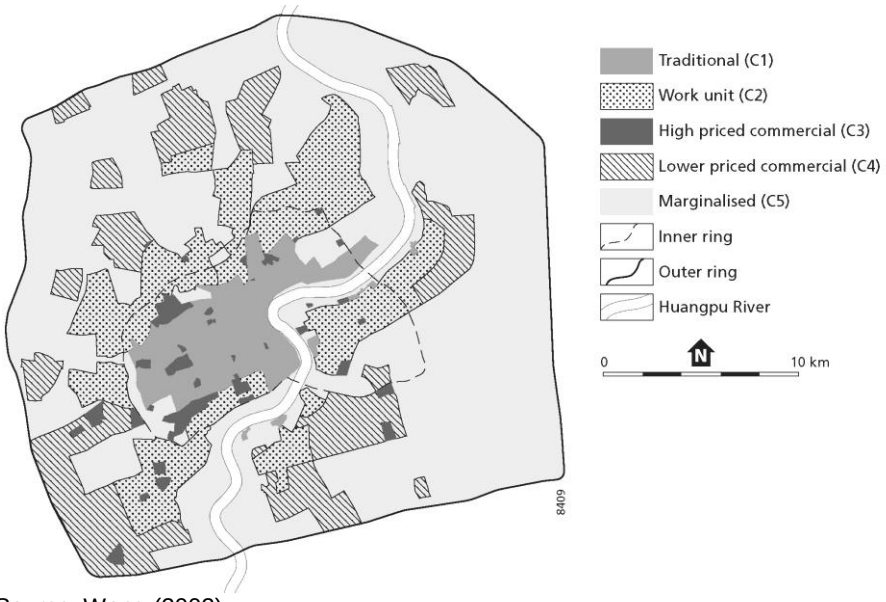
The *Hukou* (household registration) system is considered as the crucial institutional factor in the local-migrant segregation (Li and Wu, 2008; Logan et al, 2009; Wu, 2004). It was designed in the 1950s under Mao's policy of rapid industrialization, originally aiming at restricting rural-urban migration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

ther urban or rural *Hukou*. The rural-urban migration was strictly controlled before the 1980s with only few channels for instance recruitment by state-owned enterprises and university (Liu, 2005). It thus shaped an urban-rural dual society. The absence of migratory population, along with the homogeneity of residents and housing in the socialist era, didn't cause local-migrant segregation 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-*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 this transition, the local tenants of public housing are allowed to purchase their housing with very cheap price, transferring the 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 are translated into migrants' disadvantages in education level and urban labor markets, and consequently lower income level and worse housing achievement (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 segregated situation, but have to remain in the same or similar places.

The local-migrant segregation generally exhibits a center-periphery structure in urban space (Wu, 2008; Huang and Jiang, 2009). It can be described and analysed at a more 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*.

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



Source: Wang (2002)

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. It normally has poor level of quality, security and accessibility, and deficient public services.

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)
Source: Lindenberg (1999)

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

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 wellbeing, 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 are primarily fulfilled by the cultural and education facilities (library, culture centre, elderly university), entertainment facilities (elderly activity centre), public space (square, park), and facilities for non-daily consumption (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 such as food (related to services like market, supermarket and restaurant), health care (hospitals, clinic, sanatorium and nursing home), housing and money (post office and savings bank) (Gui, 2004; Zhao, 2009). Post office and savings bank are considered as money related facilities, 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 due to differential building ages, locations, qualities and developers, the physical and social resources for well-being production are not equally but heterogeneously distributed over five types of residential communities. It is expected that the elderly's residential segregation between five community types 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

3.1. Measuring basic needs satisfaction

The physical and social resources introduced above can produce five types of basic needs or instrumental goals, which in turn produce physical, social and overall well-being of the elderly. The assessment methods of basic needs satisfaction are based on the accessibility to and availability of physical and social resources (Table 2). Shanghai economic and population census (2000) will provide information of these resources on a very detailed level (survey district, covering 100 household). In general, the road-network based and location-based accessibility measure (Geurs and van Wee, 2004) is employed for physical needs assessment, whereas social

needs are measured by the availability of social and physical resources within the evaluated spatial units.

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

Well-being	Needs	Methods	Equations	
Physical	Comfort	Shortest time accessibility Measure	$C_i = 1/S_i$	C_i= Satisfaction level of comfort needs S_i= Shortest time to closest service
	Stimulation	Potential accessibility measure	$S_i = \sum_{j=1}^{n} \frac{D_j}{d_{ij}^{\beta}}$	S_j= Satisfaction level of stimulation need D_j= Destination opportunities d_{ij}= Distance between i and j β= Distance decay coefficient
Social	Behavioural Confirmation	Availability of similar social groups	$B_i = D_i \times P_i$	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	$St_i = L_i + N_i$	S_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 bank, market and hospital. 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 the extra distances. For example, if most of the food can be purchased in the nearest market, the elderly won't need to waste time and energy to buy food in a very far one. Hence the shortest time to the nearest resource is employed. Second, stimulation needs (Si) are evaluated by the potential accessibility measure, which takes accumulative opportunities, and distance decay coefficient into consideration. 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 area instead of the nearest shop provides more opportunities for the elderly to compare and buy things like clothes, electronic products and jewelry. Besides, potential accessibility gives higher weight to closer resources following a distance decay law, which helps to reveal the degree of aggregated influence through spatial interactions.

Third, satisfaction level of behavioral confirmation needs (Bi) equals the density of elderly population multiplied by their proportion in total population. Behavioural confirmation from spatial perspective can be fulfilled by

similar housing preference and locational behaviour, which could be reflected by the proximity and homogeneity of the elderly. The proximity and homogeneity in turn also stimulate the elderly's interaction and other behavioural confirmation. Specifically, more elderly live in certain spatial unit (density), and higher proportion of elderly living in the spatial unit (proportion) mean more similar housing preference and behavior. It also means more convenient to meet and socialize with each other, to improve their feeling of social approval. Fourth, status needs (Sti) are equal to the sum of the values of location and neighbourhood quality. Location can be reflected by the housing price, or number of households owning high-price housing. The areas with more households purchasing high-price housing are interpreted as having better location. As to the neighborhood quality, it usually consists of the social and physical aspects. The former is concerned with the education status (e.g. graduates and high school) and occupation status (e.g. chief and manufactory) of the overall inhabitants, while the latter refers to the housing size and housing facilities (e.g. kitchen and bathroom) (Logan et al, 1999). Last, the satisfaction of affection needs require not only the social resources such as core family members, but 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.

3.2. Measuring well-being and assigning weights

The overall well-being, as well as physical and social well-being of the elderly is measured by scores of basic needs satisfaction. 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. Weights are assigned to each sub-indicator to perform the calculation (Table 3), which are decided by 2 weighing principles. 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.

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	**Access to similar social groups**	**1**
	Status	0.5	**Location**	**0.5**
			Quantities of households purchasing high-price housing	0.5
			Neighbourhood quality	**0.5**
			Housing size	0.125
			Housing facilities	0.125
			Education status	0.125
			Occupation status	0.125

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 pay, which also implies the relative importance of various activities in their daily lives. Chai conducted a detailed survey on the elderly's travel behaviors in 2002, which covered five representative neighborhoods in Shanghai central city, and with 417 valid questionnaires received. 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 suggested (Table 4).

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	Enter-tain-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 important for the assessment of physical well-being, as various modes would 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 are influenced by travel modes and will not be included in relevant analysis. For example, the reality of living in a good neighborhood won't change no matter which travel modes one chooses to go outside. The satisfaction level of comfort and stimulation need is analysed in 5 travel modes: walking, cycling, metro, bus and car. By giving different weights to each travel modes and integrating their values, the combined or composite needs satisfaction and physical well-being can be generated. The weights for various travel modes are referred from Chai's (2002) empirical study on Shanghai elderly's travel behaviors in 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 bus is the secondary major travel mode. The average values are proposed to be the weights for each travel modes.

Table 5. Modal split of the elderly in Shanghai in 2002 (%)

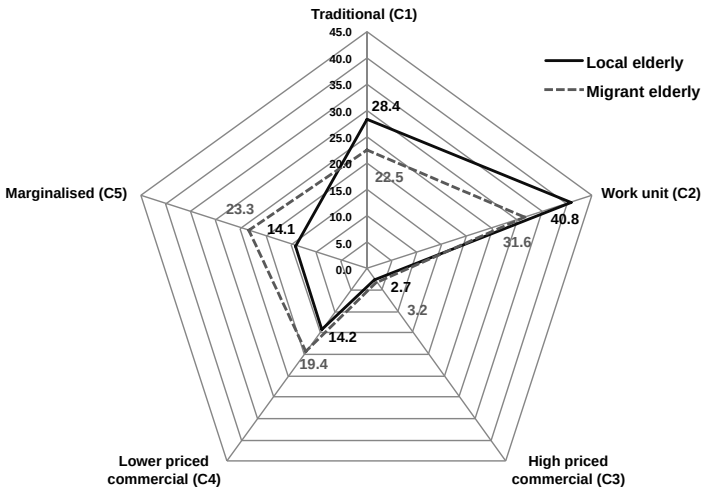
Activities	Walking	Cycling	Bus	Metro	Car	Total
Shopping	75.5	11.9	9.7	2.7	0.2	100
Leisure	63.4	11.8	21.5	2.8	0.5	100
Health care	62.4	9.3	25.7	2.1	0.5	100
Average	67.1	11.0	19.0	2.5	0.4	100

4. Results

Shanghai consists of 2.46 million local elderly and 7.7 thousands migrant elderly (including both retired migrants and cohabitating elderly parents of migrants) in 2000. This part will firstly analyse the residential segregation between local and migrant elderly, based on five community types in Shanghai central city (containing more than 60% of both local and migrant elderly population in Shanghai in 2000). Then the well-being inequity caused by such segregation will be analysed and discussed over various travel modes.

4.1. Residential segregation between local and migrant elderly

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



Within the five types of residential communities, the spatial differentiation of the local and migrant elderly is obvious. First, in terms of population distribution, a higher percentage of locals than of migrants are concen-

trated in traditional and the work unit communities near city core, while more migrants are distributed over the periphery lower priced commercial and marginalized communities (Figure 2). This indicates the residential segregation among elderly group and the migrants' disadvantages to some extent. Second, the distributive pattern exhibits a concentric structure, with local elderly and part of the migrants concentrating in the core area surrounded by the migrant elderly (Figure 3). LISA (Local Indicators of Spatial Autocorrelation) (Anselin, 1995) is employed to map the structural pattern of the elderly's concentration based on the location quotient values. And the High-High and High-Low clusters together illustrate the elderly's concentration. Specifically, the distributive pattern of the local elderly shows a clear finger shape lying from the historical communities to the adjacent work unit communities. The migrants however are more scattered instead of concentrated in all types of communities. More migrant clusters than the locals are observed in the lower priced and marginalized communities.

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

The residential segregation in Shanghai between the local and migrant elderly can be interpreted by their differential constraints and preferences. 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 mi-

grant 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.

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 thus are found concentrated for instance in those 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 traditional and present fragmented 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).

4.2. Well-being inequality among the elderly

The residential segregation between the local and migrant elderly further leads to their unequal well-being. The average well-being and needs satisfaction values of the LISA 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.

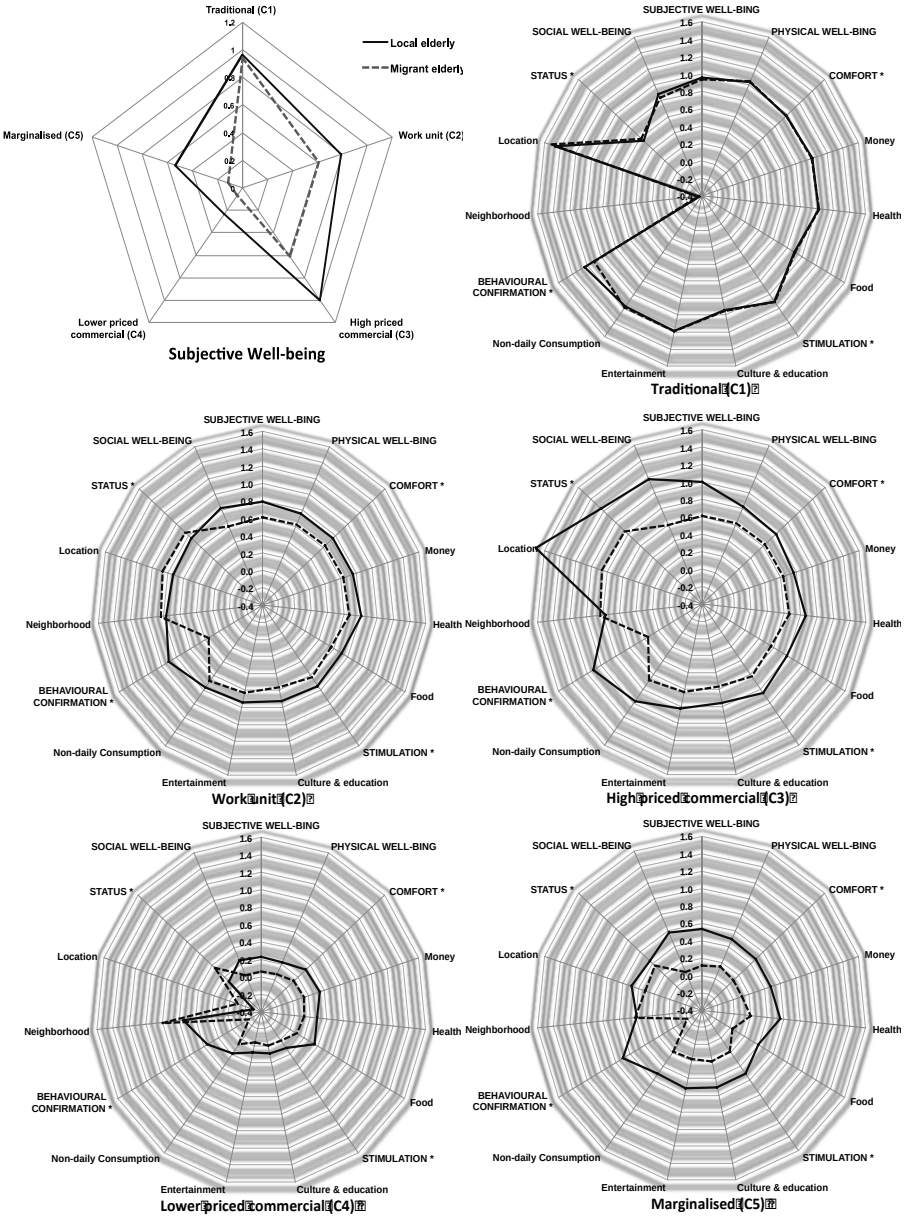


Figure 4. Inequity of well-being and needs satisfaction in 5 types of communities

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.

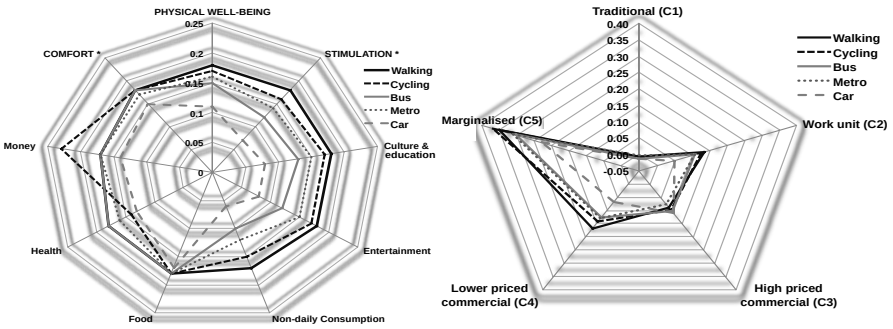
For instance, 0 means the Shanghai average level, and 1 means one standard deviation higher than the Shanghai average. In general, the overall well-being (Figure 4) exhibits spatial differentiation over five types of communities. The highest values are obtained by the traditional, work unit and high priced commercial communities, the former two of which conjointly are the most populated types of communities for both the locals and migrants (69.2% and 54.1% respectively). The bad and fairly poor areas are normally where the lower priced commercial and marginalized communities are located.

Considering the inequity between two elderly groups, several general conclusions can be made. On average the local elderly have better well-being level than the migrants, scoring 0.79 compared to 0.58 for the migrants. In addition, a general feature is demonstrated that the inequity gap between locals and migrants becomes larger and larger from the communities in the historical city center to those in the outer city fringe. The difference of well-being values grows from 0.01 to 0.24 times higher than standard deviation. 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 inequity vary among different communities. Looking into the traditional communities (C1), the similar high scores for both elderly groups 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. 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. However, they are distributed in communities with better housing and neighborhood quality, in comparison to those in the historical communities even below Shanghai average level. 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. Except the historical community, this is the same for all the communities, which to certain degree reveals the loneliness of the migrant elderly in Shanghai. The migrants only surpass the locals on their housing location and environment, and the associated status needs.

The elderly who inhabit the high priced commercial communities (C3) on average have 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 inequity gap between two elderly groups is on average larger than the one in historical communities. 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 inequity between locals and migrants is evident.



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

Figure 5. Differential effects of 5 travel modes on the inequity of various physical needs (left) and of the joint physical well-being in 5 communities (right)

Not only the residential segregation (the origins) and the differing service allocation (the destinations), but also the travel modes (ways to overcome spatial separation) could lead to the well-being inequity. Different travel modes might have different effects on the formation of inequity 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) (Figure 5, left), a general feature is exhibit that the travel mode with higher speed would have better effect on mitigating the inequity gap. For

instance, the overall physical well-being difference caused by car is smaller than bus, metro, cycling and walking. Metro plays less importance than the bus might be affected by the insufficient metro system compared to the abundant bus networks (only 3 metro lines lying mostly within the inner ring in 2000). Since higher percentages of the elderly travel by public transportation (bus and metro) (22%) than car (0.4%), improving the public transportation seems to be an ideal solution for the alleviation of well-being inequity. Moreover, the above feature for 5 travel modes is applied more evidently to the stimulation needs than to the comfort needs. This is because of their different attributes. For instance, the faster travel modes will largely improve the accessibility to the overall distant stimulation related facilities such as shopping centers and entertainment places, which decrease the difference to some extent caused by the residential segregation. However, for the comfort related facilities such as hospital, despite faster modes increase one's overall ability to reach distant facilities, the elderly's preference on the nearest facility might shift to the nearest five or ten facilities, the effect won't be so obvious compared with stimulation needs.

The travel modes play differing roles of generating well-being inequity in different communities as well. In general, there is a characteristic for all the travel modes, that is the further the communities are from the city core the larger the inequity gap between the local and migrant elderly is (Figure 5, right). Besides, the function of faster travel modes on narrowing the inequity gap is reflected better in the periphery communities than the ones in the core. This can be explained by the degree of residential differentiation of the elderly. In the communities close to the city center, migrant elderly are distributed 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 differentiation in the periphery communities is larger, which provides more opportunities for the faster travel modes to mitigate the inequity gap between the local and migrant elderly. This also suggests that the improvement of the public transportation especially in the external lower priced commercial and marginalized communities will have better effects on the equity pursuits.

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 partic-

ularly hard to overcome for the physically and economically disadvantaged elderly group, jeopardizing their life quality and well-being. The aim of this paper is to analyze the implication of residential segregation for well-being inequality between the local and migrant elderly in Shanghai. The results suggest that the local-migrant residential segregation, largely caused by *Hukou*'s institutional constraints, has produced evident segregation and inequality in well-being, making migrant elderly more disadvantaged in their urban life. Specifically, it is shown that local elderly dominate the traditional and work unit communities in the city center, while migrant elderly are scattered and relatively segregated in the peripheral communities. It leads to migrant elderly's disadvantages in terms of poor availability of and accessibility to various resources for well-being production.

The degree of well-being inequality, however, differs between community types, and depends on the specific type of basic needs and travel modes. From the traditional to the marginalised communities, the residential segregation and inequality gap of well-being between two elderly groups increase gradually. Only the traditional communities, containing the most and finest physical and social resources, present relatively mixed distribution and equal well-being levels of two elderly groups. Further, migrant elderly are not always disadvantaged regarding all types of basic needs. Migrant elderly for instance in the work unit communities enjoy better neighborhood quality and status needs fulfillment than the locals inhabiting the work-unit and dilapidated traditional communities. A maturing housing market offers migrant elderly, especially those (or their households) with higher socio-economic status, opportunities to voluntarily select their ideal housing and improve their well-being. Moreover, public travel mode including the bus and metro seems to represent an ideal way to overcome the negative effect of segregation and narrow down the inequity gaps in well-being.

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 contexts (e.g. social, cultural, geographic and institutional), the elderly's specific pursuits may be more diversified. Moreover, the

contextual difference of *Hukou* reform in China also generates the differentiations of constraints and available resources for the migrants. To facilitate economic growth, cities at lower economic level, compared to those prosperous big cities, are more willing to attract migrants by relaxing *Hukou* system and granting the migrants citizenship and associated benefits (Huang et al, 2013). These considerations on subjective experiences and pursuits of resources and contexts shed light on several interesting issues and perspectives for future supplementary studies.

Suggestions from both planning and institutional perspectives can be further proposed to mitigate local-migrant residential segregation and well-being inequity. First, by offering migrant elderly housing opportunities in the service concentrated areas, their availability of and accessibility to resources can be improved. It can be achieved through for instance social mixed and public rental housing projects in the historical communities, which are cheap and affordable for migrant elderly. This, however, depends on the reform and removal of the *Hukou* system, which, with its segregating effects on housing and employment, is the root for migrants' spatially exclusion in poor served communities. This institutional barrier largely restricts migrant elderly from entering the mainstream housing distribution system and the attached service delivery system. Despite the continuing reforms since 1980s, the most prosperous cities like Shanghai and Beijing only selectively grant richer and well educated migrants local *Hukou* and associated social welfares and benefits, ignoring the foremost disadvantaged rural migrants (Chan and Buckingham, 2008). 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 provide migrants affordable housing in the service concentrated central areas. Further reforms and better implementations are still required.

Second, by decreasing spatial separation effect caused by the river or the long distance, the resources accessibility of migrant elderly 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. Despite in Shanghai metro's function was not fully exhibited in 2000 due to the insufficient service provision and incomplete construction in the migrants concentrated peripheries, it is supposed to play a bigger role now when 10 more metro lines are constructed. 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. 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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