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**JOB-HOUSING IMBALANCE AND MOBILITY OF SOCIAL
HOUSING RESIDENTS IN CHINA: THE CASE OF GUANGZHOU**

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Ph.D

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2016

The Hong Kong Polytechnic University

Department of Building and Real Estate

**Job-housing Imbalance and Mobility of Social Housing
Residents in China: The Case of Guangzhou**

Tingting CHEN

A thesis submitted in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

January 2016

CERTIFICATE OF ORIGINALITY

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Abstract of thesis entitled

**Job-housing Imbalance and Mobility of Social Housing Residents in China:
The Case of Guangzhou**

Submitted by
Tingting Chen

This dissertation aims to develop a conceptual framework within which to better understand the relationship between travel behaviour and the built environment, with particular emphasis on job-housing imbalance and mobility issues within the contextual changes of urban space in China. More specifically, the main objectives are to evaluate the degree of job-housing imbalance and the commuting pattern of social housing residents of Guangzhou, to examine how social housing policies affect the relationship between residence and employment, as well as the activity participation of disadvantaged social housing groups, and to explore the relationship between job-housing imbalance, travel behaviour and the built environment.

On the basis of the data collected through questionnaire surveys, residents' daily commuting dairies, interviews, and field observations, the relationship among residents' travel behaviour, spatial segregation, and their use of space and facilities in Guangzhou were investigated in a quantitative and qualitative manner. In addition, the job-housing imbalance and mobility of social housing residents were assessed by using job-housing ratio, the space-time path, regression modeling, and ArcGIS tools. Finally, four social housing estates in Guangzhou were selected for case studies to examine the sociospatial implication of the social housing residents in Guangzhou.

The key findings of this research indicate that the location of social housing estates was the leading significant factor affecting job-housing imbalance and mobility. From the comparative studies of spatial analysis with urban residents of commercial housing estates, a longer commuting time and a restriction on mobility among social housing residents were the results of urban development strategies and residential relocation policies. Regression analysis results show that the economic barriers affecting

disadvantaged low-income groups and the passive residence options have aggravated the socio-spatial isolation of such groups in social housing communities.

The analysis concerning the underlying factors of job-housing imbalance indicates that government still plays a highly important role in residential relocation and social housing development. Administrative intervention on social housing planning programme in terms of land acquisition and fiscal support has direct effects on both job-housing imbalance and immobility. Furthermore, the less-organized land use pattern and spatial mismatch observed as a result of rapid urbanization process in China lead to low job accessibility and fragmented activity space. Moreover, the excessive clustering of public facilities in central areas has socially and spatially segregates social housing residents from the central areas to the urban fringe, thereby undermining the 'quality of life' of these residents. Thus, the shortcomings of the existing planning system and spatial segregation have had adverse effects on the disadvantaged, low-income groups.

Based on the aforementioned findings, the proposed recommendations are as follows: 1) policymakers should consider residents' behaviors and activity participation in the living environment when formulating social housing policies; 2) the municipal government should modify its urban development concept toward transit-oriented development and mixed-land use for the aim of sustainable social housing development; 3) in view of the perceived need for equity and effective planning, service-oriented development has the potential to influence mobility among social housing residents. The findings of this study augment travel behaviour literature and display a novel planning perspective with regard to enhancing social housing development in China. This study also provides a new research framework and findings that facilitate the stakeholders to ascertain ways of developing sustainable social housing in China in future.

Publications

Journal papers

- Chen, T.T., Wong, F. K. W., Hui, E. C. M., Wei, Z.C. Discovering the Job-housing Imbalance of Residents in Social Housing Neighbourhoods in China: A Case of Guangzhou. *Habitat International* (Under Review).
- Wei, Z., Chen T.T., Meng Z. M., Qian Q. (2015). The Dilemma and Solution of Social Housing Development in Guangzhou: Comparative Study of Public Housing in Hong Kong (广州保障性住房的困境与出路——与香港的比较研究), *Urban Planning International*, 30(4): 109-115. (in Chinese with English abstract).
- Tao, L., Hui, E. C. M., Wong, F. K. W., Chen, T.T. (2015). Housing choices of migrant workers in China: Beyond the *Hukou* perspective, *Habitat International*, 49: 474-483.
- Wang B., Zhen F., Wei Z.C., Chen T.T., (2015). A theoretical framework and methodology for urban activity spatial structure in e-society: Empirical evidence for Nanjing City, China. *Chinese Geographical Science*, 1-12.

Working papers

- Chen, T.T., Wong, K.W., Hui, C.M. (2012). The Development of Social Housing and its Planning Implications in Guangzhou, China, *2012 Yearbook of The Hong Kong Institute of Housing*, 146-153.
- Chen, H.W., Chen, T.T., Xu, S.Y., Wei, Z.C., & Li, L.N. (2012). The Report of Investigation of Residents Living in Subsidized Housing – Guangzhou as a Case Study (保障性住房居民的现状调查报告——以广州为例), *Research Report of Investigation of China 2012* (pp.1-43), Guangzhou: Nanfeng Press, (in Chinese).

Conference papers

- Chen, T.T., Wong, K.W., Hui, C.M., (2013), Mobility and Job-housing Matching for Social Housing Residents in Guangzhou, China, Building the 21st Century City: Inclusion, Innovation and Globalization (43rd UAA Annual Conference), 3-6 April 2013, San Francisco, California, U.S., 8 pages.
- Chen, T.T., Wong, K.W., Hui, C.M., (2013), The Current Situation and Development of Social Housing in Guangzhou, China, 2013 AAG Annual Meeting, 9-13 April 2013,

Los Angeles, California, U.S., 10 pages.

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Chen, T.T., Wong, K.W., Hui, C.M. (2012), 向香港学习“住房之道”——广州保障性住房的问题与出路 (The Implication and Effects of Public Housing Policies in Hong Kong on Social Housing Policies of Guangzhou, China), 多元与包容——2012 中国城市规划年会论文集 (06. 住房建设与社区规划), 2012年中国城市规划年会 (2012 China Urban Planning Annual Conference), pp. 57-63, 16-19 October, 2012, Yunnan, China.

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Abbreviations

VMT	Vehicle Miles Travelled
CBDs	Central Business Districts
LRH	Low Rental Housing
ESH	Economic and Suitable Housing
PCH	Price-capped Housing
PRH	Public Rental Housing
GZAHAT	Guangzhou Affordable Housing Administrative Team
GZSHO	Guangzhou Security Housing Office
JHR	Job-housing Ratio

Chapter 1 Introduction

1.1 Introduction

In China, housing issue has become a fundamental component in sustaining urban development and stabilizing society. The housing market has undergone dramatic transformation because of institutional changes since the end of the 20th century. China remains in a developing phase, wherein housing inequalities originate from the housing market and the socialist status (Yang & Chen, 2014). In the age of information and globalization, economic changes in China have shifted from high speed growth to medium speed growth. The country's economic structure is constantly improving and upgrading and forces are increasingly driven by innovation instead of input and investment. Nevertheless, with the considerable worsening of income inequality over the past decades, China and its cities face a deeper problem with the increasing residential and economic segregation and other related residential issues.

The 1998 housing reform and rapid urbanization process in China influenced the relationship between traditional job and housing for residents in many cities (Wu, 2000, 2002; Huang, 2004). More households are forced to live far from their workplace in new communities created under the current social housing policies (Cervero, 2006; Zhou et al., 2013). However, economic activities and the social lives of residents have changed due to ineffective land use planning and insufficient job opportunities in the suburbs. Consequently, fragmented travel behavior and social inequity have intensified for low-income groups (Boschmann & Kwan, 2008; Power, 2012; Wang et al., 2011). Thus, research on travel behavior and spatial mismatch should shed light on the working agenda of different stakeholders, including government officials, policy practitioners, and professionals who are aiming to formulate effective housing policies for sustainable development.

1.2 Global discourse on spatial mismatch in public housing systems

1.2.1 Spatial mismatch and job-housing imbalances in the American metropolitan areas

Problems associated with spatial mismatch also occur in other parts of the world, including the US. In North American cities, residential mobility varies systematically over space, and the central city has higher residential mobility than the suburbs. High residential mobility rates characterize low-income renters (Clark & Dieleman, 1996). Low wage earners often do not have access to employment in the suburban job centers and they cannot afford to relocate to such areas. People with lower income become less accessible and they devote more time to commuting after moving to suburban locations (Cervero, 2004; Clifton and Lucas, 2004; Pucher & Renne, 2003; Blumenberg et al., 2002; Holzer, 1991). The long distance between workers and their jobs is referred to as “spatial mismatch” (Kain, 1992).

Single land-use or single-use neighborhood leads to class segregation and residential segregation (Cervero & Duncan, 2004). In the US, public housing complexes built from the 1960s to 1970s were often clustered in central-city locations with high concentration of poverty and socio-spatial differentiation (e.g., O'sullivan, 2007; Jacob, 2004; Webster, 2002; Quigley, 2000). Many believe that living in such neighborhoods has limited one's economic opportunity (Wilson, 1996). Moving low-income groups to an “isolated area” seems to reduce social mix, but is likely to increase “residualisation” and spatial segregation in the city. Low-income people are likely to suffer from spatial disadvantage because they are dependent on relatively slow, inflexible, and limited public transit services (Shen, 1997, 2001; Taylor & Ong, 1995).

In the U.S., despite the introduction of various job-housing balance policies by federal and local governments to increase efficiency for commuters, many workers are still unable to reside in residential areas close to their jobs. To reduce economic segregation induced by project-based public housing provision, the US Department of Housing and Urban Development has experimented with tenant-based rental subsidies. The program aims to encourage tenants to move from high-poverty to low-poverty areas (e.g., the

Moving to Opportunity Program). Yet, the increase of physical decay and social deterioration in government-built neighborhoods are the results of physical, economic, and social marginalization of their inhabitants.

1.2.2 Job-housing imbalances of public housing in Hong Kong

Public housing policy in Hong Kong that started in 1953 has been confirmed by the existence of the positive impact on life changes in individual households and economic opportunities in urban history, particularly from the 1960s to 1980s (Lee & Yip, 2006; Hui & Wong, 1999). However, the consequences of distinctive policy mistakes from different specific cases, such as inequality, poverty concentration, social exclusion, and social polarization (Jones & O'Brien, 2003; Willmott & Murie, 1988; Pearl, 1997), resulted in unequal distribution of disadvantaged neighborhoods. The job change and mobility issues also occur (Hui et al., 2011).

The new town development in Hong Kong under the era of population decentralization is closely related to public housing programs. Given that the migration of population from other mainland cities to Hong Kong expanded rapidly during the past three decades, residential mobility was high among new towns, particularly in Tseung Kwan O, Tin Shui Wai, and North Lantau (Hui & Lam, 2005; Hui & Yu, 2009). Although efforts and policies have been implemented by the government to promote new town development, the scarcity of job opportunities near the new towns has contributed to the prevalence of urban commuting pattern between new towns and urban areas (Hui & Yu, 2009).

A great mismatch arose between job centers and residence places in new towns. This condition is a result of the current job structure in Hong Kong in which most job opportunities are present in urban areas where less than half of Hong Kong people live (Hui et al., 2012). Residents living in Tseung Kwan O, Tin Shui Wai, and North Lantau new towns complain about traffic congestion, long commute time, and the increasing difficulty of finding jobs nearby. Public housing tenants and owners are less likely to work in the same district or region of residence (Lui & Suen, 2011).

1.3 Changing job and housing relationship in urban China and the policy context

1.3.1 Housing reform and spatial restructure in Guangdong

Housing shortage had been a very serious social problem in China in the wake of the economic reform and open door policy. Guangdong Province, recognizing as the benchmark region in China, is urbanizing rapidly, and the capacity of urban construction land has been growing from 6,392.06 sq.km in 1980 to 14,120.90 sq.km in 2010 (Figure 1.1). Some large cities achieved a big improvement in urban housing conditions, and 0.1486 billion individuals have resolved housing difficulties in Guangdong Province through building a great amount of houses during the period from 1995 to 2013 (Figure 1.2). Besides, the per capita floor space of Guangdong's urban residents was merely at 15.77 sq.m in 1984, growing to 25.12 sq.m in 1995, climbing steadily to 25.71 sq.m in 2005, and 34.57 sq.m in 2013 (Statistic Department of Guangdong Province, 2014). However, many shelters were unable to cope with the current needs, particular with the rise of migrant population. More than one third of the urban residents live in inadequate house, which is one of the most pressing problems in Guangdong Province in the 21st century.

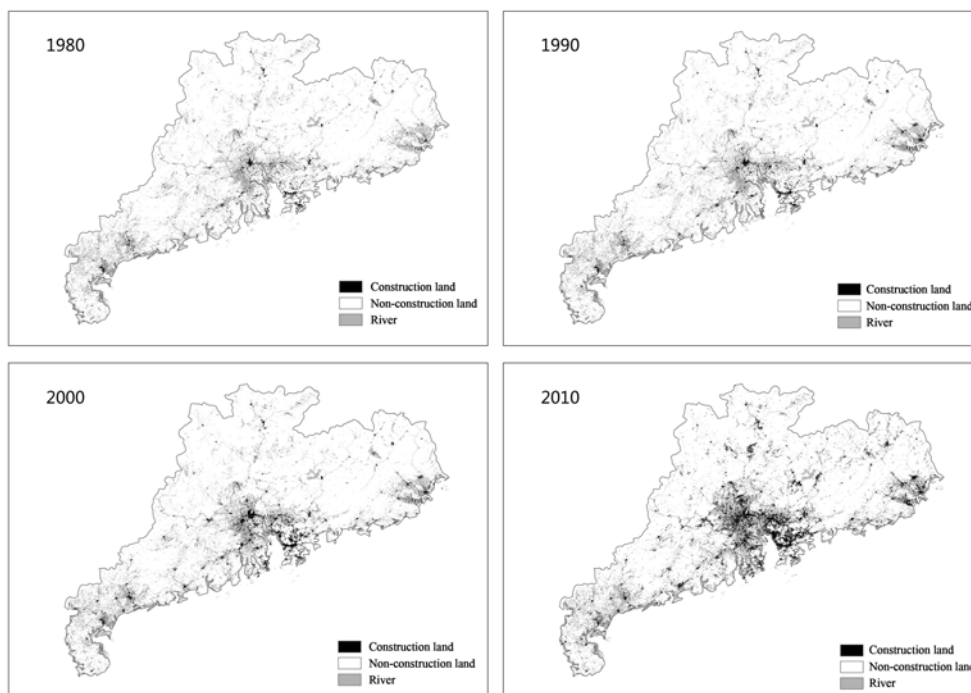


Figure 1.1 The Construction land in Guangdong Province in 1980, 1990, 2000, 2010

Source: Compiled by the author

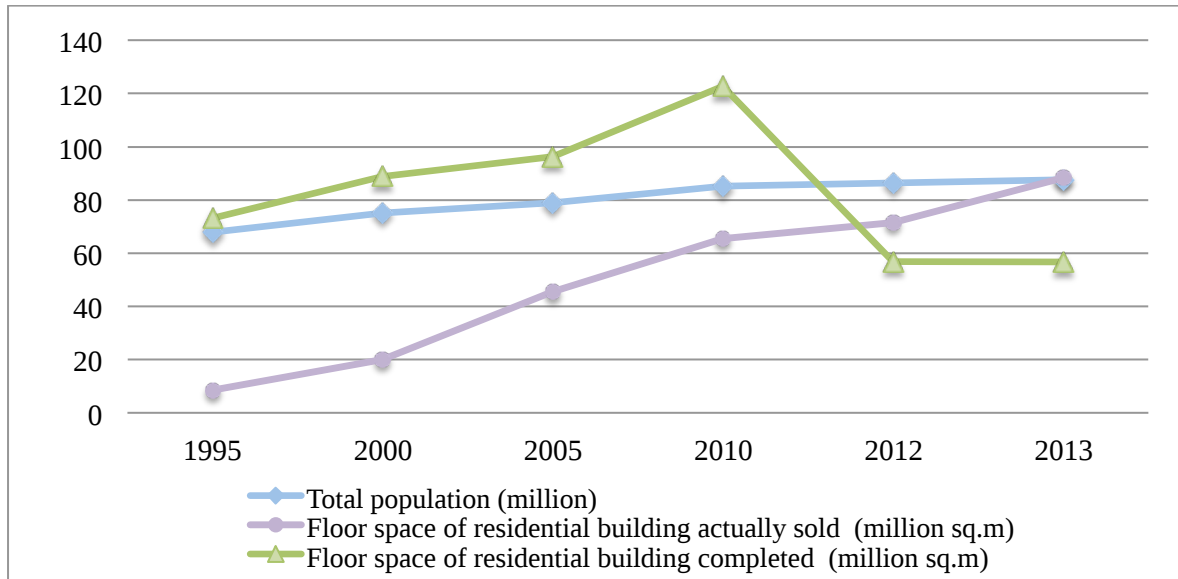


Figure 1.2 Total population and housing situation in Guangdong Province from 1995 to 2013

Source: 2013 Yearbook of Statistic Department of Guangdong Province, 2014

Following the worldwide trend in housing privatization and national economic reform, the Chinese government conducted an unprecedented housing marketization reform in the 1980s and 1990s. Since then, the cellular residential structure centered on work-unit housing has experienced radical transformations. The former work-unit residential compounds were gradually decayed and replaced by social housing neighborhoods, new work-unit housing compounds, and commodity housing compounds in accordance with socioeconomic status (He et al., 2010) (Figure 1.3). Workers who resided in work-unit housing gradually moved to owner occupation during that period (Li & Yi, 2007), which implies that the traditional job-housing relationship has changed with an increase of commuting demand for commuters (Zhao & Lv, 2010). Housing resources (from work-unit, social housing, or commodity housing) have a negative influence on job-housing balance and travel behavior (Wang & Chai, 2009).

Before the housing reform

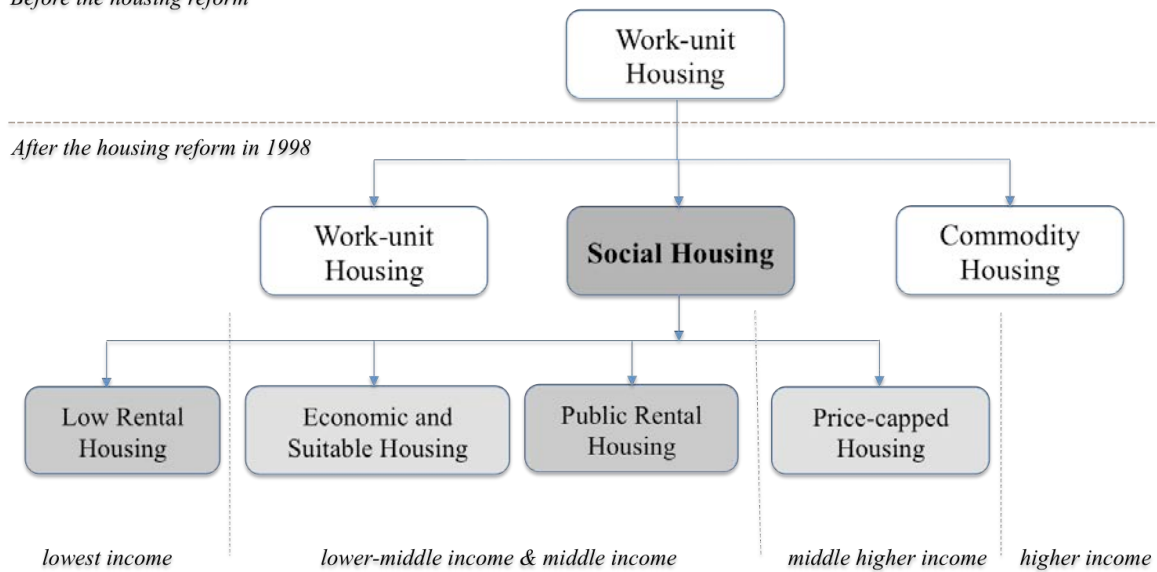


Figure 1.3 Housing types in China after the housing reform in 1998

Source: Compiled by the author

Over the past three decades, Chinese cities have undergone remarkable economic and spatial restructuring. An obvious consequence is the decline in the percentage of registered net population in urban core from 1982 to 1990, whereas the number in inner suburbs increased. The forces that drove new housing construction in suburbs were the marketization of urban land, increase of urban regeneration, shift and rehabilitation of industrial land to residential use, and improvement of transportation system. Additional factors were observed since 1998. Some of these prevalent factors are the increase in private car ownership and the large number of large-scale new commodity housing compounds constructed in the suburbs. The pattern of urban form and urban structure has progressively changed (Wang, 2001; 2003).

Rapid urbanization in China advances the growth of urban population and increases the demand of urban settlements. However, the supply of affordable housing fails to satisfy the housing need of urban residents. This situation contributes to the rapid increase in private housing prices (Figure 1.4). Residential property prices in China approached a record high in 2013, which surpassed the affordability level of lower middle and low-income groups. The frustration generated among these groups of people has threatened

social stability. The reform in the housing market has aggravated inequality of housing resource distribution. The implementation of full marketization strategies in the subsequent decade proved unsuccessful in delivering affordable housing to urban residents.

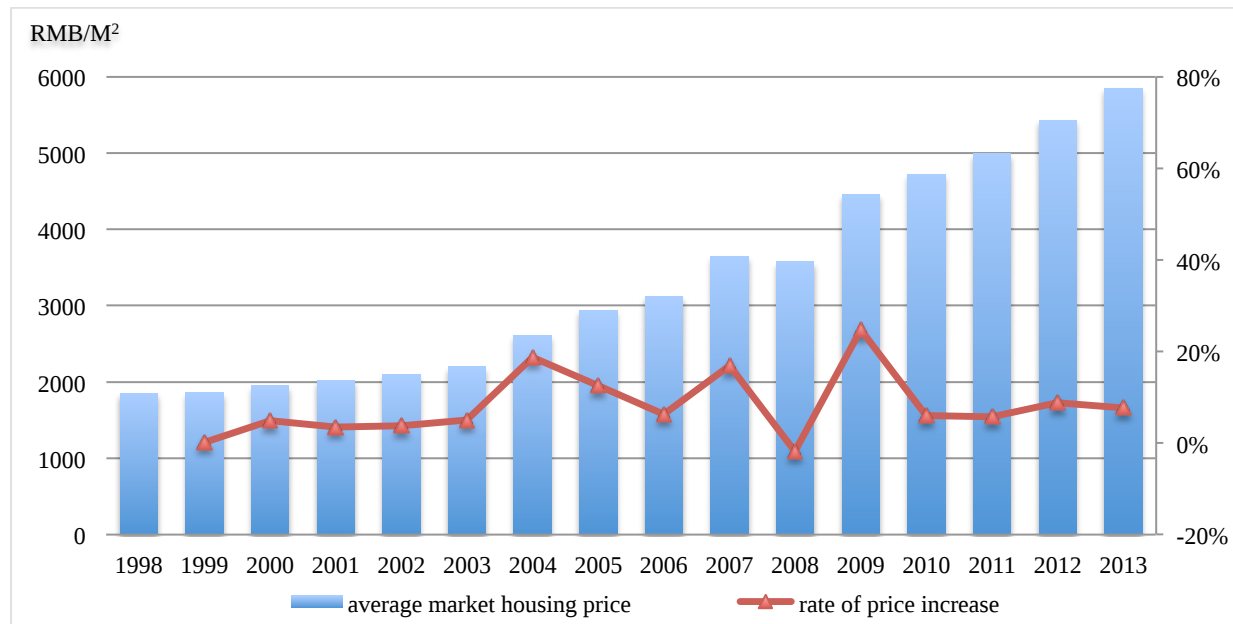


Figure 1.4 The average price of residential housing in China from 1998 to 2013

Source: National Bureau of Statistics of China, 2014

1.3.2 Evolving residential and employment location in urban Chinese cities

Economic changes and housing reforms in China have rapidly transformed the fabric of everyday life and urban spatial structure. One notable change is the progressive erosion of the strong links between workplace and residence, which is represented by work-unit compounds marked with such a significant ingredient in Chinese cities (Forrest & Yip, 2007). Additionally, residential mobility has been associated with changes in the housing provision system of China in terms of affordable and government-subsidized housing (Li & Siu, 2001). Li and Siu (2001) surveyed different housing estates in Guangzhou from 1995 to 1998, suggesting that housing re-commodification led to a pattern of residential differentiation and longer commuting duration.

The impact of China's suburbanization impelled by the housing reform of the *danwei* approach of state-provided housing is the physical separation of workers from work

and the corresponding increase in travel time and costs (Shen, 1997). A significant volume of outgoing traffic and incoming traffic move to the core in weekdays (Zhou & Yan, 2005). This situation is in part the result of industrial relocation to suburbs that does not necessarily entail residential relocation. Thus, many individuals who work in the suburbs continue to live and prefer to live in the city where education, commercial, and health services are far better than that in the suburbs. This situation means that the centralization of job opportunities and decentralization of residence lead to a changing interaction between residence and workplace (Zhao & Chai, 2011; Zhao et al., 2011; Zheng & Zhang, 2010).

1.3.3 Changes in the pattern of commuting among urban housing residents

The rising fear of weakening social stability and sustainability in the theoretical discourse has been of great influence to various social policies and practices across nations. China has endeavored to adopt policy measures to address the issue that urban population cannot afford to purchase a home. However, underlying forces of new housing construction and spatial pattern of intra-urban relocation have driven residential commuting changes. A number of commuting patterns have taken place after the economic and housing reforms in the 1990s. For example, the residential mobility rate¹ in Beijing recorded an average of 4.29 % per annum from 1980 to 2001 with an upward trend (Li, 2004). The rate in Guangzhou was at 5.3% per annum within the same period with an upward trend at 0.6% (Li, Wang, & Law, 2005).

Recently, given the spatial concentration of various affordable housing estates constructed in large-scale in the urban fringe, millions of people travel daily from the outskirts to urban areas for work and study. For example, compared with that in 2005, the average travel time of urban residents for work in Beijing was at 45 minutes with a

¹ The period from 1980 to 2001 was subdivided into 11 subperiods. Each subperiod covers a time span of 2 years. Moves within each subperiod are recorded, wherein 1 indicates that the individual moved during the given subperiod, and 0 otherwise. Multiple moves are ignored. Following the procedures of discrete time proportional hazard model, the 11 sets of data are stacked together. Each set pertains to a specific subperiod. The logit model is then applied to related resident moves (the dependent variable) to the set of life-course events and socio-demographic characteristics of the individual (independent variables).

growth rate of 18.53% (Xinjing Bao, 2011). Moreover, the provision of transportation facilities in the outer area is insufficient and inaccessible from the core of urban areas due to limited transportation options.

1.4 Problem statement: Social housing residents have serious job-housing imbalance issue?

Social housing policies were capable of supplementing the role of the housing market without interfering with the market price mechanism; these policies also mitigate the shortcomings of housing marketization process (Ye et al., 2010). However, moving to new social housing communities resulted in changes in travel and daily life patterns. The issue of job-housing imbalance and mobility has received considerable attention in the social housing neighborhoods of major cities. The development of social housing does not sufficiently consider the relationship between job location and housing relocation. This limitation may have resulted in more serious social problems, such as the aggravation of social elimination and social exclusion and the emergence of urban slums and urban poverty. These phenomena attracted the interests of scholars from around the world to conduct relevant research, such as in spatial mismatch (Wang et al., 2011; Holzer, 1991; Kain, 1968; 1992), spatial-temporal behavior (Kwan & Lee, 2004; Kwan, 2000), and job-housing relationship (Wang & Chai, 2009; Hui & Lam, 2005; Cervero, 1989; 1996). Research on the interaction between job-housing balance and travel behavior has a long tradition, which is based on urban studies in geography, social geography, and planning. Given that human travel behavior in China is still an under-researched area, it is worthwhile to investigate how travel behavior interact with urban space, whether urban space are efficiently integrating into living space for human being, and how the scenarios and mechanism of urban space affect human behavior. However, rapid urbanization and sustainable urbanism have posed challenging questions and issues that should be investigated.

Therefore, the present research aims to examine the impact of social housing on job-housing imbalance and mobility. This study raises questions on whether new residents living in social housing estates have more serious job-housing imbalance issues and

more complicated travel pattern compared with their housing conditions before moving into the new communities. How do social housing residents manifest the spatial characteristic of their daily moving pattern? What factors affect job-housing imbalance and immobility of residents living in social housing estates? What kind of factors, such as planning approach, transportation network, and institutional involvement, influence travel pattern and activity participation? How could local governments and planners achieve the degree of job-housing balance with an overall emphasis on sustainable development and urbanism in China? This study will address these questions.

1.5 Research aim and objectives

This study aims to develop a theoretical framework within which to better understand the relationship between travel behaviour and the built environment, with particular emphasis on job-housing imbalance and mobility issues within the contextual changes of urban spaces in China, with the city of Guangzhou as the case study. More specifically, the research objectives are as follows:

1. To identify the degree of job-housing imbalance and urban commuting pattern for residents living in social housing estates in Guangzhou, China.
2. To examine the effects of social housing policies on the changes of residence and employment of social housing groups.
3. To understand the influences of social housing policies on the activity participation of the social housing groups.
4. To investigate the relationship between job-housing imbalance, travel behavior, and the built environment, and propose policy recommendations.

1.6 Significance of this study

As an engine of promoting urban economic and social development, social housing has increasingly affected and changed economic-social activities in a city. Moreover, the development has affected social relations and spatial structures. Given that 36 million new social housing units were launched in China during the 12th Fifth-Year Plan (i.e., from 2011 to 2015), social housing that acts as an urban functional unit has brought the agglomeration of low-income groups in peripheral areas. Therefore, the present

research offers a new perspective for understanding the complexity and diversity of human behavior patterns when the society and city have undergone a large-scale spatial and institutional transition. An integrated approach to identify and analyze the importance of job-housing imbalance across space and social groups in Guangzhou is to understand the relationship among travel behavior, spatial segregation, and use of space and facilities by residents.

The connection between the distribution of residential locations and the employment of social groups has been investigated using the theories in economic geography, urban geography, and sociology, such as concentric zone theory and socio-spatial dialectic. However, there is limited knowledge on the relationship between mobility issues and the built environment of specific social groups and the effects of the construction of social housing on the urban spatial structure of China. In terms of theoretical contributions, the present study could broaden and deepen social housing discourse, particularly on the impact on job-housing balance. This research could address the debate on the importance of a sustainable community in China. The study will advocate changes in social housing in China from the institutional perspective, which may help in constructing a more sustainable city. The research will identify essential contributions to planning practice on social housing aspects under China's transitional context.

1.7 Outline of the dissertation

This thesis comprises eight chapters. This chapter highlighted issues related to job-housing imbalance in housing systems in the context of global discourse and local housing policy. The research aim and objectives were formulated based on these issues. Chapter 2 discusses the concept of job-housing balance and the spatial implications of social housing based on housing and planning literature. Chapter 2 also establishes the conceptual foundation for this study. The chapter identifies the dimensions and the scope of job-housing imbalance and articulates the influences of social housing policies on job changes and mobility in urban space. Chapter 3 explores the evolution of social housing in Guangzhou and highlights the job-housing imbalance and residential

differentiation issues in social housing communities in Guangzhou. Chapter 4 introduces the analytical framework, research methods, and data processing.

To answer the research questions in section 1.4, Chapter 5 assesses the degree of job-housing imbalance and job accessibility in selected social housing estates in the Guangzhou City. This section examines the impact of job-housing imbalance on activity pattern for social housing residents. Chapter 6 deliberates on the underlying factors that contribute to job-housing imbalance and the limited activity pattern of social housing residents from planning, transportation, and institutional approaches. Chapter 7 proposes planning initiatives, such as transit-oriented development, mixed-use development, service-oriented development, and implications on social housing policies under the local context. Chapter 8 summarizes the major findings, contributions to knowledge, limitations of the study, and determines the future research directions.

1.8 Summary

Human beings have specific travel purposes and varying travel lengths in terms of time and distance that create impact on a city. As a group that is highly dependent on public transportation, the social housing population has to create countless trips to the city in pursuit of stable employment and income. Identifying who they are, where they live, where they work, what their trip purposes are, and what the socioeconomic characteristics of households are of enormous essentiality and necessity to policy decision-makers and urban managers. The analysis of the social housing groups provides relevant findings that can help to address issues in land use planning and social housing planning process.

The next chapter, drawing on literature review, will interpret and demonstrate the relationship among job-housing imbalance, travel behavior, and the built environment within the contextual changes of urban space.

Chapter 2 The Conceptualization of Job-housing Imbalance and Spatial Implications of Travel Behaviour of Social Housing Residents

2.1 Introduction

In Chapter 1, the problems associated with job-housing imbalance, as well as the research objectives of this study have been introduced. Drawing on the extensive literature review, Chapter 2 aims to establish a theoretical foundation of the relationship among job-housing imbalance, travel behaviour and the built environment.

Job-housing balance has become a major planning and public policy issue for the past three decades. Despite its popularity and apparent acceptance among planners and urban policymakers in relation to its capability to reduce peak-period traffic congestion and optimise the commuting process, limited consensus has been reached on what job-housing balance actually means (Giuliano, 1991), how it works and what it works for. Therefore, the selection of a given definition is associated with diverse methodologies and outcomes in jobs-housing (im)balance studies. Different factors contribute to job-housing imbalance among different social groups in different locales. In the US, such factors as suburbanisation of jobs, housing segregation, inefficient public transportation services, race and “automobile mismatch” contribute to job-housing imbalance (or spatial mismatch) for the low-income minority or new immigrants. In China, the disappearance of work-unit (*Danwei*) compounds and the emergence of the commercial housing market led to the increase of job-housing imbalance of workers in large cities, such as Beijing and Guangzhou (Liu et al., 2009).

This chapter discusses the concept of job-housing imbalance and problems arising from job-housing imbalance in different dimensions and scales. By evaluating the housing system, the current chapter also discusses the job-housing imbalance issues pertinent to travel behaviour. Thereafter, this chapter reviews the influencing factors of travel behaviour (including activity location choice, mode choice, trip generation, trip distance

and travel time) in relation to job-housing imbalance. The final section attempts to identify the relationship between travel behaviour and the built environment (including land use pattern, transportation network and community planning).

2.2 Conceptualising job-housing imbalance

2.2.1 What is job-housing balance?

Job-housing balance describes the relationship between employment distribution relative to the distribution of workers and housing units within a given geographic area or within a given travel distance or travel time (Cervero, 1989, 2001; Giuliano, 1991, 1993; Peng, 1997). Balancing occurs as a component of the urban development process, and in this regard, Vardi and Weitz (2003) suggested that the cumulative effects become highly significant because more people make the decision to live far from their workplaces. Consequently, the driving time and cost marginally increase, which considerably increases traffic congestion and air pollution in the region.

The concept of job-housing balance as a major planning and public policy issue in environmental policy analysis has attracted the attention of Western researchers (Kain, 1992; Shen, 1997), where clean air goals have become the central focus of both short- and long-term planning efforts. Job-housing balance is often credited with the potential to correct the tangible problem of congestion on the one hand, and promote general planning and land use objectives on the other. Therefore, urban policymakers apply the concept of job-housing balance to contemporary metropolitan areas. They are concerned with the geographical balance between locations of jobs and housing as a strategy to reduce traffic congestion and air pollution in metropolitan areas. However, urban policymakers criticise the high-priced housing made available by workplace and housing balanced cities as unable to reduce spatial mismatch; in fact, adding high-end housing usually displaces local employees (Kain, 1992).

The nature of job-housing balance would lead to considerable efficiency, equity, quality of life and environmental viability (Peng, 1997). Jobs-housing balance attempts to

promote work efficiency by reducing travel time, thereby decreasing waste in the form of lost labour and leisure time because of spatial mismatch. The account on preventing the assembly of affordable housing in low-income neighbourhoods, creating job opportunities near housing growth centres and assisting to shorten commuting time should be considered to facilitate more significant equity and reduce spatial mismatch. With regard to the enhancement of quality of life, significant consideration should be given to accessibility to jobs and services, improvement of health and safety and even the provision of additional open space and recreational opportunities.

In this study, job–housing balance refers to a goal of achieving a favourable ratio of job opportunities to housing units within a particular geographic area. Available employment opportunities within a specific geographic area should match the growth of neighbourhoods and the socioeconomic characteristics of households.

2.2.2 Operationalising job-housing imbalance: Dimension and scale issues

As an umbrella concept, job-housing imbalance can be understood through various dimensions (Table 2.1). Dimensions are closely related to how the term job–housing imbalance is defined. Reviewing the literature devoted to Western contexts, Cervero (1989) primarily used the job-housing imbalance concept to explain the reasons for the continued lengthening of commuting time in metropolitan areas in the late 1980s following the rapid growth of jobs in suburban areas. He proposed that job–housing balance policies and regulations should seek to equalise the ratio of jobs to housing in specified areas to reduce rush-hour traffic congestion and air pollution (Cervero, 1989). The basic idea of job–housing balance is that metropolitan areas with separate land uses, where all employments are located in Site A and all houses are located in Site B, will create more commuting trips at longer distances than if Sites A and B each had equal proportions of jobs and housing.

Table 2.1 Application of job-housing balance in different domains

Domains	Concerns	Assumption	Argument	Case studies and authors
Planning strategies / planning policies	Travel; to work;	Workers opt to work as close to home as possible; The more balanced the community is, the shorter the commuting distance.	If a given area has a more considerable concentration of employment than resident workers, then workers must be drawn from other areas, thereby leading to considerably long commuting time. Similarly, if resident workers significantly outnumber job opportunities, then they must seek jobs in other areas. Even when the number of jobs and workers are approximately equal, long commuting time may result if the combination of jobs and housing are incompatible.	US (Cervero, 1989, 1996)
	Many suburban employment centres are not located within the proximity of suburban housing clusters.	Several remote suburban employment centres require long commuting time to visit.	Lack of coordination between employment and population decentralisation; Job-housing imbalance under urban sprawl caused by high concentration of jobs at the urban core.	US (Cervero & Landis, 1997; Cervero & Wu, 1998) Hong Kong (Hui & Lam, 2005; Loo and Chow 2011)

Transportation issue	Improvements in the match between housing and employment in local areas could reduce automobile usage.	Linking jobs and housing holds significant potential to reduce vehicle miles travelled (VMT) and vehicle hours travelled (VHT)	Every 10% increase in the number of jobs in the same occupational category within four miles of one's residence is associated with a 3.29% decrease in vehicle miles travelled (VMT).	Cervero & Duncan, 2006
	Effect of employment decentralisation on significantly long commute and unsustainable transportation.	The longest travel time to work involved those commuting from the outlying zones to urban areas	The increasing separation of population and jobs results in the growth of single-driver automobile trips, long commuting distance, and peak-period traffic congestion.	Birmingham and Tuscaloosa, US (Sultana & Weber, 2007)
Housing strategies	Relationship between employment and housing	The region's low-income and minority workers are spatially isolated from employment opportunities.	The lack of affordable housing in or near employment centres leads to long commuting time on crowded freeways for the region's workers. Housing imbalance places enormous stress on the region's employers by limiting the pool of workers who can live within a reasonable commuting distance.	Atlanta city (Hudson, 2002; Sanchez, 1999; Sultana, 2002)

Source: Compiled by the author

A job-housing imbalance occurs when the number of workers residing in an area differs substantially from the existing number of jobs available there. Table 2.1 shows that for more than a decade, researchers have been arguing that the continued lengthening of commuting time and the marked deterioration of traffic conditions are the results of the increasing job-housing imbalance in many metropolitan areas (Cervero, 1989, 1996; Downs, 1992; Giuliano & Small, 1993; Clark & Kuijpers- Linde, 1994; Wang, 2000).

Based on the continuous development of a particular city as characterised by urban expansion and population growth, researchers analysed the job-housing imbalance issue from an urban planning perspective. They put forward two channels through which urban sprawl causes a worsening job-housing imbalance situation. Firstly, a city may be experiencing employment decentralisation because of population growth. In several cases in the US, this situation is associated with the decline of the urban core as an employment centre. However, many suburban employment centres were not located in the proximity of suburban housing clusters. Thus, the imbalance is attributed to the different growth rate and locations of population, as well as employment decentralisation (Cervero & Wu, 1997, 1998; Gordon & Richardson, 1996; Sultana & Weber, 2007). The aforementioned situation also occurs in the post-suburban era (Lucy & Phillips, 1997). Several remote suburban employment centres experience a considerably long commuting time because of the inconsistency and conflict between employment and population decentralisation (Cervero & Landis, 1997; Cervero & Wu, 1998).

Secondly, the high concentration of jobs at the central business districts (CBDs) despite population decentralisation could also cause job-housing imbalance under urban sprawl. This situation has been observed in Hong Kong; suburban commuters were predominantly commuting to the downtown area (Hui & Lam, 2005; Loo & Chow, 2008; Sui, 1995).

To assess the transportation issue of the reduction of automobile usage, Cervero and Duncan (2006) and Kockelman (1997) used microdata from travel diaries to regress

individual or household vehicle miles travelled (VMT) on land use measures (including job-housing balance metrics) plus the controlled variables of household income and survey respondent gender, age and ethnicity among other demographic characteristics. Their studies are more sophisticated than those that used data aggregated to census tracts or other geographic areas (e.g., Horner, 2002; Peng, 1997). Thus, the suggestion that job-housing imbalance could partially contribute to auto dependence and to a significantly high VMT is considered.

By focusing on Birmingham and Tuscaloosa in the US, Sultana and Weber (2007) determined that the longest travel time to work 'surprisingly' involves those who commuted from outlying zones to urban areas. Regardless of the different reasons, the result is the increasing separation of the population from the jobs. This situation has led to unsustainable transport trends, such as the growth of single-driver automobile trips, considerably long commuting distances, severe peak-hour traffic congestion and other negative externalities associated with automobile usage (Bart, 2010).

Job-housing balance is a new label for the community planning concept that traces its beginnings to balanced or self-contained community. A community is considered balanced when the distributions of employment and residence are approximately equal, as well as when available housing options complement the earning potential of available jobs, thereby ensuring that the region's workers live in a reasonable commuting distance (Giuliano, 1991). Implicit in job-housing balance is a broad combination of housing types that could accommodate households (workers) from a range of income categories. Housing types and preferences closely connected with personal socioeconomic characteristics, occupation and affordability are comparatively difficult to distinguish.

2.2.3 Measuring job-housing imbalance

The resulting job-housing imbalance has been theoretically and empirically analysed by urban economists, geographers and planners with increasingly refined methodological tools. Such action was intended to measure job-housing balance (Giuliano & Small,

1993; Peng, 1997; Sultana, 2002), excess commute (Charron, 2007; Ma & Banister, 2006a; Yang, 2008), minimum commute (Buliung & Kanaroglou, 2002; Hamilton, 1982, 1989; White, 1988), maximum commute (Black & Katakos, 1987; Charron, 2007; Horner, 2002; Ma and Banister, 2007), spatial mismatch (Horner & Mefford, 2007; Immergluck, 1998; Niedzielski, 2006) and accessibility (El-Geneidy & Levinson, 2006) (Table 2.2).

Excess commute

Studies that focused on excess commute in a city over time (Horner, 2007; Ma & Banister, 2006, 2007) could not fully determine whether the spatial redistribution of population and employment is the cause of the commuting change. Ma and Banister (2007) explained that a comparison of the excess commute rates among different cities is generally meaningless because of the heterogeneity of housing and jobs.

Minimum commute

Based on the strong assumptions that job opportunity, employers and residential units are homogeneous, and that workers have an easy time switching jobs or housing with minimal or no cost, Hamilton and Roell (1982) and White (1988) argued that a minimum required commute (MRC) exists for all workers. However, the actual required commute (ARC) for all workers is constantly larger than MRC. The differences between MRC and ARC are collectively called wasteful commute (Hamilton & Roell, 1982) or excessive commute (Ma & Bainster, 2006a; O'Kelly & Lee, 2005; Horner, 2002; Buliung & Kanaroglou, 2002; Yang, 2008).

Maximum commute

Based on both ARC and MRC, Horner (2002) proposed a method to evaluate the commute efficiency of different cities. He reiterated that apart from MRC, a maximum required commute (MaxRC) also exists. Using the 1990 US census data, Horner (2002) compared the commute efficiencies of 26 US cities; however, his comparisons did not differentiate commuters by mode option. Therefore, whether job-housing balance for

bus commuters is better or worse than other commuters is difficult to determine. Nevertheless, more relevant insights tend to be generated when commuters' mode option is considered. For example, Levinson (1998) learned that transit commuters appear to have higher accessibility than automobile users.

Spatial mismatch

Principally built on the aforementioned studies, Horner and Mefford (2007) developed a conceptual approach that synthesises research on spatial mismatch and job-housing balance, including disaggregation studies of the phenomena by mode of transportation within the broad excess commute framework. Using residential and workplace location data from Atlanta, the two researchers demonstrated that (a) minority's home-work alternatives (after controlling mode of travel) are more spatially constrained, and (b) race and mode option should be simultaneously considered when studying job-housing balance.

Job-housing ratio and accessibility

The ratio of jobs to housing is generally used to reflect the numerical balance between jobs and housing in relation to a given geographical scale (e.g., Cervero, 1989b; Peng, 1997). Household job proximity has also been measured using the potential opportunities method (Wang, 2000). However, both approaches are disadvantaged by the inability to provide the actual individual household job preference. Moreover, past theoretical contributions devoted to employment-based accessibility measures have two important shortcomings: 1) the basis was the spatial variation in the employment levels rather than employment growth, and 2) the failure to adequately characterise a neighbourhood's location relative to all other areas in the local labour market. The first shortcoming reiterates the need to utilise a qualitative flaw in defining the sources of employment opportunities for new labour market entrants. The second shortcoming concerns the technical difficulties encountered in reducing a two-dimensional perspective (i.e., the location of a given neighbourhood in urban space) to a one-dimensional variable (i.e., an accessibility measure).

Table 2.2 Summary of job-housing imbalance and spatial mismatch studies by American scholars since the 1960s

Authors	Concerns	Issues	Suggestion and exploration	Methodology/ Analytical tools/Cases
Kain, 1968	Residential segregation	(1) Residential segregation affects the geographical distribution of black employment; (2) residential segregation increases black unemployment; and (3) the negative effect of housing segregation on black employment is magnified by decentralisation of jobs.	The suburbanization of jobs and involuntary housing market segregation have acted together to create a surplus of workers relative to the number of available jobs in inner-city neighbourhoods where blacks are concentrated.	
Ellwood, 1986	Exploring spatial mismatch hypothesis to explain the poor labour market of young blacks	Teenagers missing jobs in the ghetto	'Blacks really are being gradually disadvantaged by job movements (p.149)" and "race, not space, remains the key exploratory variable' (p.150).	Probability of the youth having jobs/ accessibility measures/ Chicago
Jenck and Mayer, 1990	Critical review of the debate on spatial mismatch hypothesis by Kain (1968)	Residential segregation; demand and supply of employment for blacks; Influence of the neighbourhood characteristics and suburbanisation on blacks' job opportunities	'The support [for the idea that job proximity increases the supply of black workers] is so mixed that no prudent policy analyst should rely on it' (p. 219).	
Holzer, 1991	Reviewing the spatial mismatch hypothesis	The relationship between spatial mismatch and labor market	'Spatial mismatch has a significant effect on black employment. Casual evidence in the	

	from 1968 to 1990		last year or two of tight labor markets for young people in various suburban areas, at the same time central-city employment remains high, also strengthens the impression that spatial mismatch is growing more relevant over time. But considerable uncertainty remains about the magnitudes of these effects, if not about their existence' (p. 118)	
Moss and Chris, 1991	Reviewing the transition of black, future direction			
Kain, 1992	Reviewing the influence of discriminati on in the housing market on blacks' job opportunitie s and income	Racial discrimination in the housing market resulted in the average gross wages (standardised for human capital characteristics) received by employed African- American individuals to be less precise on both theoretical and empirical grounds	The metropolitan labour market is segmented into central city and suburban submarkets, and that the expected wage (i.e., wage times the probability of employment) is higher in the suburbs.	Chicago and the Detroit labor markets
Ihlanfeldt , 1992	Review and evaluate the literature on job accessibility and policy implication	Re-examine the effects of spatial access on youth employment probabilities and on earnings of black teenagers at different scales of cities	'Job access is found to have a strong effect on a youth's job probability as long as he/she lives in a metropolitan area with more than 800,000 people. However, for the youth living in the	

			smallest size class of metropolitan areas (i.e., population below 800,000), none of the job access effects for any of the racial groups is significantly different from zero' (pp. 78–79).	
Ihlanfeldt and Sjoquist, 1998	Critically review new studies and assesses the implications that can be drawn for welfare reform	Suggest using individual microdata instead of aggregate census tract variables	The average commute time of low-wage workers in an individual's area of residence significantly and substantially affects the probability that a particular youth is employed. A mobility strategy is strictly a short-term policy. Eliminating housing and job discrimination and significantly improving the job skills of minority workers are the long-term solutions.	Philadelphia metropolitan area
Raphael, 1998	How the constrained residential choice of African-Americans affects their employment and earnings prospects	Spatial mismatch hypothesis and black youth's joblessness	The principal spatial disadvantage suffered by black male youth is their residence in areas of weak or negative employment growth.	San Francisco Bay Area

Sources: Kain, 1968; Ellwood, 1986; Jenck & Mayer, 1990; Holzer, 1991; Moss & Chris, 1991; Ihlanfeldt, 1992; Ihlanfeldt & Sjoquist, 1998; Raphael, 1998.

Apart from the abovementioned studies related to job–housing balance in the Western context, parallel studies have also been conducted in the Chinese context. Largely due to urban expansion and suburbanisation of social housing, all commuters, including those from social housing projects in selected cities, such as Beijing (Liu, et al., 2009; Li & Li, 2007) and Guangzhou (Zhou & Liu, 2010) have observed an increase in their commuting distance. However, only a few studies on job–housing imbalance in the Chinese context have focused on the social housing residents’ travel behaviour. One of these few studies is that of Zhou and Liu (2010), who used the census and household survey data to determine the relationship between jobs and residential location from 1996 to 2007. This study, which focused on job–housing imbalance in four types of housing estates in Guangzhou, indicated that the changes in the commuting distance and time for both commercial and social housing residents are larger than those of work units’ residents. Similarly, based on the travel survey data of a small sample of workers ($n < 750$) in Beijing, Wang and Chai (2009) and Zhao et al. (2011) opined that the traditional employer-provided housing system in China contributes to better job–housing balance and a shorter commute, whereas the marketization of the housing supply in China decreases job–housing balance and lengthened workers’ commute. These studies were mainly based on the comparison among traditional work units, commercial housing and social housing compounds. Commuters living in social housing communities that are perceived as spatially and socially disadvantaged communities have rarely been focused on.

2.2.4 Job-housing imbalance at the city level

With the popularity of the job–housing imbalance concept among policymakers and scholars, an increasing number of empirical studies have been devoted to the investigation of the relationship between job–housing imbalance and commuting behaviour at the city level. Generally, the researchers disputed that the increasing imbalance between jobs and housing locations is a primary cause of worsening traffic congestion in dispersed metropolitan areas (Cervero, 1989; Bourne, 1989; Guiliano & Small, 1991; Wachs et al., 1993; Wang, 2000). Cervero (1989) identified job–housing imbalance cases in suburban areas in Chicago and San Francisco, where the suburbs implement restrictive land-use policies that prohibit industrial and commercial

employment, thereby contributing to the increase in commuting time. Similarly, Bourne (1989) conducted a study on Canadian cities where the growing imbalance between labour supply and demand resulted in the increase in residence–workplace separation. Rosetti and Eversole (1993) used US Census data to show the increase in the mean commuting time in 35 out of 39 metropolitan areas from 1980 to 1990. Using 1990 U.S. Census of Transportation Planning Package (CTTP) data for Chicago, Wang (2000) discovered that job–housing imbalance tends to correlate with long commuting time.

Many American metropolitan areas have enacted job–housing balance policies. The Metropolitan Council initiated the Smart Growth Twin Cities Project² with the objective of increasing the percentage of households located within two miles of the region’s largest employment concentrations (Orfield, 2011). In 2001, Boulder initiated a “Jobs to Population Balance Project” by means of rewriting zoning ordinances to balance the excess of jobs, provide affordable housing and decrease the approximately 40,000 commuters coming into the city daily (Boulder Valley Comprehensive Plan, 2003). The Southern California Association of Governments adopted regional plans to redirect 9% of job growth to ‘housing rich’ areas and 5% of housing to ‘jobs-rich’ areas (Cervero, 1996). In the late 1980s, Toronto directed additional housing towards its jobs-rich central core to alleviate traffic congestion (Nowlan & Stewart, 1991). To determine the reason why less prosperous people sensibly choose cities, the *New York Daily News*³ (2013) examined neighbourhoods near new transit stations built in various cities after 1973. It is found that the dwellers make reasonable location decisions, and many of them opt for New York partially because of its numerous public transit systems.

In the Chinese context, the Peking–Lincoln Centre housing group has conducted a series of housing policy studies, like “Intra-Urban Spatial Inequalities Across Chinese Cities” (Zheng & Fu, 2009) and “Low-income Housing in China: Current Issues and Policy Design” (Man, 2009). With Chinese cities as the case study, the project investigated

² More information on Smart Growth Twin Cities can be accessed from <http://orgs.carleton.edu/farmhouse/lrt/essays/met.htm> and <http://www.equinoxcenter.org/assets/files/pdf/Twin-Cities-Case-Study.pdf>.

³ A happy tale of two cities, BY ED GLAESER, NEW YORK DAILY NEWS, issued on October 13, 2013, <http://www.nydailynews.com/opinion/happy-tale-cities-article-1.1483174>.

urban spatial inequalities increase with average income, educational level, urban density and urban growth. The research also highlighted such inequalities restricted low-income residents from accessing local public services and employment opportunities.

2.3 Spatial implications of travel behaviour

Travel is essentially a representation of space–time behaviour. The relationships between travel characteristics (e.g., destination, mode and route) and various space attributes (e.g., function and form) are popular means towards gaining an understanding of the intricate relationship between human activities and the built environment in urban geography discourse (Hanson & Hanson, 1993; Kwan, 1999, 2002a; Chai et al., 2002; Miller, 2004). Recently, the considerable popularity and influence of space–time behaviour research have been attributed to the development of geographical information system (GIS)-based analytic tools and high-quality individual space–time activity data (e.g., Kwan, 2004; Chai & Zhao, 2009; Shaw & Yu, 2009; Neutens et al., 2011; Wang et al., 2012).

Previous empirical studies based on the space–time activity approach have focused on describing the spatial–temporal patterns of individual daily activities, thereby providing a micro-level interpretation of China’s urban spatial structure. Descriptive statistics have shown how urban residents allocate their time to different types of activities, the temporal rhythms of daily activities by urban residents over the course of 24 hours and the average travel distances from home based on the precise objective of an activity (e.g., Chai et al., 2002).

Socio-spatial issues for particular groups

Having learned from Western literature, urban geographers in China have immediately applied the space–time activity approach to socio-spatial issues in Chinese cities by focusing on the daily activity experiences of the disadvantaged population members, such as women, seniors and urban poor (Lan & Feng, 2010; Liu, et al., 2009; Shen, et al.,

2013; Wang, et al., 2015; Zhang & Chai, 2011). Several scholars have analysed gender differences in space–time activity patterns in Chinese cities and compared them with those of Western cities. Cao and Chai (2007) focused on time–use patterns and determined that women carry more household responsibilities than men; however, men spend considerable time on work and leisure activities. Zhang and Chai (2008) showed that the comparison of space–time activity patterns between husbands and wives can reveal the gendered division of domestic labour in Chinese urban households. Men perform most out-of-home activities, whereas most in-home activities are performed by women (Zhang & Chai, 2008). Another important topic concerns the space–time activity patterns of low-income groups in Chinese cities. Low-income population members face enormous difficulties in daily commuting because of the emerging job–housing mismatch in Chinese urban spaces (Liu & Wang, 2011). Zhang and Chai (2011) determined that low-income populations in Beijing have ‘fragmented’ space–time activity patterns because they have short work durations and irregular time allocations for work activities. Low-income residents in Guangzhou possess more constrained activity space than other income groups (Zhou, et al., 2013).

Integrating transit and land use development

Western urban geographers have conducted studies on diverse transportation based on the space–time behaviour approach with particular emphasis on the use of individuals as the unit of analysis. However, one concern has remained: the need for a large scale integrated spatio–temporal analysis of the activity-based travel demands and the role of space–time constraints in travel decisions. Based on the time–geographic framework, accessibility-oriented planning methods have been particularly useful in analysing city-level spatio–temporal patterns. Geovisualizations and simulations of space–time behaviour have been performed to map and predict visitor flows and activity patterns (Zhu & Wang, 2008; Wang et al., 2009; Huang & Ma, 2011). Similar methods have been used in other planning practices, including the smart-city master planning of Chengde City in Hebei Province, tourism planning for the Summer Palace in Beijing and infrastructure site planning for the Shanghai Expo. Consequently, the space–time behaviour approach has become a highly useful human-oriented approach to land use and transportation planning practice in China (Lu et al., 2009; Chai et al., 2013).

Urban socio-spatial transformation

The space–time behaviour research has also affected China since the late 1990s; interested scholars have explored the dynamic interactions between individual life experiences at the neighbourhood scale and urban social and spatial transformations at the city level (Chai & Zhao, 2009). Hundreds of fruitful academic research articles have been published in Chinese and English, thereby introducing the theoretical arguments and highlighting empirical studies on China’s major cities (e.g., Beijing, Tianjin, Shanghai, Shenzhen, Guangzhou, Nanjing and Wuhan). However, theoretical contributions on space–time behaviour analysis remain limited in China, which emphasises the need for improved access to data availability and techniques.

2.4 Research gaps and summary

Research gaps have been identified in the Chinese literature in the course of probing the international discourse and policy debates on job–housing imbalance issues. Firstly, the attention of Lefebvre’s theory of the production of space has been given to social sciences and extended to urban geography. Given the complex process of urbanization and globalization emerged, space and time do not exist (Goonewarena, et al., 2008). The new space-time configuration determines to integrate city, space and time in a single, comprehensive theory, enabling the understanding of spatial process at different levels. Space of social housing neighborhood is a product created by social housing residents; however, how space (social housing community) is produced is worth investigating from diverse dialectically interconnected dimensions. From western experience, social housing induces spatial segregation and increases the distance to jobs. Indeed, placing together relatively lower income families in areas generally located far from jobs (this situation is true both in the US and in Europe) results in reduced job opportunities for these households. As job-housing balance is a global issue, obtaining increasingly international recognition, the aforementioned arguments would contribute to a great deal of debate. This necessitates a reconstruction of the theory of the production of space, particular including context. This work draws extensively on Henri Lefebvre (1991) and Neil Smith (2008) to understand the role of human beings, everyday life, and social movements in the dynamics of urban conflicts and spatial restructuring. Thus, whether the same situation will happen in Chinese cities and how serious job-housing

imbalance appear for social housing residents are worthwhile to investigate in the Chinese context (referring to objective 1).

Although China's current social housing policies and planning programme have integrated the relevant experiences and policies of western countries, the influences of job-housing imbalance and social housing policies on social housing residents have not been investigated from the travel behaviour and planning perspective. Thus, local literature on job-housing imbalance and mobility of social housing residents is limited. Less focus on social housing policy has been devoted to the intensification of spatial mismatch and residential inequalities, increase in housing segregation and considerably long commuting time to places of social activities. Thus, the exploration of the effects of residential relocation on employment accessed socially and spatially by low-income groups will be discussed (referring to objective 2).

The differences in spatial patterns between individuals cannot be clearly using conventional accessibility measures. Spatial analysis articulates spatial pattern with social relations at various levels of our planet – from the individual, through the urban, to the global, and reveals the patterns for individuals who resemble the spatial distribution of a workplace in a visual and intuitive manner. The current study attempts to utilise the ArcGIS tools to elaborate individual travel patterns and their activity pattern, as well as to understand the interaction between accurate geovisualization of space-time activities pattern and the transformation of urban spatial structure in Guangzhou (referring to objective 3).

Finally, the existing literature provided fragmented views on the factors affecting job-housing imbalance and immobility for social housing estates. Several researchers argued that job-housing imbalance is the result of population growth and employment decentralisation in metropolitan areas (Cervero & Wu, 1997, 1998; Gordon & Richardson, 1996, Sultana & Weber, 2007; Loo & Chow, 2011). Others identified spatial mismatch, particularly skill mismatch, as the cause of poor job access and the worsening labour-market outcomes (Kain, 1968; Ihlanfeldt & Sjoquist, 1998; Ihlanfeldt, 2006;

Zenou, 2009). Other researchers explained that racial difference hinders racially diverse people from gaining access to employment (Ellwood, 1986; Taylor & Ong, 1995). However, these studies lack an integrated conceptual framework which is able to explore the interaction between travel behaviour and built environment. Thus, this research attempts to establish a conceptual framework to illustrate the mechanism between urban space and human commuting behaviour, with the emphasis on low-income groups (referring to objective 4).

Chapter 3 interprets the job–housing imbalance and mobility issues among residents of social housing communities in China and contextualises China’s experience within the extensive urban spatial restructuring.

Chapter 3 Evolution of Social Housing in Guangzhou: Emergence of Job-housing Imbalance and Mobility Issues

3.1 Introduction

Owing to the high and rising housing price, the Social Housing Programmes became a new trend of housing development in China since 2006 and was intended to address the difficulties of limited production of affordable housing in Chinese cities. In 2011, the State Council has proposed to build 3.6 million flats within the Twelfth Five-Year Plan period (from 2011 to 2015). The central government perceived social housing programmes as effective ways to improve the living quality of the low-income groups. However, past experience shows that social housing programmes mainly implemented in the outer areas of major cities tend to change the job and housing relationship. Given the spreading suburbanization and job centralization in Chinese cities, urban residents are commuting longer, a situation that is considered as a severe spatial problem, and indicates a major shift towards job-housing imbalance and immobility (Zhou et al., 2013). Thus, people living in social housing neighbourhoods seem to be 'labelled' as social and spatial disadvantaged groups, which should be secluded and sequestered in the outer area of cities.

This chapter aims to explain the general job-housing imbalance issues related to social housing communities in Guangzhou. The rest of this chapter is organized as follows. First, social housing and target groups in this study are conceptualized. Then, the history of social housing development in China in general and Guangzhou in particular is reviewed. Finally, job-housing imbalance and mobility issues in Guangzhou are illustrated.

3.2 Conceptualising social housing and target groups

3.2.1 The meaning of social housing

Research on social housing in Western countries has offered a variety of inspirations. The first theme in the wide-ranging discussions is related to the meaning of social

housing. This theme addresses the issues of what kind of individuals or households are entitled by virtue of being the needed groups of a particular society in the context of welfare (Table 3.1). The different contexts of a society or a state should accompany the changes in the scope of housing provision, and different public policies should be geared towards housing for the distinctive needed groups.

Table 3.1 The meaning of social housing in different countries

Concept	Representative	Meaning	Main body
Social Housing	The Netherlands ¹	Social housing is mainly reserved for people who have low income and have difficulties finding a home on the free market. Social housing is provided by housing associations based on affordable rental price. Housing associations are partly responsible for the quality of life in the neighbourhood.	Many social housing estates in the Netherlands belong to housing associations that include the social housing sector and the private or non-subsidized sector. The government also encourages cooperation among housing associations, home care organizations, and other civil society organizations.
Social Rental Housing	Britain ²	Social rental housing is intended to house people in 'need', who are defined as people with low income.	The state is currently the most prominent supplier of welfare. A threefold distinction of types of housing provision is developed. This housing provision includes household, state, and Northern Ireland Housing Executive as social housing suppliers.
Public Housing	Sweden ³	Public housing aims to provide housing for people who are unable to purchase a home of their own or unable to obtain a tenancy in other forms of rented accommodation. No upper income limit is set for people willing to rent an apartment. This programme encourages the rich and poor to live in the same block.	The public housing utilities are provided by housing companies that are owned and run by local municipalities by promoting the supply of good dwellings without profit.
Public Housing	United States ⁴	Public housing is the most well-known form of the provision of decent and safe rental housing for eligible low-income households, the elderly, and persons with disabilities. This provision originated in 1937 and operated	The US Department of Housing and Urban Development (HUD) administers financial assistance to local public housing authorities (PHAs) that manage the housing for

		on a much larger stringent basis.	low-income residents and set the rents that meet their affordability. HUD equips technical and professional assistance for public housing programmes in terms of planning, design, management, and operation.
Public Housing	Hong Kong ⁵	Hong Kong's public housing programme aims to meet the housing needs of households who cannot afford private rental housing, and to provide subsidized home ownership flats to qualified persons. Public housing is determined and implemented by the Housing Authority (HA).	The HA is a statutory body to plan, build, manage, and maintain different types of public housing. The Housing Department acts as the HA's executive arm to provide public housing, as well as to manage and maintain public housing estates.
Public Housing	Singapore ⁶	Public housing schemes have been developed by the Housing and Development Board (HDB) to satisfy the housing needs of more than 80% of Singapore's resident population. These schemes contributed to ownership by approximately 90% of these resident households of their HDB flat, and aimed to give citizens a tangible asset to help in all the social, economic, and political stability of the country.	The HDB is Singapore's Public Housing Authority and a statutory board under the Ministry of National Development.

Source: CECODHAS, 2005; ^{1,2,3} CECODHAS Housing Europe, Social housing country profiles, Retrieved from <http://www.housingeurope.eu/publication/social-housing-country-profiles/social-housing-in/united-kingdom>, access on 13 October 2013.

⁴ The U.S. Department of Housing and Urban Development, 2013, HUD's Public Housing Programme, Retrieved from http://portal.hud.gov/hudportal/HUD?src=/topics/rental_assistance/phprog, access on 13 October 2013.

⁵ Hong Kong Housing Authority, 2012, The Information about Housing Authority, Retrieved from <http://www.housingauthority.gov.hk/en/about-us/housing-authority/index.html>, access on 13 October 2013.

⁶ The Housing & Development Board, 2012, The Role of the Housing & Development Board, Retrieved from <http://www.hdb.gov.sg/fi10/fi10320p.nsf/w/AboutUsOurRole?OpenDocument>, access on 13 October 2013.

3.2.2 Definition of social housing in China

'Social housing' in Chinese language literature is referred to as a product of social welfare wherein the government provides certain subsidy or physical product to the

target groups. The construction standards of this type of social housing are stipulated and the price or rent of the housing is controlled. The scenario of social housing programme aims to address the transpiring urban poverty issue. The provision model of social housing would be changed on the basis of the scale of city development. A top-down approach is the means for the implementation of the current distribution system of social housing in China because the quota is determined by the upper administrative level. The discretion of the specific location of housing projects and the targeted groups is determined by the local governments.

Social housing development in China has undergone many progressive changes in relation to different policy objectives and targeted groups (Figure 3.1). In 1995, the State Council launched the Comfortable Housing Project (*Anju Project*) to house low-income households whose per capita living space is below 4 m². A new social housing policy allocation directed towards different household incomes in China was introduced in 1998. With the aim of assisting the lower-middle-income households, particularly government officials (e.g., civil servants, professionals, teachers, and policemen), to secure homeownership, the government offered the Economic and Suitable Housing (ESH) to this target group based on the principle of nominal profits. In 1998, the Low Rental Housing (LRH) was built for the very low-income groups, which needed housing the most.

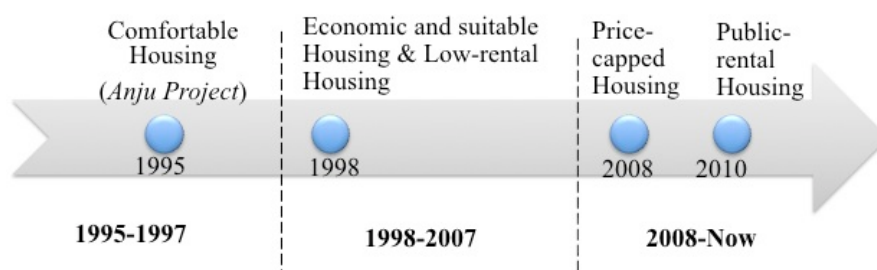


Figure 3.1 Different Stages of Social Housing Development in China from 1995 to Present

Source: Compiled by the author

The dynamics of the urbanization process in the 21st century has led to the implementation of diverse urban regeneration and infrastructure projects in the urban core (e.g., subway development, urban redevelopment, and transportation hub, among others). As a result, the Relocation and Resettlement Housing (*Chaiqian anzhi fang*) is

being allocated to the affected households. In an attempt to cool down the overheated housing market in 2008, the local governments set the specific ratio of the provision of small- and medium-size flats by private developers in their new housing projects. Moreover, the local governments implemented the Price-capped Housing (PCH) in response to the sharp increase in the demand for small- and medium-size units from urban citizens. In 2010, the Public Rental Housing (PRH) served as a transitional agent in supplying houses for 'sandwich class' citizens, who are qualified applicants to the affordable housing scheme but could not afford the down payment.

The utilization methods of social housing to buy or rent vary significantly based on the socioeconomic status of the households. LRH and PRH are owned by the local governments, and subsidies for low-income households are offered by the local governments to enable rent payment. The land for construction of ESH is allocated by the local governments; thus, exempted from charges, such as those incurred by the provision of infrastructure facilities. In addition, the local governments enact a preferential taxation policy and provide lower-middle-income households with home ownership based on a controlled price to ensure affordability.

3.2.3 Low-income group and lower-middle income group in China

The terms 'low-income group' and 'lower-middle-income group' generally used in some policy documents, refer to the urban households that require government help. However, the central government does not have a clear definition for 'low-income group', and it turns to local governments to define the low-income households. For social security purposes, most large cities have established a poverty line based on household income. The municipal government provides funds or goods to those urban households with incomes below the poverty line. In academic research or official statistical reports, the most common way of defining income groups is using the ratio of conditions of per capita cash income to expenditure of urban households in a city based on the municipal statistical yearbook.

Guangzhou where social housing policies are based on the national strategies and local governments are committed to resolve housing difficulties for urban populations is the city selected for this research (Table 3.2). The actual annual income per household of the low-income group in Guangzhou was 18,615.70 yuan in 2013, whereas that of the lower-middle-income group was 33,220.35 yuan. The actual annual income per household of the middle-income group was 46,986.64 yuan, and that of the higher-middle-income group was 56,685.65 yuan (Guangzhou Municipal Statistics Bureau, 2015). The minimum wage in Guangzhou was 1,300 yuan/month in 2011. Urban population with different income levels is in line with the availability and eligibility of various housing programmes.

Table 3.2 Categories of different income groups according to income (2013)

	Average income level of household	Percentage of households (%)
Low-income group	18,615.70 yuan	21.37%
Lower-middle income group	33,220.35 yuan	20.19%
Middle-income group	46,986.64 yuan	19.87%
Higher-middle-income group	56,685.65 yuan	19.50%
High-income group	85,010.71 yuan	19.07%

Source: Guangzhou Municipal Statistics Bureau, 2015

3.3 Local context: Evolution of social housing in Guangzhou

3.3.1 Brief review of housing development in Guangzhou

Guangzhou is the capital city of Guangdong Province. The city covers a total area of 7,434.4 km² with a registered population of 12,926,800 in 2013 (Figure 3.2) (Guangzhou Municipal Statistics Bureau, 2015). The gross domestic product (GDP) of Guangzhou is the highest among all cities in the Pearl River Delta. Guangzhou is one of the top three cities in China in terms of economic aggregate, with the total GDP of RMB 1,542.014 billion (US\$242.83 billion) in 2013 (Guangzhou Municipal Statistics Bureau, 2015).



Figure 3.2 Ten districts and two counties in Guangzhou in 2013

Source: http://upload.wikimedia.org/wikipedia/commons/1/19/Guangzhou_administrative_divisions_%28French%29.svg, access on 5 Januray 2014.

Since 1986, the performance of social housing development has been remarkable because of the implementation of social housing policies by the local government. At the end of 2010, 225,000 households, among the 2.52 million registered households in the 10 districts of Guangzhou, shared the fruits of housing welfare, through the diverse housing options of LRH, ESH, PCH, PRH, and other forms (Guangzhou Municipal Government, 2013). Through the efforts of the local government to improve housing conditions and to increase residential space, the average living space per capita for urban citizen in Guangzhou increased steadily from 3.82 m² in 1978 to 22.73 m² in 2013 (Guangzhou Municipal Statistic Bureau, 2015).

However, the limited coverage of social housing and supply shortfalls are two of the most serious difficulties in many major cities in China. In Guangzhou, the percentage of low-income households assigned with social housing is at 6%; and only 30,000 households have been settled since 1998 (Guangzhou Urban Planning Bureau & Guangzhou Land Resources Bureau, 2008). The proportion is low as compared with that of Beijing and Shanghai, whose proportions of the supply of LRH and ESH are 8.4% and 22.73%, respectively (China Index Academy, 2011). In addition, the low-income households and lower-middle-income households in Guangzhou in 2010 account for approximately 40% of the total number of urban households, whereas the proportions of those in particular need of housing in Beijing and Shanghai are 33.3% and 36%, respectively (Beijing Statistic Bureau, 2010; Shanghai Statistic Bureau, 2010). Guangzhou has the lowest percentage of social housing supply but the highest rate of social housing demand among these three mega cities.

The rationale for choosing Guangzhou as a case study is that Guangzhou is one of the pilot cities of 1998 nationwide housing reform in China (GZSHO and GZLRHAB, 2008; Chen et al., 2012). Social housing in Guangzhou has a long history of more than 25 years, and is a typical representative of national policies. Thus, putting Guangzhou's policy in alignment with those nationwide, it can be seen that social housing development of Guangzhou precedes other cities of China as a case study.

3.3.2 Current situation of social housing in Guangzhou

By synchronizing with the housing system stipulated by the central government, the Guangzhou Municipal Government has created a framework of social housing provision since 1995 for low-income and lower-middle-income groups. Such action aimed to increase urban citizen's residential living space and to improve the quality of living (Table 3.3). LRH is provided for those with the highest need, whereas the targeted group of ESH and price-capped housing is the group that is composed of the lower-middle-income household families. The purpose of PRH allocation is to provide a living place for new migrants, new graduates, and newly married couples.

The three types of social housing schemes shown in Table 3.3 are conducive to the dramatic changes of social housing development in Guangzhou in terms of the production and supply of social housing. Such spectacular achievements have been made more than 120,000 low-income households, average annual income ranging from 15,600 yuan/year to 40,188 yuan/year, for addressing their housing difficulties till June 2014, according to the interview with the staff who works in the Guangzhou Security Housing Office (GZSHO) on July 2015. Furthermore, Guangzhou has constructed an unprecedented number of 151,700 sets of social housing between 2011 and 2014, about 1.5 times larger than the accumulated sum of social housing completed in Guangzhou in the past twenty-five years (before 2011) (The interview with the staff of GZSHO on July 2015).

Table 3.3 Comparison of three social housing schemes in Guangzhou

Types	Low Rental Housing	Economic and Suitable Housing	Public Rental Housing
Targets	Lowest-income households (official urban households with an income below the poverty line)	Lower-middle- income households	- Sandwich class households - Single person over 30 (parents without ownership house) - Talented people with working contract of three years or above
Requirements	- Registered permanent residence - No own house - Per capita living space < 10 m² - Household annual per capita disposable income below 15,600 yuan	- Registered permanent residence - No own house - Household annual per capita disposable income 18,287 yuan	- The registered permanent residence - No own house - Per capita living space < 15 m² - Household annual per capita disposable income below 40,188 yuan
Sizes	35 m ² , 45 m ²	< 60 m ²	< 50 m ²
Sale price		Follows the sale strategies of government; once decided, no changes made by any institution or individual shall apply	
Sale method		Allotment	

Traded		Can only be traded after five years of tenancy and after submitting the 80% of the difference of price between housing and commercial located in the same neighbourhood after selling the house	
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Source: Guangzhou Municipal Land Resources and Housing Administrative Bureau, 2009

Governance mode

Examining the governance structure can be a way to critically evaluate housing system; thus, determining which interest groups are involved in policy making and how the corresponding policies are formulated is crucial (Cerna, 2013). The “government-led, social participation” mode induces Guangzhou to be a good example of social housing development by the Ministry of Housing and Urban-Rural Development in Guangzhou. As the governance body responsible for formulating and implementing social housing policies in Guangzhou, the Guangzhou Affordable Housing Administrative Team (GZAHAT) has been established to take charge of all significant issues concerning social housing. However, GZAHAT is not a standing body and only operates to make significant decisions when needed.

As the executive arm and main housing provider of GZAHAT, the GZSHO is mainly responsible for the implementation and monitoring, as well as for collaborating with the other members from GZAHAT, such as the Urban Planning Bureau, the Land Resources and Housing Management Bureau, and the Reform and Development Commission to formulate the relevant policies on social housing planning and construction (Figure 3.3). With no more than 92 staff members, GZSHO cannot sustain the efficient management of social housing in a large city of 8.2 million citizens. This excessive fragmentation of social housing development has resulted in a few inefficient outcomes. The actual execution of arrangements disposed by GZSHO that consists home sale exercises, the operation and management of public housing communities, and the search of the funding for construction and housing management of public housing, is completed by its different sub-organizations.

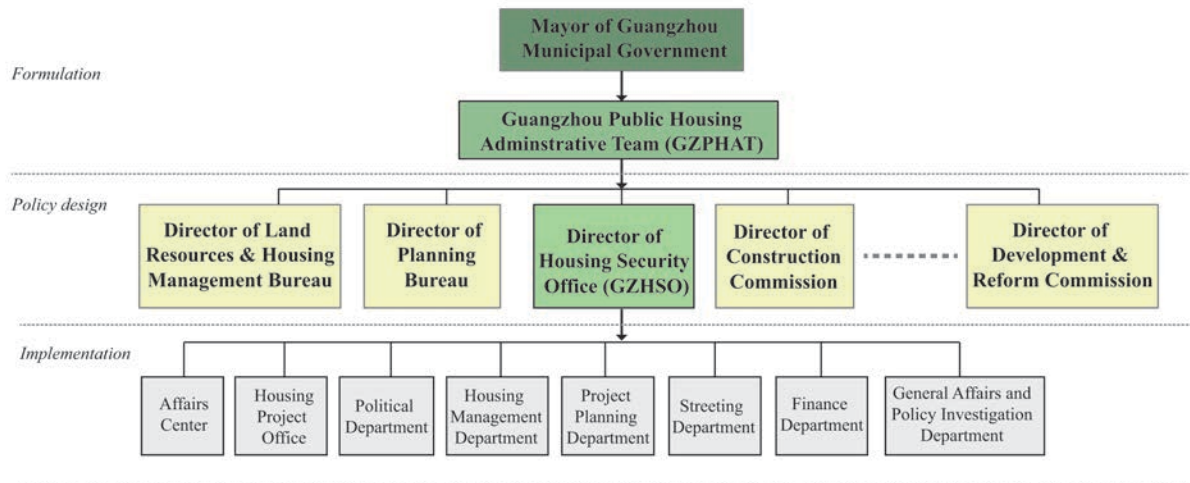


Figure 3.3 Governance structure of Guangzhou affordable housing system

Source: Compiled by the author based on Guangzhou Municipal Land Resources and Housing Administrative Bureau, 2011

Criteria of location selection for new social housing communities

As shown in Table 3.4, the indicators of site selection are analyzed at the macro level (compulsory), micro level (highly recommended), and the cooperative implementation level (recommended) according to the information provided by the GZSHO. At the macro level, the consideration of the combination of urban development, urban master, and regional development strategies should be taken. In countries where the social housing for the poor is subsidized by the government, location is recognized as a critical factor of the success of the social housing plan (e.g., UK Communities and Local Government, 2006). The provision of social housing in convenient locations not only ensures decent housing for the poor, but also offers economic and social opportunities to guarantee self-sufficiency. Historical lessons from public housing programmes in the US and Hong Kong have emphasized the danger of placing social housing projects in inferior locations where employment opportunities and public infrastructure are scarce (Gabriel, 1996; Holmans, 2005).

The micro level is the indispensable attributes which influence neighbourhoods and the quality of life of residents, namely public transportation network, community facilities, and community planning. The influence of accessibility to community resources such as

recreational facilities, healthcare facilities, educational facilities, public transportation has been embedded in the recent debates concerning lifestyle and health (Pearce et al., 2006). The indicators are of interest in locality based on social housing policy and planning.

The third level of spatial distribution of social housing is the consideration of the potential development zones in a city. More importantly, the implementation of community facilities should be accomplished before the occupation time schedule of the housing projects. However, local implementation of the affordable housing programmes has been problematic and sometimes ineffective (Huang, 2012; Zou, 2014). Local governments determine the specific location of housing programmes. However, the total number of dwellings and the proportion of low-income housing to overall housing provision are emphasized without giving enough consideration to the location of social housing projects.

Table 3.4 Framework of Implementation Planning Principles for Choices of Social Housing Location in Guangzhou

Indicators of location choice	Requirement	Contents
Indicators at macro level (Compulsory)	1 Complied with urban development strategy	Applying urban master planning on the allocation and deployment of urban spatial structure
	2 Linked with urban industry spatial development strategy	Declining excess commuting of the large proportion of practitioners at outskirts; advocating the concept of 'job-housing balance'
	3 Regional balanced development strategy	Avoiding the unreasonable spatial pattern with excessive agglomeration or excessive dispersion; satisfying the need of geographical place-based relationship for targeted groups and their transportation need of daily travel behaviour
Indicators at micro level	1 Complied with public	• First optimization criteria: located Ensuring the convenience of social housing residents to

(Highly recommended)	transportation network	within 1 km coverage area to rail transit station (15-minute walking distance) • Second standard criteria: located within 3 km coverage area to rail transit station (10-minute shuttle bus ride)	catch up with public transportation network
	2 Complied with public service facilities	First optimization criteria: 500 m to residential communities • Second standard criteria: 800 m to residential communities	Guaranteeing social housing residents to share the utilization of public service facilities with high performance
	3 Mixed community planning	• First optimization criteria: the ratio of construction land of social housing more than 1/3, and social housing population less than 1/2 • Second standard criteria: the ratio of construction land of social housing less than 1/2	Mixed use of different kind of land use to avoid the emergence of residential spatial differentiation
Cooperative implementation (Recommended)	1 Cooperative implementation	Closed to the potential development zone in a city	Mixed allocation of social housing construction to the leased land of affordable housing in the Twelfth Five-Year Plan; implemented at the same period, and population size over 30,000; satisfying the configuration and requirements of public service facilities at neighbourhood level; avoiding the circumstance of time lag behind planning implementation

Source: Guangzhou Municipal Land Resources and Housing Administrative Bureau, 2011

The interview with officers of the GZSHO (September 2013) showed that social housing provision has three models:

- Municipal governments requisition land and invest in the construction of social housing projects. For example, all the requisitioned lands for this year are derived from collective lands, such as farmland and collective industrial land.
- Enterprises cooperate with governments in the provision of social housing. However, acquiring land for social housing construction is usually problematic. The problem arises because the land will be recovered by the government without payment should the enterprises fail to invest in construction. This model is not ideal, and successful cases are rare.
- A particular residential land that is officially auctioned to real estate companies has to accommodate a certain percentage (generally 30%) of the social housing units.

These models result in two types of social housing neighbourhoods. First, large-scale social housing neighbourhoods are constructed in the suburbs. Second, a certain percentage of social housing communities are constructed in old urban districts because of infrastructure and urban renewal projects. The site selection of projects in the three abovementioned models is totally based on governmental mandates.

Holmes (2006) opined that the availability of good-quality social housing is a precondition for a successful and integrated economy. As discussed earlier, large-scale social housing schemes were formulated and implemented by the government since 2005 in Guangzhou. The 1986 and 1998 housing reforms in Guangzhou have inevitably undergone tremendous changes in terms of housing mechanism, social interaction, and residential patterns (Forrest & Yip, 2007). Traditional ‘work-unit’ communities under the previous political economic system were socially and spatially related to workplaces. The housing conditions and social and economic status of residents were homogeneous with other housing areas. However, the 1988 housing reform on the work-unit residential compounds brought such effects as ownership of property, separation from home to job, changes of socioeconomic characteristics of residents, and housing differentiation in terms of housing conditions. With the acceleration of the 1998

housing reform, the diversification of housing options has resulted in housing inequality and residential differentiation in tenure, housing quality, and location (Wang & Jiang, 2009).

The residential patterns have become more diverse and complicated since the 2000s. According to the household commuting survey held in 2005 by the Guangzhou government, the average commuting time for urban residents for every travel activity was 27.4 minutes, a 4.4 minutes increase as compared with the 1984 figure. In 2011, Guangzhou was required to build 84,959 new social housing units by the Guangdong Provincial Government through political assignment from the central government to the local governments (Guangzhou Municipal Land Resources and Housing Administrative Bureau, 2011). A large amount of social housing estates emerged gradually in the suburban areas of Guangzhou. The associated issues with new emergence of social housing will be discussed in the coming sections.

3.4 New issues that emerged after urban residents started living in outer-skirt areas

3.4.1 Residential spatial differentiation issue

The development of a socialist economy and the housing reform in China between 1949 and 2000 changed the urban landscape of many large cities and created a particular spatial pattern. This phenomenon led to the upgrading of parts of the original areas in the old historic city centers and the development of work unit zones beyond them. Before the commercial property boom and housing transformation of the 1990s, a general land-use pattern could easily be identified in most major cities. In the historical core of such cities, public and private housing, mixed with poor-quality single-storey accommodation, dominated the landscape, with modern state-owned shops and offices along the main street. Beyond this zone was a ring of work units of public institutions and their related housing estates. In the suburban zone, a ring of work units engaged in different industrial activities was present, with the remnants of the original rural settlements in between the work units.

Residential spatial differentiation has started to emerge in Guangzhou since the 1990s, associated with the rise of household income, population growth, and *hukou* system (Zhou et al., 2015). Owing to cheaper land price in the outer area, the provision of social housing projects was pushed outside the city center. In particular, with the effects of planning and land use development, a few new social housing projects were constructed after 2006 (Figure 3.4), and some social housing areas have influenced the mobility of its residents. In addition to the insufficient consideration of the elimination or alleviation of differentiation, this phenomenon has led to a wider degree of residential spatial differentiation and greater social polarization in the social housing neighbourhood in Guangzhou after 2003 (Chen et al., 2012).

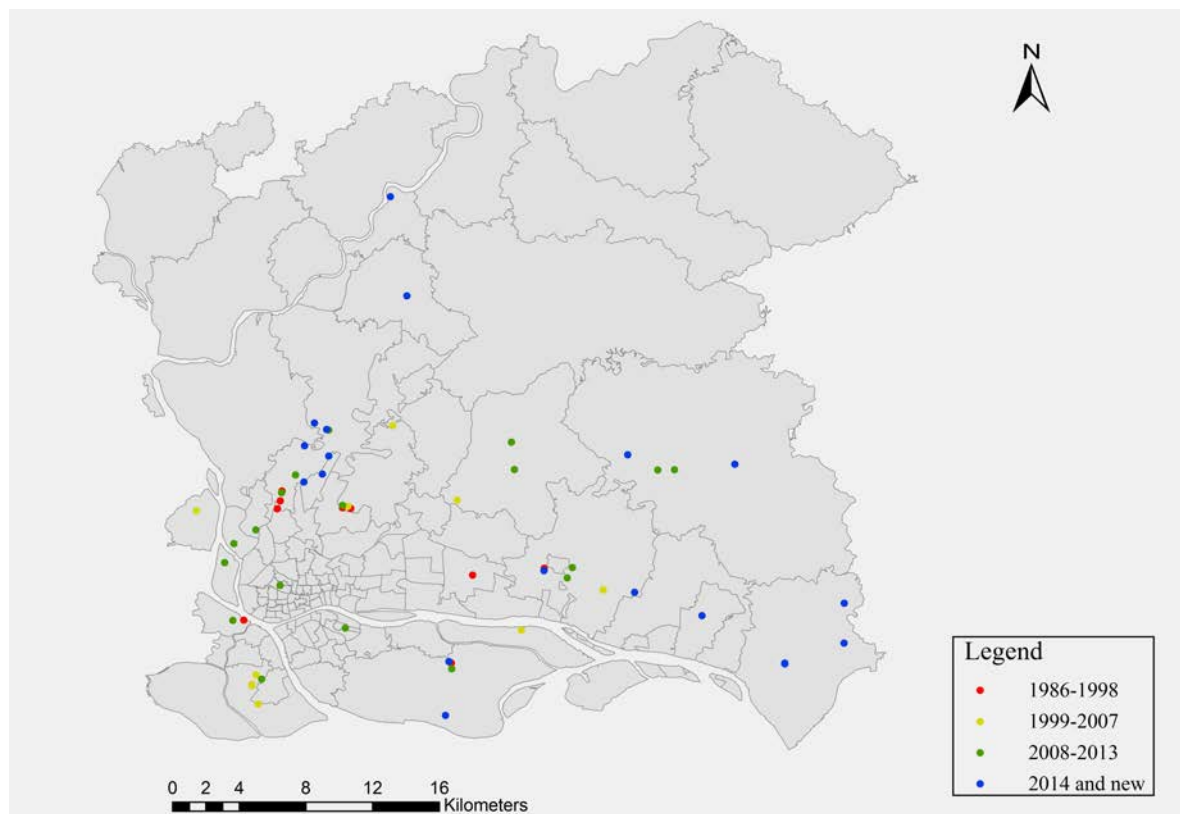


Figure 3.4 Spatial distribution of social housing projects in Guangzhou

Source: Compiled by the author

To a greater extent, reducing segregation and avoiding the stigma attached to social housing spatial concentrations are the ideal logic and strategic action (Jones & O'Brien, 2003). However, only few actions and initiatives could be implemented to accelerate

community mixing during the decision-making process or planning process. Furthermore, new social housing projects lack of close link and coordination with new employment opportunities in the nearby areas and with the planning of new transport infrastructure.

By contrast, the targets of PRH mainly focus on single people, talented people, and university graduates. According to the latest survey of the housing needs of PRH, people who are working at the downtown hope to live near their workplaces. If they are forced to live in the outer area, great stress would be placed on the transportation system during rush hours. Such choice would also cause an increase to their transportation costs. Additionally, some applicants have to give up the chance of living in the outer area although they have successfully applied for a housing unit because of the issues related to *hukou* and school-age children. It shows the great importance of the location of social housing which is dominant in large metropolitan areas.

Residential space in China is highly differentiated (Li & Wu, 2006) in terms of spatial and social segregation as evidenced by residential segregation that is emerging in the suburbs in Guangzhou. With the popularity of private cars and insufficiency of transportation alternatives, people living in the social housing estates in the outskirts are unable to share the benefits of various kinds of public resources (such as education, healthcare, and parks) and job accessibility. These people also have to spend 3-5 hours per day on working and nonworking trips, which in turn, results in less time for family matters and for their children, according to the questionnaire survey⁴ on residential mobility pattern conducted in four selected estates⁵ in Guangzhou and the interviews in July 2012.

⁴ The Survey was conducted by the HKU Investigation China Research Team on Conditions of Residents in Social Housing in 2012. The team members comprise Huiwei Chen (Principal Investigator), Tingting Chen, Siyang Xu, Zongcai Wei, and Linna Li. The survey was funded by Nanfengchuang Magazine and YouCheng China Social Entrepreneur Foundation. Approval has been given by the HKU Research Team for questions on residential mobility pattern to be included as Section C in the survey.

⁵ These four selected cases are Ju De Housing Estate (大塘聚德花苑) in Haizhu District, Jin sha zhou residential community (金沙洲居住新城新社区) in Baiyun District, Tangde Housing Estate (龙归城社区) in Tianhe District, and Ze De Housing Estate (同德围泽德花苑) in Baiyun District.

3.4.2 Changing residential and movement pattern of social housing residents

Commuting is a major issue for low-income group people who are living in social housing estates, particularly in the outer areas. The provision of public facilities and transport alternatives in the outer area of Guangzhou is substantially insufficient. As shown in Figure 3.5, environment & security, entertainment and recreation facilities, transportation, and property management are the four main aspects with lower degree of satisfaction from social housing residents. Millions of people spend more than two hours on travelling between work or school and home every day. This situation places considerable pressure on the transportation system, which in turn, causes air pollution. According to the questionnaire survey in July 2012, 58% of residents choose public transport as their main means of transportation for daily trips.

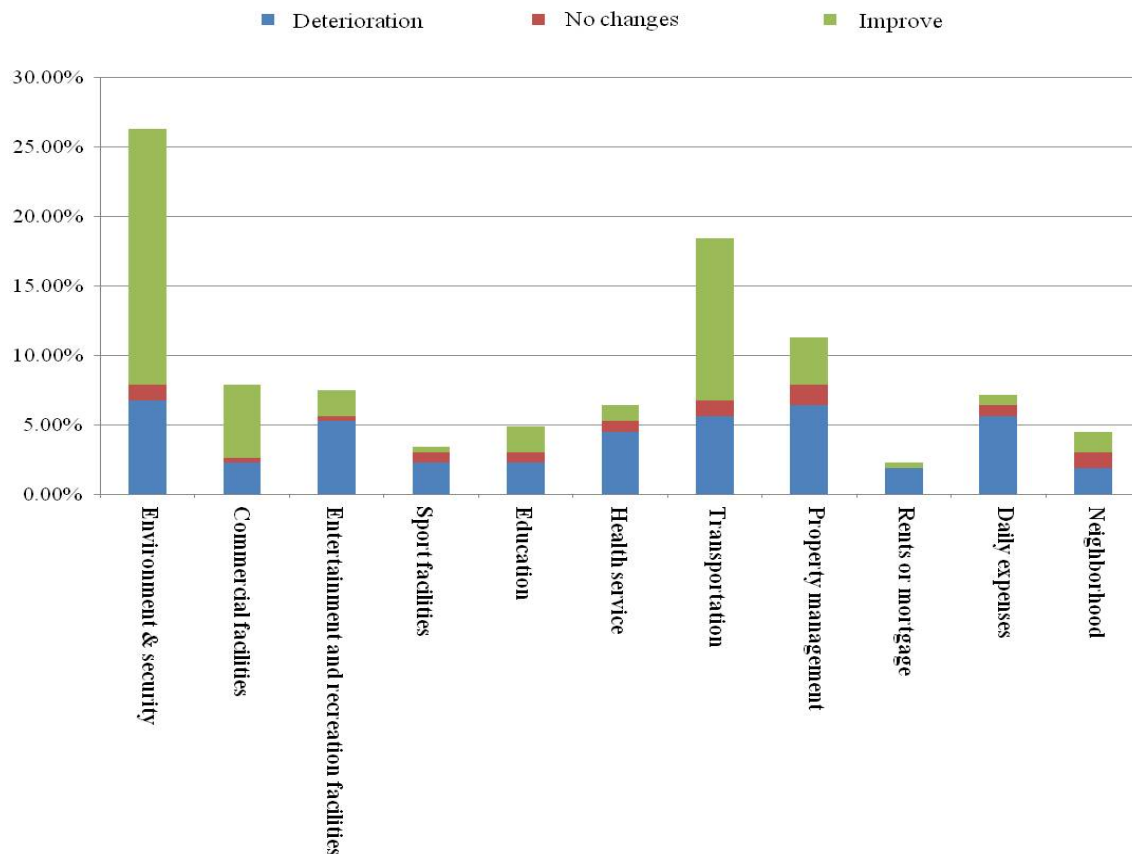


Figure 3.5 Comparative observation before and after moving in social housing estates

Source: Chen, H. et al., 2012

Socio-economic and household characteristics influence residential mobility. For example, long-distance movements increase with the level of education and household income. Segregation of the workplace also affects mobility behaviour. About one third of

LRH residents in Jinshazhou residential communities are unemployed or are casual labourers based on a survey conducted in 2012 (Chen, H. et al., 2012). Considering the lack of suitable job opportunities in suburban areas, the residents with lower educational level and unskilled workers have to move toward the inner city core to find jobs. The findings shown in Figure 3.6 and Figure 3.7 reveal that the commuting time is longer than before moving in the existing social housing communities. Moreover, transportation cost becomes the main burden for the employed households; the cost accounts for nearly 50% of daily expenses of these households. The mean travelling time for workers was only under 30 minutes before moving in the current estates, whereas 43.6% of workers took more than 60 minutes to get to work (Figure 3.6). In fact, the restriction of transportation choice and the use of private cars among social housing residents have led to long cross-district commutes.

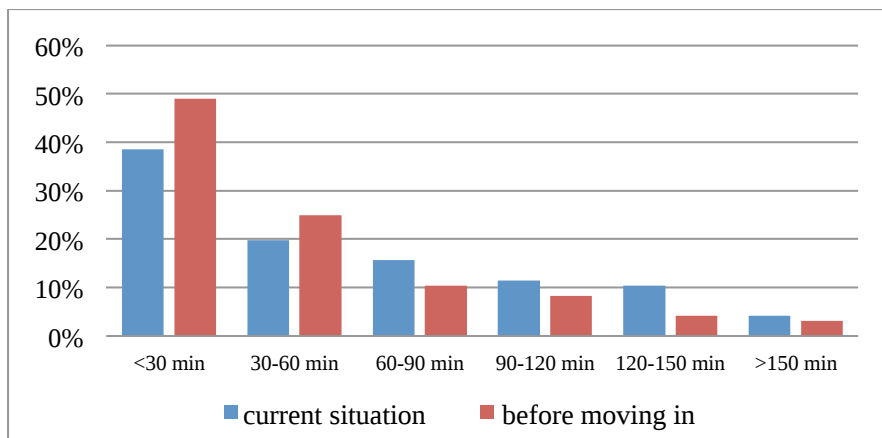


Figure 3.6 Comparison of the commuting time before and after moving in social housing estates

Source: Compiled by the author

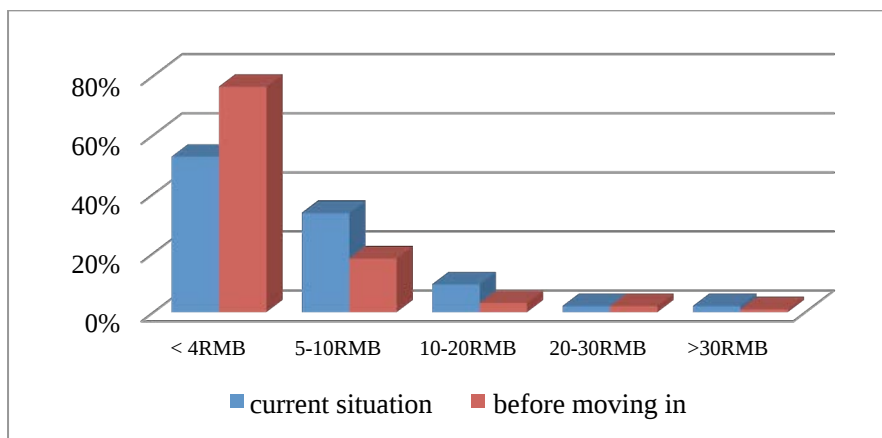


Figure 3.7 Comparison of the daily transportation cost before and after moving in social housing estates

Source: Compiled by the author

3.4.3 Effects of better living environment but long commuting - good or bad?

After the 1998 housing reform, the housing system in Guangzhou has undergone dramatic transformation, from domination by public ownership and administrative allocation to home-ownership and privatization. The comparatively comprehensive framework of urban housing system on the basis of socialist and marketization approach in Guangzhou since 1999 has been established to advance the quality of life and sustainable housing development for urban citizens.

Changes in the urban space and residential pattern have affected travel behaviour and job-housing connection of the local people (Figure 3.8). The provision of new types of social housing has been strengthened to accelerate the urbanization process and to stimulate a consistent economic growth. The spectrum of housing consumption of commodity housing and the massive scale of social housing provision after the 1998 housing reform have generated new types of housing inequality and diverse residential pattern. As expected, the newly introduced housing market has aggravated housing inequality and residential mobility, and has contributed to a significant residential differentiation in homeownership, the size of owned homes, and location because of differences in the access to social housing (Wang & Jiang, 2009).

The improvement in the landscape of living conditions and the housing marketization resulted in reshaping the relationship between employment location and residence. The total urban-registered residents have more than tripled, growing from 2.4 million in 1990 to 8.2 million in 2013, in Guangzhou (Statistics Bureau of Guangzhou Municipality, 2015). Yet, over 4.6 million of the permanent residents in Guangzhou were non-registered. Given the rise of household income and huge clustering of floating population into urban areas, house became a fundamental necessity for floating population. All the issues faced after the 1998 housing reform generate an increasing housing demand. However, the marketization practice reduces the housing choices, particularly those of low-income group, the urban poor, and rural-urban migrants. The

replacement of other residential forms with gated communities, social housing compounds, migrant enclaves, and urban villages has resulted in the destruction of the traditional Chinese housing landscape. It is also the result of separation of jobs and housing. The immobility of urban residents, especially low-income groups, has also sharpened because of the polycentric job structure and residential differentiation.

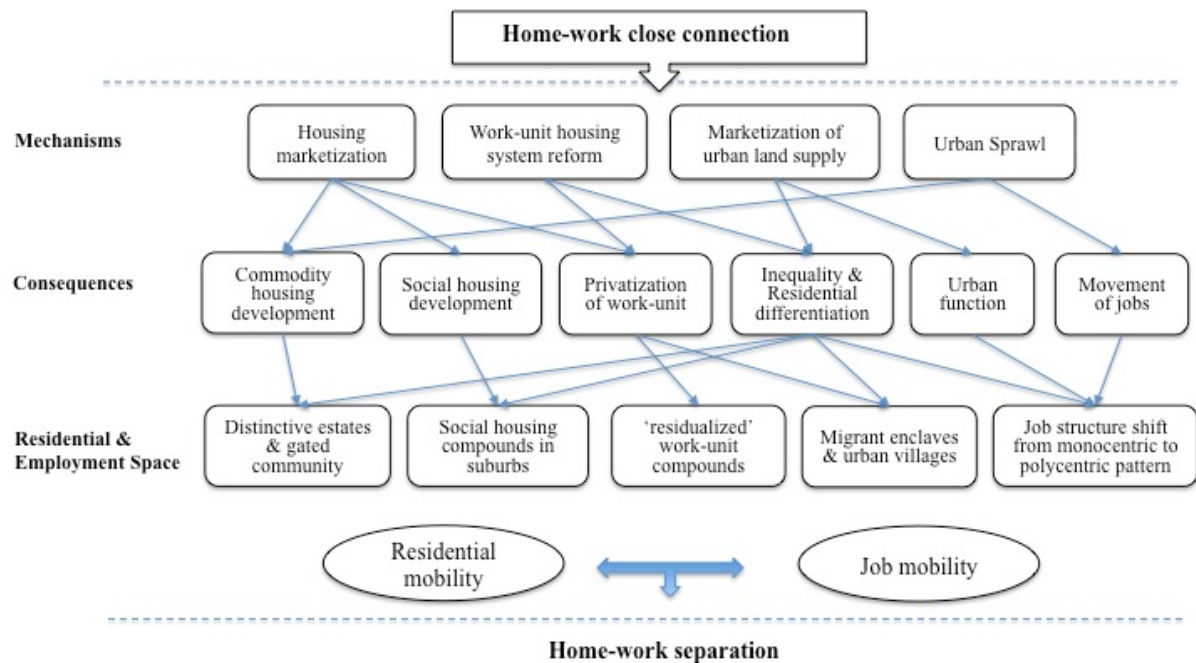


Figure 3.8 The changing relationship between home and work after the 1998 housing reform

Source: Compiled by the author

3.5 Summary

In this chapter, social housing is defined as subsidized (directly or indirectly) housing for the poor by either targeting places or people. Social housing would certainly improve the living conditions of local residents particularly if decent housing is provided.

This chapter has discussed the empirical background and preliminary findings on residents in social housing in the outer areas of Guangzhou. As per many spectacular achievements have been made by the Guangzhou government since 1986, more than 120,000 low-income households have addressed their housing difficulties and

improving their living conditions through in-kind production and in-cash subsidy till June 2014. Around 38% of social housing estates are located in inner core area; social housing communities situated in inner suburban areas account for 55%, and 7% of social housing neighborhoods are located in outer suburban areas. These spatial practices induce residents to produce the networks of interaction and communication that appears in everyday life, such as daily connection of residence and workplace (Schmid, 2008). Thus, the development of social housing has a strong impact on the employment and commuting outcomes of residents.

Given the growing importance of changing job-housing relationship and long commuting among social housing tenants, Chapter 4 generates the methodology that used to complete the research objectives of the study.

Chapter 4 Research Methodology

4.1 Introduction

Given the importance of travel behavior and social segregation to spatially disadvantaged residents both inside and outside urban communities, the relationship between individual travel behavior and job–housing imbalance was reviewed in Chapter 2. Furthermore, the emergence of spatial mismatch and the increasing trend of job–housing imbalance for social housing residents in China were empirically explored in Chapter 3. Within the past decade, although a considerable number of studies have been conducted to prove that changes in the built environment (such as compact neighborhoods, mixed-land uses, and transit-oriented developments) have negative influences on the demographic characteristics of travelers (Cervero & Kockelman, 1997; Ihlanfeldt & Sjoquist, 1998; Ihlanfeldt, 2006; Zenou, 2009), the consequences of the proliferation of new large-scale social housing enclaves and their relationship with job–housing imbalance and spatial mismatch have not been widely studied. Therefore, a systemic model is required to identify which dimensions of the built environment (land use, transportation, etc.) affect an individual’s actual accessibility to employment location and other urban spaces in their daily lives. The mechanism and degree of this effect is also studied, particularly for individuals living in economic and suitable housing estates.

This chapter aims to bring out the research methodology used for the study. First, the chapter presents the establishment of the general direction of the research approaches employed. Second, it shows the construction of the analytical framework to address the research questions presented in Chapter 1 on the basis of the theoretical framework and contextual background described in the previous chapters. Finally, it introduces the data collection methods and explains the quantitative analytical tools.

4.2 Approaches to answer the research questions

4.2.1 Research strategies

Research strategies refer to the manners in which researchers ask research questions within the framework of a particular research paradigm to determine data collection and

analyses methods fundamentally (Blaikie, 2007). Research strategies are generally categorized into two types, namely, inductive research strategy and deductive research strategy. Inductive research strategy begins with the observation of events or data collection. On the basis of collected data, the patterns of events or actions of particular groups of people are characterized and generalized. The generalized patterns then become new models or theories in which other similar phenomena can be explained. Therefore, an inductive research strategy is useful for theory building research and generally involves “what” questions. A deductive research strategy starts with finding models or theories that can explain particular social phenomena. The theories are then examined in reality such that they can be corroborated or adjusted according to the findings. In this regard, a deductive research strategy is relevant in theory testing research and in examining “why” questions. However, some studies have indicated that the use of exclusively one research method may misdirect the connotation and significance of research findings (David & Sutton, 2011).

In this regard, this study used a combined-mode research strategy by applying both inductive and deductive principles to minimize the weakness of using only one strategy. The evaluation of the degree of job–housing imbalance and the exploration of urban commuting patterns, demographics, and socioeconomic characteristics for social housing residents were observed. The assumption referring to the influence of spatial constraints on travel choice and occupational and employment status was examined. In coping with the second research objective, deduction was used as the primary strategy because the interaction of social housing residents between daily activity patterns is complex and time-consuming. The underlying factors affecting the job–housing imbalance for social housing residents were tested by the cases of four selected social housing neighborhoods in Guangzhou, China. The third research objective employed a deductive research strategy to speculate how residence choice and travel behavior affect the structure of urban regions.

4.2.2 Analytical framework

The selection of a research strategy determines what should be analyzed and how, as well as which data should be collected. On the basis of the research strategies applied to answer the research questions, the analytical framework of this study is developed, as illustrated in Figure 4.1. The analytical framework incorporates the research gaps derived from the intensive and extensive literature review in Chapter 2 and the review of the background in Chapter 3. The framework also consists of three steps to deduct and explore stepwise the four established research objectives in Chapter 1. In the first stage, the job–housing relationship and the commuting pattern of social housing residents in Guangzhou were investigated through the space–time path. Furthermore, the effects of space–time constraints on the commuting pattern and daily activities of four selected social housing communities were analyzed. In the second stage, the mechanism of influence of major underlying factors, namely, household and personal characteristics, commuting characteristics, activity attributes, and urban structure/land use, on the relationship between travel behavior and job–housing imbalance was examined. Finally, the effect of institutional factors on job–housing imbalance in Guangzhou was explored. Each step of the analysis is further expounded in the following subsections.

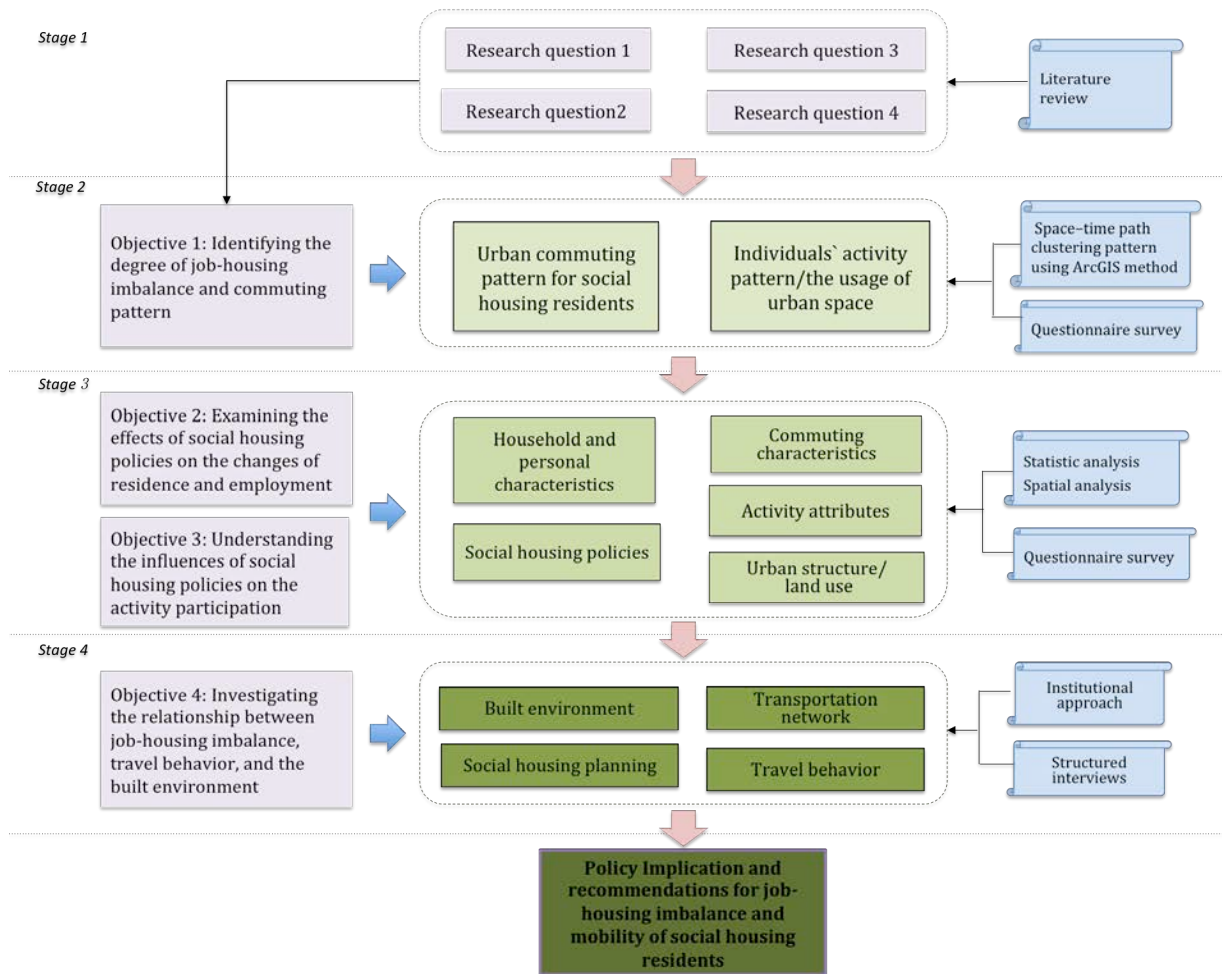


Figure 4.1 Analytical framework of this study

Source: Compiled by the author

4.2.2.1 Identifying the degree of job-housing imbalance and commuting pattern of social housing residents in Guangzhou (referring to Objective 1)

To understand the effects of social housing allocation on job-housing relationship and commuting behavior, this research investigates whether differences exist in the commuting behavior between individuals living in social houses provided by the government before and after moving into the social housing estates. Furthermore, job-housing imbalance was analyzed on the basis of the job-housing balance ratio for inhabitants.

4.2.2.2 Examining the effects of social housing policies on the changes of residence and employment of social housing groups (referring to Objective 2)

This study employed logistic regression to investigate the interaction between housing source, commuting pattern, and transportation mode. As the presumably the most

influential factors, household and personal characteristics shown in Figure 4.2 were divided into household characteristics (when to move into this estate, from which district, household size, household income, number of employed people, etc.) and socioeconomic characteristics (e.g., age, gender, occupation, income, place of employment, etc.). Furthermore, transport-related attributes have significant effects on residential location choice and individual commuting behavior. The previous study by Kim et al. (2005) only show that residents living in housing locations with a combination of short commuting time, low transport costs, and a few have high quality of life. Thus, against such background, this study further expands the underlying factors exhibited in Figure 4.2, including length of commuting distance, commuting time, transportation mode and cost, and transfer time, to investigate the commuting characteristics of social housing residents. Finally, neighborhood characteristics (e.g., average length of road links between intersections, density of bus stations within a 500 m radius of surveyed residences, distance to the closest facilities, etc.) and urban structure (e.g., job structure, job accessibility, resident structure, etc.) were identified.

Household and individual socioeconomic characteristics	Commuting characteristics	Activity attributes	Urban structure/land use
• Age, • Gender, • Household size, • Occupation, • Education, • Income etc. (e.g. Lu and Pas, 1999; Kitamura, 1999; Akar, et al., 2011)	• Commuting distance • Commuting time • Transportation mode • Transportation cost	• Weekdays and weekends, time of day (morning, afternoon, evening) (Bhat and Gossen, 2004; Wang, et al., 2012) • Previous and following activity (Akar et al., 2011)	• Job accessibility • Location of residence and employment place • Distance to transportation facilities • Distance to public facilities

Figure 4.2 Factors that influence commuting patterns and activity locations

Source: Compiled by the author

4.2.2.3 Understanding the influences of social housing policies on the activity participation of the social housing groups (referring to Objective 3)

The effects of spatial restructuring and institutional factors on job–housing imbalance and mobility in Guangzhou were explored. In an attempt to investigate why the increasing trend of job–housing imbalance have become typical phenomenon in major Chinese cities where housing reform and urban expansion accelerate residential differentiation, segregation, and urban restructure, the effects of spatial structure (urban transformation and housing reform), planning (land-use pattern) and transportation, and institutional involvement (fiscal support and land provision system) on job–housing imbalance and mobility were discussed at Stage 3.

4.2.2.4 Investigating the relationship between job-housing imbalance, travel behavior, and the built environment (referring to Objective 4)

By conducting progressive analysis on the aforementioned three stages, the implication and policy recommendation on job–housing balance and mobility will be provided to formulate social housing policies in Chinese cities in the future.

4.3 Research methods

4.3.1 Data collection

4.3.1.1 Case selection method

For this study, four social housing estates with distinct characteristics are selected as the cases (Table 4.1). Given the researcher’s past working experiences with involvement and contribution to the Guangzhou Master Plan (2000-2010), Guangzhou Regulatory Plan, and Guangzhou Strategic Plan, a variety of relevant research materials in terms of housing development and social housing development in Guangzhou at both the macro and micro levels were gathered. Thus, four cases were selected by the comprehensive assessment of different qualities of housing estate, location, scale, and surrounding environment (Figure 4.3). These four cases are Jude Housing Estate (聚德花苑), Jinshazhou Housing Estate (金沙洲新社区), Fanghe Housing Estate (芳和花园), and Guangdan Housing Estate (广氮花园).

Table 4.1 Basic information of the four selected cases

	Name	Size (m ²)	No. of Households	Occupancy since	Characteristics
1	Jude Housing Estate	217,000	5,576	1998	Well-developed, long history, close to railway station, inner core area
2	Jinshazhou Housing Estate	528,000	6,288	2007	Biggest social housing estate in Guangzhou before 2014, inner suburbs
3	Fanghe Housing Estate	79,600	5,938	2011	Close to railway station, inner suburbs
4	Guangdan Housing Estate	85,528	4,444	2012	New, close to city center, inner core area

Source: Compiled by the author

These four residential estates in Guangzhou have developed by stages and are considered the major typical social housing estates for social housing schemes in this region. The locations and satellite maps of the selected cases are presented in Figures 4.3 and 4.4, respectively. Jude Housing Estate is located in central Guangzhou in the old urban district of Haizhu. This estate has a long development history and is spatially and socially integrated with adjacent urban neighborhoods. Sufficient neighborhood amenities and transportation choices contribute to the convenience of people in this social housing estate. Jinshazhou Residential Community is located in the inner city of the western part of Guangzhou. It is a large-scale social housing estate in Guangzhou, accommodating 20,000 individuals. The adjunct commercial housing estates were rapidly developed after 2009. However, poor accessibility to amenities and public service facilities caused social problems and inconvenience. Fanghe Housing Estate is located in the inner city, with good accessibility to the subway line. Guangdan Housing Estate is located in the outer area but is close to Tianhe District. It has poor accessibility to the central area by public transportation. Thus, the comparative studies of four selected cases have an essential theoretical and practical significance to explore the social and spatial characteristics due to their unique locations, development history and features.

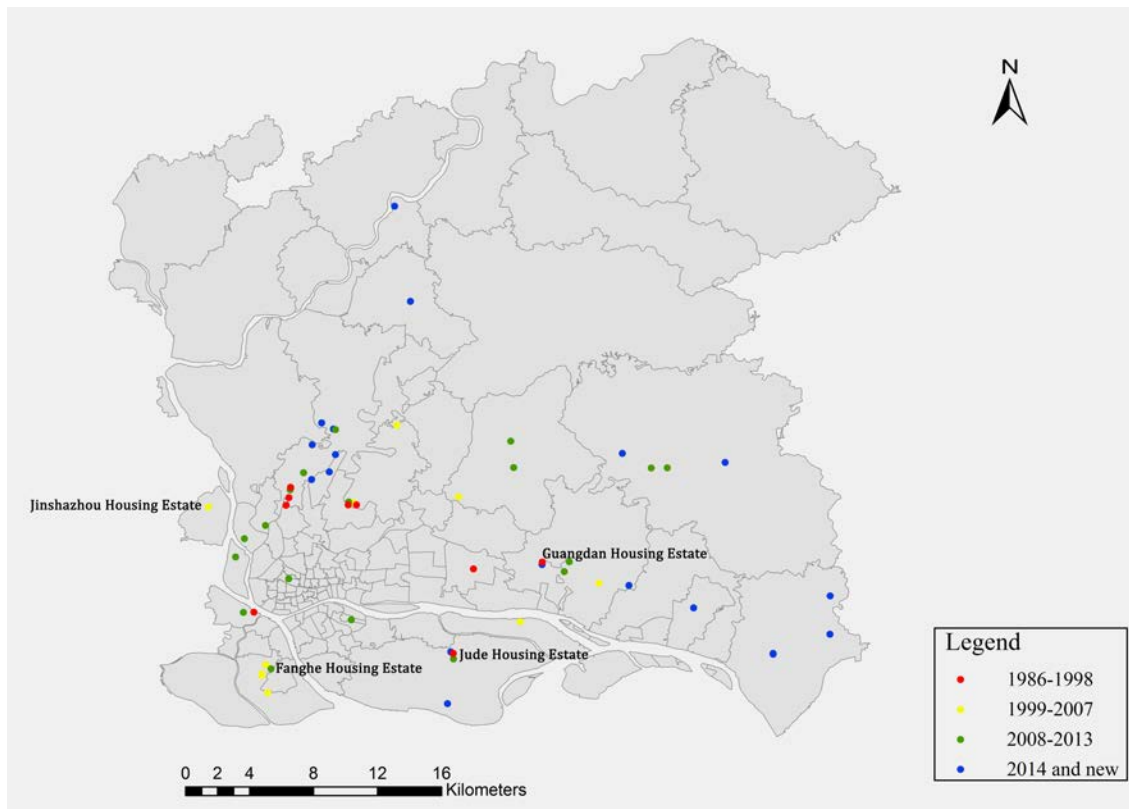


Figure 4.3 Geographical distribution of the four selected cases in Guangzhou

Source: Compiled by the author



Figure 4.4 Satellite maps of the four selected cases in Guangzhou

Source: Compiled by the author

4.3.1.2 Desktop research

The purpose of desktop research is to collect secondary data on social housing in Guangzhou in general. The secondary data are mainly concerned with the policy environment and institutional practices related to social housing development, planning, and design principles, which are assumed to have influenced the physical environment and commuting behavior of the social housing residents. These types of materials are expected to help capture the general features of social housing in Guangzhou, some controversial issues of the social and physical environment of ESH, and the socioeconomic conditions of LRH residents. Furthermore, the data can serve as a guide to the criteria used in selecting relevant cases for study and provide further explanations for the results of this study.

The secondary data acquired through desktop research are listed as follows:

- 2010 Population and Housing Census Data
- Social housing planning and development in Guangzhou (2013–2020)
- Land use and zoning plans in Guangzhou
- Plan drawings and project summaries of the four selected cases provided by the Guangzhou Urban Planning & Design, Survey Institute (GZUP)
- Relevant working papers of the GZUP

4.3.1.3 Structured questionnaire survey

Studies on commuting trips used to be based on large samples, but some recent works have relied on smaller scale surveys (Barber, 1995). In many countries, census micro-data files provide a valuable source for analyzing job and residential distributions. However, the Chinese census database lacks of information on employment location. Moreover, residential location at the sub-district level is unavailable in the micro-data census file. Thus, data resources and comments on the first and second research question principally rely on the daily trip records and opinions of residents.

The questionnaire survey was designed to gather current and pre-move retrospective data on household members' travel patterns by focusing on the commute trip and activity pattern. Therefore, a structured questionnaire survey was used to provide data inputs from responses to a before-and-after survey of 1,100 inhabitants residing in those 4 selected housing communities across the 4 urban districts. The questionnaire consists of 4 sections: the commute trip from before and after moving into the social housing estates; the changes in job accessibility and commuting behavior; the respondents' sociodemographic information; and the feedback toward moving to social housing estates in terms of activity space, interpersonal communication, physical environment, and presence of nearby public services and green areas.

Given that this study involves statistical analyses, the data were collected by probability sampling methods. Furthermore, the four housing estates were already selected on purpose. To overcome this methodological limitation and to increase the randomness of the samples within the four chosen cases, this study uses two strategies. First, the main survey was conducted using a questionnaire survey mainly through face-to-face interview to ensure a high degree of accuracy. The interviews were conducted at the entrance of every housing estate or in public open spaces. Second, the interviews were undertaken at various time segments for each visit: 7:00–8:30 am and 5:30–8:30 pm (weekdays); 8:30–10:00 am, 12:00–1:30 pm, and 4:30–7:00 pm (weekends). This approach was used to balance the response of diverse groups of residents by age and employment profile.

The survey was undertaken in the four case areas of Guangzhou from July to September 2013. A total of 1,100 questionnaires were collected in the full survey, 905 of which were valid for analysis. The number of respondents in each housing estate is presented in Table 4.2. Besides, 200 of questionnaires from commercial housing residents who are living in commercial housing community where located near these four selected cases were collected to do comparative studies.

Table 4.2 Response rates in each case estate

	Name	Number of households (ESH)	Number of responses	Valid responses
1	Jude Housing Estate	1,431	200	159
2	Jinshazhou Housing Estate	4,641	350	288
3	Fanghe Housing Estate	3,988	300	253
4	Guangdan Housing Estate	2,641	250	205

Source: compiled by the author

4.3.1.4 Semi-structured interview

Given that obtaining qualitative data solely from a structured questionnaire survey is difficult, face-to-face interviews have also been conducted during the same period of the questionnaire survey. Eighty residents were interviewed with regard to the physical environment and quality of life issues. In addition, one of the estate managers and two security guards of each housing estate were interviewed about the evolving job of residents, residential status, and resident satisfaction issues. Simultaneously, a staff member of the Guangzhou Social Housing Management Office who was in charge of formulating social housing and housing management policies was also interviewed about social housing, providing assistance to the needy, considerations for allocating large-scale housing estates in the outskirts areas of Guangzhou, and their long-term plans for social housing. Lastly, in-depth interviews with three housing professionals involved in research projects on job–housing imbalance and spatial mismatch issues in China were conducted.

4.3.1.5 Field observation

Several data regarding the types of commercial and transportation facilities and accessibility conditions are unavailable through desktop research, questionnaire survey, or face-to-face interviews. These types of data were collected by the author by visiting the sites of the four selected estates and conducting field observations and recording. Photographs were also taken at various spots within and around the selected case areas.

4.3.2 Quantitative analysis methods

In this study, quantitative analysis involves using statistics to assess the degree of job–housing imbalance and examine the reason behind travel behavior and forced residential reallocation. As shown in Table 4.3, job–housing imbalance phenomena were examined in the second stage using a theoretical job–housing ratio (JHR). The validation of JHR was also analyzed. In the third stage, the job–housing relationship and commuting pattern of social housing residents in Guangzhou were investigated through space–time path and spatial analyses. At the fourth stage, the household and personal characteristics of respondents were discussed and divided into several groups of components, which were meaningful in conducting further statistical analysis, by using regression analysis. This analytical tool aims to reduce the number of components that significantly explain the total variance of the variable set (Reinard, 2006). The validity and reliability of the indicators were also examined. To support the quantitative analyses, this study used a computerized statistical program (SPSS 18.0). While descriptive statistics were simply presented with the mean scores and standard deviations, several analyses in this study required advanced statistical applications.

Table 4.3 Application of the research methods at different stages

Stages	Objectives	Research methods
2	1) To evaluate the degree of job-housing imbalance and urban commuting pattern for residents living in social housing estates in Guangzhou, China.	• Space-time path analysis • Statistic analysis
3	2) To examine the effects of social housing policies on the changes of residence and employment of social housing groups.	• Space-time path analysis • Spatial analysis
3	3) To identify the influences of social housing policies on the activity participation of the disadvantaged social housing groups.	• Space-time path analysis • Spatial analysis
4	4) To explore the relationship between job-housing imbalance, travel behavior, and the built environment.	• Multiple regression analysis

Notes: The stage is referring to Figure 4.1 on page 58.

Source: Compiled by the author

Theoretical Job-housing Ratio (JHR)

The ratio of jobs to housing can be expressed as a fraction, with the total number of jobs as the numerator and the number of dwelling units as the denominator:

$$JHR_i = \frac{J_i}{H_i}$$

(J_i means the number of jobs in zone i ; H_i means the number of dwelling units in zone i)

It can also be expressed as a ratio wherein the numerator is the first figure and the denominator is the second figure (e.g., 1.2:1). Jobs include all types of employment opportunities, including those provided in the retail, industrial, government, and office sectors, located within the city boundaries. Housing denotes all dwelling units available for habitation.

Theoretically, if jobs and housing opportunities are spatially balanced, that is, if the number of jobs is equal to the number of employed residents in a geographical area, then the people will be able to work and live in the same area and long commute will be avoided. Cervero (1989a) argues that the spatial mismatch between the location of jobs and the location of affordable housing, or job-housing imbalance, is a major contributing factor to the increased commuting distance among suburban Americans. However, the ratio of jobs to housing being equal to 1 is not necessarily a perfect situation for solving all issues on long commuting distant. Levinson (1998) determines that residences in job-rich areas and workplaces in housing-rich areas are associated with short commuting times, which suggests that adding housing units to job-rich areas or creating jobs in housing-rich areas may reduce the duration of trips to work. Similar findings are reported by Sultana (2002), who notes that employees working in job-rich areas or residents living in housing-rich areas are found to commute longer than those working or living in more balanced areas. Peng (1997) reports that jobs and housing units are balanced in most areas in a metropolitan region and a nonlinear relationship exists between JHR and vehicle miles traveled (VMT) per capita and trip length. Only in extremely job-poor or extremely job-rich areas do VMT per capita and trip length change noticeably as JHR changes.

Validation of JHR

The job-housing balancing strategies have been promoted by urban planners in China to resolve long traveling time, traffic jam, and air pollution issues. They suggest that a residential place should attempt to get closer to an employment center; that is, from the perspective of land resource utilization, industrial use should be mixed with residential use. In reality, however, the spatial structure of a city obviously exhibits uneven characteristics, that is, the size and structure of the population and the industry in space have a distinctive geographic distribution. Hence, JHR exhibits dissimilarity in a different location. Blindly pursuing the ideal balanced amount or the same JHR in a city is inappropriate.

$$JHBR_{H,i} = \frac{MATCH_i}{H_i} \quad JHBR_{J,i} = \frac{MATCH_i}{J_i}$$

($MATCH_i$ means the number of commuters both living and working in zone i ; J_i means the number of jobs in zone i ; H_i means the number of dwelling units in zone i)

The nature of job-housing balance is not simply the numerical balance between job opportunities and residential population, but attention is also given to the match between the two variables. In response to characterizing real job-housing imbalance, $JHBR_{H,i}$ and $JHBR_{J,i}$ accordingly reflect the observed relationship between job and housing. Therefore, the current research thoroughly examined job and housing relation in space. The latest data on jobs and residential population obtained from the Sixth Population Census in 2010 were used to calculate the theoretical JHR. Utilizing the data on the number of working people and their residence resourcing from the Guangzhou Social and Economic Survey in 2007 validated the more realistic JHR.

Space-time path

A space-time path is used to examine the relationship between the activity patterns of an individual and his/her geographical location, which reveals the movement of respondents in space and time in an urban space. The space-time path instrument has been used in previous studies to collect similar data (Kwan, 1998, 1999; Ren & Kwan, 2007, 2009;

Schwanen & Kwan, 2008; Schwanen et al. 2008). The items collected using an activity-travel diary include (Table 4.4): the undertaken activity, the time the activity started and ended, whether the activity was performed at the same time on weekdays, the location where the activity was performed, transportation mode, transportation cost, transit status, and purposes of the activity. These activity data were collected on two different survey days: (1) any day from Monday to Friday and (2) Saturday or Sunday.

In the surveys, the locations of the residence and the workplace were given by sub-district name, street name (*jiedao*), or building block. In the subsequent analysis, street name (*jiedao*) was used to locate residence, place of employment, and daily activities. The data in the activity diary were visualized in two steps. First, the specific address was extracted from the diary survey, and then the longitude and latitude of each address was determined using Baidu API to determine the digitized location. Second, the identified longitude and latitude of the location of each address was imported into ArcGIS to form a digital database of activity patterns in urban space (Figures 4.5, 4.6 & 4.7).

Table 4.4 An example of the activity diary

Sequence	Departure time	From	Transport	Arrival time	To	Cost	Reason for travelling
1	7:30am	Home	Bus	8:30am	Company	\$4	Work
2	10:00am	Company	Taxi	10:30am	Company B	\$10	Go out for business
3	5:00pm	Company	Bus	5:30pm	Jinshazhou primary school	\$2	Pick up children after school
4	5:30pm	Jinshazhou primary school	Bus	6:00pm	Supermarket	\$4	Grocery shopping
5	6:15pm	Supermarket	Foot	6:30pm	Home	\$0	Go home
6	8:30pm	Home	Foot	8:40pm	Riverside park	\$0	Go for a walk
7	9:15pm	Riverside park	Foot	9:30pm	Home	\$0	Go home

Source: Compiled by the author

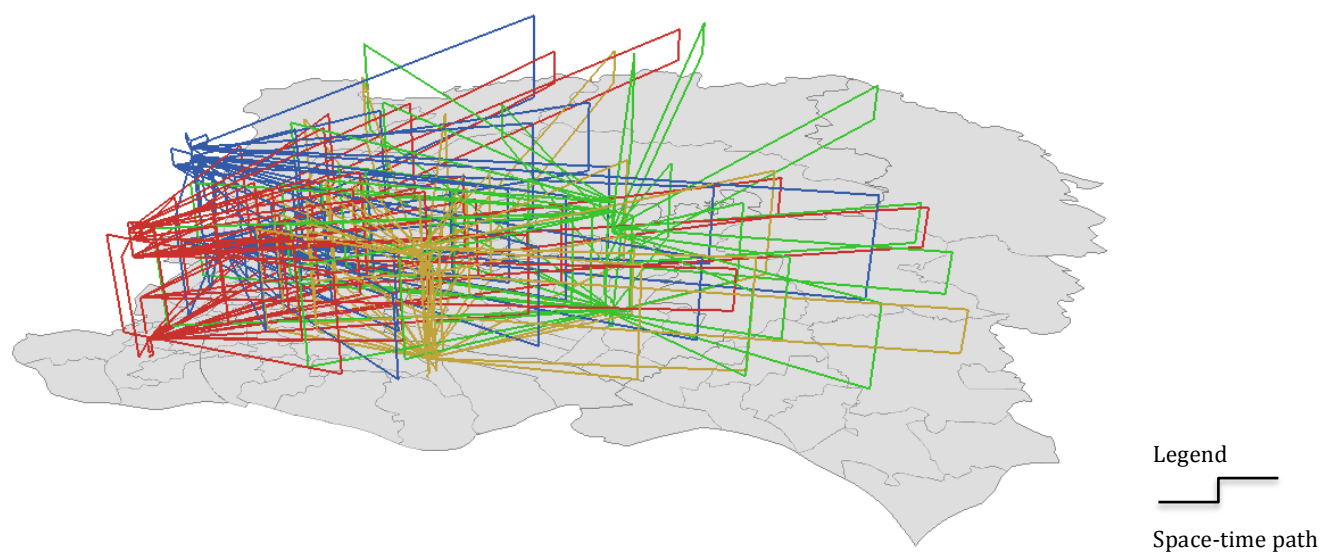


Figure 4.5 Visualisation of space-time path in ArcGIS tool

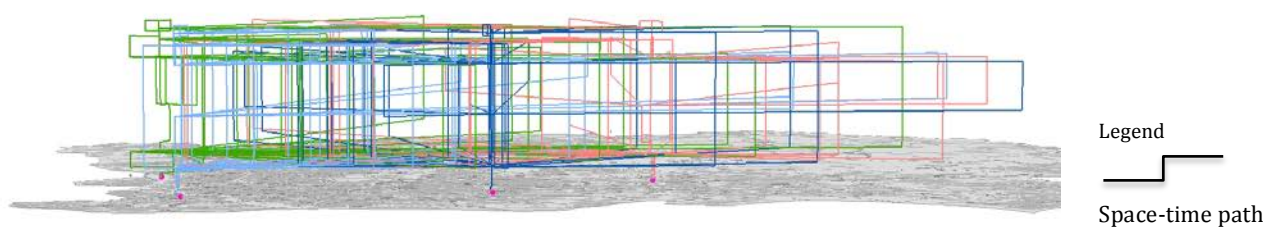


Figure 4.6 Visualisation of space-time path in 2D dimension

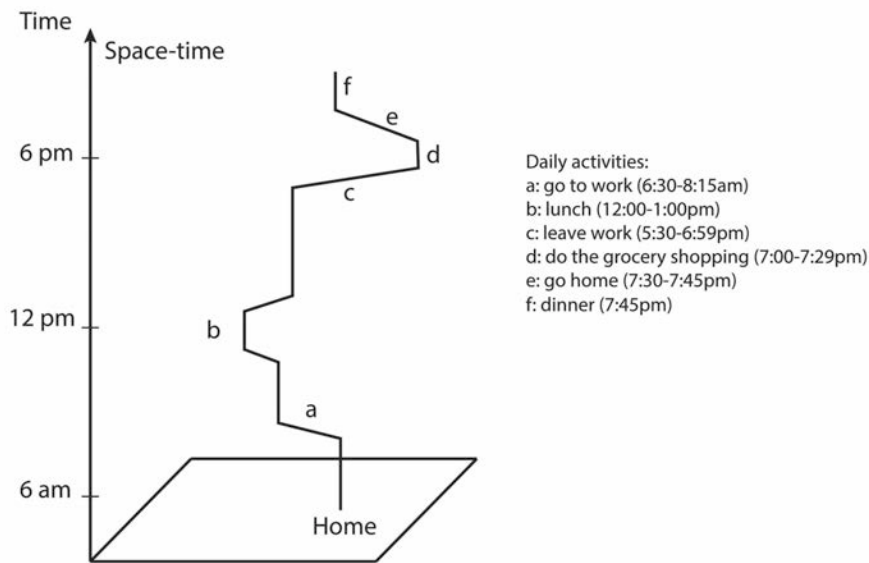


Figure 4.7 Demonstration of one space-time path

Source: Compiled by the author

The simultaneous analysis of the temporal, spatial, and social dimensions of commuting behavior is a space–time activity analysis process based on time geography (Kwan, 2000, 2004; Kwan & Lee, 2004; Lee & Kwan, 2011). An individual’s existence can be described as a continuous sequence of activities and is characterized as either a daily path or simply a space–time path (Hägerstrand 1970). An individual’s space–time path can be used to interpret a person’s spatial and social connection with other urban spaces and with other social groups through repeated coupling or uncoupling with other activity bundles for specific purposes. These space-time paths can also reveal the structure of spatial and social relations in the form of activity paths that are inherent to diverse forms of spatial interaction (Pred, 1982).

Spatial analysis

Using the tool of “XY to Line” in ArcMAP, a considerable number of geodetic lines of each residence–workplace pair with X and Y value features were created in accordance with their longitude and latitude. By applying a field calculator, the Euclidean distance that represents the straight-line distance between a residence and a place of employment was constructed using a particular set of field values. The minimum distance, maximum distance, and average distance were calculated based on attribute tables. This activity

diary survey also collected data on commuting time, transportation modes, and the transportation cost associated with each activity based on the report of the respondent.

In addition, the Kernel Density analysis tool⁶ was used to visualize the activity patterns of social housing residents in Guangzhou. Therefore, the basic demographic characteristics and geographic locations of the surveyed social housing residents closely resemble the proportion of social housing residents in Guangzhou.

Such showcase of spatial accessibility focuses mainly on the amount of reachable spatial opportunities for social housing residents in a particular working day or during the weekend, rather than on the geographic locations of spatial opportunities, for understanding physical separation among spatial opportunities. Hence, visualizing where and when people engage in spatial activities (and therefore, in creating their personal activity space) is more meaningful.

Regression analysis

Apart from recording space–time paths of social housing residents, the aforementioned review of literature suggests that bearing in mind systemic potential influential factors that cover socioeconomic, spatial, and transportation variables is imperative to capture accurately the differences in commuting behavior between individuals before and after moving into the social houses provided by the local governments.

Thus, in the second stage, the influences of the restrictive effect of space–time constraints on individual commuting pattern (travel for work and non-work trips), as well as the relationship between the travel behavior of social housing residents and the location of their home, were investigated qualitatively. Regression analysis is commonly performed

⁶ Kernel Density refers to a spatial analysis tool in ArcMAP that calculates the density of features in a neighborhood around those features. Conceptually, a smoothly curved surface is fitted over each point. The surface value is highest at the location of the point and decreases with increasing distance from the point until it eventually reaches zero at the “Search” radius distance from the point. Only a circular neighborhood is possible. The volume under the surface is equal to the Population field value for the point, or one if NONE is specified. The density at each output raster cell is calculated by adding the values of all the kernel surfaces where they overlay the raster cell center. The kernel function is based on the quadratic kernel function described by Silverman (1986).

by researchers to identify the correlations between an independent variable and a dependent variable (Gao et al., 2007; Mokhtarian et al., 2008). Considering that this study involved more than one independent variable and the dependent variable (mobile⁷) was measured quantitatively, multiple logistic regression was employed to investigate the interactions among housing source, commuting pattern, and transportation mode. The relationship between the sociodemographic data of residents and their mobility was also examined by regression analysis.

Consistent with the disaggregate method used to study commuting time, this research uses a disaggregate approach to measure the degree of job–housing imbalance at the individual level, that is, “home-based job accessibility.” The home-based job proximity variable was defined and used to measure the local job–housing imbalance. Home-based job proximity refers to the actual access of workers to workplaces based on the actual spatial–geographical relationship between individual housing units and jobs. This variable is measured as follows. When the job of a worker is located in the same sub-district as his/her house, home-based job proximity is defined as “1,” and “0” otherwise. This study does not only indicate the numerical balance between jobs and housing but also reflect the results of individual choices related to the costs of housing and commuting. Furthermore, given that the commuting time of a worker is determined by physical separation between his/her home and workplace, the home-based job proximity approach provides precise measures of this critical link.

Through regression modeling, this study empirically examines the relationships among occupation, workers per capita, income per capita, and employment changes at the aggregate level with daily data from Guangzhou. Under the specification of the conceptual model, the model-implied covariance matrix exhibits a reasonably good fit with the observed covariance matrix. Direct and total effects are significantly consistent with theory or empirical observations across a variety of geographical contexts. Although time and resource limitations are recognized, the use of longitudinal structural equations that

⁷ Mobile and immobile phases describe mass transfer process of social housing residents in their daily life. Mobility means the residents have to travel outside the street where the community is located, while immobility means the residents work at the same street with their social housing estate.

model the control groups is recommended. Moreover, a powerful design with respect to all causality requisites is necessary.

4.4 Summary

This chapter has established the analytical framework within which to establish a research methodology to achieve the four research objectives of this study by case-studying the four social housing estates chosen (Table 4.1). Given that this study is concerned with the complex interaction between travel behavior and resident location of social housing residents, as well as the underlying factors that affect job-housing imbalance among these residents, the inquiries into the research questions use both quantitative and qualitative approaches in combination. In this manner, applying triangulation strategies improves the quality of the research outcomes.

The logical and sequential arrangement of different research methods to deal with the interaction between job-housing imbalance and residential relocation, and to explain the implementation of research tools at each research stage was presented in Figure 4.1 and Table 4.3. First, the job-housing relationship and the commuting pattern of social housing residents in four cases will be investigated through space-time path analysis in Chapter 5. Second, the influences of the major underlying factors (e.g., household and personal characteristics, commuting characteristics, activity attributes, and urban structure/land use) on job-housing imbalance among social housing residents will be examined through quantitative and qualitative analyses (Figures 4.2 & Table 4.3) in Chapter 6. Third, the job accessibility of social housing residents and the effects of institutional factors on job-housing imbalance in Guangzhou will explore through quantitative analysis in Chapter 6. Fourth, policy implication and recommendation for job-housing balance and mobility of social housing residents will be provided through institutional approach in Chapter 7.

This chapter introduced the study area and the justifications for each of the estates chosen. After completing the detailed questionnaire design, a questionnaire survey has been employed to collect the data in Guangzhou, and the structured interviews with

government officials are also conducted in Guangzhou. With regard to data analysis, quantitative analysis methods have been adopted.

In Chapter 5, the job-housing imbalance situation in Guangzhou will be quantitatively evaluated. In addition, the interviews of social housing residents and the observed social and spatial phenomena in the neighborhood will be incorporated.

Chapter 5 Discovery of Job-housing Imbalance and Spatial Characteristics of Social Housing Residents in Guangzhou

5.1 Introduction

Travel is a demand derived from the performance of out-of-home activities (Axhausen & Gärling, 1992). Prior to analyzing the effects of job-housing imbalance on social change experienced by social housing residents, it is important to grasp where, when and what kind of activities are conducted. By doing that, the understanding regarding the travel associated with these activities will be enhanced. Therefore, this chapter explores the spatial distributions of employment and social housing and investigates the type of job-housing imbalance experienced by social housing residents upon moving into new housing estates. The chapter also examines how personal characteristics influence individuals' decisions regarding commute. The relationship of the degree of job-housing imbalance with institutional and market factors (including job opportunities, public service faculties, and housing stock) were analyzed to identify the inherent factors affecting commuting behavior as well as the changes in daily living. The latter part of this chapter compares the spatial characteristics of urban and social housing residents. The outcomes of social housing policies on residence-employment are summarized as well. In this regard, the quantitative evaluation results of job-housing imbalance in the selected cases are incorporated with data obtained from qualitative interviews conducted with residents in the community.

English-language literature on China's housing policy has primarily documented the reform of social housing policy and its effects on urban residents. However, few studies have directly assessed individual programs. The efficacy of each program is much debated in the media and the academy of China. Unfortunately, much of the debate is driven by advocacy and not by empirical data. Nevertheless, the extensive public debate facilitated a consensus on the implementation of these housing programs and on the current issues concerning job-housing imbalance. This section of the study summarizes this knowledge.

5.2 Degree of job-housing imbalance in social housing neighborhoods

5.2.1 Job-housing imbalance in Guangzhou at a city level

Guangzhou is an ancient city with more than 2,000 years of history. With the initiation of the housing reform in 1978, which was accompanied by extraordinary economic growth, urban expansion and spatial restructuring has equitably been accelerated. Prior to the 1990s, the districts of Yuexiu, Liwan, and Dongshan were heavily developed and now these are Guangzhou's central area. In the 1990s, the built-up areas of the city extended to Haizhu, Tianhe, Fangcun, Southern Baiyun, and part of Huangpu. Thus, the spatial structure of Guangzhou⁸ has transformed drastically in the last twenty years.

To provide a general overview of the spatial distribution of residential areas and places of employment, three-zone classification is implemented in this research. The three zones consist of inner core areas, which include Yuexiu District, Liwan District, Haizhu District, and Tianhe District; inner suburban areas, which include Northern Panyu District, Southern Baiyun District, Western Huangpu District, and Luogang District; and outer suburban areas, which include the rest of Guangzhou. Figure 5.1 shows the boundaries of Guangzhou's urban districts; the inner core, inner suburban area, and outer suburban area are highlighted in different tones.

⁸ The adjustment in administrative boundary in 2000 merged Guangzhou with former Panyu County and Huadu County, turning these counties into two urban districts of Guangzhou. The mushrooming real estate developments extended urban development to Panyu District, the rest of Baiyun District, and Huangpu District. Moreover, Huadu District has focused on New Baiyun Airport as an important logistic hub. In 2005, Dongshan District merged with Yuexiu District; Liwan District annexed Fangcun District; and Nansha and Luogang Districts were established as industrial and high-technology zones, respectively.



Figure 5.1 Administrative boundaries of Guangzhou's urban districts

Source: Guangzhou Municipal Government, 2013.

<http://www.gz.gov.cn/gzgov/s2768/201108/126915/images/d9e9328ceddb487eba60df7579d886a3.jpg>

In 2013, the average theoretical Job-housing Ratio (JHR) in Guangzhou (Figure 5.2), which covers 11 districts and 163 streets (*jiedao*), was 2.03. This figure indicates that the number of employees in Guangzhou is slightly mismatching to the accessibility to residential areas. The JHR recorded a value of 1.46, 1.78 and 3.57 in the inner core area, the inner suburb area and the outer suburb area respectively, showing that a low degree of mismatch between employment and population in the inner core area and

inner suburb area, but a high degree of mismatch in the outer suburb area. The changes of job-housing imbalance become manifest across urban districts. It is evident that the residence of commuters concentrates spatially in the inner core area and the inner suburb area. It is interesting to note that job-housing imbalance has been increasingly prolonged from inner core area to outer areas, but concentrating in the inner suburb area because of the concentration of employment.

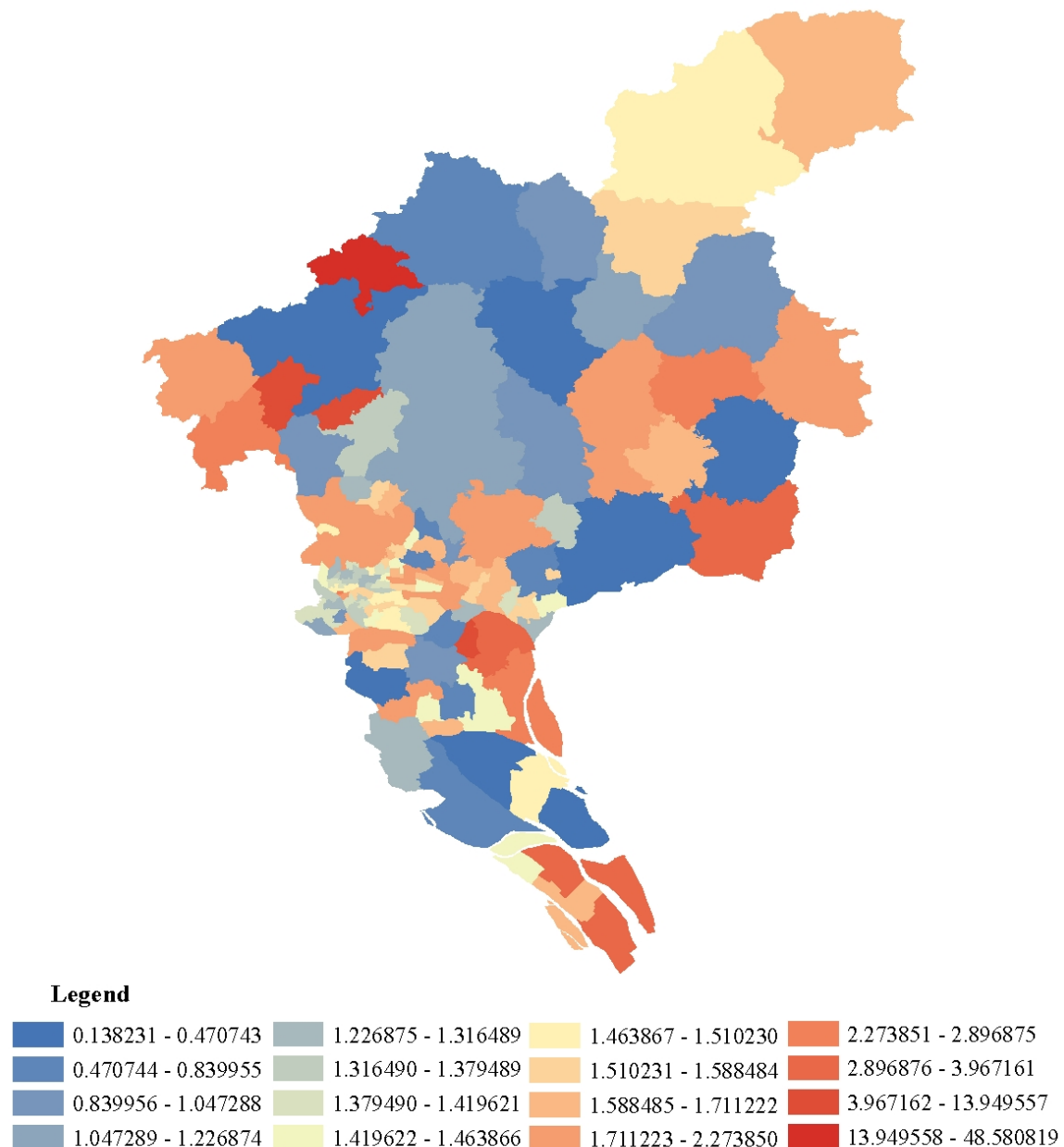


Figure 5.2 Theoretical JHR in Guangzhou

Source: Compiled by the author

However, commuters cannot be assumed to have solved the issues of long-distance commuting. Moreover, employers may not necessarily be situated in the proximate housing areas. Job-housing balance is a complicated and multidimensional issue because the relationship between employment and residence in terms of space and time is closely interrelated with commuting patterns and personal socioeconomic characteristics. The findings of an intensive analysis of these concerns are discussed in latter sections.

5.3 Characterization of the job-housing imbalance for social housing residents in Guangzhou

5.3.1 Space-time path clustering pattern of social housing residents

Three different dimensions are investigated to better understand job-housing imbalance: (1) the temporal dimension, which illustrates the timing and duration of an individual's round trip between his residence and the workplace; (2) the spatial dimension, which reveals the spatial configurations of participants' activity patterns, and the restrictions in a person's spatial interaction with other spaces (e.g., industrial, commercial, and open spaces). (3) the social dimension, which depicts one's social network with other individuals.

To understand the influence of the factors that contribute to the selection of employment activity locations, the potential causal relationships between influencing factors and the choices of employment location are determined (Table 5.1). Several plausible log-linear models for cross-classified data fit these relationships well. The quick and simple results reveal that (1) employment location interacted with commute distance and with employment structure in all of the best-fitting models, thus confirming the importance of these two variables in the selection of residence location; (2) the interaction of an employee's daytime status and the destination of a journey is significant; and (3) housing tenure, age, and educational attainment affect the choice of employment location.

Table 5.1 shows the social status and socioeconomic characteristic of four social housing residents and commercial housing residents. Nearly 50% of responses were concentrated in the group aged 41-60. Most of their educational level was at high school level, while Guangdan's interviewees have a university diploma or undergraduate degree. Those engaged as casual workers, clerks, and technician have lower households income and higher job change frequency. Although social housing residents have undergone an increasing growth of employment movement and residence movement distance, the residence movement distance of JSZHE and GDHE were more notable in similar circumstances to those in commercial housing residents.

Commercial housing residents' education level, occupation, and income are higher than the social housing residents' average level. Their educational level was concentrated at masters or above level. They mainly worked as professional technician and senior manager, having middle higher affordability and income level for travel, accommodation, and consumption. In contrast, the employment status is more stable.

Table 5.1 Descriptive statistics of diary respondents

		JDHE	JSZHE	FHHE	GDHE	CHE
Age (%)	18-40	21	25	36	38	53
	41-60	69	52	48	52	44
	61 and above	10	23	16	10	3
Level of education (%)	Illiterate	0	1	0	0	0
	Primary school	2	5	1	0	0
	Middle school	16	8	3	0	0
	High school ⁹	46	53	54	22	0
	Diploma or undergraduate education	35	32	41	67	27
	Master or above	1	1	2	1	63
Occupation (%)	1. Professional/researcher ¹⁰	0	0	0	0	1
	2. Teacher ¹¹	0	0	1	2	8

⁹ High school includes professional and vocational schooling.

¹⁰ Professional/researcher includes teachers in universities or colleges.

¹¹ Teacher excludes those teaching in universities or colleges.

3. Manager	13	7	23	25	35
4. Technician, clerk	38	18	63	66	50
5. Non-skilled workers, casual workers	33	63	11	5	0
6. Self-employed entrepreneurs	16	12	2	2	6
Personal monthly income*	2000-3000	2000-3000	3000-4000	3000-4000	4000-5000
Average residential movement distance (km)	2.12	5.35	4.67	5.84	4.68
Average workplace movement distance (km)	1.71	3.57	2.71	1.78	1.54
Job change frequency (including retirement)	63.7%	63.2%	43.2%	12.3%	33.2%

Note: JDHE = Jude housing estate, JSZHE = Jinshazhou housing estate, FHHE = Fanghe housing estate, GDHE = Guangdan housing estate, CHE= Commercial housing estate

* Personal monthly income includes those aged 60+ have retirement pension.

Source: Compiled by the author

The homes and workplaces of the surveyed social housing residents were connected separately (Figures 5.3, 5.4, 5.5, and 5.6), and their spatial relationships were analyzed with the aid of ArcGIS software. The straight lines that connect residences and workplaces were calculated by length (in km) to determine the straight commuting distance. Job-housing distance evidently increased considerably for social housing residents upon moving into the social housing neighborhoods; in fact, 86% of participants' activities were conducted far from the workplace in terms of commuting distance after transitioning to the new housing area. The commuting distance of JSZHE and GDHE residents (Figures 5.4 and 5.5) increased substantially, whereas that of JDHE and FHHE residents (Figures 5.3 and 5.6) increased only slightly. Overall, the distance between the workplace and social housing community increased.

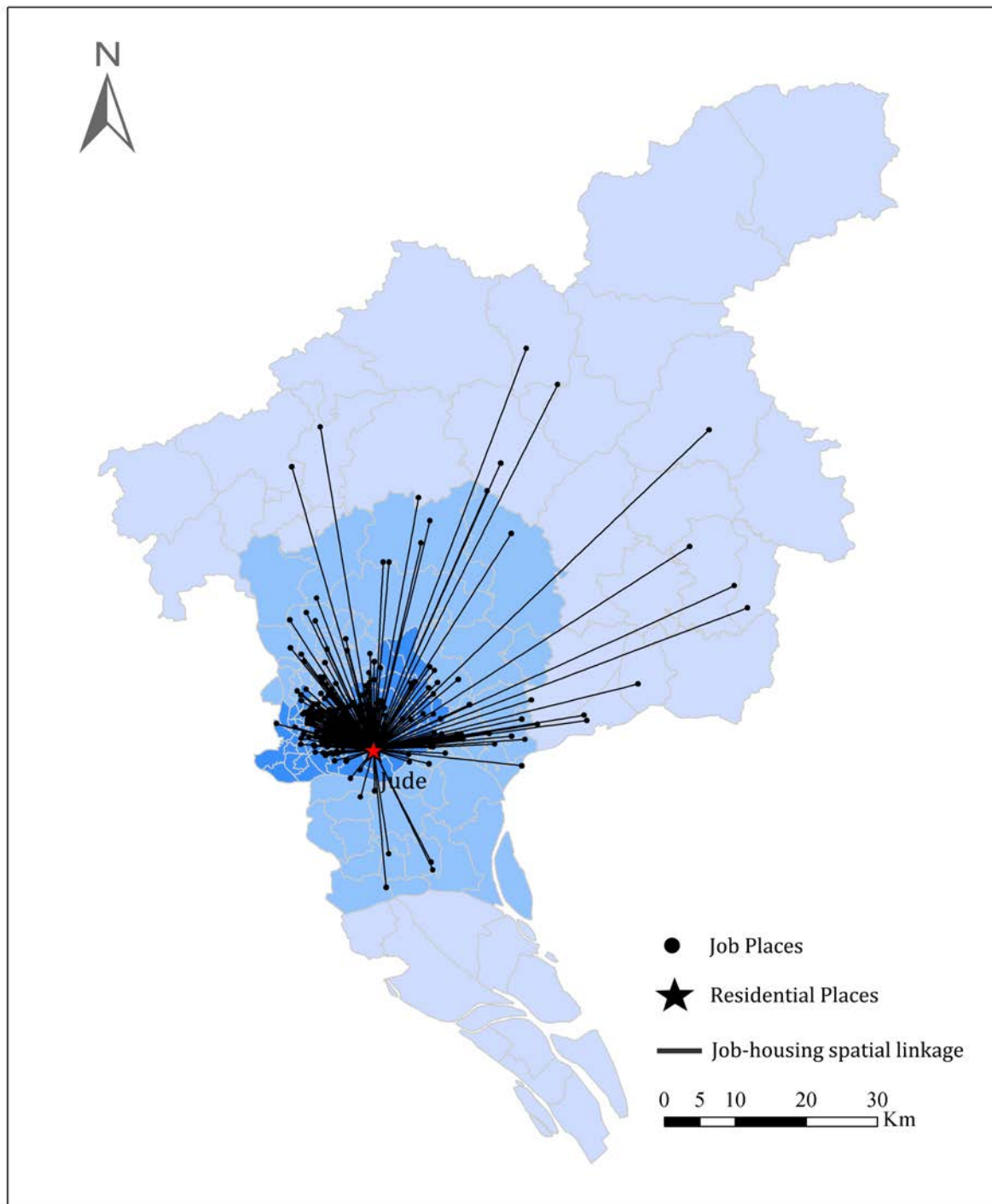


Figure 5.3 Job-housing distances for the residents of Jude Housing Estate

Source: Compiled by the author

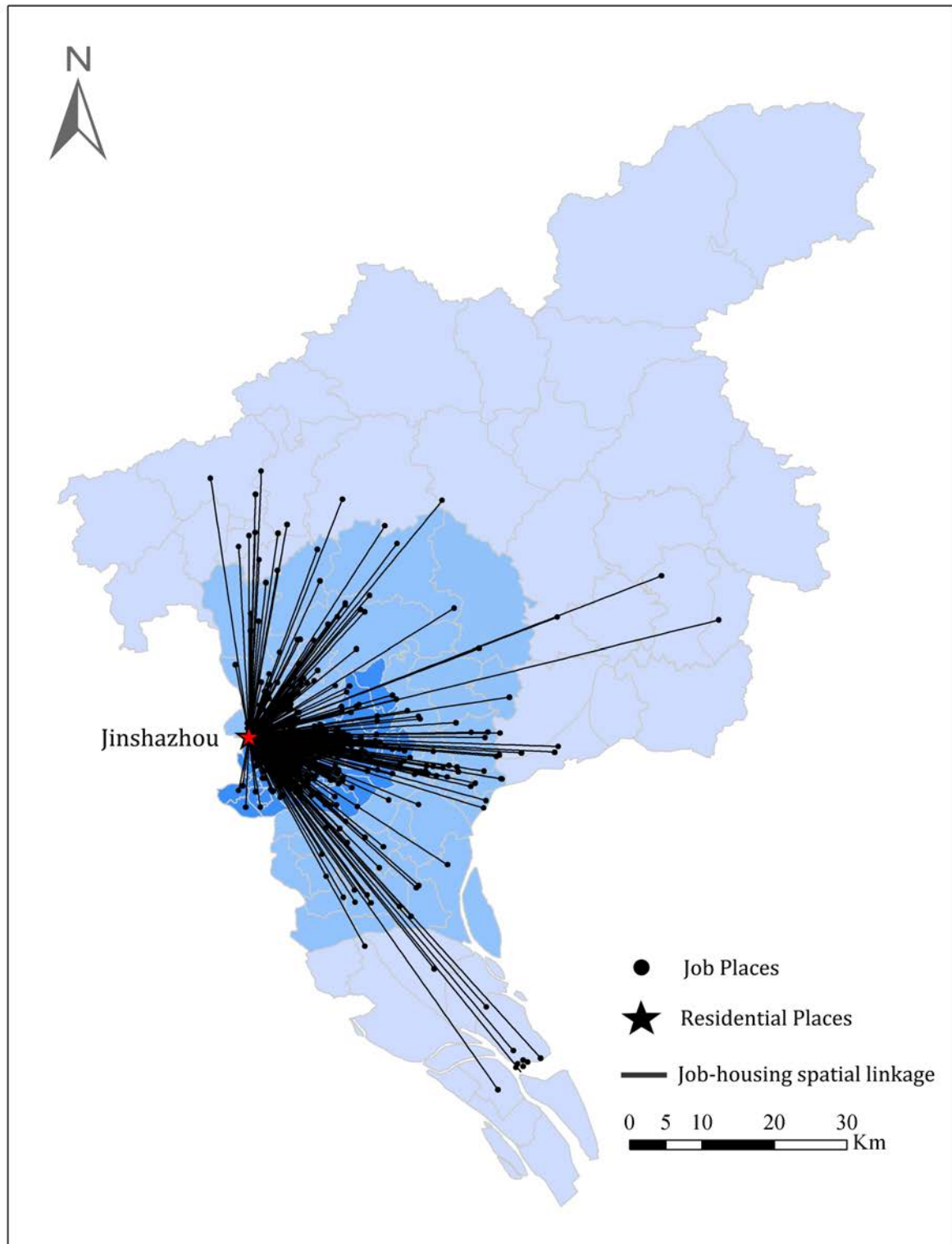


Figure 5.4 Job-housing distances for residents of Jinshazhou Housing Estate

Source: Compiled by the author

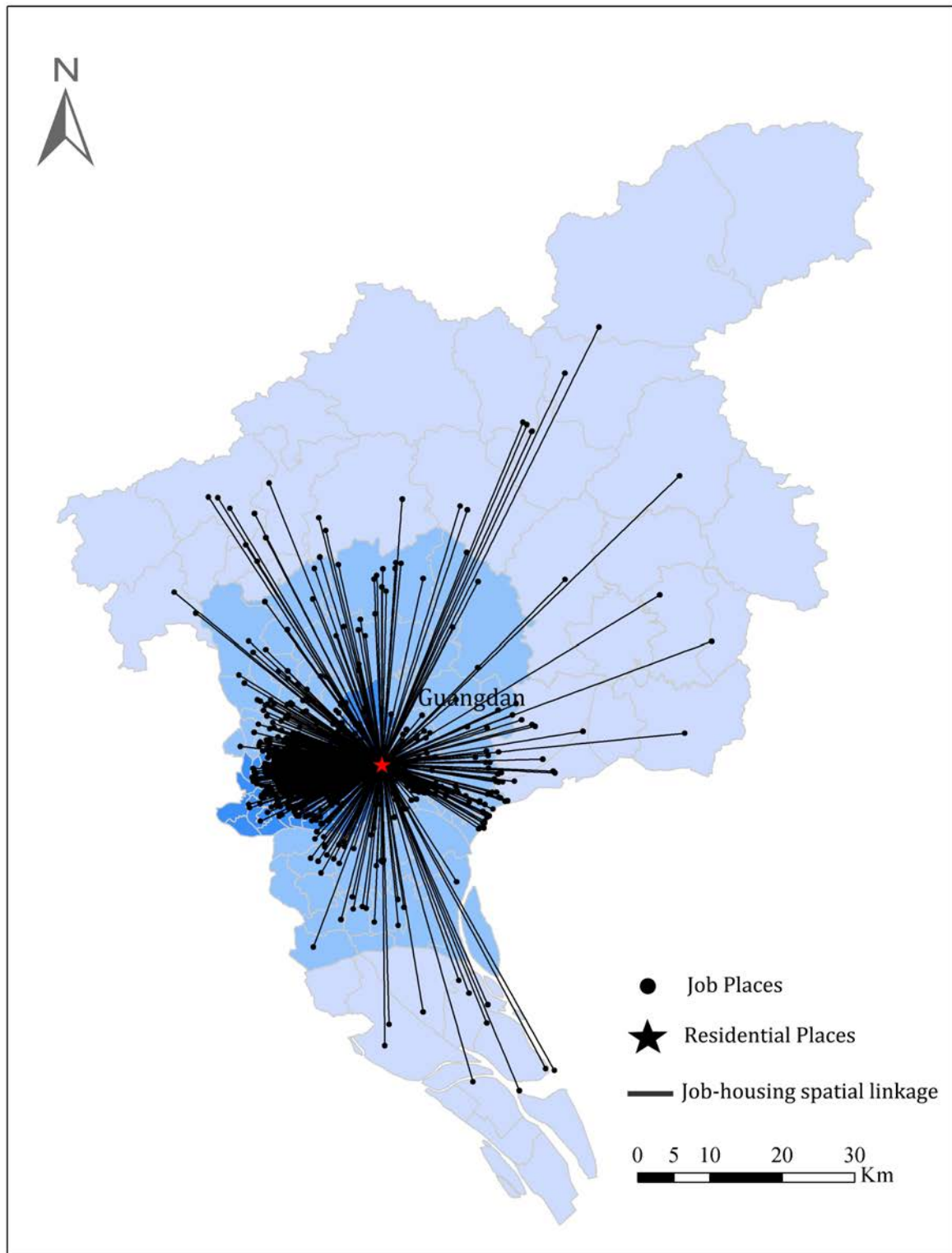


Figure 5.5 Job-housing distances for residents of Guangdan Housing Estate

Source: Compiled by the author

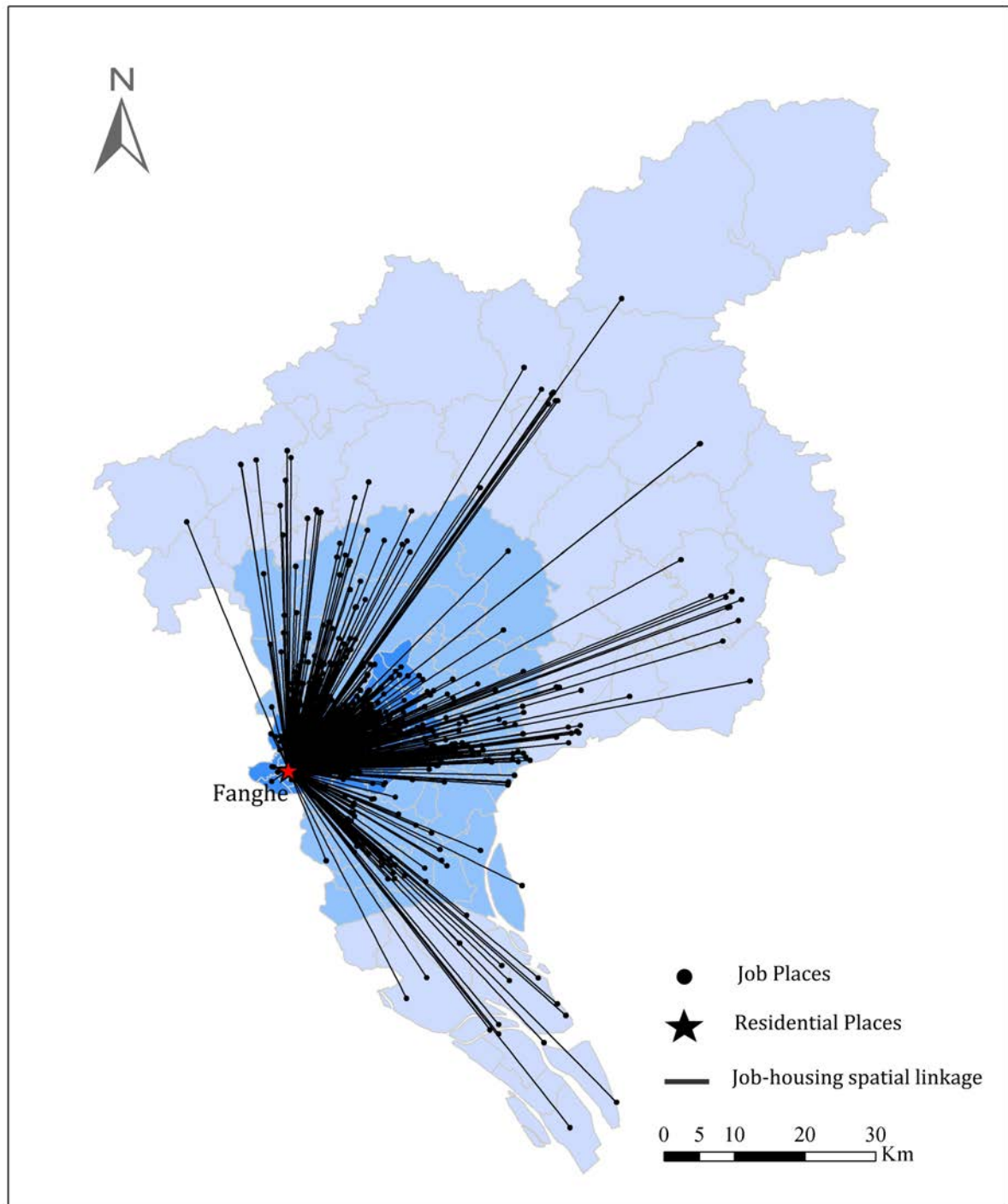


Figure 5.6 Job-housing distances for residents of Fanghe Housing Estate

Source: Compiled by the author

Table 5.2 lists the direct distance, travel time, and transportation modes to and from the workplace and the home. More than 60% of commutes concentrate in the inner core and inner suburb areas. As the four social housing estates have constructed in different

periods, residents moved in their new social housing estate in different years. For Jude housing residents, the average distance increased from 3.60 km in 2005 to 9.50 km in 2013, and the average travel time was 43 minutes. The average distance for Jinshazhou housing residents increased from 4.30 km in 2006 to 11.27 km in 2013, and the average travel time was 68 minutes. The average distance for Fanghe housing residents increased from 2.50 km in 2010 to 12.09 km in 2013, and the average travel time was 58 minutes. Finally, the average distance for Guangdan housing residents increased from 3.50 km in 2011 to 13.05 km in 2013, and the average travel time was 73 minutes. The results reveal that the residents residing in Guangdan housing community have a longer commuting distance, whose spatial separation between workplace and residence is more prominent. In contrast, the average commuting distance for commercial housing residents increased from 2.80 km in 2011 to 11.41 km in 2013. This shows that purchasing commercial housing units in the urban fringe area had caused a significant increase in commuting distance as well.

Table 5.2 Comparison of travel distances, travel times and transportation modes from the different social housing neighborhoods in Guangzhou to workplaces

		JDHE	JSZHE	FHHE	GDHE	CHE
Trip to workplace (Guangzhou)	Average distance (km)	9.50	11.27	12.09	13.05	11.41
	Minimum distance (km)	0.08	0.18	0.79	0.39	0.73
	Maximum distance (km)	65.22	66.69	81.68	67.20	73.83
Trip to workplace (inner core & inner suburbs area)	Average distance (km)	7.528	9.08	9.53	11.41	10.23
	Minimum distance (km)	0.08	0.18	0.79	0.39	0.73
	Maximum distance (km)	39.83	36.26	43.90	29.69	39.87
	Average travel time (min)	43	68	58	73	52
	Transport mode	Bus>MTR>bicycle	Bus>walk	MTR>Bus>walk	Bus>MTR	MTR>private car>walk

Note: JDHE = Jude housing estate, JSZHE = Jinshazhou housing estate, FHHE = Fanghe housing estate, GDHE = Guangdan housing estate, CHE = Commercial housing estate

Source: Compiled by the author

When comparing the job-housing distance of the individuals in these four neighborhoods (Table 5.2), it is clear that the average job-housing distance for Jude housing residents is the shortest. This result suggests that the habitation in Jude, which is located in Haizhu district and closer to city center, was warmly welcomed by the applicants of social housing. For the individuals of JSZHE, GDHE, FHHE, the distance become much longer after moving into social housing neighborhoods, particularly the FH housing and GD housing residents, of which are longer than commercial housing residents' average. In addition, most social housing residents travel long distances to reach their workplaces in the inner core area of Guangzhou. 77.8% of Guangdan residents, 78.6% of Jinshazhou residents, 84.3% of Jude residents, 81.4% of Fanghe residents commute to the inner core areas (Table 5.3). Comparatively, 73.50% of the residents of commercial housing estates work in the inner core areas (Figure 5.7).

Table 5.3 Locations of employment in Guangzhou according to broad geographical zones

Neighborhood	Administrative district	Working zone				
		The same street	The same district with neighborhood	Inner core	Inner suburbs	Outer suburbs
JDHE	Haizhu District	7.3%	36.2%	84.3%	10.1%	5.6%
JSZHE	Liwan District	2.5%	13.9%	78.6%	17.4%	4.0%
FHHE	Tianhe District	1.3%	16.7%	81.5%	14.4%	4.1%
GDHE	Tianhe District	3.1%	23.1%	77.8%	12.5%	9.5%
CHE	-	0.2%	25.1%	73.5%	16.0%	10.5%

Note: JDHE = Jude housing estate, JSZHE = Jinshazhou housing estate, FHHE = Fanghe housing estate, GDHE = Guangdan housing estate, CHE= Commercial housing estate

Source: Compiled by the author

It is found that JHR of Jude housing estate was lighter than that of three other cases, because of the convenience of transport and the original workplace which is close to the existing residence (the interview on July 23rd, 2013). Interestingly, 36.2% of the workers residing in Jude estate have remained to commute within the same urban district with neighborhood, because of Haizhu district as an old urban district having more job opportunities. This traditional district performs favorable connection with city

center, excellent public transport network, and better job-housing balance due to its long development history and rapid urbanization.

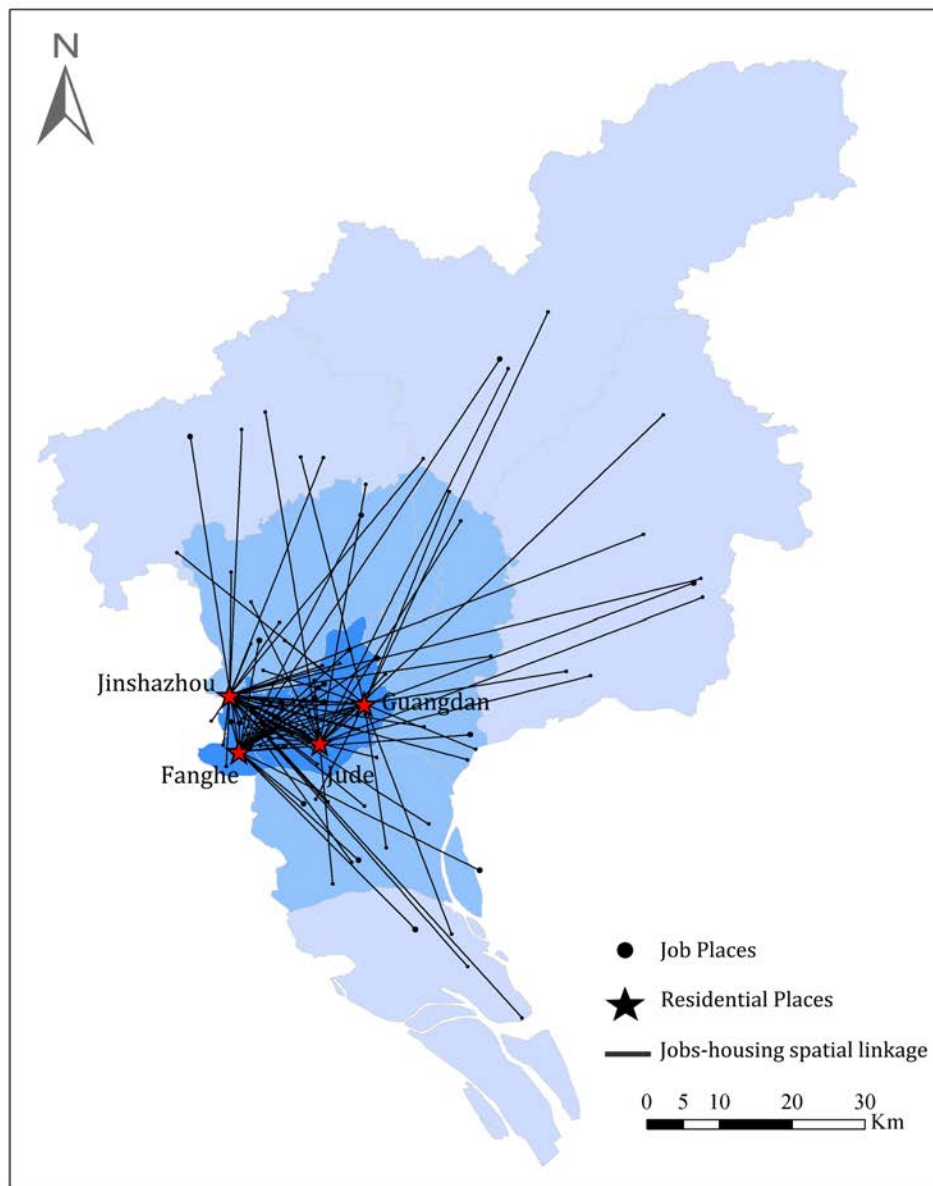


Figure 5.7 Job-housing distances for nonsocial housing residents

Source: Compiled by the author

These results reveal the long distance traveled by residents who moved to social housing communities, and nonsocial housing residents. The social housing development in Guangzhou has caused the job-housing imbalance and increased the residents' commuting distance because most of their workplaces are still located in the inner core and inner suburbs areas. The disadvantaged groups are constrained by relocation barriers as a result of economic (growth of wage) and political (social housing policies)

considerations; these groups cannot address the job–housing imbalance personally (Zhou et al., 2013). Similarity, nonsocial housing residents also have long job-housing distance; yet, they were clustering in the same district where they live and also scattering in different districts of Guangzhou city, to some extent, because of automobile dependence. When the respondents were asked about the priorities considered in selecting current residences and work places, most prioritized employment over residence. The results suggest that the responses did not regard changes in residence as an important factor in job shifting.

5.3.3 Underlying factors influencing the relationship between jobs and housing

Table 5.4 shows that mobility and travel time for daily travel vary considerably across age and gender groups. Respondents of both genders belonging to the age groups 30–39 and 40–49 exhibit a tendency to take public transportation to their workplaces. Younger groups travel more extensively than older groups. Older social housing residents tend to be less mobile in that they take fewer trips, travel shorter distances, and have shorter travel times. This pattern is even more pronounced among older men who stated that medical constraints affect their mobility; yet, older women have traveled more frequently than older men because they need to send their grandchild to school every weekday so as to relieve the working and commuting pressure for younger couples as reported. This is a general phenomenon in major Chinese cities.

The survey data also reflect that occupation, marital status, and educational level affect workers' commuting behavior. Casual female workers travel more than their male counterparts because domestic service jobs are always available in the inner core areas. However, less job opportunities available nearby and lower income level result in more residents working far from their residence, particularly for those self-employed workers. With regard to personal income, the pattern is clear that the intra-zone commutes increases with income status, and higher-income respondents tend to have higher likelihood of commuting. The remaining factors played minor roles in predicting respondents' commuting pattern. The results are consistent with former researches using Chinese cities as examples, like Beijing (Wang & Chai, 2009; Zhao et al., 2010;

Wang et al., 2011), and Guangzhou (Li, 2010; Zhou et al., 2013), and studies in western countries that identified the relationship of mobility with social, economic, and cultural constraints (Khan, 1999; Motte & Nassi, 2012; Ureta, 2008).

Table 5.4 Demographic determinants of mobility across gender

DV: Mobility in the same street Mobile = 1 Immobile = 0	Male (45%)				Female (55%)			
	Coeff.	SE	Wald Chi2	Pr> Chi2	Coeff.	SE	Wald Chi2	Pr> Chi2
Age								
18-29	-0.875	0.047	-14.3	*	-0.905	0.042	-14.6	*
30-39	-1.548	0.000	-4.09	***	-0.480	0.001	-2.66	***
40-49	1.044	0.001	-3.86	***	0.790	0.005	-5.78	**
50-59	1.437	0.018	-5.35	*	0.480	0.011	-2.66	*
60+	-0.954	0.231	-4.13		-0.581	0.080	-9.82	+
Social role								
Technician, clerk	1.123	0.001	0.28	***	1.459	0.013	-6.85	*
Mangers	0.505	0.395	-1.28		-1.245	0.218	-5.7	
Causal workers	0.746	0.013	-7.2	*	-1.459	0.003	-6.85	**
Self-employed	-1.664	0.005	-4.52	**	-1.245	0.218	-5.7	
Married	0.147	0.194	0.76		-0.258	0.058	-4.42	+
Education	0.147	0.031	4.71	*	-0.018	0.013	-1.41	*
Personal income								
Up to 2000	0.854	0.393	2.17		0.721	0.249	2.9	
2001-3000	0.892	0.015	2.2	**	0.721	0.049	2.9	***
3001-4000	1.317	0.009	2.87	**	0.473	0.005	1.72	**
Above 4000	1.153	0.001	2.7	***	0.733	0.001	2.67	***

Key: "+" p < 0.10, "*" p < 0.05, "***" p < 0.01, "****" p < 0.001

Source: Compiled by the author

Residents' employment and daily activities are strongly correlated to commuting cost, including travel time and travel expenses. This correlation is a crucial indicator of

spatial mismatch. Different individuals report varying commuting times depending on the proximity of their residence to their workplaces (Table 5.5). Firstly, the residents of the Jude and Fanghe housing estates report short commuting times 55 and 52 minutes, respectively; these numbers are similar to the commuting time of commercial housing residents. However, the residents of Guangdan and Jinshazhou housing estates have much higher commuting time, i.e. 65 and 70 minutes respectively. All these figures are much higher than the average commuting time of U.S. residents, 25.1 minutes average of all the samples and 34.6 minutes in the New York metropolitan area in 2009 (McKenzie & Rapino, 2011); they are also much longer than weekday journey by public transport in Hong Kong in 2011 (43 minutes) (Hong Kong Transport Department, 2014). Regarding the motivation and satisfaction of commute and travel mode for interviewers, the reaction varies. 50% of the respondents were dissatisfied with the travel time, whereas merely 3% were highly satisfied.

Table 5.5 Commuting costs for different individuals

Variable name	Variable description	JDHE	JSZHE	FHHE	GDHE	CHE
Commuting time	Single commuting time [home to work place in the morning (minutes)]	55	70	52	65	50
Transfers	Number of transfers in a single commuting trip	>1	>2	>1	>2	>1
Monthly transport costs	The total monthly household transport cost (yuan) for individual	600.00	520.00	480.00	530.00	1080
	Public transport fares (percentage)	80.70	81.60	82.10	88.30	32.30
	Private cars or motorcycles fares (percentage)	4.20	5.70	4.80	3.10	43.60
	Taxi fares (percentage)	15.10	12.70	13.10	8.60	24.10

Note: JDHE = Jude housing estate, JSZHE = Jinshazhou housing estate, FHHE = Fanghe housing estate, GDHE = Guangdan housing estate, CHE= Commercial housing estate

Source: Compiled by the author

Second, the residents reported varied monthly transport expenses depending on their preference of transportation mode and urban transportation network. In addition, residents from different housing estates have different transport cost. Fanghe residents have fewer commuting expenses than Jinshazhou and Guangdan residents, who have analogous costs. Social housing residents spent less on commuting than commercial housing residents. It is because the external travel modes of social housing residents mainly comprise public transport (Figure 5.8), in accordance with the personal characteristics of social housing residents (low income), residence location (located in the marginal region of the inner suburban area), and transport conditions (a poor transportation network).

Third, the results also show the different roles of transportation mode in individual's commuting characteristic. 31% take the metro, 43% take buses, and 10% take bicycles. In particular, bicycles are primarily used in short-distance travels. Internal non-motorized travel modes are cycling and walking, with walking-led development. Table 5.5 shows that the public transportation fares for the respondents in the four cases account for more than their total 80% of commuting expenses, unlike the 32.30% reported by commercial housing residents. Moreover, 43.60% of the transport fares of commercial housing residents were allotted for the use of private cars and 24.10% for taxi fares; both figures are considerably higher than the expenditures of social housing residents. Differences in the use of transportation mode are undeniable among different income groups. This phenomenon is attributed to the fact that commercial housing residents have additional options and the ability to afford various transport modes given their higher income level.

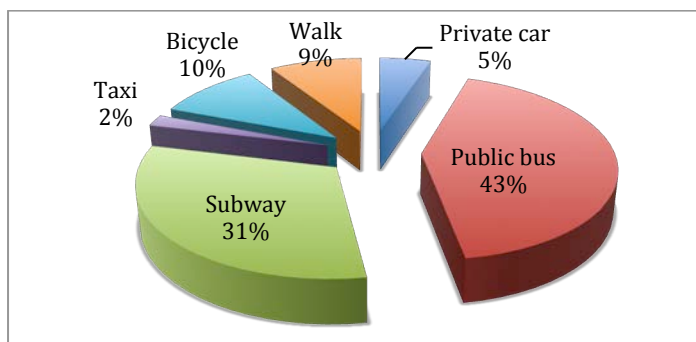


Figure 5.8 Transportation modes of social housing residents

Source: Compiled by the author

5.3.2 Effects of social housing development on job accessibility

The statistical results reveal that social housing residents residing in different neighborhoods have different employment rates and frequently change jobs (Table 5.1, p.82). Guangdan housing residents have the lowest job change frequency at 12.3%, and the employment status of these residents is relatively stable because they moved in Guangdan housing estate in 2012. A heavy burden on households, e.g. monthly installment and children educational costs, creates a critical need for stable job accessibility, even though their workplaces are farther away. By contrast, the job change frequencies of the Jinshazhou and Jude housing estate residents were high at approximately 60%, partially because many elderly residents have retired that influences the rate of job accessibility.

By comparing the age, educational level, and occupation among different groups, the job accessibility rate and opportunities in employment market showcase divergence. Research by economists has shown that despite agglomeration effects, subcenters have not eliminated the importance of the primary center, and contain less than the majority of metropolitan jobs (Rosenthal and Strange, 2003). Likewise, the situation in Guangzhou suggests that basic employment is generally in the inner-core and inner suburbs areas, while work in the governmental sector, the high-technology industry and the financial sector are mainly performed in the inner-core area. Therefore, social housing residents who have much more difficulties in finding suitable jobs in the same street or same urban district where they live have to travel further.

On the other hand, job opportunities unmatched with residents' personal skills, to some extents, is a result of the increase in job and housing distance and commuting time. Social housing residents perform low-skill jobs, receive little income, and are less educated. They are mainly involved in small rental businesses, the domestic service industry, and transportation services (Figures 5.9 and 5.10), of which employment opportunities concentrate in urban central areas. Changes in the number of job seekers and their matching jobs are mainly associated with shifts in the socioeconomic conditions of a certain area (Hu, 2014). Suburbanization was evident after 2008,

indicating that an increasing number of job seekers moved from the inner city to suburbs. Such spatial changes increased both job demand and job supply in suburbs. However, the number of poor job seekers increased more quickly than the number of matching jobs due to socioeconomic transformation, resulting in a decline of community vibrancy in job accessibility.

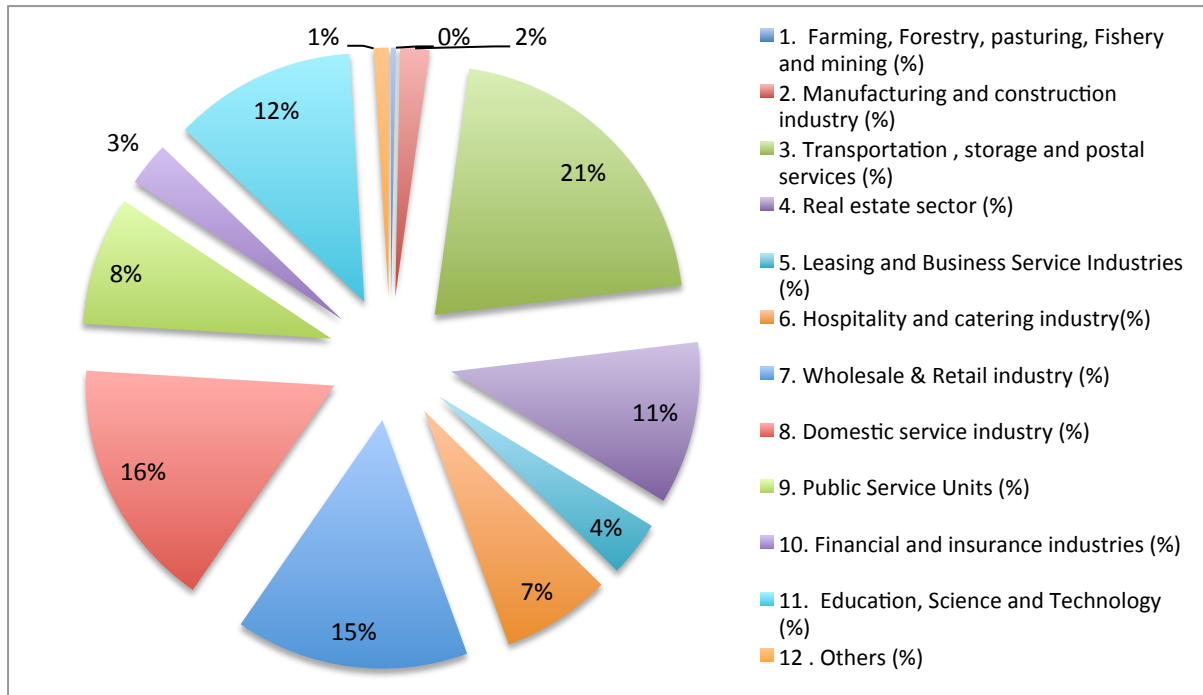


Figure 5.9 Occupations of social housing estate residents

Source: Compiled by the author

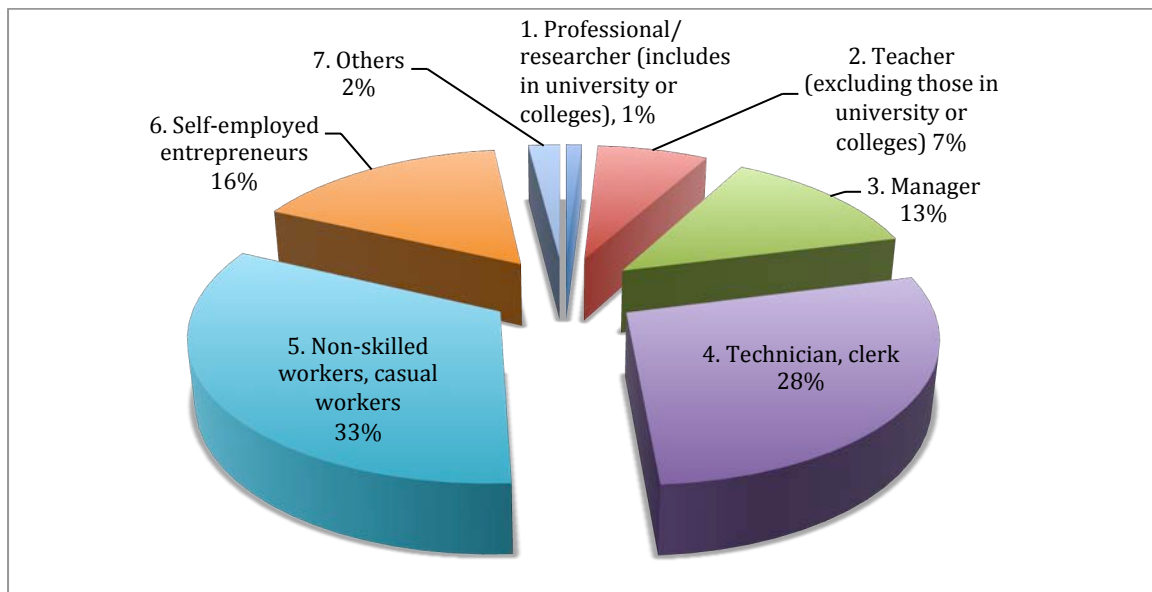


Figure 5.10 Types of employment for social housing residents

Source: Compiled by the author

Job accessibility is associated with housing tenure. Lowest rental housing residents are willing to consider suitable job vacancies nearby for saving transportation costs. However, job accessibility is low for these individuals given their socioeconomic status and spatial constraints even though urban expansion has generated new job opportunities around social housing neighborhoods (such as in the Jinshazhou and Guangdan housing estates). Interestingly, economic and suitable housing residents have higher incentive to sustain the current employment status which works in inner core areas with stable salary for supporting the monthly installment payment. But, social housing residents still experience difficulty in finding suitable jobs in their proximity.

The findings suggest that the location of social housing estates significantly influences individuals' decision to change jobs. This study also identified the personal social networks outside one's neighborhood that affect time allocation to discretionary activities and the willingness to socialize. In particular, people with a large number of friends/acquaintances in the old districts exhibit a significantly higher chance to perform discretionary activity and to allocate large fractions of discretionary time outside of their neighborhoods. Furthermore, having a large number of family members/relatives who work in old urban districts significantly increases one's chances of changing his/her workplace.

The situation in Guangzhou differs from that observed by Kain (1968), who reported that disadvantaged groups in the U.S. were concentrated in the inner cities and that jobs were suburbanized, especially manufacturing jobs that are suitable for low-skilled and low-wage workers who are living in the inner city. Both sets of results indicate that disadvantaged households have fewer residential choices and limited options of mobility to their desired workplace.

5.4 Spatial characteristics of social housing residents in Guangzhou

A spatial analysis was conducted on the activity spaces of social housing residents to analyze the effects of residential location changes and to reveal the spatial configurations of participants' activity patterns, including spatial mobility, and residents'

restricted spatial interaction with other space (e.g., industrial, commercial, and open space, etc.). Figures 5.11, 5.12, 5.13, and 5.14 reveal that how the spatial scope of activity space varied distinctively at the peak hour. As shown in the figures although the working activities of some residents concentrate around their employment locations, certain differences can be identified between the activity patterns of residents. This justifies the importance of looking into individuals' activity spaces beyond their residential locations.

Job locations in Jude housing estate are the most concentrated (Figure 5.11), where it is built in the 1990s and developed by many urban strategies. Many working and nonworking trips happened in the neighborhood. In addition, the activity density patterns suggest that individuals in Fanghe housing estate exhibit the most dispersed activity spaces (Figure 5.13), implying that the residents visited more locations than the residents living in other three housing estates. This is the main reason of its location and good transportation network which are conducive to less fragmented trip. The case of Jinshazhou is different (Figure 5.12), which is built after 2007. Less employment opportunities are concentrated in the proximity, which lead to longer commutes traveling to central areas. Thus, they must spend more time in commuting. Residents of Guangdan housing estate have the similarity to that of Jinshazhou housing estate (Figure 5.14), yet the clustering pattern concentrates in the Tianhe District and Liwan District.

Another finding is that location constrains of social housing residents restrict their spatial movements and activity spaces. First, social housing residents usually last much longer than the other non-work activities on the basis of the previous analysis of work or work-related activities. Understandably, non-work activities on weekday were concentrated before (8:00am) or after work (7:30pm) due to long distances and longer commuting time to workplace. Second, they seldom performed out-of-home, non-work activities after 9:30pm on weekday and 10:00pm on weekend. This can be explained by the limitation of business hour of public buses. On the other hand, a large percentage of non-work activities of commercial housing residents were conducted after 9:30pm both on weekday and weekend.

The home-work separation in Guangzhou is associated with changes in social and housing spaces, particularly the life-cycle effect and space constraints encountered upon moving into a new social housing community. The fundamental limits of living space arrangements alter space utilization by movers. Despite high commuting costs, residents can save money because their housing costs are cheaper than the rental fee they may have incurred by renting apartments close to their workplace. Residents may also have moved to social housing estates because they were unable to afford their original apartments. Increasing number of people have decided to live far from their workplaces, which lead to their activity space clustering in inner core area during weekday and increasing the cumulative effect of job-housing imbalance.

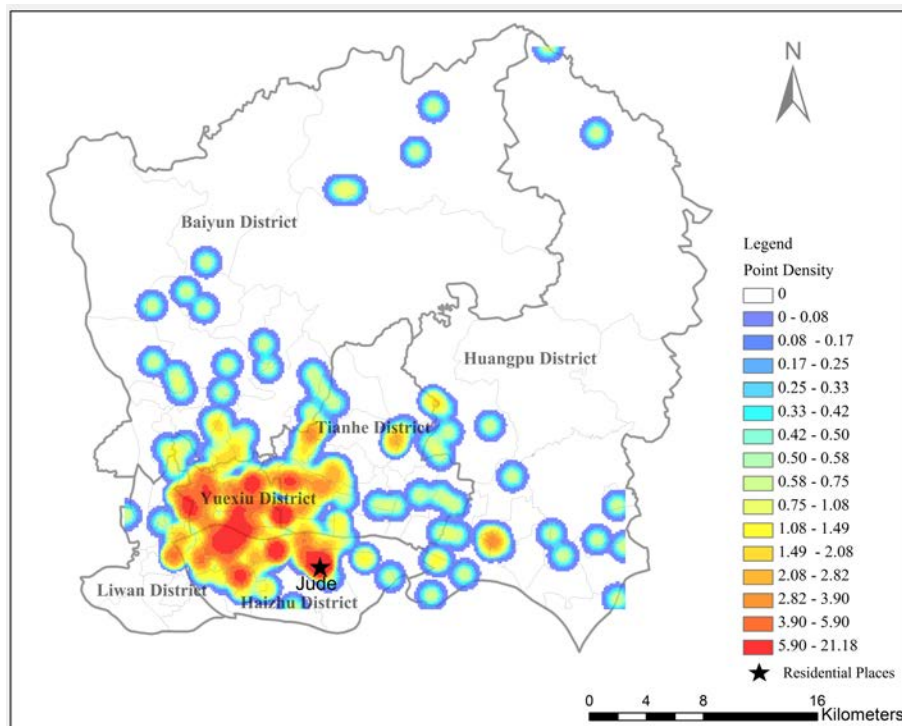


Figure 5.11 Activity density patterns in Jude housing estates at peak hours during one weekday

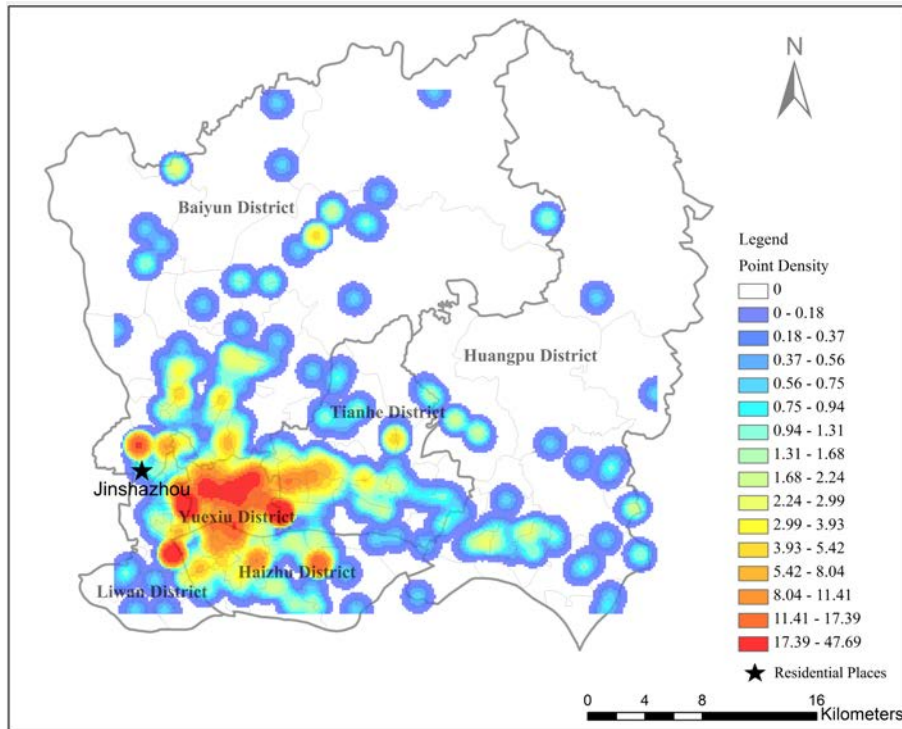


Figure 5.12 Activity density patterns in Jinshazhou housing estates at peak hours during one weekday

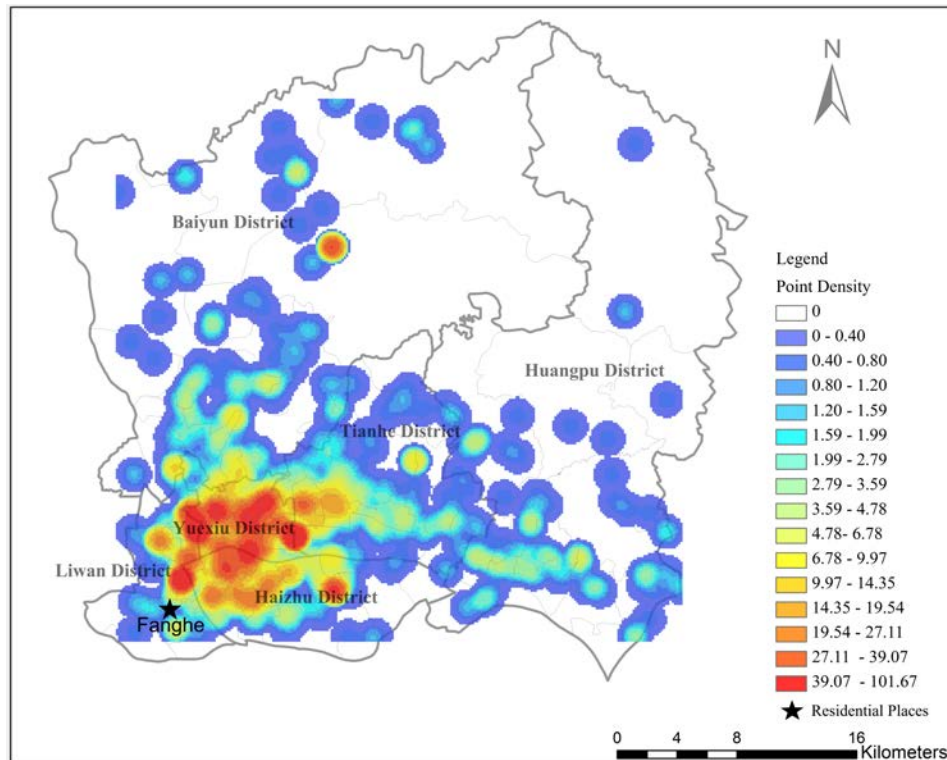


Figure 5.13 Activity density patterns in Fanghe housing estates at peak hours during one weekday

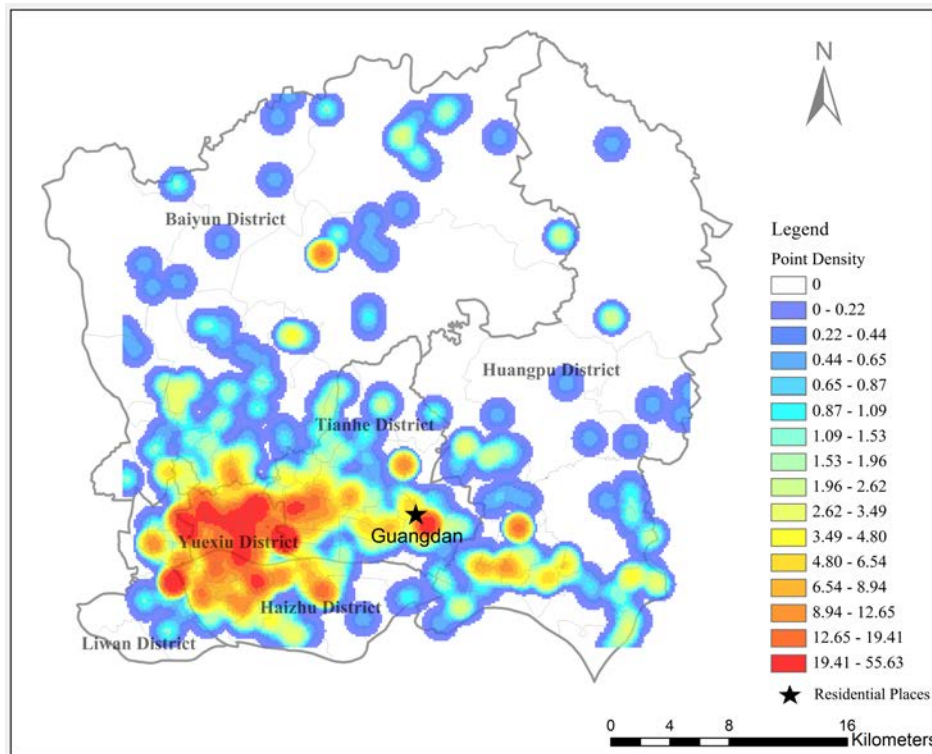


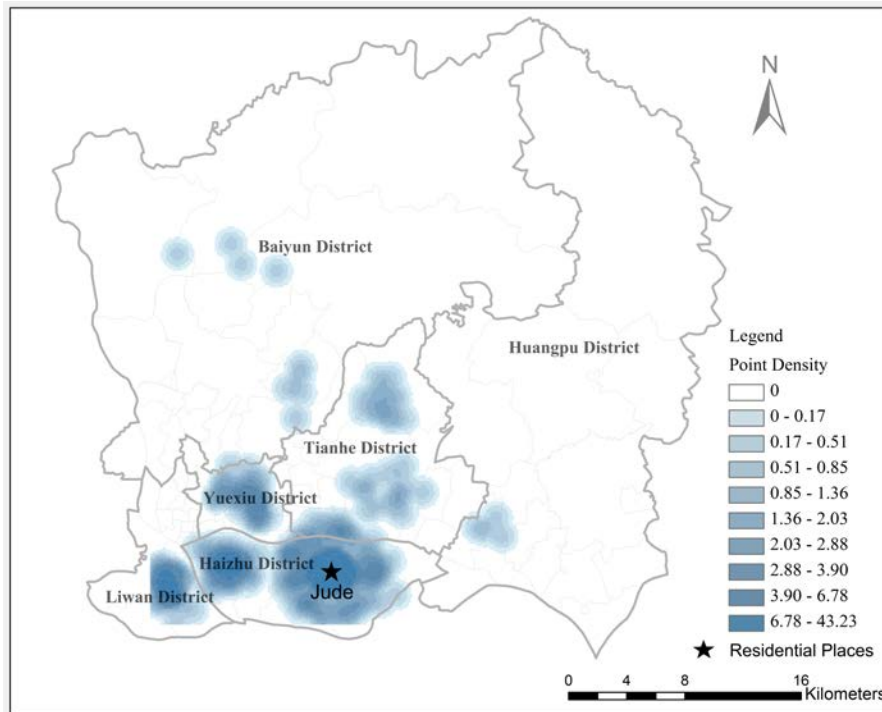
Figure 5.14 Activity density patterns in Guangdan housing estates at peak hours during one weekday

Source: Compiled by the author

With regard to daily activities in weekend, the findings revealed the activity space of social housing residents mainly cluster in their neighborhoods, compared with urban residents (nonsocial housing residents) (Figure 5.15-5.19). Merely 13 percent of activities are scattered in different districts, most of which are visits to relatives and family gatherings. Thus, the spatial extensity of social housing residents is smaller than that of commercial housing residents.

Due to lack of access to service facilities in the nearby communities, particular the newer neighbourhoods like Guangdan estate, the majority of social housing residents are dissatisfied with the living environment when accessing to catering places, recreational facilities and children playground. They would have slightly wider range of density of daily activities with 3.6km radius from their residence (Figure 5.18). In contrast, nonsocial housing residents travel more places and concentrated spatially in Tianhe District and Yuexiu District where shopping malls, recreational places, and

urban parks concentrate (Figure 5.19); moreover, the commercial housing residents have a higher intensity than that of social housing residents, because of their higher income level and ownership of private vehicles.



5.15 Density distributions of the daily activities of Jude housing residents during weekends

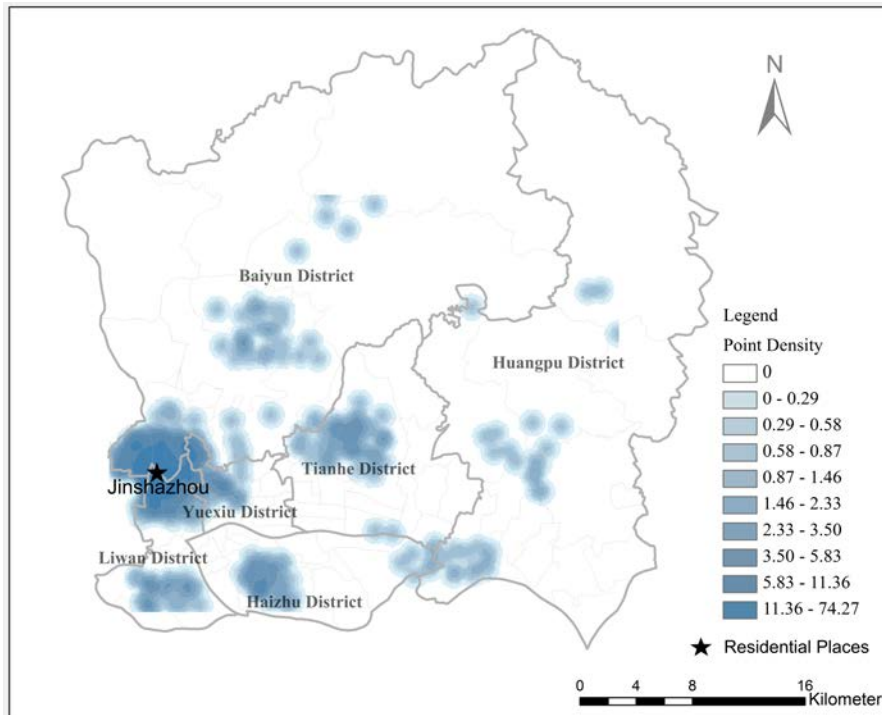


Figure 5.16 Density distributions of the daily activities of Jinshazhou housing residents during weekends

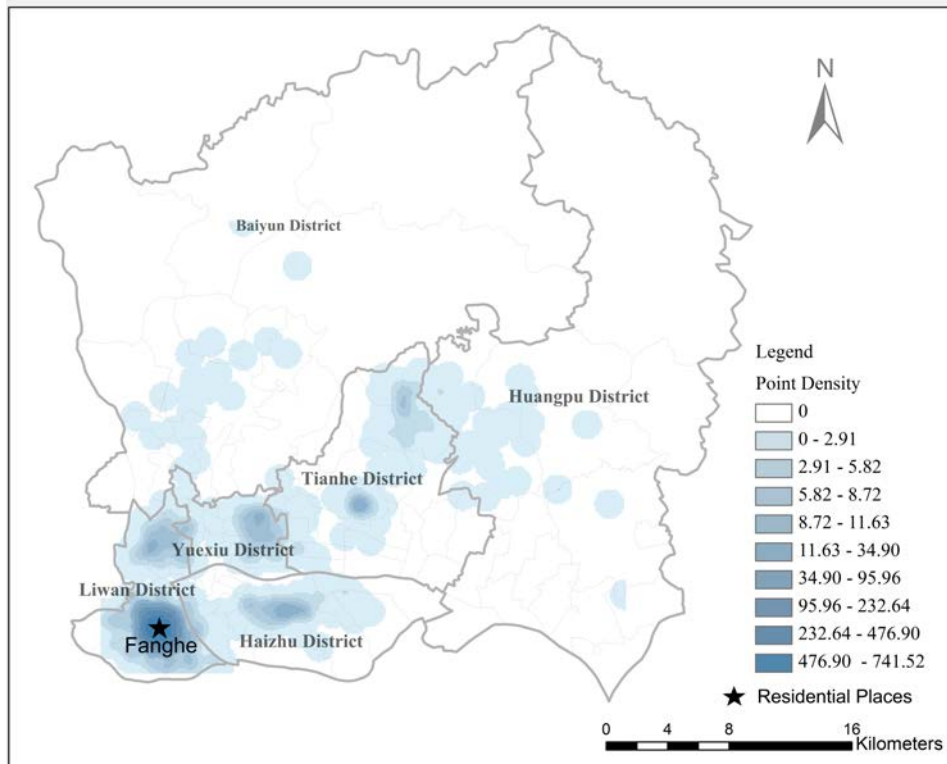


Figure 5.17 Density distributions of the daily activities of Fanghe housing residents during weekends

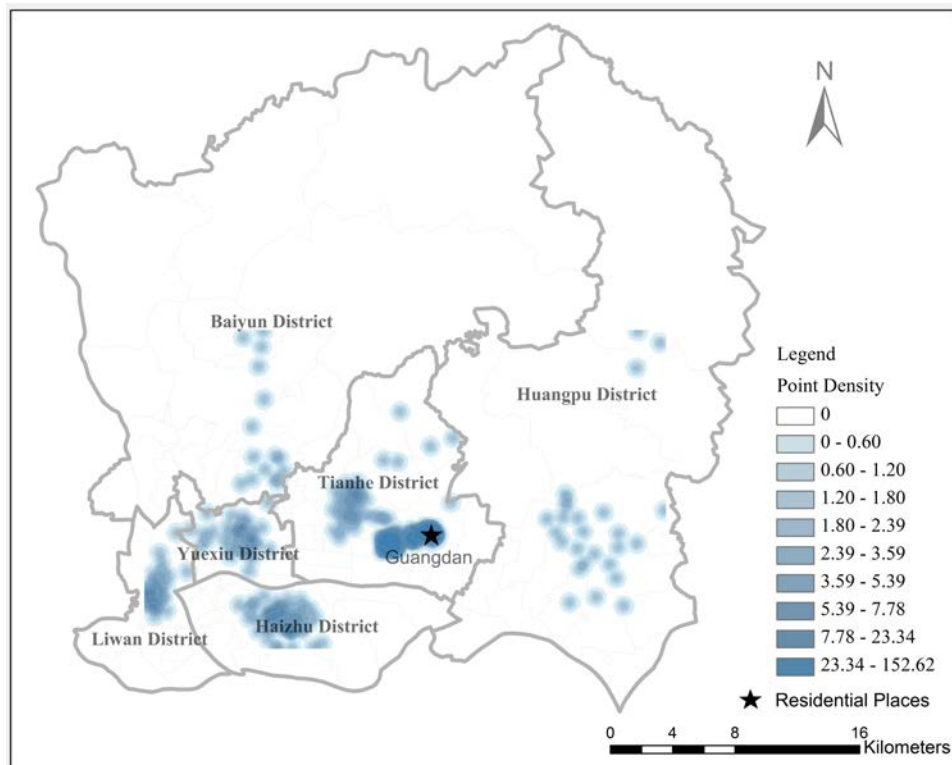


Figure 5.18 Density distributions of the daily activities of Guangdan housing residents during weekends

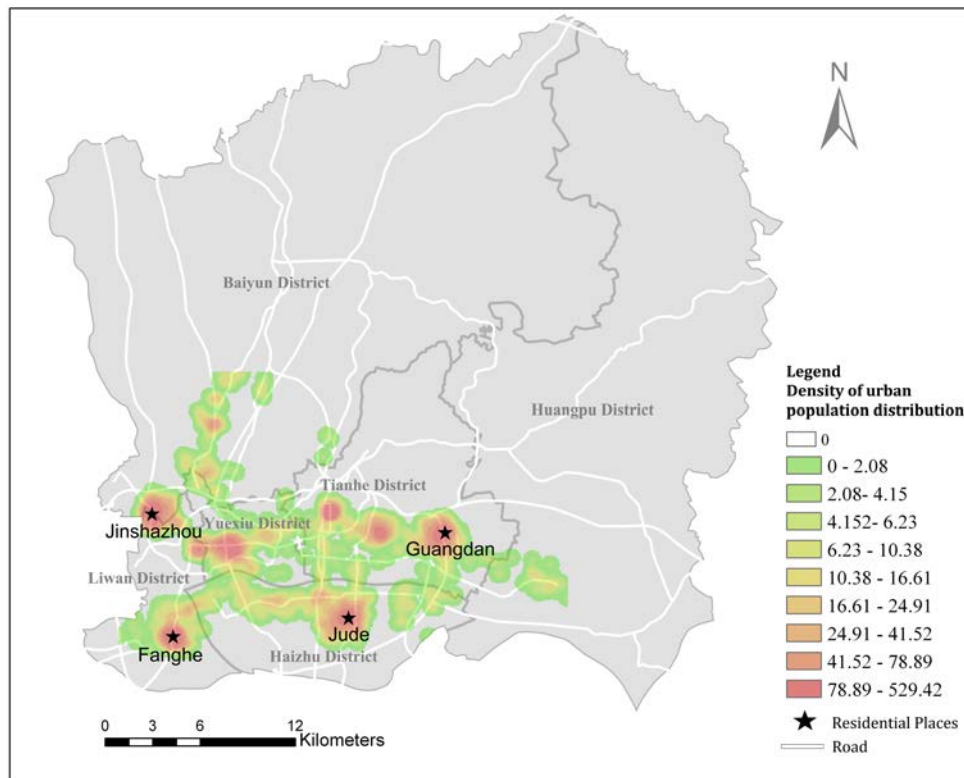


Figure 5.19 Density distributions of the daily activities of urban residents during weekends

Source: Compiled by the author

Residents of Fenghe housing estate have the most extensive but least intense activities (Figure 5.17), while residents of Jude housing estate have the most intense activities (Figure 5.15). The activity times of residents who live in Jude housing estate are more than 2 times on weekend, while shopping activities and recreational activities are concentrated in the community where it is located in old urban district and close to urban village. The activity times of residents who live in Guangdan and Jinshazhou housing estates are usually once.

The limited interaction between people living in various zones adversely affected employment status and income level. Living in the small cluster of social housing community influence the types of social ties generated among the poor when they seek for employment (Kleit, 2001). According to the statistic from questionnaire survey, more than 80 % of lowest rental housing resident rely on their social ties in the central

area to find a suitable job because of personal barriers, particularly for the night-time job opportunities. However, upon moving to new houses, these residents are restricted spatially and socially because of poor transportation network and inadequate public facilities. The more detailed information pertaining to this issue will be discussed on next chapter. To some extent, this scenario contributes to an increase in job change frequency. Besides, the gap in socioeconomic status between social housing neighborhoods and the surrounding neighborhoods is significant. Social residents may be discouraged from visiting the retail facilities in the district because of the high prices of products and services. Commercial housing residents are clustering in the urban areas for diverse activity patterns due to ownership of private car and income level. This situation in turn weakens social networking among residents within a community.

A locational disadvantage results in insufficient face-to-face social contact with other people because of long commuting distances given that much time is spent on traveling. Social contact is an important indicator of social housing residents' daily life and employment status. Upon moving to new social housing estates, most residents complained of having no friends to chat with and about the restriction of their social networks. In addition, economic barriers and limitation of location influenced activity participation, particularly for elderly groups. Due to the long commuting time in weekdays, more than 53 percent of respondents are unwilling to travel in weekend (the interview conducted on 19th July 2013). Overall, social and economic determinants influenced activity participation for social housing residents in the inner suburban areas, and the activity spaces of these people varied significantly in terms of extensity, intensity, and exclusivity.

5.5 Summary

In summary, this chapter explored the job-housing imbalance issues in the spatial and temporal dimension. The spatial relationship between workplace and residence of social housing residents were investigated by analyzing the spatial patterns of commuting. Significant results were generated through the spatial analysis: 1) the increasing commuting time and cost is the direct result of the residents of the passive

chosen social housing communities; 2) The mobility and commuting time vary across age and gender groups, and occupation, marital status, and educational level have influenced residents' travel behavior; 3) These residents have low accessibility that is hard to find appropriate jobs at the surrounding areas, and endure long-distance commuting, as well as long commuting times between residences and workplaces.

The findings reveal that job-housing imbalance issues become manifest for low-income residents after moving into social housing estates. The personal characteristics of residents (such as age, level of education, and skills) influence their commuting behavior. Moreover, the increase in travel distance and commuting time clearly induced changes in the daily living activities of residents in the new neighborhoods. The outcomes of existing social housing policies were a reduction in job accessibility and an increase of commuting distance.

The lessons learned from the implementation of social housing policy in Guangzhou include the positive effect of social housing on the changes in the household life of an individual. When making decisions on where to live and to work, social housing residents do not consider all possible elements given that their choices are fewer than those of urban residents. This disparity is determined by socio-demographic and economic factors, such as occupation, income, gender, transport mode, housing type, housing tenure, access to environmental and leisure activities, school quality, and access to public facilities. Even though both urban and social housing residents experience job-housing imbalance, urban residents have additional choices in terms of transportation modes. With regard to the activity space in weekends, social housing residents mainly cluster in their neighborhoods, while nonsocial housing residents concentrate in urban core areas owing to the increase of income level and private car ownership. Thus, they are not segregated by their selected residence.

The workplace-residence mismatch and a locational disadvantage lead to insufficient face-to-face social contact with other people because of much time spending on traveling. The landscape of working trips and nonworking trips has experienced

earthshaking changes, such as, shrinking spatial extensity and reducing the intensity of communication and social contacts, which results in spatial and social exclusivity in a gradual manner.

Economic changes and housing reforms transform the fabric of daily life and the urban structure. The changes in the housing provision system in China drive immobility (e.g. Li & Siu, 2001; Zhou et al., 2005). A sample survey conducted in four different new social housing estates in Guangzhou discovered that the progressive erosion of the strong links between work and residence has been marked as the transition of urbanization of the Chinese cities. Moreover, economic transformation, spatial restructuring, transportation networks, and land use patterns are the underlying factors in understanding job-housing imbalance. The influence of these fundamental factors on job-housing imbalance, the variation in the long-term activity participation of individuals in Guangzhou, and the effect of these issues on an individual's activity participation in Guangzhou will be discussed in the following chapter.

Chapter 6 Effects of Spatial Restructuring, Planning Approach, and Institutional Involvement on the Job-housing Imbalance and Mobility of Social Housing Residents in Guangzhou

6.1 Introduction

Many studies have been conducted to understand the variations in commute times among geographically, economically, and socially defined population groups. Some of their findings are thought-provoking. One view postulates that housing market segregation and employment decentralization significantly complicate job accessibility for low-income groups, especially for those living far from market resources (Wang & Chai, 2009; Zhou et al., 2013). Another view suggests that land use patterns strongly affect travel behavior in western countries (Cervero, 1989, 1991; Newman & Kenworthy, 1989). In light of the implications of the findings of recent human behavior studies, it is imperative to discuss in this chapter the applicability of these popular western controversies to China, as with the effect of the underlying built environment (e.g. space structure, land use pattern, transportation, public facilities) on job-housing imbalance and travel behavior for social housing residents.

The previous chapter identified the interaction between the location of one's residence and travel behavior. This chapter extends these findings by indicating that job-housing imbalance is strongly associated with the spatial restructuring, urban planning, transportation, and institutional perspectives. The chapter explains the reasons behind the job-housing imbalance in Chinese megacities wherein the *Danwei* system was phased out in favor of a market-oriented economy. It also measures the influence of activity participation on this job-housing imbalance by selecting four neighborhoods in Guangzhou as case studies.

6.2 Effects of spatial restructuring on the job and spatial structures of social housing residents

Urban spatial structure generally refers as to the distribution, combination, and evolution of different urban elements. Nodes, hierarchies, networks, flows, and surface are considered the five elements of this structure (Haggert, 2001). The diminishing influence of the traditional *Danwei* system and the market-oriented housing reform in urban development has changed the residential location (nodes), residential suburbanization (hierarchies), social contacts (network), travel (flows), and activity spaces (surface) of individuals and families. To some extent, urban spatial form has been reshaped as a result of the rapid social housing development and the ever-changing human activity and travel behavior in Guangzhou.

6.2.1 Spatial restructuring and residential suburbanization in Guangzhou

Cities in China have been undergoing symbolic transformations as a result of globalization and New-type Urbanization¹². Guangzhou is at the forefront of this initiative and drives the search for an effective approach to resolve housing and social instability issues for disadvantaged households, thereby improving the quality of life and happiness of these groups. The changes in Guangzhou City since the 2000s represent a dynamic urban system with a considerable degree of social mix and urban expansion (Figures 6.1 and 6.2). An attempt to develop Tianhe district as a new CBD in the 2000s serves to extend the city towards the eastern part of Guangzhou (Ma & Wu, 2004). Moreover, administrative annexation and reorganization¹³ is a key driving force of the change from a monocentric to a polycentric spatial structure as well as a engine of regional and local economic development (Ma, 2005), as evidenced by the expansion of the eastern and southern parts of Guangzhou since the 2000s, and of residential differentiation. As the government relaxes its responsibilities for housing provision, it

¹² National New-type Urbanization Plan is a new state policy and guideline of urbanization, which released on March 2014. The implementation of this plan reveals a new development vision of urbanization in China, represents a new stage in the development of cities and towns in China, and demand new requirements in urban-rural development and planning. Thus, new-type urbanization plan, as a national urban development strategy, has become a great concern by the central government, and has been comprehensively promoted by local governments.

¹³ In May 2000, Panyu and Huadu County have become Panyu and Huadu district. In February 2014, Zengcheng and Conghua County have become Zengcheng and Conghua district.

relinquishes the key mechanisms by which it has controlled employees and citizens in terms of residential mobility (Wang & Murie, 2000; 2011; Wu, 2002).

Given the rapid urban development and housing transformation after 2000, Guangzhou citizens can purchase housing units in accordance with their income level, locational preferences of residence, employment location, the marital status, and so on. This freedom has led to a housing pattern in which citizens no longer live in similarly sized apartments within the same building blocks. Households in social housing have been forced to move from the city center to the fringes of the urban area (Figure 6.3). Residents previously occupied different neighborhoods according to their workplaces. However, they are presently grouped according to their socioeconomic characteristics and housing status. At present, patterns include old housing districts, work-unit compounds and urban villages in the urban core area, distinctive estates of social housing in the inner suburb and outer suburb areas, villages in the suburbs. The diversification of housing options facilitates residential suburbanization and differentiation, and also affects the employment and residence interaction.

A housing policy development, particularly the social housing policy, has affected the pattern of urban population significantly. First, the housing reform of 1998 changed the structure of communities and cities from work-based to residence-based (Wang & Murie, 2000; Li, 2000). The perceived average distance of spatial separation of work and housing evolved from 2.7 km before moving in new social housing estates to 4.6 km in 2012, an increase of more than 70 percent. The job change frequency has increased to 53 percent, even reaching 63.7 percent, recorded for this sector. Besides, low-income households that are unable to afford housing in the private market and whose employer do not provide accommodation have to move out of urban centers resulting in the emergence of spatial mismatch. Second, the housing transformation of 2008 has influenced the distribution of social housing and has reduced residential mobility because entitlement to social housing in a specific area is generally non-transferable to other areas. The housing relocation has resulted in the marginalization of the urban poor on the urban fringe and worsened the existing job-housing imbalance (Figure 6.4).

The moves to inner suburb and outer suburb areas are evident, and urban core moves to inner suburb areas account for 56.3 percent of the cases.

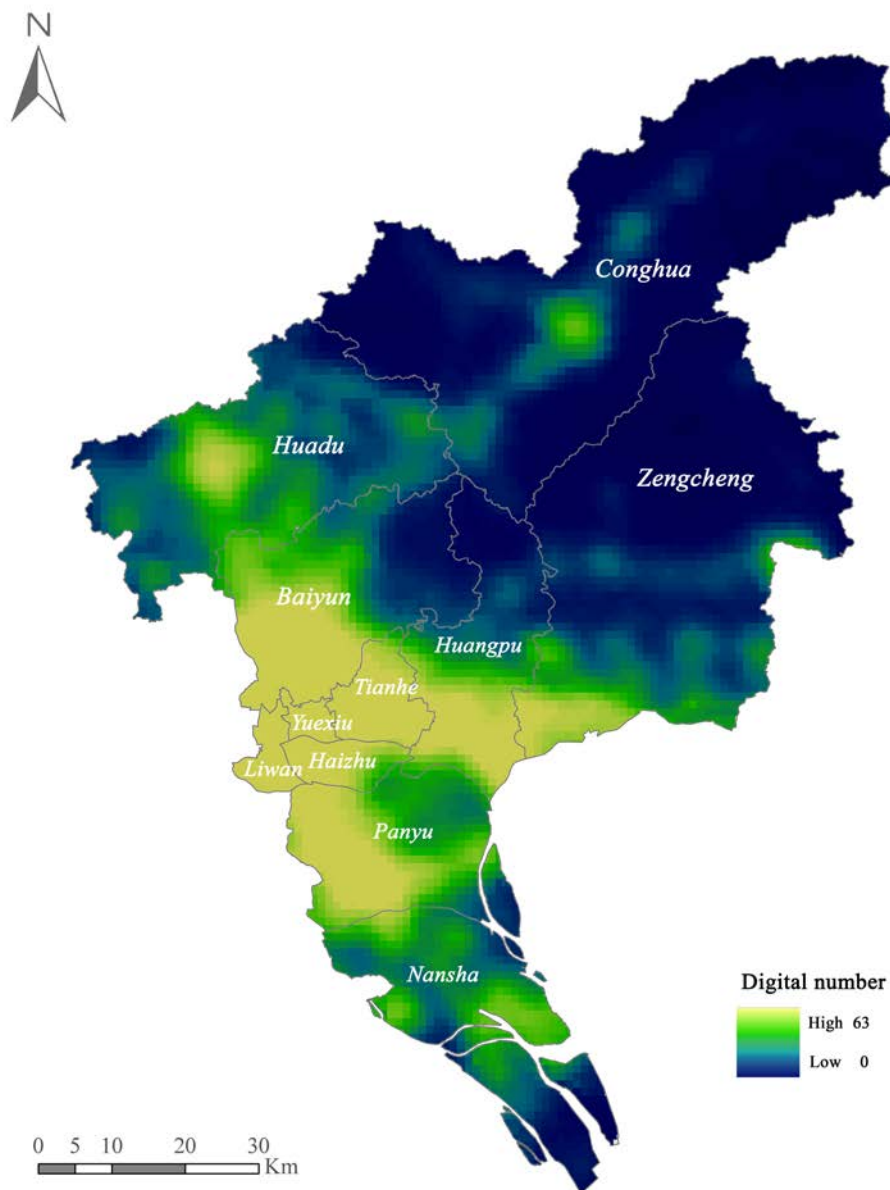


Figure 6.1 Urban development and housing transformation based on the DMSP/OLS night-time light over Guangzhou in 2000

Source: DMSP/OLS night-time light imagery of China in 2000

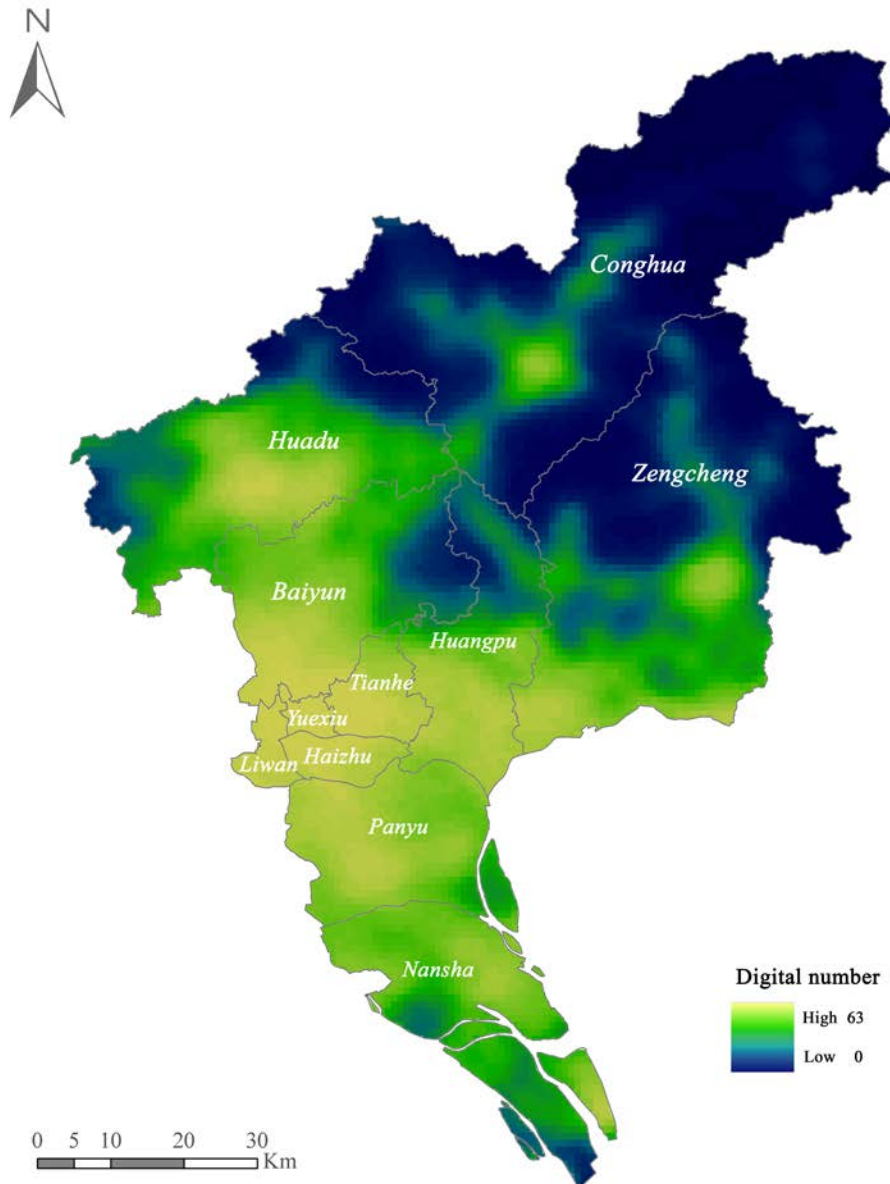


Figure 6.2 Urban development and housing transformation based on the DMSP/OLS night-time light over Guangzhou in 2012

Source: DMSP/OLS night-time light imagery of China in 2012

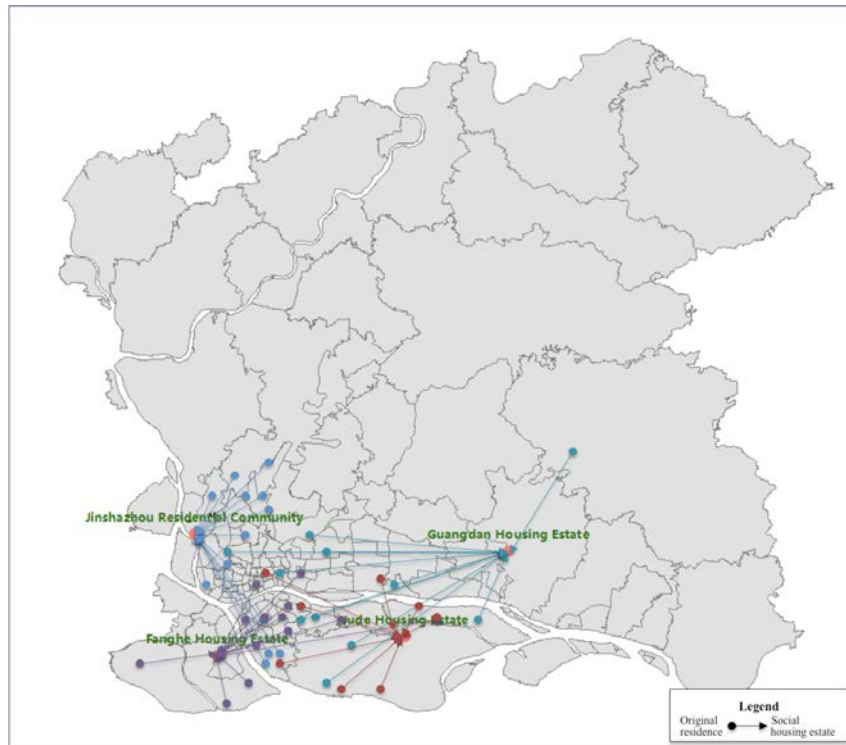


Figure 6.3 Spatial linkages between residential location before and after moving to social housing estates

Source: Compiled by the author

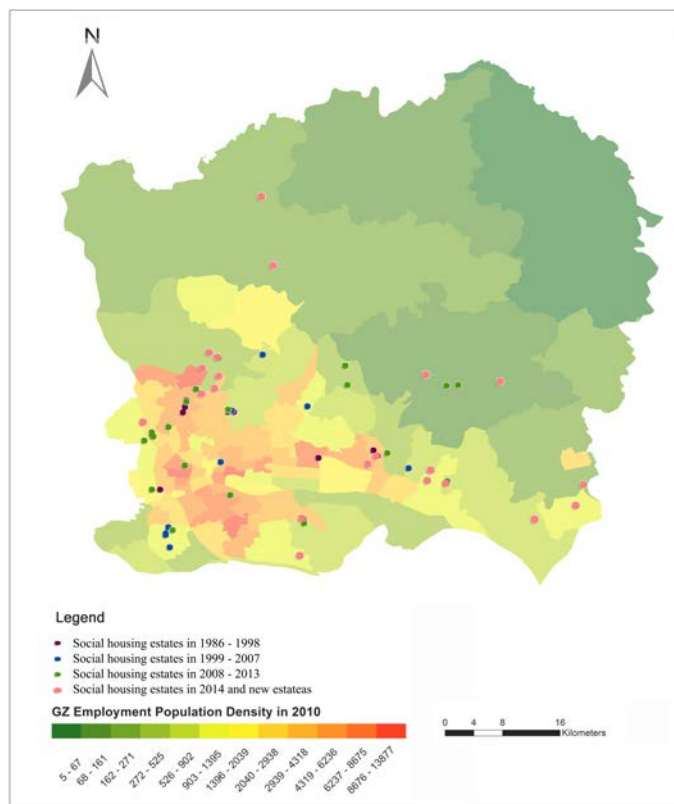


Figure 6.4 The relationship between social housing estates and main job clusters

Source: Compiled by the author

6.2.2 Entrepreneurial government, industrial upgrading and changing job structure

The economic sector is one of the most crucial dynamics contributing to the job-housing imbalance among low-income households living in social housing. Alongside the continuous development of the market economy, the prices of lands and houses are rising rapidly. Differential land prices that depend on location have encouraged local governments to treat the sale of land as an important source of income. To increase economic returns, local governments have auctioned lands near centers of employment and on the periphery of these area (with a good living environment) for commercial housing, while building low-income neighborhoods along the edge of the center or in the suburbs to reduce overall development costs. To improve living conditions, low-income groups who applied for subsidized housing have no choice but to accept the offer of resettlement. However, the suburbs have failed to provide appropriate jobs for this group, resulting in long-distance commutes between residences and workplaces.

To a certain extent, job opportunities are mismatched with personal abilities. Since the 2000s, a large number of factories that used to be located in Haizhu District and Baiyun District moved to Zengcheng (增城), Conghua (從化), and Nansha District (南沙) owing to economic transformation. As a result of this transformation, the job structure has changed from monocentric to polycentric (Figures 6.5 and 6.6). In addition to the attention of Figure 6.7 is given to significant sector differences that non-service jobs has been spreading to inner suburb areas and outer suburb areas, while service employment has clustered in inner core areas. In accordance with the profile of social housing residents (recorded in Chapter 5), they were engaging in labor-intensive jobs, such as transportation service, service sector, and manufacturing, that are mainly concentrated in the inner core areas (Haizhu and Liwan district) and the inner suburbs (Baiyun District). In this regard, the spatial separation between residence and workplace leads to spatial mismatch in the city, and is the result of an increase of working commutes by public transportation, which have great impacts on travel and daily life for social housing residents.

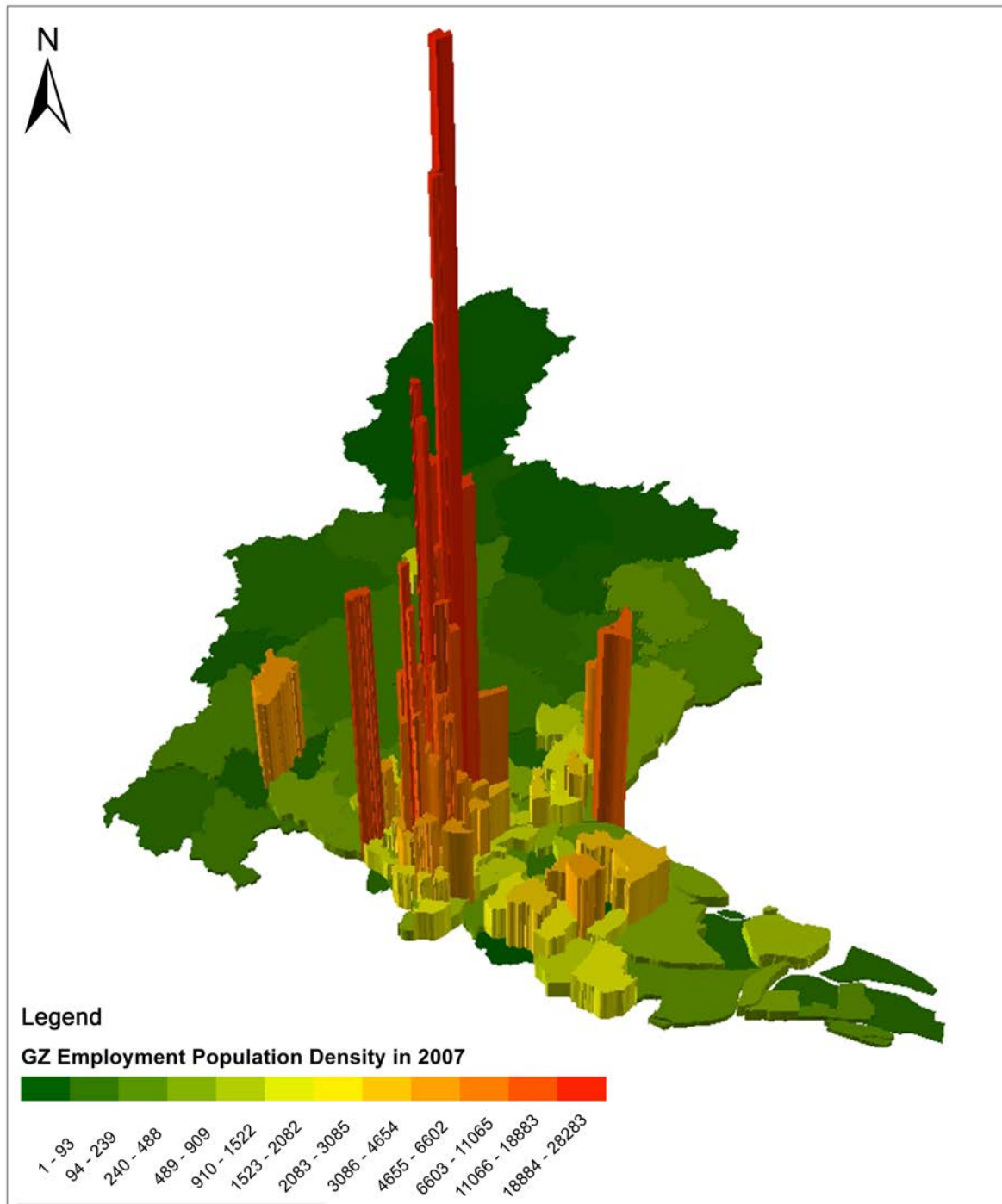


Figure 6.5 Employment Population Density in Guangzhou in 2007

Source: Guangzhou Statistic Department, 2008

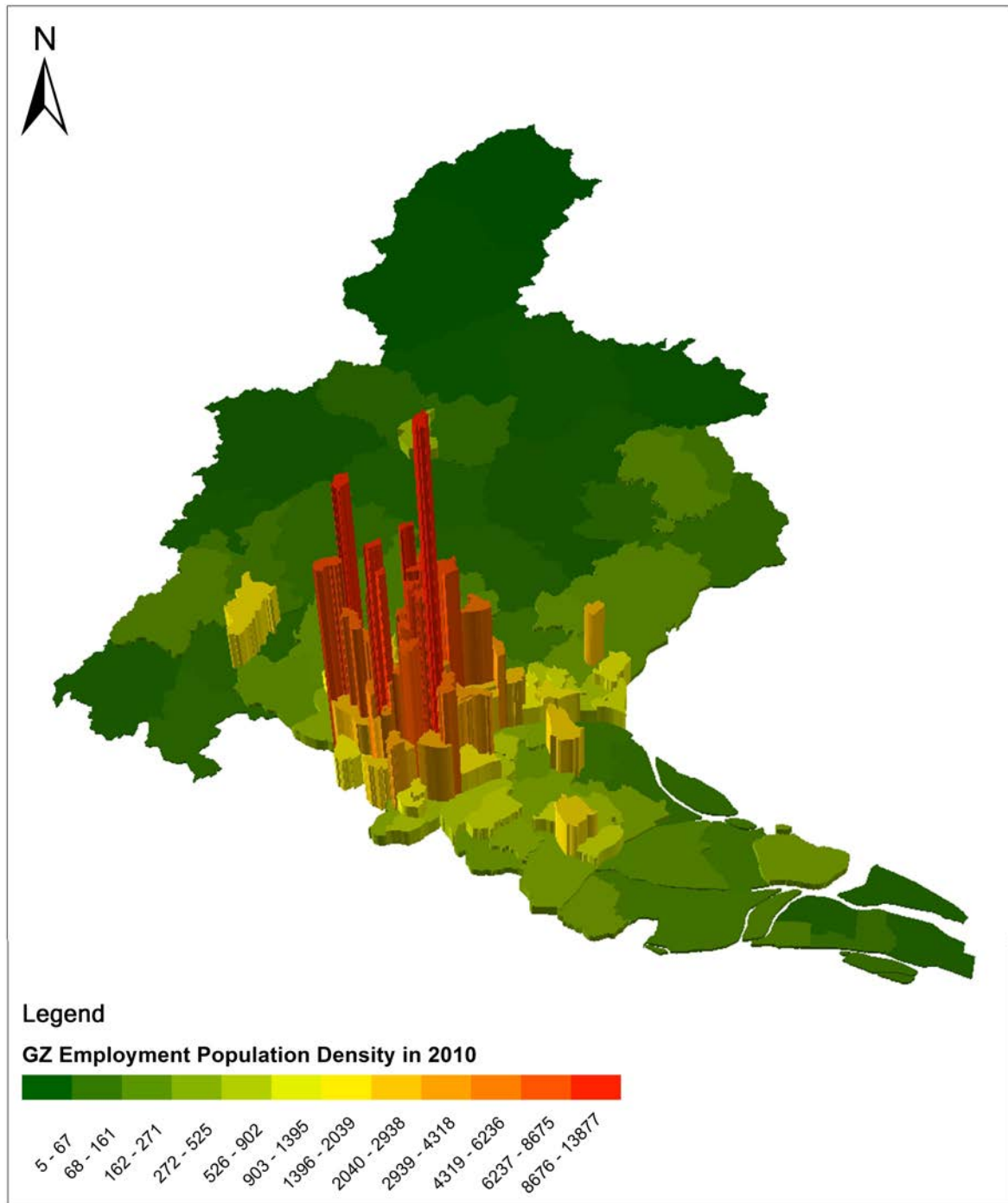


Figure 6.6 Employment Population Density in Guangzhou in 2007

Source: Guangzhou Statistic Department, The National Sixth Population Census, 2013

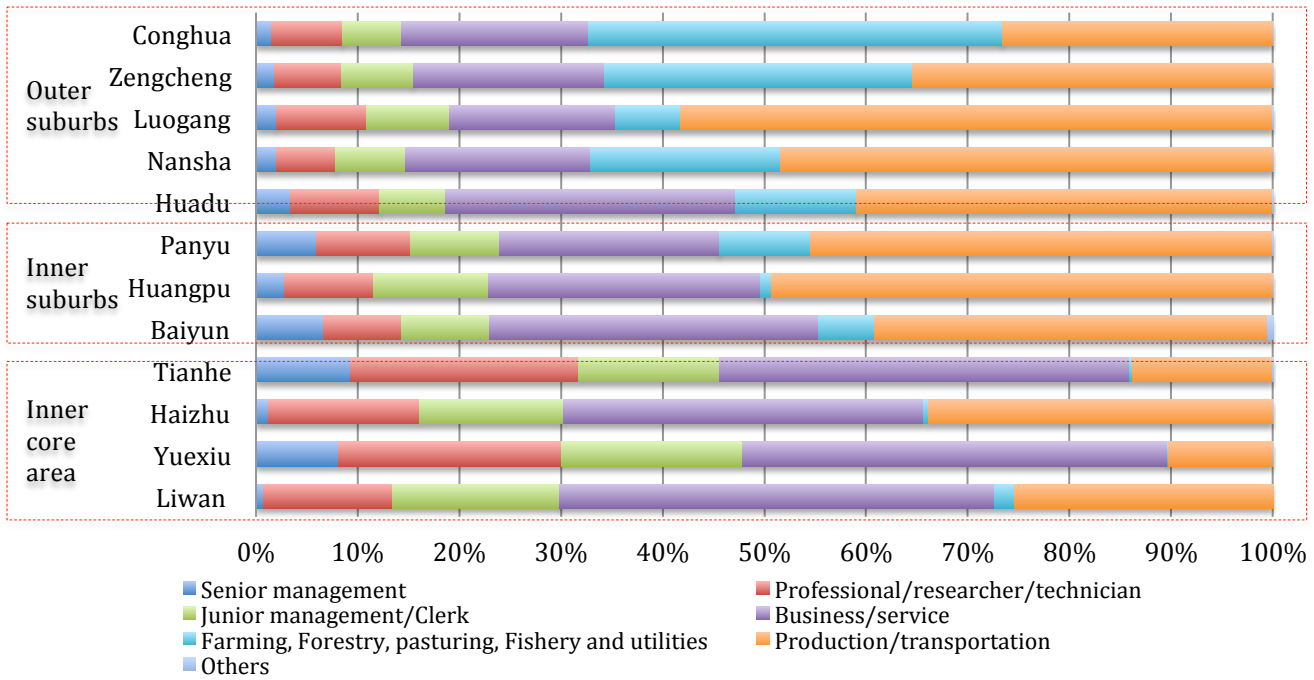


Figure 6.7 Occupational profile of urban residents in Guangzhou in 2010

Source: Guangzhou Statistic Department, The National Sixth Population Census, 2013

On the other hand, wholesale & retail employment growth and catering clusters have become more prominent in the four selected cases areas. Yet, the creation of new job opportunities is more suitable for migrant workers, rather than low-income social housing residents. There are two reasons to interpret this phenomenon: 1) retail and catering employment in those areas is generally self-employed or private-sector employee, contributing to less job opportunities for low-income people. Furthermore, a high job availability in inner core areas is the main attraction factors for social housing residents, especially for those who are likely to be employed in low-end jobs. 2) Nearly 20 percent of those working social housing residents are 46-59 years old (Figure 6.8). Some residents have to give up employment opportunities because of the significant distance between jobs and their residences.

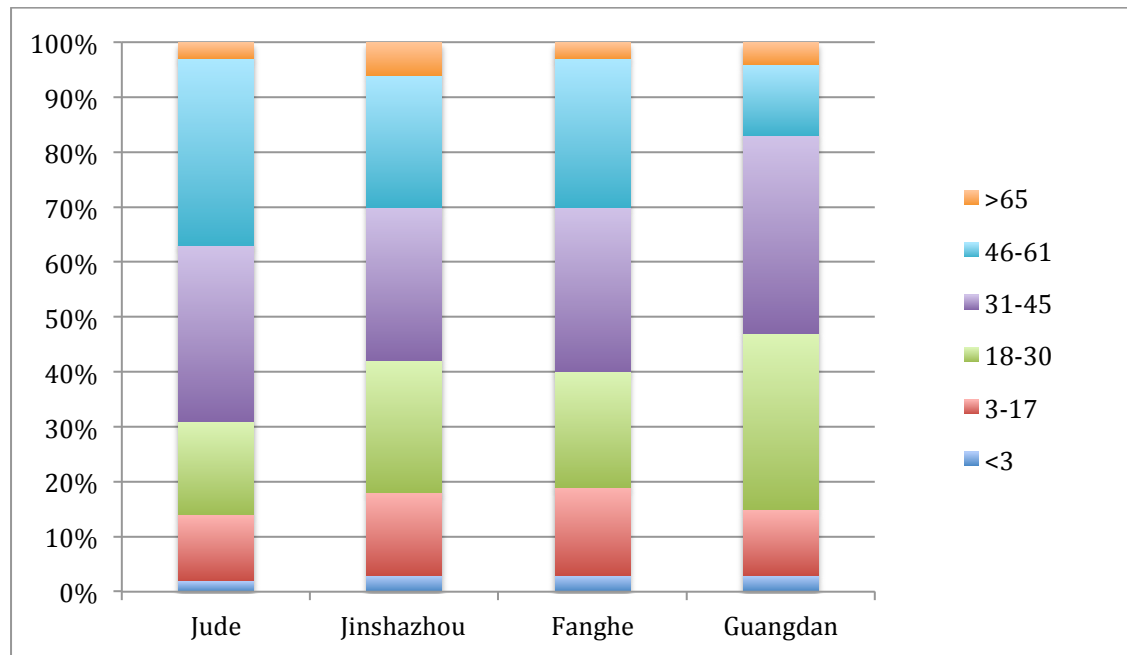


Figure 6.8 Proportion of the populations in the Jude, Jinshazhou, Fanghe, and Guangdan housing estate by age (in years)

Source: Compiled by the author

Rapid urbanization resulted in the decentralization of job structure that some urban areas have gradually transformed into high-tech industrial districts or new business centers. The emerging new job opportunities focused on knowledge-intensive industries, clustering in Tianhe and Yuexiu Districts. For instance, the Guangdan Housing Estate is located within 30 minutes of the Tianhe high-tech industrial zone. Younger persons tend to be more mobile than older adults and take long-distance trips due to their educational levels and their preference for being employed in high employment area and urban areas. Comparatively, such jobs are unsuitable for the less mobile, and poorly educated low-income group. Thus, some of the disadvantage households living in social housing have remained poor and the unemployment rate is still high because of the low incidence of job-housing relocation and housing tenure status. This situation is a root cause of job-housing imbalance.

6.3 Effects of urban planning and transportation in Guangzhou on job-housing separation and activity spaces in the four housing estates

6.3.1 Land use pattern at the city and neighborhood level – mixed or single?

The built environment (land use mix), neighborhood characteristics, and travel attitudes significantly influence trip making. Moreover, these factors retain a diverse influence on behavior (Cao et al., 2009). Both preferences/attitudes and the built environment itself play prominent roles in explaining the variation in the travel patterns of social residents and other urban residents.

To reduce land costs, Guangzhou has established social housing neighborhoods in the suburbs. The social housing neighborhoods are located far from the city center. In addition, the land use pattern at the neighborhood level tends to be single use, coupled with a lack of public facilities and amenities in the surrounding areas. Figure 6.9 indicates that residential accommodation constitutes almost 63.8% of the total land use in Jinshazhou area, while the 36.2 % of other lands comprise 5% of commercial land, 8% of social service, and 10.3% of landscape land and river. Likewise, Figure 6.10 shows that 50.4% of the land in Guangdan area is allocated for residential use, but commercial land and social service land occupy less than 15%. In addition, the function of commercial land is to provide entertainment, leisure and shopping activities for the residents living in the proximity. Clearly, the employment density of this area is incompatible with residential use. The expanding types of residential area and the shrinking types of other land use categories generate a single function of this area, which increase population density but diminish local employment. The transformation of urban land-use pattern from a more diverse and mixed pattern to more specialized and single land-use zones have led to significant separation of job-housing spatial relationship. In addition to job-housing imbalance, the single land-use pattern restricts the range of activity spaces and services for individuals and families.

Furthermore, the construction of public facilities was lagging behind from the completion of residential blocks, which influences dwellers' livability and health. The residents were forced to travel to the neighborhood where they lived before for doing

grocery shopping and to seek for public service, leading to increase their nonworking trips. Thus, in despite to the reduction of the land costs for the local government, all the respondents point out that residential relocation increases generally 30 percent of their transportation and living costs. Consequently, these social housing neighborhoods are unattractive to lower-middle-income households whose members usually work in the city center and are unwilling to spend too much money and time on commuting.



Figure 6.9 Land use pattern of the Jinshazhou area

Source: GZPI, 金沙洲居住新城控制性详细规划, 2009



Figure 6.10 Land use pattern of the Guangdan area

Source: Guangzhou Planning Department, 广氮地区城市设计及控制性详细规划, 2014

The findings suggest that people opt to reside in high-density neighborhood areas in part because they are concerned about the built environment towards multi functional land use. They also aim to reduce the required daily travel because high-density living create high efficiency in land utilization and public service, which reduces work commutes. Over 90 percent of the interviewees strongly prioritized public transport availability, the built environment, and public resources. Low-density areas, such as the Jinshazhou housing estate, are chosen partly because they offer an improved living environment, flexible apartment sizes, and enhanced air quality.

6.3.2 Transportation network at city and neighborhood levels

It is well accepted that the livability of an area depends directly or indirectly on the type and quality of its transportation system (Vuchic, 1999). The influence of the built environment and the transportation network that remained after self-selection is statistically significant as per the examination of the four cases in Guangzhou. Poor transportation network is a crucial contributor to the fragmentation and spatial mismatch in daily life for social housing residents, although telecommuting is correlated with residential location and nonworking trips (Pendyala et al., 1991; Saxena & Mokhtarian, 1997; Mokhtarian, 1998). The population density in social housing

communities of Guangzhou is too high, many people have to commute between home and work frequently, which overloads urban transport system and creates traffic congestion. The excess commute not only creates air and noise pollution (Acioly & Davidson, 1996), but also increases traffic and time costs and lowers working efficiency due to long waiting times.

According to individual traveling diaries, over 83.6% of commuters transfer at least twice to reach destinations, and single commuting time increased significantly. The findings prove the debate of Litman (2003) that conventional transportation planning mostly considered the needs of traffic conditions for motor vehicles, ignoring the livability objectives. More than 80% of the interviewees relied on public transportation for both work- and non-work-related trips. Yet, the findings derived from the semi-structured interviews conducted with residents indicated that the implementation of the public transportation in the surrounding areas severely lagged behind the construction schedule of social housing projects. Moreover, with regard to the provision of public transportation facilities at the city level, the transportation facilities in Guangzhou might not be accessible to different groups with different modes due to city development and population growth, particularly for social housing groups in the inner suburbs. Figure 6.11 shows that insufficient transport facilities have been provided at the edge of urban core areas. Furthermore, no short bus line connects to a nearby transferable bus or subway station in each estate. Thus, inefficient transportation networks exhibit negative traffic disruption, which increases travel time and the risk of losing accessibility.

Residents are compelled to cut one activity into many segments of traveling time due to restrictions in transport modes and stop-by places. According to the interviews in Jinshazhou and Guangdan housing estates, average waiting time was over 15 minutes, at least 2 times of transfers in a single trip, and the first service bus was at 6:30am, which is extremely inconvenient for school-age children and white-collar workers. If their workplace or schools are at great distance, they have to walk more than 15 minutes to reach its proximate bus station for taking earlier buses. Furthermore, within the first year of moving to the Guangdan housing estate, no bus station was located within a 300-meter range for residents, thus increasing the walking distance (more than

15 minutes) to the nearest bus station. Short and irregular time allocations for daily activities lead to fragmented space–time activity patterns and reduce the quality of life for social housing groups.

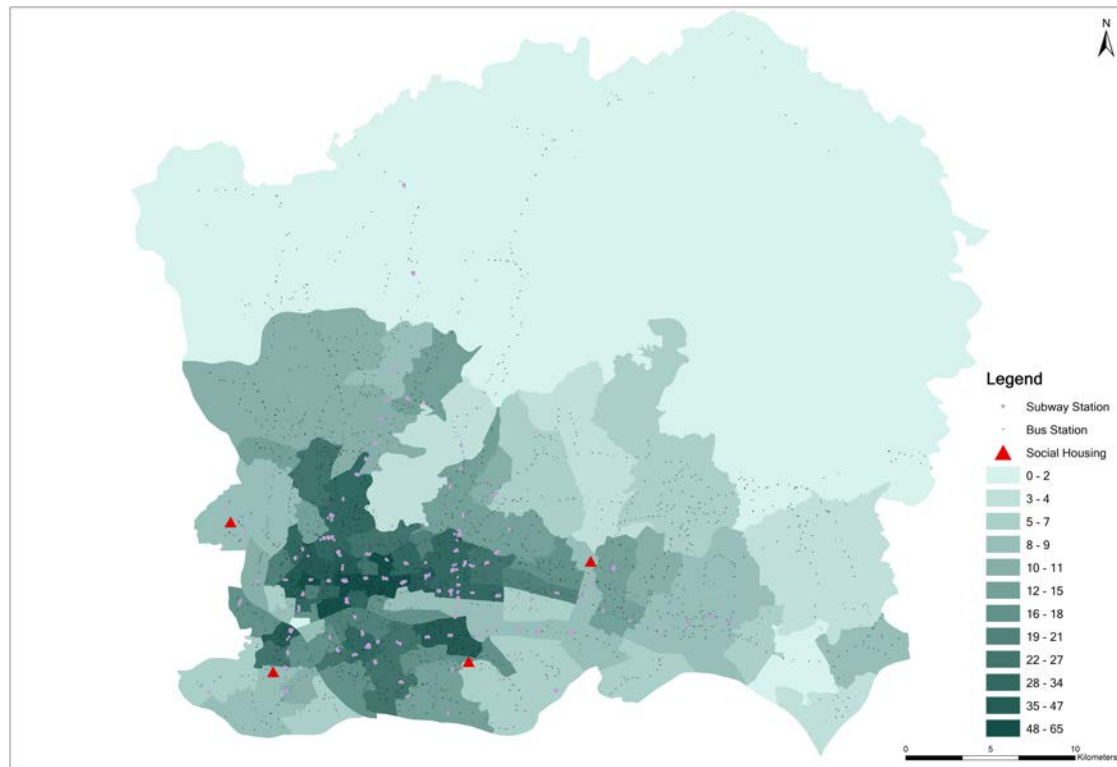


Figure 6.11 Density of public transportation facilities in Guangzhou

Source: Compiled by the author

Shortage of critical public transportation facilities poses an increasing threat to people's health and happiness (Downing & Patwardhan, 2005). Table 6.1 reveal that the density of bus stations within a 500 m range in the Guangdan area is merely 0.418, while provision in the other three cases is approaching 0.96. Nevertheless, the expansion of transportation networks to the outskirts of the city continues to experience disruption partly because of the mismatch between population increase and public service. Such disrupted transportation adversely affects public health, safety, security, and wellbeing (Grenier, 2001; Auld et al., 2006). The interviewers experienced how the lives of families on Guangdan and Jinshazhou housing estates were at risk because of the absence of taxi or bus service that can take them to public hospitals in case of emergence. This situation also leads to a loss of services and accessibility to urban

resources for social housing residents. In this sense, spatial disparities worsen the discomfort of disadvantaged social housing residents as caused by poor accessibility to workplaces and the fragmentation of space.

Table 6.1 Density of bus stations within the range of 500m neighborhood

Community name	Jinshazhou	Fanghe	Jude	Guangdan	Total
Number of bus stations	11	7	11	3	32
Density of bus stations (500m)	0.965	0.992	1	0.418	N.A

Source: Compiled by the author

6.3.3 Provision of community facilities near social housing neighborhoods

Most local governments in China have treated the provision of low-income housing as a political task and have focused on pursuing this agenda from a quantitative perspective while neglecting the quality of life. The Guangzhou municipal government is no exception. The total number of dwellings and the proportion of low-income housing supply to the overall housing provision are emphasized without accounting for the location and service facilities of a housing estate. As a result, local governments may choose to build housing in the suburbs to reduce the effort of vacating occupants and completing the task with little financial investment.

The original concept behind social housing neighborhoods is to provide a balanced and self-contained community that involved promoting the concept of job–housing balance and reducing the commuting time of residents on the outskirts. However, in fact, this initiative has created a cluster of disconnected communities that fail to facilitate casual social interactions and has forced residents to spend more time commuting at a high cost. Although nearby commercial and retail facilities, as well as street-level shops often provide job opportunities, most employment opportunities are still concentrated in

urban centers. The lack of appropriate jobs for residents with a low skill level forces them to travel to these centers on a daily basis.

No planning standard and guideline of public facilities for social housing community in terms of provision and allocation is the root cause of insufficient supporting facilities and longer travel time for social housing residents, according to the interview in Guangzhou on July 2015 and the news published on the official website¹⁴. They have to rely on district parks, shopping areas, public meeting spaces (Figure 6.12), and healthcare and educational facilities (Figure 6.13) at the city level associated with the construction of social housing communities. However, the provision of public resources amenities is imbalanced and unequally distributed. To some extent, it is hard to share the benefits from public facilities and urban resources for social housing residents.

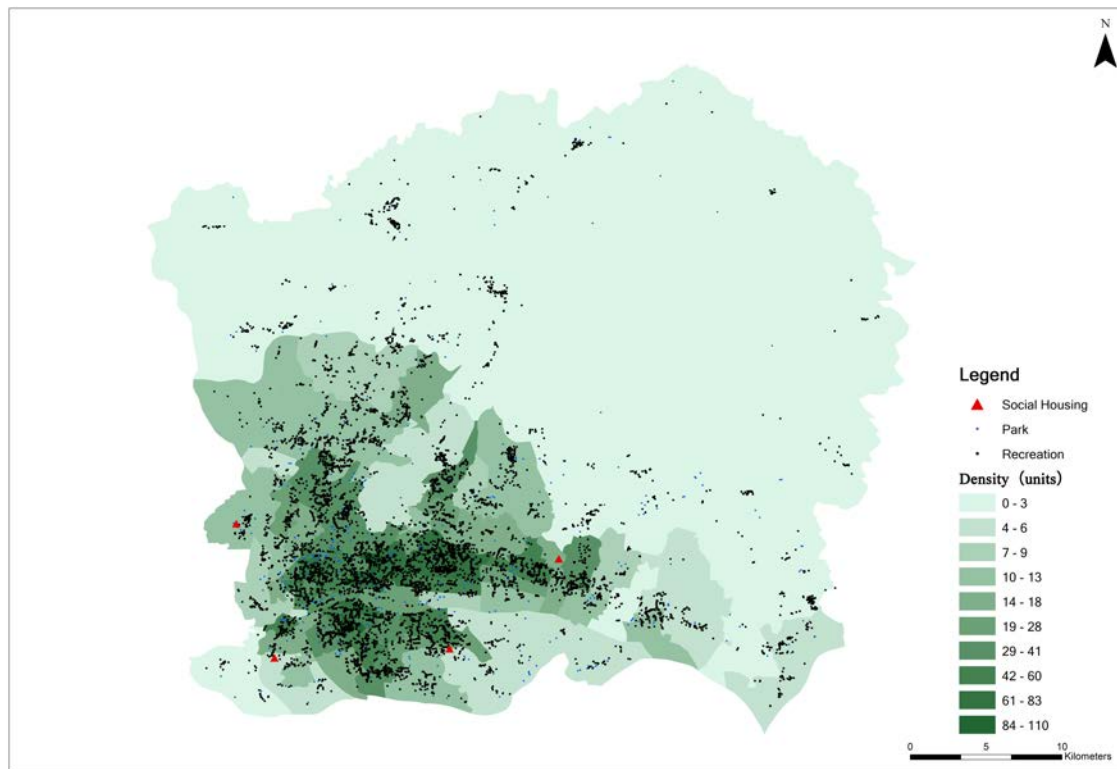


Figure 6.12 Density of parks and recreation areas in Guangzhou

Source: Compiled by the author

¹⁴Guangzhou Land Resource and Housing Management Bureau, 为群众出行解忧保障房项目周边市政道路建设纳入城建计划, 2013, available in http://www.laho.gov.cn/xwzx/bjdt/201309/t20130927_380291.htm

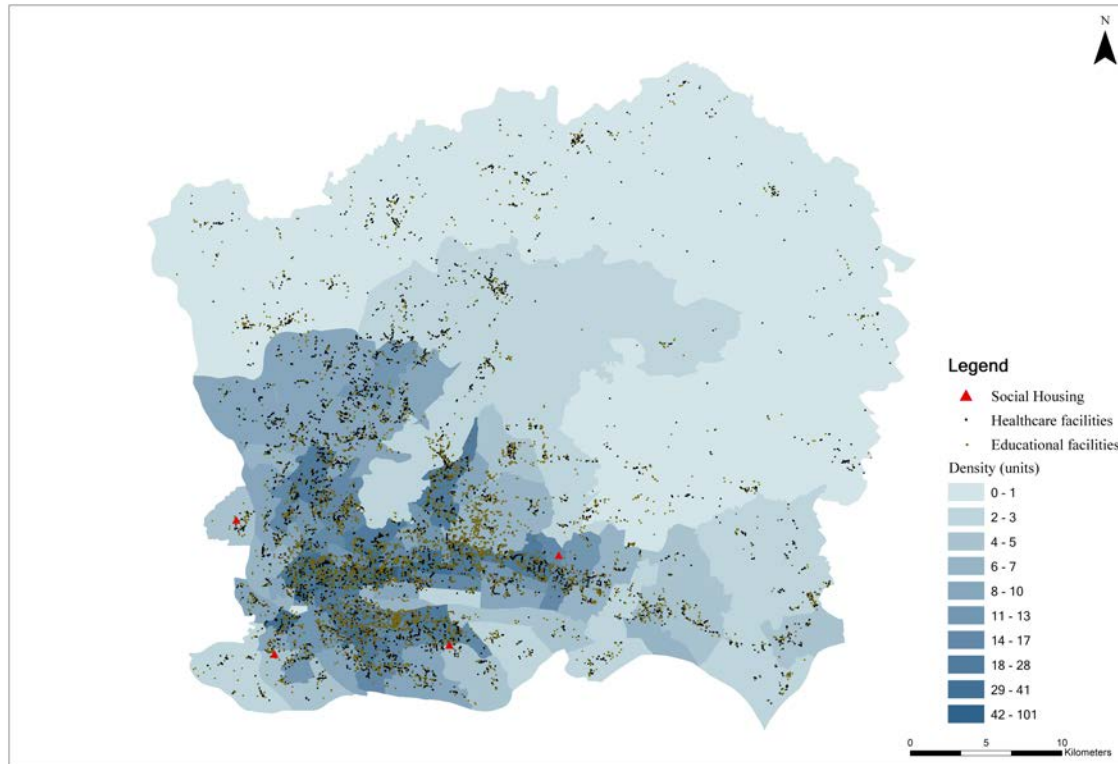


Figure 6.13 Density of health care and educational facilities in Guangzhou

Source: Compiled by the author

The community resources provided are insufficient and different from the planning documents they received from the Guangzhou Security Housing Office. As the interviewees who live in Guangdan housing estate for two years have suffered from a shortage of street-level retail stores within a 2000-meter radius, they have to visit itinerant hawkers (Figure 6.14). Furthermore, there were a considerable amount of community facilities, such as kindergarten, retail stores, and healthcare center, from the planning documents that concerns the community with an orderly development, but in the reality, economic determinants and political pressures are key factors influencing the provision of community facilities. Thus, they argue that they are the groups who are abandoned by the government and the society.

On the other hand, owing to the longer distance to recreational places, the public space within the community is the only place of daily life of residents (Figure 6.14). The limited usage of community public space, people's preference to see doctors in urban centers, and a school-age population that commutes to areas with improved educational

resources become a universal phenomenon of urban population who live in social housing neighborhoods. Nevertheless, the results indicate that the scarcity of community facilities both within and among neighborhoods as well as the disconnection with the central areas discourage social interactions and community building. This situation also reinforces residents' social and spatial isolation.



Figure 6.14 Daily life of Guangdan housing residents

Source: the photos taken by the author on 23 August 2013

Moreover, the varying population profiles of different communities significantly affect the utilization rates of neighborhood support and welfare facilities that are run by the social housing management. Communities with a large elderly population require many healthcare centers, but high-quality healthcare facilities are clustering in urban center. Therefore, to address the changing needs of a developing community, a standard planning guideline of supporting facilities for social housing community should be provided.

To understand the spatial accessibility of the living environment for social housing residents, the actual travel time from one's residence to public service facilities was calculated through service area (SA) analysis (Figure 6.15) to measure the potential spatial accessibility of public community facilities (including commercial facilities, recreational facilities, parks, educational facilities, healthcare facilities, and bus stations). On the basis of a standard 30 minutes of travel time via pedestrian walking (equivalent to a 5 km/hour radius), areas were categorized into six zones with five-minute increments. Figure 6.15 implies that the smaller size of service area, the spatial

accessibility of public community facilities is better. That means the individuals can access to a variety of community facilities within a smaller range where the density of transportation network and community facilities is high. The service areas of JSZHE, JDHE, FHHE, and GDHE measure 6.7688, 6.9692, 9.0578, and 8.3401 km², respectively. JSZHE and JDHE have been developed for more than five years. Therefore, the transportation network systems in these areas have undergone remarkable changes in terms of road conditions as a result of urban expansion. The 30-minute service areas for these two housing estates are smaller. When the transportation network and facilities provided in FHHE and GDHE are insufficient, the size of the 30-minute service area increases and the mobility decreases.

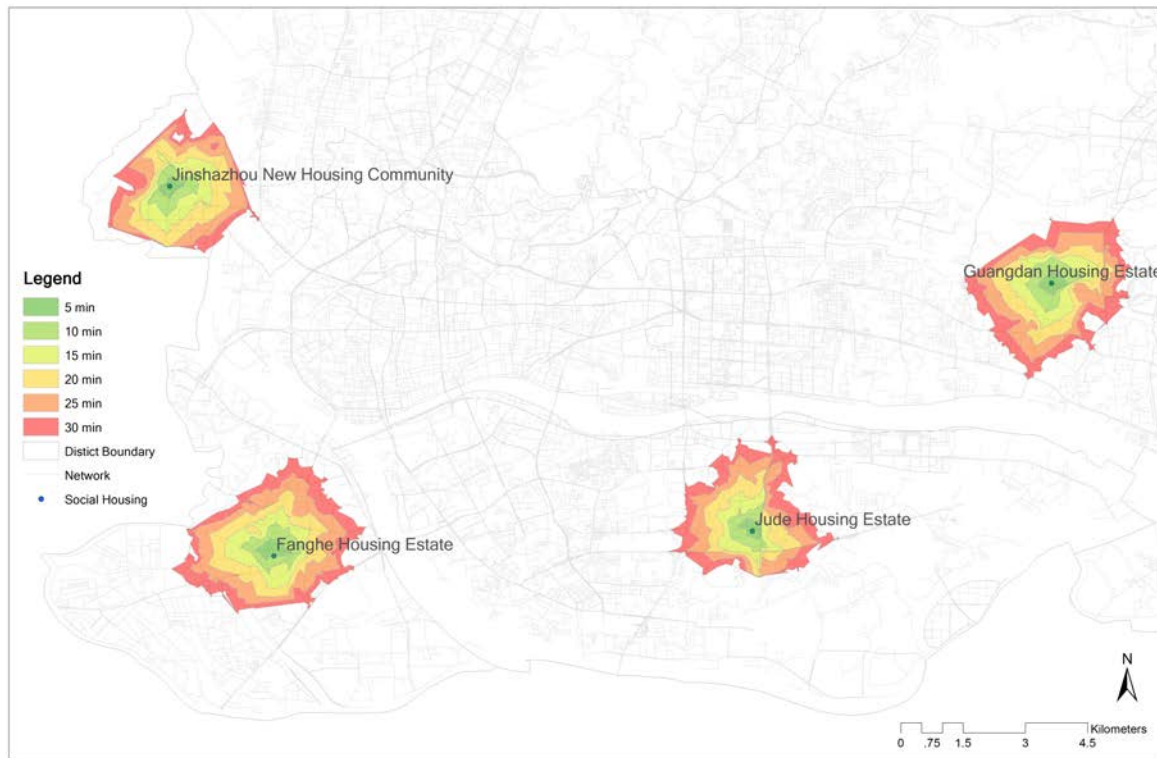


Figure 6.15 The 30-minute service area to public service facilities

Source: Compiled by the author

An individual's access to facilities varies in terms of space, income, and other built environment factors. However, the distribution and implementation of community facilities varies widely among four selected social housing estates (see Appendix One). The general characteristic is that the amount of community facilities within 15-20-minute, 20-25-minute, 25-30-minute service area is substantial. The obvious difference

is the 0-5-minute and 5-10-minute service area where the provision of facilities directly affects the activity participation of residents. The inequity of facility supply is the result of the investment of local governments, the attitude of diverse governmental departments, and shortage of social housing planning standard and guideline in accordance with the interview conducted with the staff of GZSHO in July 2015.

In addition, Table 6.2 highlights one important issue in the planning of social housing projects, that is, the life cycle of a community. As for planning implementation process on the ground, the undertaking of GZSHO has not strictly comply with the requirements in the <Planning standards and guidelines of community facilities in urban residential area in Guangzhou (2005)>, even for the statutory items, because of financial investment and lack of communication among different involved official departments. This leads to insufficient provision of community facilities to satisfy residents' needs. More specifically, new communities generally face a shortage not only of retail shops and banks but also of kindergartens, primary schools, and sports facilities for children and youth. Neighborhood transportation and daily-life facilities are inconvenient in Guangdan housing estate. Only one fresh market is located within the 5 min walking distance, and 12 shopping places and 2 bus stations are located within the 5-10 min walking distance. Their residents sincerely hope that the community could have a kindergarten. However, despite the negotiation with GZSHO and relevant Guangzhou Educational Department since 2012, there is no kindergarten until July 2015. Thus, the current situation is different from their expectation and the information in the pamphlets provided by GZSHO (the interviews on August 2013 and July 2015). Compared with the developed communities, like Jude housing estate, the community facilities provided for social housing residents are sufficient due to city development and its location in urban core area.

Table 6.2 Comparative studies between planning standard of community facilities in Guangzhou and four selected cases

Facility	Items	Standard			Real situation			
		Land	Service	Setting levels	JSZHE	JUHE	FHHE	GDHZ

		requirement (m ² /place)	scale (10,000)	Territorial	District	Neighbourhood				
Educational	High schools	20000~30000	3~6	▲	△		✓	✓	✓	✓
	Secondary Schools	18000~22500	2.25~4.5		▲		✓	✓	✓	X
	Primary Schools	10000~20000	1~2.2		▲		✓	✓	✓	✓
	Kindergartens	1800~5400	0.45~1.6			▲	✓	✓	✓	X
Medical and Health	Health Centers	2000~3000	3~10		▲		✓	✓	✓	✓
	Community clinic					△	✓	✓	✓	X
	Specialist Clinic		10		△		✓	✓	✓	X
Cultural and creation facilities	Cultural center	1500~2000	3~10		▲		✓	X	X	X
	Cultural room		0.6~0.75			▲	✓	X	✓	X
	Sports center	10000~20000	3~10		▲		✓	X	✓	X
	Neighbourhood fitness	1000	0.6~0.75			▲	✓	✓	✓	X
Community Halls & Social Welfare	District Elderly Community Centers	No set standard	3~10		▲		✓	X	X	X
	Residential Care Homes for the Elderly	No set standard	0.75~2			△	✓	X	X	X
	Neighbourhood Elderly Centers	No set standard	0.6~0.75			▲	X	✓	X	X
	Child Care Centers	1200	1~1.5			▲	X	X	X	X
	Street office	No set standard	3~10		▲		✓	✓	✓	X
	Police substation	No set standard	3~10		▲		✓	✓	✓	X
	Community center	No set standard	3~10		▲		✓	✓	✓	X
	Neighborhood committee	No set standard	0.6~0.75			▲	✓	✓	✓	✓
	Property management cooperation	No set standard				▲	✓	✓	✓	✓
Post Offices	Post Offices	No set standard	1.5~3		▲		✓	✓	X	X
	Refuse collection point	160	0.6~0.75			▲	✓	✓	✓	✓
	Renewable resource recycling stations	No set standard			▲		X	X	X	X
	Toilets	No set standard	0.25~0.5			▲	X	X	✓	X
	Loading/unloading bay	>3500	5~10	▲			✓	✓	✓	✓

	Bus stops	1000~2500	1~5		▲		✓	✓	✓	✓
	Lay-by for taxis	300~500	1~1.5			△	X	X	X	X
Commercial facilities	Retail market (supermarket)	No set standard	3~5		▲		✓	✓	✓	✓
		No set standard	1~1.5			△	✓	✓	✓	✓

Notes:

- a) ▲ for statutory items, △ for non-statutory item.
- b) No set land area standard for the facility in this table is normally provided in a composite building, and detailed planning design is decided by specific cases.
- c) Neighborhood level: <500m, District level: <3000m, Territorial level: the same administrative district.

Source: Guangzhou Municipal Government, 2005; in combination of field observation

It is important to recognize that a disproportionate distribution exerts a considerable negative effect on the equitable provision of public facilities among urban residents, the creation of community vibrancy, and activity participation. The results of the five closest distance facilities depicted in Figures 6.15 and 6.16 illustrate the differences in the spatial accessibility of diverse closest facilities to two cases. As per an analysis of the distance to the nearest community facilities across two cases revealed that most households were proximate to the nearest community facilities, except for urban green space. More specifically, the average distance between residence and the closest commercial facilities (restaurants and retail stores) was 0.163km, while the average distance between residence and the closest urban park was 0.83km (more than 10 minutes on foot). In Jude and Guangdan housing estates, the distance was greater than 1.5km (20 minutes to the closest urban park) (Figure 6.16 and 6.17). Furthermore, the Jude, Jinshazhou and Fanghe housing estates around the communities are more vibrant, compared with Guangdan community observed from field trip, particularly in night time. Jude and Jinshazhou housing estates, where urban development can have significant and long ranging impacts, have longer development history. Thus, the built environment and lifestyle of these communities are more physically active. Comparatively, Fanghe and Guangdan housing estates are newer neighborhoods in that the deferment of planning implementation decreases the quality of living environment and dissatisfy residents' growing environmental aspirations. Essentially, the scope of activity participation of social housing residents in Guangzhou is restricted because those community facilities are unequally distributed in the community.

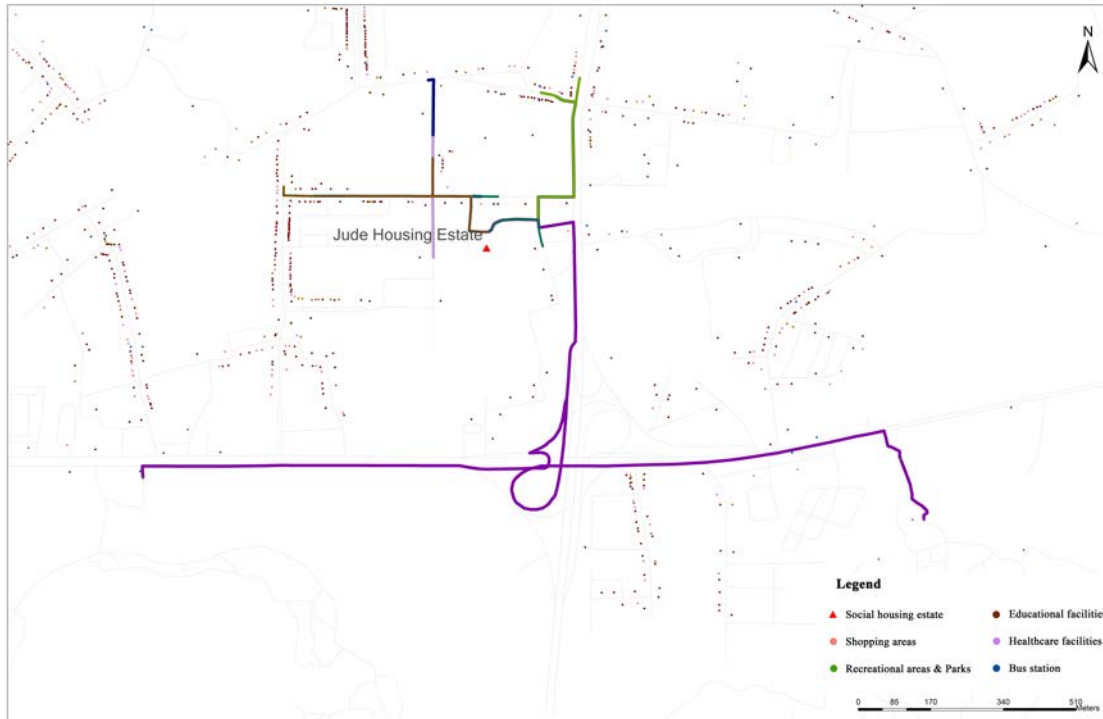


Figure 6.16 Distance to the five nearest facilities (commercial facilities, recreational facilities, parks, educational facilities, healthcare facilities, and bus stations) at the Jude housing estate (with older neighborhoods)

Source: Compiled by the author

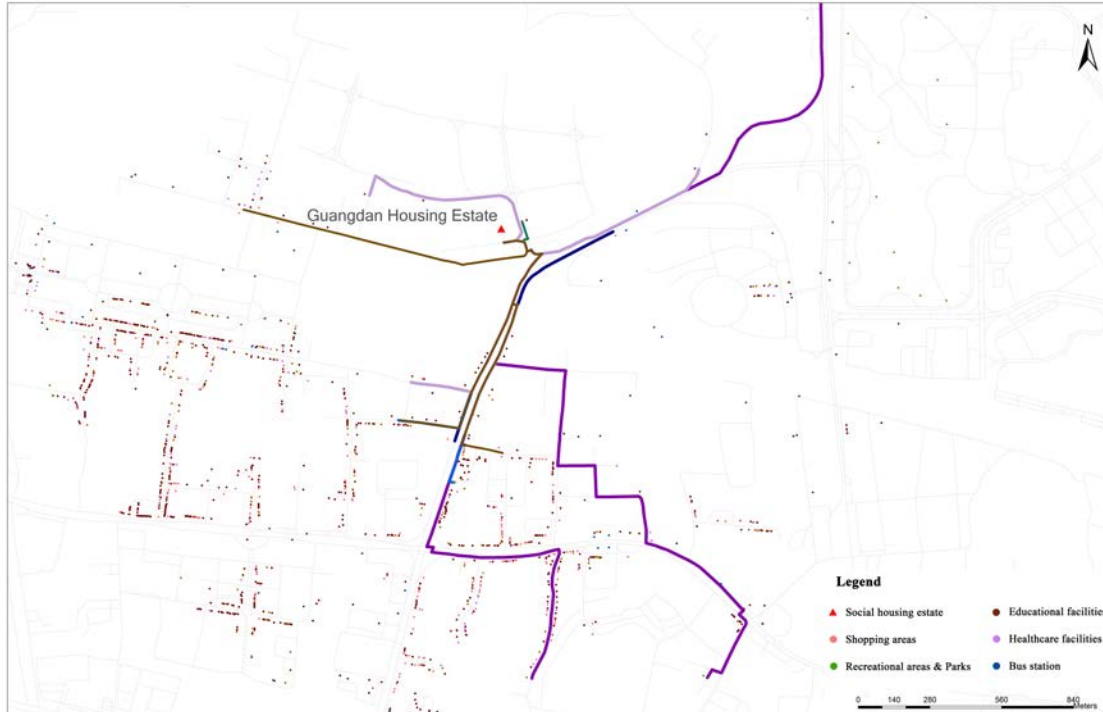


Figure 6.17 Distance to the five nearest facilities (commercial facilities, recreational facilities, parks, educational facilities, healthcare facilities, and bus stations) at the Guangdan housing estate (with newer neighborhoods)

Source: Compiled by the author

Social disadvantage and proximity disadvantage are strongly linked (Dodson et al., 2006; Dodson et al., 2007). The lack of access to basic services (social disadvantage) is positively related to proximity disadvantage; a sociocultural context increases social housing residents' mobility disadvantage; and public facility reliance increases immobility. A public facility disadvantage limits discretionary activity participation by social housing residents, particularly those who live in the new housing estates that have been developed for less than five years, such as Guangdan housing estate.

6.4 Institutional involvement

6.4.1 Effects of local governments involvement, job-housing imbalance and mobility

With the interaction of the socialist land and housing market legacy with the new market-oriented system, the local governments contribute to play an important role in housing supply and spatial production of urban China (Wu, 2002). State dominance is behind the policy making prior to social housing planning and spatial production (Wu, 2015). This scenario is especially true in the case of low-income families, who face 'passive' job-housing relocation and mismatch while the market-orientated parts of the system play an active role in job relocation for people. Low-income groups who depend on new social housing provided by the local governments, often at locations far away from their workplace, have experienced job-housing imbalance issues to a different extent. As a result, housing provision leads to the growth of commuting demand and commuting time (Wang & Chai, 2009; Zhao & Lv, 2010).

The local governments play an active role in housing relocation for social housing residents. The key issue in terms of welfare housing policy concerns the level of governments that should be involved. The central government implements a broad-based redistributive policy that can enhance the fairness of the mechanism (Zeou, 2009). The central government of China has endeavored, since 2010, to construct social housing on a large scale using a top-down approach. Facing this sudden burden, many local governments are puzzled about how to resolve land and finance issues to support large-scale public housing. The devolution of social housing development and state

rescaling from central government to local government has created a different attitude toward social housing development and tensions between them. The central government focuses on social stability, while local governments, identifying the potential in land-based interests (Ma & Wu, 2004), are more entrepreneurial. Guangzhou municipal government merely enforces the political instruction from the central government, but ignoring the 'quality of life' issue. Therefore, this initiative leads to the concentration of social housing projects on the urban fringes. As a result, those who reside in social housing provided by local governments currently tend to have a longer commuting time than before they moved into new social housing estates.

To some extents, the failure of social housing policy implementation is attributed to the top-down approach, which was adopted as the only way to construct social housing in China (Huang, 2012; Dang et al., 2014). Since 1986, a large amount of free land has been allocated for the construction of social housing in Guangzhou, and land has been offered at a discounted price for build-for-sale schemes. This situation illustrates that politicians display much concern for livelihood issues, particularly that of housing low-income households. However, unlike in Singapore and Hong Kong, economic development has remained the top priority for local governments in China. Most of the local government finances come from locally-controlled resources and locally-generated taxes and charges, rather than the former grants from the upper-level governments (Xu et al., 2009). The real estate sector has been regarded as a major economic sector, which has become the primary source of fiscal revenue for local governments (Lin & Yi, 2011).

The Guangzhou municipal government is driven by the mechanism of land incentives to promote GDP growth, rather than to develop social housing under this Socialist political system. According to an interview with staff in GZSHO, a total area of 695 hectares of land was reserved for public housing between 2009 and 2013, but finally only 285 hectares (41 percent of the total reserved land area) were used for social housing development, since many reserved land plots were allocated for commodity housing developed (Interview with GZSHO officer). The remote location of social housing in the inner suburbs and outer suburbs area is a result of the local government that concerns

itself the efficient enforcement of the political orders of public housing provision from the upper level governments, without the consideration of intention and needs of the low-income households.

The location of social housing projects decided by the local governments determines households' access to public services, including education, as well as neighborhood quality. A housing program that is well designed or not may otherwise lead to its beneficiaries becoming socially isolated and having poor access to job opportunities. However, most housing policymakers have neglected the spatial issues (Zenou, 2012; Wang & Muire, 2011), and overlooked the needs of residents, such as traveling to work, accessibility to healthcare and educational facilities. Inadequate public service and deferred planning implementation of social housing neighborhoods is a result of the local governments attitude toward social housing development and livability issue (Wei et al., 2015). In contrast, the social housing residents' intensity and extensity of activity pattern have direct relationship with the built environment provided by local governments, for example, Fanghe housing estate and Jude housing estate. The disadvantaged households have no alternative but to accept the arrangement passively. In this regard, social housing programme has long-term effects on the spatial relationship between housing and workplace, thereby influencing the social composition and vibrancy of neighborhoods (Wu, 1996).

6.4.2 Housing management system and job accessibility

The most important issue related to the implementation of housing policies is the application of a well-organized management mechanism to ensure that public housing resources are equitably allocated to those people who need them most and to treat all households equally according to their needs (Branch, 2007). However, distributing affordable housing to needy and qualified residents equitably is a significant challenge for the current governments of China, especially in the context of housing marketization reform. Local governments who face painful problems of massive immigration are required to provide housing for migrants (Fan, 2001). In China, the household registration system that is a unique product related to workers' housing occupancy and

job accessibility (Zhao & Lv, 2010) makes social housing provision more complicated. More than 4 millions new migrant workers and new graduates living in Guangzhou for over 6 months are non-registered population in 2013, and 600 units of public rental housing each year¹⁵ is planning to satisfy their housing need. This situation encourages more migrants to concentrate in the suburb areas where the long distance to their workplace and insufficient transportation services generate immobility and job-housing imbalance.

As per the critical review of the management organization sub-committee in Chapter 3, Section 3.3.2, scientific decision-making advisory committees and relevant stakeholders, such as representatives of low-income groups, are not involved in the housing policy-making process. According to < Urban and Rural Planning Law of the People's Republic of China > issued in 2007, Article 26 declares that before filing an urban and rural planning for examination and approval, the planning authorities shall announce the draft of planning documents to the public, and collect opinions from experts and public consultation by means of verification meetings and public hearings. The notice shall be announced for at least 30 days. However, through reviewing the historical notices on the official website of GZSHO, seldom plans have been published to the public, which lead to deficiency in public participation in the formulation of social housing plans. Furthermore, public participation takes place only after the formulation of plans, not before it. This is associated with social housing approach that the buyers do not have the right to determine the purchase of social housing estate before the planning formulation. Third, the social housing planning decision-making process is not open and transparent, but solely decided by the local governments. In the absence of formal institutions to monitor the public participation process, the relevant housing institutions do not strictly comply with the law (Zhou & Yan, 2005).

The participation of the public in the plan formulation process is minimal. Neighborhood committees cannot comprehensively express the voices of all the groups living in the communities as the representative of local residents because the

¹⁵ <http://www.askci.com/news/chanye/2015/01/26/174231s7d6.shtml>

households living in rental housing are unable to join such committees given their housing status. In essence, the stakeholders at the neighborhood level, such as low-income families, are absent. This shortcoming of participation and decision making in the policy-making process results in the lack of a channel through which such groups can express their opinion on the difficulties of their living conditions. As a result, many social problems have already emerged in new social housing estates, such as high unemployment rate, high transportation costs, social segregation, and urban poverty.

6.4.3 Funding resources, land provision, job-housing imbalance and mobility

The public resources used to implement projects are divided into two categories, namely, land and finance. Two types of funding resources are provided: the Housing Provident Fund (HPF) established in 1994 and financial support from the municipal government. To ensure sufficient capital for indemnificatory housing projects, the municipal government of Guangzhou has increased its fiscal input. At present, 13% of the yearly net profit from land lease should be used for the construction of social housing, which represents an increase of 3% points from the original 10% (Guangzhou Municipal Government, 2011). In addition, a proportion of premiums from land lease should also be used for the construction of social housing. Efforts have also been exerted to explore the possibility of setting up financing platforms and expanding financing channels.

Nevertheless, these funding resources are subjected to considerable pressure. Currently, some of the subsidized home ownership schemes in cities of China are directly developed and implemented by the local governments while others are established by private sector developers. Most of these developers are state-owned enterprises. Furthermore, with the exception of construction cost, the municipal government taken on the high cost of arranging for the relocation of affected households, as well as annual maintenance cost.

Major cities in China, such as Guangzhou, initiated a rapid urbanization process in the early 1990s. The real-estate sector has served as a major economic platform for all such

cities. The sector has also become a primary source of fiscal revenue for local governments. In the process, the construction of public housing has been neglected. Reports have shown that 69.4% of the 2010 fiscal revenue of local governments throughout China was derived from land-transferring fees. This scheme is the so-called “Land finance” scheme (Lin & Yi, 2011). Moreover, the land quota of the incremental construction for Guangzhou is small and is strictly restricted by the central government to protect vital farmland from occupation. Promoting large-scale public housing development under the context of new-type urbanization is challenging; the director of GZSHO revealed during the interview that prior to 2008, the land used for social housing was only approximately 200 hectares. It indicates that the land sources for social housing development in Guangzhou are unstable and arbitrary.

The significant emphasis on the quantity of social housing developments constructed over a short period coupled with the unstable funding and land resources contribute to the current ineffective housing management structure. With poor fiscal support, management, and planning, cities are effortlessly overwhelmed by urban problems of congestions, unregular sprawl, not just in slums but creation with the placement of social housing estates in disadvantaged locations (Figure 6.18). Furthermore, the disconnection between the central area and the urban fringe as well as the insufficient supply of public infrastructure and services negatively affect the residents in terms of using the city space and urban functions. In this regard, the disconnection may generate a spatial cluster of low-income groups with reduced social mobility. The shortage of employment and the centralization of job structure have aggravated the job-housing imbalance.

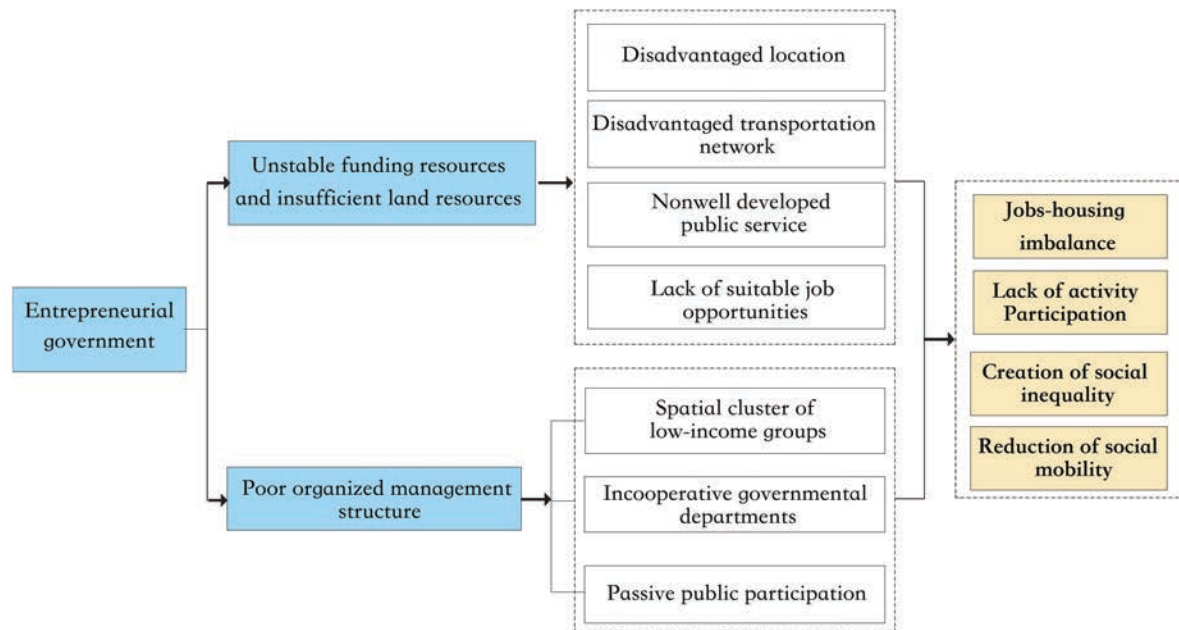


Figure 6.18 Effects of institutional factors on social housing development

Source: Compiled by the author

One specific problem that has received much attention but has not been subject to sufficient systematic analysis is the discriminatory site selection practice in the development of social housing projects, especially in communities that accommodate more than 30,000 people. 20 new social housing projects constructed in 2013 are located in the edge of inner suburb areas, like Longgui housing estate and Renhe housing project. It is partially because local governments often prefer to build housing in the suburbs to avoid the effort and expenses required for vacating the existing occupants and to accomplish this task with little financial investment. These governments ignore long-term quality and housing management services; as a result, low-income residents reside in areas that are far from employment opportunities and lack efficient public transportation and public services.

6.5 Summary

This chapter investigated the causes of the job-housing imbalance among the social housing residents in Guangzhou, and how such imbalance is affected by spatial restructuring, residential context, planning approaches and institutional involvement.

First, the effects of urban spatial restructuring and housing transformation in Guangzhou on residential pattern and job structure were analyzed. Subsequently, the process through which the planning approach has influenced the job-housing imbalance and the limitations imposed on everyday activities at the community level were examined. The chapter has highlighted the hegemonic power of the local governments over spatial production has been paid during the social housing development process.

Urban spatial restructure results in social housing development as well as the changes of inherent structure of human activity and travel behavior in Guangzhou. The spatial restructuring adopted by adjustment of administrative division and residential suburbanization contribute to residential differentiation as well as the residence and workplace interaction in accordance with housing tenure, quality of dwelling, and employment location. Though urbanization process leads to job decentralization, a large number of social housing groups have difficulties in finding suitable jobs in the vicinity.

The discriminatory site selection practice observed in the social housing projects display distinctive land-use patterns within their administrative geographical areas, affects the shaping of the socio-spatial structure of the territory. The key outcome of this important initiative is that the disconnection between central area and urban fringe worsens the spatial segregation and reduces mobility of residents. The homogeneous function of these areas is the result of the highly insufficient job opportunities provided to residents living in the same area. Thus, an island that is completely separate from the city is being generated; this concept may have given birth to the so-called “Tin Shui Wai new town¹⁶” in Guangzhou.

¹⁶ Tin Shui Wai New Town is located in the northwestern part of the New Territories in Hong Kong. As of January 2008, this town has a population of 273,800 and is situated at 25 km from the city center. Some residents have suffered family tragedies because of the town's remote location, limited employment opportunities, and the high density of public housing estates. Tin Shui Wai has become known as an area where numerous serious family and social issues occur, including domestic violence, mental illness, and suicide. The accumulation of such events caused Mrs. Carrie Lam, the Director of Social Welfare, to label Tin Shui Wai as the "City of Misery" (悲情城市) in July 2006.

The planning approach analysis demonstrated that insufficient community facilities, and deficient transportation service contribute significantly to the restriction of daily activities. The service area analysis and the closest facilities analysis depict the unfavorable factors identified from the institutional and planning perspectives, inducing outstanding discrepancies between the needs of social housing residents and reality. The socioeconomic characteristics of these residents are indicative of their high dependency on public transportation and public services, a low-cost lifestyle, and labor-intensive job opportunities. However, the plan based on the original intentions of social housing project has backfired, and the spatial agglomeration of disadvantaged groups has had the opposite effect in this scenario.

Notably, the local governments still play an active role in housing relocation. The complex hierarchical administrative system of governments and the land-leasing system in China considerably complicate the development of social housing. The overly fragmented governance of social housing development has resulted in inefficient planning enforcement. Policy makers at distinctive management levels have neglected the basic needs of social housing residents in terms of provision of transportation and community facilities. Moreover, the significant emphasis on the quantity of social housing constructed over a short period coupled with the unstable funding and land resources contribute to the ineffective housing management structure and the reduction in quality of life. The next chapter provides policy implications and recommendations for the future of social housing policy making and social housing planning in Guangzhou.

Chapter 7 Policy Implication and Recommendations

7.1 Introduction

In the age of information and globalization, the economic structure has constantly been improving and upgrading while growth is increasingly driven by innovation instead of input and investment. The significant changes to social housing development in Guangzhou have affected the production and supply of social housing, and notable achievements have been made with the coverage of lower-middle-income households earning with 18,287 yuan/per year in 2007. From 1986 to 2014, Guangzhou has constructed 239,000 social housing units through measures such as lowest-rental housing, public rental housing, economic and suitable housing, price-capped, and housing rent allowances (according to the interview with the staff of GZSHO). In 2011, 77,177 low-income residents registered for social housing and other qualified households were allocated to address their housing difficulties.

Drawing on the findings in Chapter 5 and 6, this chapter presents the policy implications and puts forward recommendations for the future planning and development of social housing estates in pursuit of more socially, economically, and environmentally sustainable communities in Guangzhou. The recommendations focus on policy-related and practical aspects, such as planning, urban growth and management, but taking the behaviors of residents and daily activities in the living environment into account. Key principles of sustainable social housing development for addressing job-housing imbalance include 1) Transit Oriented Development (TOD) and mixed-land use (to increase job accessibility), and 2) Service Oriented Development (SOD) and the shrinking of social housing communities. All of these factors may significantly influence job accessibility and residential allocation for social housing residents.

7.2 Feasible solutions to address job-housing imbalance issues in China

The previous chapters indicated social housing development is strongly associated with land use pattern, transportation development, and planning approach in the city. The location of social housing estates is the most significant factor affecting job-housing imbalance and immobility for social housing residents. The findings in Chapter 5 indicate that the displacement of social housing estates to urban fringes result in two main outcomes for social housing residents: 1) job and housing imbalance as represented by long commuting distances and increased transportation cost; and 2) a restricted activity pattern that resulted in limited mobility and residential differentiation. Chapter 6 investigated the underlying and fundamental factors affecting job-housing imbalance and mobility from planning, transportation, and institutional perspectives; the results indicated that social housing neighborhoods, as a residential space, are functionally separated by the different types of land use in the city. As a result, residential differentiation occurs and connection to the existing transportation network is poor. Moreover, social housing policies in Guangzhou adopted a top-down approach wherein local government plays a predominant central role while public participation is limited. Hence, social housing in Chinese cities is somehow considered a “slum” that reinforces existing spatial disparities and worsens geographically concentrated poverty in the suburbs.

Therefore, this study of this dissertation recommends several planning and development strategies to realize sustainable social housing developments socially, economically, and environmentally for the lowest income and middle-lower income groups. These strategies can improve the current circumstances and facilitate future development (Table 7.1). Based on the lessons learned from conventional social housing schemes, the dissertation proposes the ideas for approaching social housing development with a “new emphasis” on sustainable urbanism. Emphasis is given to the aspects discussed in the following sections. Those aspects are fundamental for social housing development in Guangzhou, namely, urban planning strategies, transportation, built environment, and governance.

Table 7.1 Four aspects of proposed changes to social housing development in Guangzhou

	<i>Existing</i>	<i>New Emphasis</i>
Urban Planning and Strategies	Residential differentiation and isolated islands (Presented in Chapter 6, section 6.3.1 & 6.3.2)	The location should be near district centers or transportation hubs, or commercial centers → increasing job opportunities
	Not connected to overall city development (Presented in Chapter 6, section 6.2)	Transit Oriented Development (TOD) and Service Oriented Development (SOD) → reducing commuting time & increasing job accessibility
	Functional separation of residence by different types of land use (Presented in Chapter 6, section 6.3.1)	Mixed land use (living, employment, and leisure activities within the same compact area) → enhancement of job accessibility
	More emphasis on the quantity of social housing projects (Presented in Chapter 6, section 6.4.3)	New town approach; a vibrant neighborhood
Transport	Poor connection with existing transportation networks (Presented in Chapter 6, section 6.3.2)	Establish a well-connected public transport network → shorten travel time and cost → balancing working trips & nonworking trips
	Movement is restricted by transportation network and traffic issues (Presented in Chapter 6, section 6.3.2)	Mobility, accessibility, and seamless connectivity to transit stations → reducing fragmented trips
Built environment	Restricted activity pattern (Presented in Chapter 6, section 6.3.3)	Quality of life, happiness index, livability
	Isolated from some public services (Presented in Chapter 6, section 6.3.3 & 6.4.3)	Equal distribution of public facilities → promoting diverse activity pattern, Compliance with planning standards and guidelines
Governance	Local government plays dominant, central role (Presented in Chapter 6, section 6.4.1)	Stable land and financial resources → improving location, Focus on people-oriented, Enhanced collaboration and cooperation with diverse governmental authorities
	Limited public participation and consultation (Presented in Chapter 6, section 6.4.2)	Consultative approach to planning and design, with the opinion of citizens serving as an important input

Source: Compiled by the author

7.2.1 Urban Planning and Strategies

In China, the government provides social housing. The analysis of institutional approach reveals that the administrative intervention in the social housing planning program, particularly through land acquisition and fiscal support, directly affects the outcome of social housing policies, which echoes the contents of Section 6.4. A total of 1,000 appropriate daily commuting records presented in Chapter 5 have been obtained via a trace record across spatial and temporal scales based on how residents responded to changes in residence; these records explain the effects of urban policies on human activity. The findings of this study provide a better understanding of travel behavior at both neighborhood and city levels. The study proposes many planning strategies to enrich the future development of social housing in Guangzhou.

First, the integration of the concept of sustainable development with social housing development is a milestone for the sustainable built environment that is generated and serves as a catalyst for the establishment of a high-quality, transit-induced sprawl. However, as reported in Chapter 6, there is the economic inefficiency to designate favorable sites for social housing development. Despite the transformation of urban spaces from monocentric spatial structures to polycentric spatial structures during the 2000s, urban spatial development in Guangzhou is obviously concentrated in the central area. A single-center layout does not only lead to traffic congestion and rising travel costs for residents but also to increase energy consumption, the aggravation of air pollution, and rising economic costs. A highly dense city center induces many intrazone and interzone journeys every day from workplaces to residences and necessitates unreasonable commutes. Thus, the Transit-oriented Development (TOD) initiatives benefit neighborhood revitalization, improved transportation conditions, and the enhancement of built and natural environments (Arrington & Parker, 2001). Social housing estate should be located near district centers or transportation hubs in which much land is utilized or allocated for commercial activities.

Second, the TOD concept can be applied to maximize development potential. The development corridors can either follow the existing lines or to seek new and attractive

industrial areas that are conducive to high-intensity development. As reported in Figure 7.1, four development axes in Guangzhou are allocated for close connection with the city core area to facilitate urban expansion. In particular, many development hubs or industrial zones are established along development corridors. As described in Section 6.3.2, the built environment and the transportation network have detrimental affects on residents' travel behavior and activity participation. The investments on intensive urban construction, such as infrastructure and transportation, have the potential to create jobs and to reduce the negative impacts of poor transportation network. Furthermore, such areas should be functionally situated to accompany a social-housing community zone, which are likely to quickly affect the job accessibility. Therefore, the changes in the economic and spatial conditions of industrial zones alter the number of job seekers and increase the number of job opportunities.

Third, the mixed-land-use development strategy is a target of attacks against single land use pattern and auto-dependent travel (Krizek, 2011), which assists social housing residents in improving their perception of the quality of retail facilities and educational environment in the neighborhoods to reduce long commutes. Mixed-use community with more complete site design such as street crossings and sidewalks facilitates the vibrancy of community (Hess et al., 1999). Especially, this contributes to the spur of economic development in a social-housing community, including job growth; higher land use mix lower the household rates of vehicle travel for those living, working, and shopping within a transit station area (Cervero & Kockelman, 1997).

One approach to address this issue involves integrating social housing as part of residential development planning at the city level and as a component of comprehensive urban development. Living spaces are incorporated into commercial and physical spaces in the city such that the functions of housing, employment, and recreation, among others, are consolidated in the community of an urban fringe area. This approach inspires a vibrant social housing neighborhood where residents live and advance the shared norms and trust of the community and consequently, enhance job accessibility.

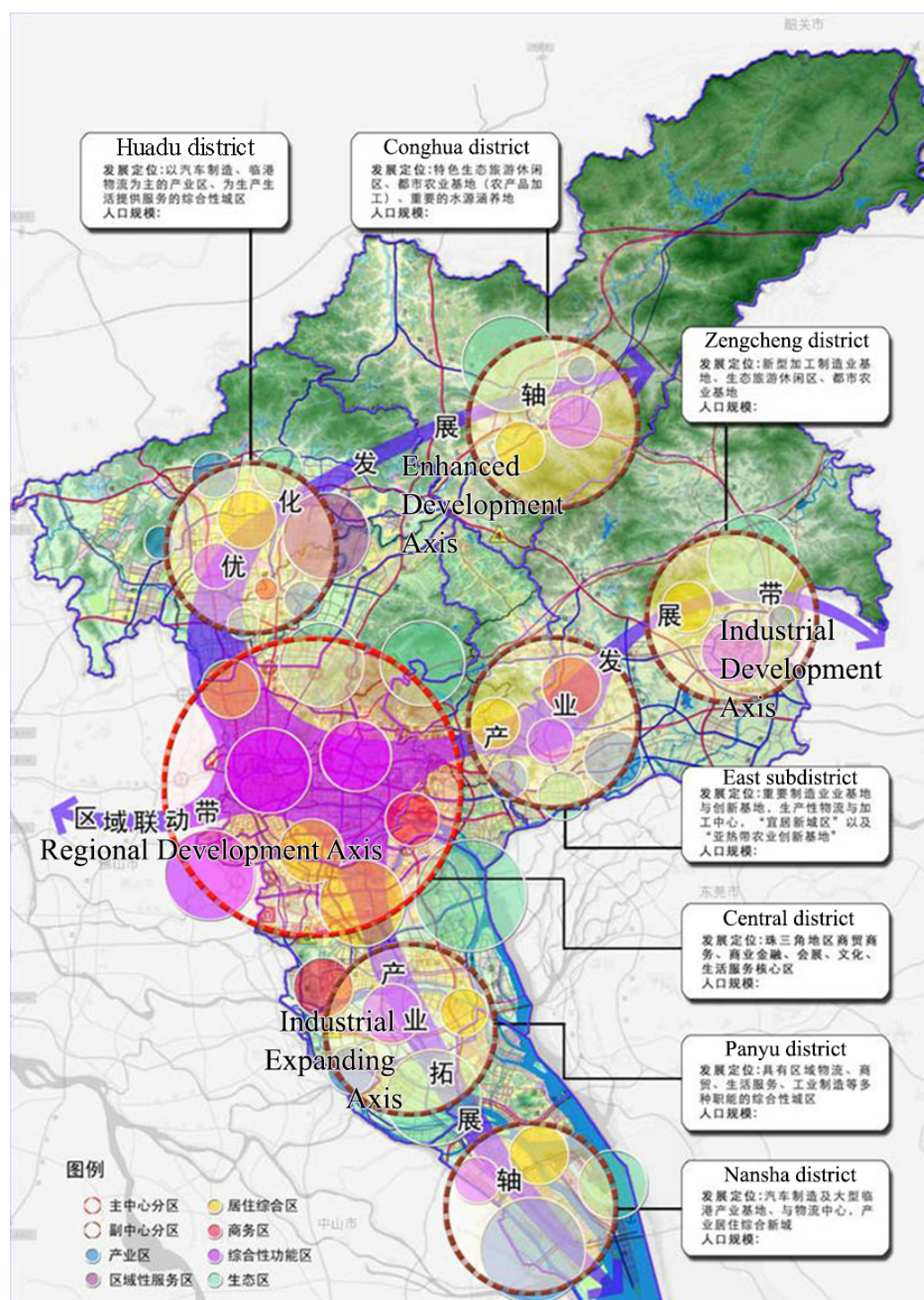


Figure 7.1 Urban spatial structure with urban functions in Guangzhou

Source: Guangzhou Land Resources and Urban Planning Committee, 2007

<http://upo.gov.cn/pages/news/bjxw/2008/309.shtml>

7.2.2 Transportation

The extracted typologies of human daily activity profiles in Chapter 5 (Figures 5.3, 5.4, 5.5 & 5.6) reveal that low-income groups, with passive residential options, in social housing communities are often more vulnerable to socio-spatial isolation than those in private housing. Furthermore, evidence recorded in Chapter 6 suggests that inefficient transportation network has been instrumental in commuting patterns for inhabitants and has contributed to long commutes, limited time with family, and a low satisfaction level for social housing residents in Guangzhou. The TOD initiatives, therefore, aim to address this issue because the sort of social housing residents rely strongly on public transportation, based on the statistical results presented in Chapter 6. Constructing mass transit infrastructures improves job accessibility in suburban areas, reduces the cost and time of transportation, and alleviates stressful commutes to work (Cass & Faulconbridge, 2016; Glaeser et al., 2001).

A mixed-use community enables residents to live near a transit service and to increase accessibility and seamless connectivity to job opportunities as well as to public facilities in the process as the desired outcomes of mobility (Still, 2002). The transportation network of TODs partly strengthens and inspires the generation between residential neighborhoods and the community (Calthorpe, 1993; Loukaitou-Sideris, 1993; Duaney et al. 2001). In order to reduce the fragmentized activity pattern and time wasted by working groups as examined in Section 6.3.2 of Chapter 6, it is encouraged to establish child-care centers and primary schools at or nearby transit stations.

7.2.3 Built environment and community service facilities

The scattering of job opportunities to achieve job-housing balance may require sacrificing the agglomeration of economic benefits. Nonetheless, large clusters of high-quality public services exert different positive effects, such as reducing inefficiency and social inequality problems (e.g. diminishing the need for school-age children to cross districts to attend classes and limiting the increasing need of healthcare facilities due to the growth of aging population), which echoes the contents of Section 6.3.3.

Rising transportation costs has put pressure on the living expenses of social housing families. According to the interview conducted with local residents, poorly staffed schools and hospitals in neighborhoods and environmental hazards are some of the factors that affect the success of poor young families searching for better quality of living and the positive attitude in job seeking. If a human being is distracted by scarcity, his/her mind and judgment constantly returns to it, and he/she is less likely to pay attention to the rest of his/her life (Mullainathan & Shafir, 2013). Mullainathan & Shafir (2013) also noted that scarcity reduces all the components of mental capacity, that is, the so-called *bandwidth*. As a result, people are less insightful, less forward thinking, and less controlled than normal. These researchers imply that all poor behavior and decision-making are consequences of long-term poverty and *bandwidth* shortage.

Based on the findings presented in Section 6.3.1, a single land use pattern and spatial mismatch exacerbate the lack of accessibility to jobs and the fragmentation of activity spaces. People's travel behavior likewise change with the built environment with which they were provided. Given the changes to public service facilities as highlighted in the National New-type Urbanization Planning (2014-2020) (Table 7.2), the central government revolves around improving the quality of life of urban residents. This plan aims to build a comprehensive society that is environmental friendly, economically efficiency and equal. Therefore, the distribution of urban public service facilities (especially basic education and healthcare facilities) in a reasonable and spatially balanced manner should be considered to alleviate existing spatial disparities in suburbs containing social housing neighborhoods. The increase in living quality eases geographically concentrated poverty and thus increases social mobility.

Table 7.2 Comparison of the elements of traditional urbanization and new-type urbanization

	Traditional urbanization	New-type urbanization
<i>Concerns</i>	The soaring number of urbanized towns; economic growth; urbanization of the industry and the land	The improvement in the quality of urbanization; additional concerns regarding the integrated development of economic upgrades, social progress, environmental protection, and cultural traditions; the improvement of quality of life for new urban residents; people-oriented urbanization
<i>Approach</i>	Industrialization and extensive expansion	The integrated development of industrialization; the application of IT; urbanization and agricultural modernization
<i>Spatial development mode</i>	Outer city expansion; focus on increments	Shift from increment to connotation; city clusters as a major form supported by comprehensive accommodating capacity and safeguarded by institutional innovation
<i>Financial support</i>	Land transfer income and land mortgage financing	Tax reforms
<i>Development mode</i>	Government-driven	Market-driven; policy intervention; public participation
<i>Public service</i>	N.A.	To promote the reform of the household registration system and the equalization of basic public services; to provide improved access to basic services

Sources: Summarized by the author based on <The National New-type Urbanization Planning (2014-2020)> , available in http://www.gov.cn/zhengce/2014-03/16/content_2640075.htm, access on 15 October 2014.

The comparative studies of community facilities between planning standard in Guangzhou and the real situation of the four selected cases in Chapter 6 has identified wide differences between community planning and planning implementation. The equity of public facilities is a global strategy. The public facilities and community welfare centers within social housing estates should function as neighborhood amenities for diverse groups of people in the long run, rather than as facilities for low-

income estate residents for the short term only. Targeting social housing residents constrains alone the quantities and types of facilities offered because of the limited population over a short period and the compliance with planning standards. Therefore, adequate community facilities should be prioritized from the beginning of planning. The urgent demand for such supporting facilities is evident not just in Guangzhou but also in other cities in China. In addition, such a target also restricts the activity pattern for residents of social housing estates due to a shortage of public facilities. Thereby, the public facilities and community welfare centers in social housing estates should be planned and targeted for developing a long-term community.

7.2.4 Enhanced collaboration and consultative approach

As stated in Section 6.4, the existing top-down governance mode limits the cooperation between the Guangzhou Housing Security Office and the other relevant departments, such as the Bureau of Human Resources and Social Security of Guangzhou Municipality and the Guangzhou Urban-Rural Construction Bureau. Thus, improved collaboration and cooperation among diverse governmental authorities to incorporate frontline inputs into the planning and decision-making process involves drawing up pre-arranged plans against any associated risk and maintaining stable employment. Local governments are better informed about local conditions and better able to judge which households are the most needy.

Under the ideology of the National New-type Urbanization Plan, the transition from increment planning to inventory planning is a new concern that makes urbanization policies more people-oriented and more productive (Wang et al., 2015), and breaks the institutional barriers of the planning system in China. In Urban Master Planning, the planning scenarios for a residential area facilitate housing development and restriction of excessive urban sprawl in a city. Social housing as a means of urbanization of transferring migrants to a new urban life should be considered as part of Urban Master Planning that related to job structure and housing relocation.

Based on the principle of “people-oriented urbanization”, the National New-type Urbanization Plan emphasizes on improvement in urban public services for urban residents and balancing the urban areas and rural areas. This is beneficial to social housing communities. Adopting the approach of ‘new town’, social housing neighborhoods are recommended to integrate the planning of social housing into the current planning system (Figure 7.2). The creation of a comprehensive planning structure that integrates “Urban master planning – Residential area planning – Social housing planning” is pivotal in creating a livable and productive community with high living quality and high value of neighborhood resources (Chang & Liao, 2011). In addition to land use perspective, the amount of comprehensive planning approach has been taken into consideration on geographical distribution of activity and compatibility of different land use development in the social housing neighborhood. A combination of new town and an integrated planning structure that promote the improvement of community resources (land use pattern, transportation, and community facilities) can help create healthier and livable neighborhood and job-housing balance.

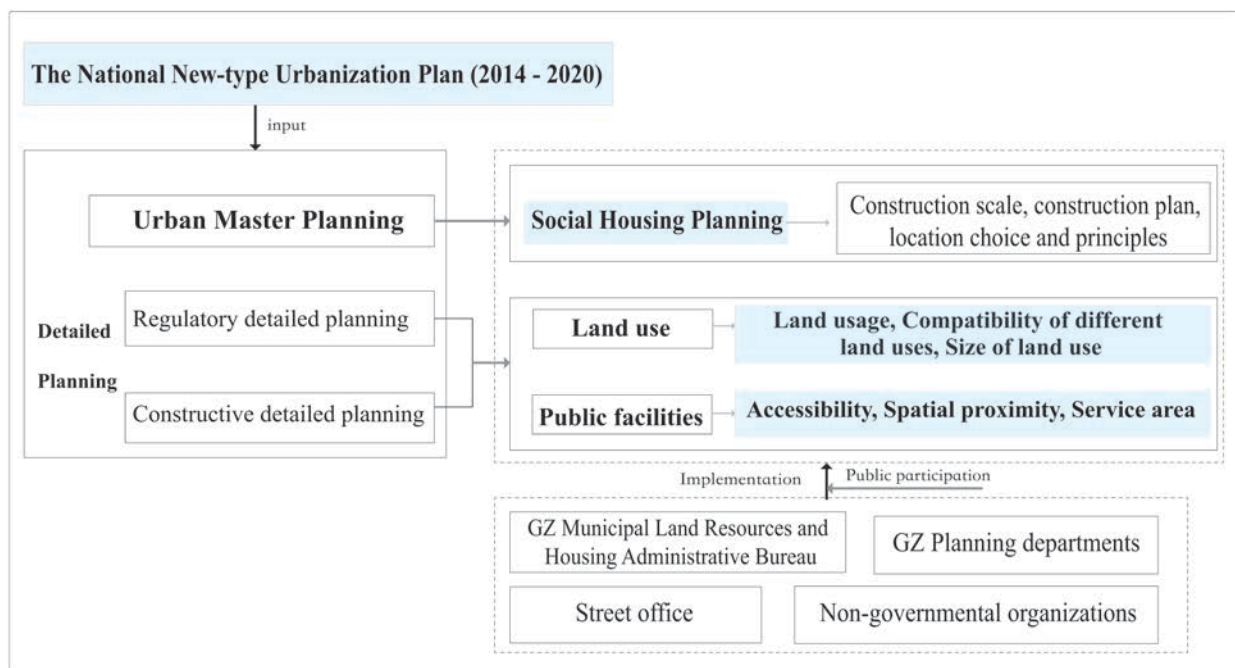


Figure 7.2 Integration of social housing planning into the existing planning system

Source: Compiled by the author

In the planning process, the central and municipal governments should solicit the opinions of residents. At the city level, the public is recommended to participate and to express their opinions on urban planning and social housing development. At the street level, street offices should consider motivating residents to participate through various types of social media (such as Wechat, Weibo, and QQ groups). Therefore, the status quo and conditions of community resources will undergo review and further analysis.

7.3 Attitudes toward different stakeholders

7.3.1 Commitment of the government and the prioritization of citizens

To put citizens at the center of policies, policy-makers and leaders must deviate from numerical indicators such as Gross Domestic Product (GDP) growth or urbanization level, which are often pursued at the expense of social benefits. Based on the experiences of Singapore and Hong Kong under a similar socioeconomic and urban context, governments are willing to accord increased priority to social housing development as long as it also brings about other social benefits, such as the attainment of political, economic, and social objectives in a city, and as long as these objectives can be achieved at low cost through social housing provision rather than the provision of other social goods such as education and public health (Chiu, 2010).

The commitment of the government and the prioritization of land and infrastructure development directly affects the availability and the development potential of residential sites, including those for social housing. The Government should endeavor not only to supply more housing, but also focusing on livability and vibrancy issues of the community. City leaders must be encouraged and rewarded for adopting responsible and sustainable practices, such as job-housing balance policies, in comprehensive planning for the city, for integrating job-housing balance into land use regulations, and for ensuring a qualitative balance in large-scale development reviews.

7.3.2 More considerations for job accessibility and mobility in the policy-making process from the land supply and fiscal perspectives

As the sites of social housing estates are likely to be in urban fringe areas, the provision of infrastructure and public transport to enhance accessibility is essential. Yet, this provision depends on the financial ability and commitment of the governments. At present, as elaborated in Section 6.4, the mode of governance is not participatory, and the decision-making process is bureaucrat led, which in turn led to the project planning being particularly beneficial to civil servants while depriving the right of the general population. Based on the unsuccessful planning practices of industry zones that rigidly match with residential zones, the government should pay attention to the rationally balanced allocation of public resources at the regional and city levels and to the formation of a fair basis for future development with substantial financial investment and long-term land provision development strategies.

The existing land-reserve system has not operated well since 2008 because Guangzhou has developed into a mature and modern city of China. Identifying suitable residential sites for implementing social-housing projects is not a straightforward task. Rather, this tedious and prolonged process requires the establishment of a constant and regular land-reserve system to ensure the effective implementation of social housing policies. Some preferential policies based on the current law and policies are proposed, such as abating the outlay of land transfer for social housing and establishing a land-reserve system for the long run. The government should consider urban development concepts with an emphasis on mixed-land use in developing sustainable social housing.

The national law dictates that all lands in urban areas in China are owned by the government and can be rented to the users only under a certain lease and conditions. However, the law does not indicate that the availability of land resources suitable for social housing development is unconstrained. In fact, the Guangzhou Municipal Government avoids buying back land that is already leased because the sale generates financial funds and physical positions with a favorable location that is either occupied or reserved for the commodity housing to increase government revenue, as in Hong

Kong (Chiu, 2010). The multifunctional role of the government necessitates the rigorous implementation of 5% land transfer revenues for social housing construction in Guangzhou according to the law. In the pursuit of revenue to support infrastructure and economic development, local authorities may be interested in revenue rather than social housing development. This initiative maintains the stability of financial supports for social housing development.

The mass construction of social housing projects during 2008 to 2013 was subject to political intervention and a top-down approach. The Guangzhou municipal government, particularly the Guangzhou Municipal Land Resources and Housing Administrative Bureau, focused on political performance. Rather, it seems to pay attention on the inobservance of the needs of the residents in the long run. To some extent, this focus exerted a negative effect on social housing development. Therefore, the balanced distribution of social housing programs in Guangzhou must be emphasized in combination with preferential policies to encourage steady financial support from the government through multiple channels of investment in social housing. This initiative promotes the good interaction of population assembly and public resources.

The manner of investing in the construction and maintenance of social housing estates must be addressed urgently by the local government. As previously discussed in Section 6.4, insufficient governmental investment in social housing development is the crucial factor for the unsatisfactory livability and lack of happiness of social housing residents. The local government should invest sufficiently in transportation to connect residence locations with the workplace. Furthermore, non-governmental organizations should be encouraged to participate in construction to facilitate active development and to fundamentally resolve the issue of insufficient funding for social housing development in cities. The increase in stable land provision and fiscal investment facilitates the well-being of the community as a whole and thereby increases job accessibility.

7.3.3 Social housing planning as more than a simple planning issue

The National New-type Urbanization Plan of China (2014-2020) mandates that more concerns have been raised regarding the integrated development of economic upgrading, social progress, environmental protection, cultural traditions, and the improvement in the quality of life of new urban residents. Guangzhou has no more remaining land resources for the construction of new social housing estates. From the planning perspective, the government is willing to deviate from conventional approaches to accept complicated and flexible methods. Thus, innovations should be encouraged to explore available urban spaces in central area (e.g. job rich areas for younger generation according to the space-time path analysis in Chapter 5). For example, social housing in Guangzhou should be developed further to renovate and restore old buildings or old *danwei* compounds. The locations of traditional *danwei* compounds are favorable and accessible, but the lack of sanitation and shared kitchens are not good enough to satisfy the increasing expectation from the urban population. Functional changes are recommended to convert these old buildings into suitable dwelling units to satisfy the preference of the younger generations to live and work in the city center and to balance employment and residence needs. In addition, abandoned factory buildings can be renovated into temporary residences for those who seek to rent a house in central area.

More publicity should be made to encourage city residents to actively participate in the construction and planning of social housing. Residents, local planners, and local jurisdictions should be positively engaged in the planning process, to oversee the apparatuses for planning in their neighborhoods, and to participate in community designs. This participation helps foster a stronger sense of belonging whereby all people benefit while diminishing the economic and residential segregations in Guangzhou.

7.4 Summary

Job-housing imbalance is a global issue, and it has an extraordinary influence to the urban society. In response to the recently re-emerging emphasis on social housing policies (public housing policy) in East Asia and other nations, the current study draws upon the key principles from sustainable development which indicates TOD and SOD

concepts to resolve the problems of job-housing imbalance and immobility in Guangzhou. The four proposed perspectives are urban planning strategies, transportation, built environment, and governance, to improve job accessibility and to enhance the living environment of social housing residents in the existing neighborhoods.

The Guangzhou government is urged to plan large-scale social housing projects in tandem with the growth of the population and social stability. The increasing recognition of government and the attitudes of planners and policy makers toward social housing development should not only consider housing needs but also the importance of creating suitable job opportunities as well as people's travel patterns in the urban fringe areas. More considerations for job accessibility and mobility in the policy-making process should be taken from the land supply and fiscal perspectives to improve the entire social housing planning process and to ensure high quality living environment for balancing residence and employment relationship. Social housing residents should be responsible and duty bound to positively engage in the planning and policy formulation process. The next chapter summarizes the major findings of this research, identifies its contributions to knowledge, and explores its limitations as well as directions for future research.

Chapter 8 Conclusions

8.1 Introduction

This dissertation was developed upon the groundwork of international social housing context and conceptual literature on job-housing imbalance and spatial mismatch. The main objectives of this study, as presented in Chapter 1, are (1) to evaluate the degree of job-housing imbalance and the commuting pattern of Guangzhou's social housing residents, (2) to examine the effects of social housing policies on the changes of residence and employment of social housing groups, (3) to identify the influences of social housing policies on the activity participation of the social housing groups, and (4) to explore the relationship between job-housing imbalance, travel behaviour and the built environment, and propose policy recommendations.

The four research objectives have been fully achieved through this dissertation, chapter by chapter. To develop a theoretical framework within which to better understand the relationship between travel behaviour and the built environment, Chapters 2 and 3 reviewed the literature related to both job-housing imbalance and mobility issues within the contextual changes of urban space in China. Chapter 4 described the research methods used in this study as per theoretical review and background. Thereafter, Chapter 5 and Chapter 6 explained the key findings from the quantitative analysis of the data collected from the four social housing estates in Guangzhou. Specifically, the analysis presented in Chapter 5 is related to the job-housing imbalance and mobility of social housing residents according to job-housing ratio, space-time path, regression modeling, and spatial analysis (referring to Objective 1). The relationship among residents' travel behaviour, spatial segregation, and their use of space and facilities in Guangzhou were also investigated (referring to Objective 2 & 3). Chapter 6 presented the influence of spatial restructuring, administrative intervention pertaining to land use acquisition and fiscal support, and planning approach on job-housing imbalance and immobility of social housing residents (referring to Objective 4). Chapter 7 provided several policy recommendations and planning strategies in relation to the findings (referring to Objective 4).

Chapter 8 presents concluding remarks of this study. Firstly, the major findings of this study were summarized. Second, the contributions and limitations of the study were presented. Finally, recommendations were made for future studies.

8.2 Summary of the major findings

8.2.1 Degree of job-housing imbalance and spatial characteristics of social housing residents

The average theoretical Job-Housing Ratio (JHR) of Guangzhou was at 2.03 in 2013, and this ratio appears slightly mismatch at the city level. However, the JHR is low in the outer suburb areas of the city. Furthermore, the degree of job-housing imbalance for social housing residents has been aggravated after transitioning into social housing neighborhoods. The key findings of this study indicated that the progressive erosion of the traditional links between workplaces and residences has been marked as a crucial benchmark in major Chinese cities, such as Guangzhou, with the implementation of housing reform and the development of social housing.

The survey data also reflect that occupation, marital status, and educational level affect workers' commuting behavior. Casual female workers travel more than their male counterparts because domestic service jobs are always available in the inner core areas. However, less job opportunities available nearby and lower income level result in more residents working far from their residence. Regarding the income level, the intra-zone commutes increases with income status, and higher-income respondents tend to have higher likelihood of commuting. Besides, residents' employment and daily activities are strongly correlated to commuting cost, including travel time and travel expenses. Different individuals report varying commuting times depending on the proximity of their residence to their workplace.

In addition, the findings reveal that the location of social housing estates was the most significant factor affecting job-housing imbalance and mobility. The passive relocation of social housing estates to inner suburb areas and outer suburb areas reflects the series of problems encountered by residents on the cusp of unemployment or changing

jobs and limited mobility. In addition to the comparative studies of spatial analysis conducted with urban residents of commercial housing estates, urban development strategies and residential relocation policies were the results of a longer commuting time and a restriction on mobility among social housing residents. The regression analysis shows that economic barriers affecting disadvantaged low-income groups and the passive options of their residence have aggravated their socio-spatial isolation in social housing communities.

The job-housing imbalance situation in Guangzhou has a detrimental impact on the life changes for both individuals and households in terms of distribution of activities and destinations. A locational disadvantage results in insufficient social contact among people, particularly household members, the reduction of activity range from weekdays and weekends, and spatial and social isolation from the central area of a city. Social housing residents usually last much longer than the other non-work activities on the basis of the previous analysis of work or work-related activities. In contrast, with regard to daily activities in weekend, the findings revealed the activity space of social housing residents mainly cluster in their neighborhoods, compared with urban residents (nonsocial housing residents). Furthermore, a locational disadvantage results in insufficient face-to-face social contact with other people because of long commuting distances given that much time is spent on traveling.

8.2.2 Influences of underlying factors

The analysis results for the underlying factors in job-housing imbalance indicate that government still plays an important role in residential relocation and social housing development. The spatial restructuring adopted by adjustment of administrative division and residential suburbanization contributes to residential differentiation, spatial mismatch, and the interaction between residence and workplace.

Single land use patterns and spatial mismatch attributed to rapid urbanization process in Guangzhou lead to low job accessibility and fragmented activity space. The extracted human activity profiles infer the relationship between the pattern of activity-based

human mobility and the urban context of Guangzhou. The disconnection between central area and the suburb areas worsens the spatial segregation and reduces mobility of residents. The homogeneous function of these areas is the result of the highly insufficient job opportunities provided to residents living in the same area.

The findings also highlight that, in order to understand the affects of job-housing imbalance and mobility of social housing residents in Guangzhou, it is important not only to understand the inherent socioeconomic and demographic features of the low-income people living in social housing estates, but also to identify the distinctive local context that results in the differences in social housing development at different development phases. The differences of transportation system connectivity in different social housing communities have significant impacts on the residents' mobility and commuting behavior. The more accessible to transportation facilities, the higher mobility they are. Likewise, the built environment in the older neighborhood provides better access to neighborhood activities and facilities. Nevertheless, the excessive clustering of high-quality public facilities in central areas and an inefficient transport network also socially and spatially segregate social housing residents from the central areas to the urban fringe; therefore, their 'quality of life' was undermined.

Administrative intervention on social housing planning programmes in terms of land acquisition and fiscal support has direct effects on the job-housing imbalance and immobility. The plans based on the original intentions of social housing projects have backfired, and the spatial agglomeration of disadvantaged groups has had the opposite effect in this scenario. In summary, the shortcomings of the existing planning system and spatial segregation have had an adverse effect on the disadvantaged, low-income groups.

8.3 Contributions to knowledge

This study has illustrated the attributes of job-housing imbalance of social housing residents in Guangzhou both quantitatively and qualitatively, at the city level and neighborhood level. While some of the findings can be understood as global phenomena

that can be commonly observed in disadvantaged communities in other countries, some are seen as specific to the individual case study areas. This research contributes to the current literature and body of knowledge in several aspects. First, this research has established an analytical framework for job-housing imbalance and mobility of social housing residents in Guangzhou. It attempted to answer some questions regarding exactly how social housing policies and planning designs affect human behaviour, how the separation of workplace and residence is shaped through the interplay of territorial/institutional tensions. This study adopted a holistic approach to pinpointing the underlying factors, namely socioeconomic characteristic, urban context, built environment and the corresponding rationales. The framework and the factors are more thorough than previous studies, enriching both spatial behaviour and urban geography research. The analysis is conducted based on examining the relationship between the built environment, planning implementation, and institutional involvement. The task ahead is to narrow the gap between theory and practice. This study represents an initial step in carrying out this task. Thus, the present work yielded practical findings and formulated recommendations to advance job-housing balance for groups that have experienced spatial disadvantage in Guangzhou and in other Chinese cities.

Secondly, this study contributes to planning literature by offering a new planning perspective on the enhancement of social housing development in major cities of China. The impulse of 'sustainable planning' is necessary to focus on the impacts of ineffective planning strategies, fragmented transportation network, and unequal public facilities distribution on the job-housing imbalance and immobility of social housing residents in sustainable urbanism research. The present study has filled the gap in traditional spatial measurement research by utilising ArcGIS tools to elucidate individual travel patterns at city and neighbourhood levels. This could deepen our understanding of the interaction between travel patterns and the built environment in Guangzhou. These research methods can be generalized for use in other Chinese cities and cities in other Asian countries in order to plan a sustainable social housing neighborhood and to optimize urban spatial structures.

Thirdly, this study filled the gaps observed in the local literature regarding job-housing imbalance and social housing in China. Previous work on the integration of job-housing imbalance and mobility into the social housing and planning fields are limited. There are no updated officially released data regarding urban residents' mobility and commuting characteristic in Guangzhou since 2005, this study contributes significantly to the empirical research in this field. Furthermore, many studies on policy research and on social housing policy formulation have rarely implemented the concept of job-housing imbalance. The current study was designed to understand the trip purpose, destination and duration happened in the daily lives of social housing residents that shapes the urban space, and to identify the key factors beyond the conditions of land use, transportation, and public facilities, that have been disregarded in recent literature. The spatial interaction between employment and housing during urban development is a novel direction for urban geography and urban planning research. Therefore, this study, on one hand, has significant implications for enriching the theory on the spatial interaction of housing and labor markets, and for enhancing urban administrative efficiency and spatial balance. These new practices in social housing development provide scientific insights into the relationship between housing development and urbanization. On the other hand, this study reported several novel research findings that facilitate diverse stakeholders to ascertain ways of developing sustainable social housing in China in future. The experience of Guangzhou in addressing job-housing imbalance and mobility issues can provide reference to other Chinese cities.

8.4 Policy implications and recommendations

The new research framework and findings allow stakeholders to ascertain ways of developing sustainable social housing in China in future, and provide some social and spatial foundation on achieving a safe and just community. Practical and critical factors of social housing development can be incorporated into the future policy directives to enhance the job-housing balance and mobility of the social housing residents in Guangzhou and other major cities in China. With reference to the findings, the proposed recommendations are as follows: 1) policymakers should take the residents' behaviours and activity participation in the living environment into account when formulating social housing policies; 2) the municipal government should modify its urban

development concept for transit-oriented development and mixed-land use to facilitate sustainable social housing development; 3) in view of the perceived need for equity and effective planning, service-oriented development has the potential to influence mobility among social housing residents.

The rise of income and living quality would facilitate overall well-being in society and hence increase social mobility. Not only should policy makers and planners consider housing needs, but also the importance of creating suitable job opportunities and people's travel patterns when formulating social housing policies. The comprehensively consolidating planning strategies can ensure equity and improve quality of life, as well as ensuring effective mobility and access to job opportunities for the residents of social-housing communities. The recommendations on social housing development help further foster a better community whereby all people will benefit, while diminishing economic and residential segregations in the future.

8.5 Limitations of the study and areas for future research

8.5.1 Limitations of the study

This study has several limitations despite the findings regarding the relationship between travel behavior and the built environment in social housing neighborhoods as well as its contributions to existing literature and policy recommendations. First, only four social housing estates were examined as cases because of time constraints and the cost of data collection. The four selected cases in Guangzhou may differ from other social housing estates in the city, or even those in other major cities. In addition, although the quality of the survey data was high, the attributes of the surveyed subjects in Guangzhou may not fully represent the population residing in social housing because of the comparatively small sample size.

Another limitation pertains to the research scope. This study focused on social housing residents that represent the disadvantaged, low-income group in Guangzhou. However, they merely accounts for a portion of the low-income groups in the city. Although the significance of job-housing imbalance issues for social housing residents is

acknowledged, the influences of this issue for other kinds of low-income groups is still a question.

Given the limitations and constraints of this study, several suggestions were postulated to ensure the research quality. To supplement primary data sources, particularly for the locals, qualitative methods, including in-depth interviews, were conducted to help trace the life-course events of residents (e.g. husband into work or not, change of job, wife into work or not, marry status). Furthermore, community-level information (e.g. population size, site area, provision and utilization of community facilities) was gathered during the research period. Finally, field observations and site visits were made to facilitate the ground research.

8.5.2 Areas for future research

In view of the limitations, the following suggestions are proposed for future research:

First, data regarding mobility information and socioeconomic characteristics on social housing residents in other social housing communities in Guangzhou and other major cities in China should be collected as supplementation and verification, particularly under the popularity of big data (e.g. transportation smart card and mobile phone data) that can gain more extensity of travel pattern of social housing residents at the city level. Comparison between different neighborhoods at city-wide range in Guangzhou should also be made through which a better understanding of social housing residents and their travel behaviors in Guangzhou can be achieved. In addition, a comparative study of social housing residents or low-income households in other Chinese cities and in other cities across different social and economic contexts, like Beijing, Shanghai, Chongqing, Hong Kong, and Singapore, should be conducted to explore the characteristic and implementation of social housing policies in the future.

Second, low-income households in China, whose accommodations are provided by governments, non-governmental organizations through in-kind products and in-cash subsidies, should be further explored. In that case, the suggestions and solutions for

achieving job-housing balance and fostering a sustainable neighborhood for low-income groups can be more comprehensive and constructive.

Appendix One Service area analysis for four cases in Guangzhou

Housing Estates	Time frequency	Shopping	Recreation	Health	Education	Public park	Bus station	ATM & Banking	Service area (km ²)
Jude	0-5 min	27	4	3	4	0	2	2	0.1672
	5-10 min	142	20	11	12	0	16	6	0.4334
	10-15min	176	23	14	14	0	20	12	0.8220
	15-20min	275	69	40	28	0	42	20	1.3375
	20-25min	343	75	56	31	2	42	26	1.7933
	25-30min	331	62	46	28	2	56	45	2.4158
Jinshazhou	0-5 min	16	0	2	2	1	4	0	0.1535
	5-10 min	179	18	8	13	0	28	5	0.5762
	10-15min	185	54	18	13	2	18	13	1.1560
	15-20min	52	10	3	4	4	10	1	1.8248
	20-25min	11	1	2	1	0	14	0	1.6910
	25-30min	14	3	0	1	0	4	0	1.3673
Fangde	0-5 min	52	13	6	4	0	8	4	0.2230
	5-10 min	68	10	9	15	0	14	6	0.6393
	10-15min	116	14	14	8	1	25	5	1.2114
	15-20min	251	11	6	11	0	32	6	1.9002
	20-25min	361	44	34	29	2	26	26	2.4899
	25-30min	253	38	27	14	0	20	16	2.5940
Guangdan	0-5 min	1	0	0	0	0	0	0	0.2091
	5-10 min	12	0	0	0	0	2	0	0.6902
	10-15min	52	7	9	10	0	12	3	1.1247
	15-20min	199	38	28	24	0	20	8	1.5089
	20-25min	279	50	36	22	0	24	24	2.1855
	25-30min	495	73	49	40	1	24	26	2.6216

Source: compiled by author

Appendix Two

Ref no of interviewee: □□□□

Survey on Current Situation and Features of Travelling Pattern of Urban Residents in Guangzhou

Date of interview: ____ / ____ / 2013

(dd) (mm)

Dear resident,

To facilitate *the Research on Current Situation and Features of Travelling Pattern of Urban Residents in Guangzhou*, I am sincerely inviting you to complete this survey regarding the living environment of your neighborhood. This research is conducted to understand the residence and job choice, commuting pattern, employment opportunity and working conditions so as to improve the housing policy and urban planning of Guangzhou city. This survey is used only for academic purpose. Please note that no name or address will be recorded. All the personal information will be kept confidential. You may take around 15 minutes to finish this survey.

Please answer the survey according to your genuine experience. Thank you for your support and cooperation. Should you like to know the result of the research, please leave your contact. If you have any question or comment, please feel free to contact Ms Chen at 134302

Ms Chen

Department of Building and Real Estate, The Hong Kong Polytechnic University
Hung Hom, Hong Kong

Corresponding Address: _____, _____, _____

(Estate) (No) (Street)

_____, _____, Guangzhou
(Sub-district office) (District)

A. The current commuting features

A1. The address of your workplace is:

_____, _____, _____, Guangzhou

(*Building*)

(*Street*)

(*District*)

(Tianhe District Yuexiu District Haizhu District Liwan District
 Baiyun District Panyu District Luogang District Huadu District
 Nansha District Conghua District Zengcheng City Other cities)

A2. My main outdoor activities are (you may choose more than one answer)

1. Entertainment activities like sporting or playing cards
2. Grocery shopping
3. Buying daily necessity
4. Seeing the doctor
5. Going to post office or bank
6. Participating in cultural activities
7. Picking up or dropping off children
8. Working
9. Working at former unit
10. Others (Please specify: _____)

A3. I usually travel _____ time(s) a day.

The transportation mode you prefer to choose is/ are (you may choose more than one answer)

1. Metro
2. Bus
3. Company car
4. Private car
5. Bicycle
6. On foot
7. Taxi
8. Shuttle bus
9. Others (Please specify: _____)

Working days/ Weekdays (Please choose a typical working day as reference)

Sequence	Departure time	From	Transport	Arrival time	To	Cost	Reason for travelling
<i>Example</i>	<i>7:30</i>	<i>Home</i>	<i>Private car</i>	<i>8:20</i>	<i>Company at Ring Road</i>	<i>\$20</i>	<i>Work</i>
	<i>10:00</i>	<i>Company at Huangshi Road</i>	<i>Private car</i>	<i>10:30</i>	<i>Company at Dongfeng Road</i>	<i>\$10</i>	<i>Work at other unit</i>
	<i>17:30</i>	<i>Company</i>	<i>Metro/ bus</i>	<i>18:00</i>	<i>Middle School Attached to Sun Yat-sen University</i>	<i>\$6</i>	<i>Pick up children after school</i>
	<i>18:10</i>	<i>Middle School Attached to Sun Yat-sen University</i>	<i>Bus</i>	<i>19:00</i>	<i>Home</i>	<i>\$2</i>	<i>Grocery shopping and go home</i>
	<i>21 : 00</i>	<i>Home</i>	<i>On foot</i>	<i>21 : 15</i>	<i>Sun Yat-sen University North Entrance Square</i>	<i>\$0</i>	<i>Stroll or dance</i>
1st							
2nd							
3rd							
4th							
5th							
6th							

(Notes: Please use “/” to indicate transferring car. For instance, “Metro/ Bus” means transferring from metro to bus.)

Weekend (Please choose one day from Saturday and Sunday)

Sequence	Departure time	From	Transport	Arrival time	To	Cost	Reason for travelling
<i>Example</i>	<i>9:00</i>	<i>Home</i>	<i>Bus</i>	<i>9:30</i>	<i>Zhongshan 5th Road</i>	<i>\$2</i>	<i>Entertainment/ meeting friends/ Shopping/ Outdoor activities</i>
	<i>8:00</i>	<i>Home</i>	<i>Private car</i>	<i>8:30</i>	<i>Huanshidong Road</i>	<i>\$10</i>	<i>Yum Cha/ going to park</i>
1st							
2nd							
3rd							
4th							
5th							
6th							

Comparison of the travelling situation before moving to this community (Please choose a weekday as reference)

Sequence	Departure time	From	Transport	Arrival time	To	Cost	Reason for travelling
<i>Example</i>	<i>7:30 am</i>	<i>Home</i>	<i>Private car</i>	<i>8:20am</i>	<i>Company at Ring Road</i>	<i>\$20</i>	<i>Work</i>
1st							
2nd							
3rd							
4th							
5th							

6th							
-----	--	--	--	--	--	--	--

A4. Your rating on the current travelling time and transportation:

1. Satisfied 2. Neutral 3. Dissatisfied⇒Why? _____

A5. The average transportation cost per month is

A51. Public transport (Including bus, metro, shuttle bus, etc) \$_____;

A52. Private car \$_____;

A53. Taxi \$_____;

A54. Company car \$_____;

A55. Others \$_____

***A6. Please answer the following questions if you work at home or remote office:
(Please skip this question If you have filled in the above table questions)***

A61. How long do you use Internet for work per day?

1. Less than 1 hour 2. 1-2 hours 3. 3-5 hours 4. 6-8 hours
5. 9-11 hours 6. More than 12 hours

A62. How much time do you spend on mobile phone everyday?

1. Less than 1 hour 2. 1-2 hours 3. 3-5 hours 4. 6-8 hours
5. 9-11 hours 6. More than 12 hours

A63. When you access Internet, which of the following do you usually do?

1. Read news 2. Information seeking 3. Receive or send email
4 Internet shopping 5. Internet social networking (e.g., QQ or weibo)
6 Others (Please specify: _____).

B. The effect of residence to job selection

B1. The priority of choosing your current residence and work place is

1. Find a job first and find a residence later
2. Find a job and the company will designate a residence for you

3. Buy a house first and find job later
4. Rent a house first and find job later
5. Live at parents' house and find a job later
6. Others (Please specify: _____)

B2. The main reason for choosing the current residence is

(Please choose the most important reason)

1. Convenient to work (for family and I)
2. Children' schooling
3. Cheap rental or house price
4. Resettlement of residential area
5. No personal choice due to government welfare allocation
6. The nearby ancillary facilities
7. Good living environment
8. Others: _____

B3. Is your previous living place your own property? Yes No

If yes, the type of housing is:

1. Commodity housing
2. Economical housing (Including National comfortable housing project and low-profit housing)
3. House built for low income family (Comfortable housing or low-rent housing)
4. Housing-reform house
5. Housing placement
6. Self-help house (Ancestry house)
7. Others (Please specify: _____)

B4. Did you change your job after moving in this community?

Yes No

If yes, ⇒ your previous job was in _____, _____

(Street) (District)

The job type is _____

The main reason for job change at that time is (Please choose ONE answer only)

- | | |
|--|---------------------------|
| 1. Personnel transfer within the company | 2. Children's schooling |
| 3. Retirement | 4. No prospect in the job |
| 5. Low income | |
| 6. Bad relations with colleagues or management | |
| 7. Far away from dwelling place | 8. Job change of spouse |
| 9. Moving of former company | |

B5. How did you get your current job? (Please choose ONE answer only)

- | | | |
|-------------------------|------------------------|---------------------------|
| 1. Campus recruitment | 2. Company recruitment | 3. Employment market |
| 4. Internet recruitment | 5. Referred by friends | 6. National allocation |
| 7. Influence of spouse | 8. Self-employed | 9. Newspaper or magazines |
| 10. Others _____ | | |

C. The tendency of future residence and work

C1. Do you plan to move in these 5 years?

1. Yes

2. No ⇒ C11. The reason for not buying the house is _____ (You may skip Question C2 and C3)

C2. Where do you plan to move?

Please describe that place _____ (District) _____ (Street)

C3. The main reason for moving (Please rank the priority from 1 to 3 in the blank below)

_____ > _____ > _____

- | | |
|---|--|
| 1. Profit from investment | 2. To improve the current living condition |
| 3. A new house is needed for grown children | 4. For children education |
| 5. Closer to current workplace | 6. To have better ancillary facilities |
| 7. To buy my own house instead of renting a house | |
| 8. To live closer to friends | 9. To get married |

10. Need more space after giving birth to children 11. Others_____

C4. Did you think of changing your job in these 3 years?

1. Yes⇒C41. The reason for changing the job is _____ and the location of your workplace is _____

2 . No

D. Basic information about your family

D1. Family structure

- | | | |
|---|---------------------------------|-------------------------|
| 1. Single | 2. Married couple | 3. Single-parent family |
| 4. A married couple with 1 kid | 5. A married couple with 2 kids | |
| 6. A married couple with more than 2 kids | 7. A family with 3 generation | |
| 8. Others | | |

D2. The total no of family members is _____ people.

Among them, D21 _____ person/ people has / have a job.

D3. The total construction area of our household is _____square meter.

D4. Are you living in your own house? Yes No

If yes, the type of housing is

- | | |
|---|-----------------------------------|
| 1. Commodity housing | |
| 2. Economical housing (Including National comfortable housing project and low-profit housing) | |
| 3. House built for low income family (Comfortable housing or low-rent housing) | |
| 4. Housing-reform house | 5. Housing placement |
| 6. Self-help house (Ancestry house) | 7. Others (Please specify: _____) |

D5. I moved to this community in _____ (year).

I lived in _____ (street), _____ (district) before moving in this community.

E. Basic personal information

E1. Gender 1. Male 2. Female

E2. Education

- 1. Illiterate 2. Low literacy 3. Primary school
- 4. Middle school 5. High school (Including professional school)
- 6. Diploma or undergraduate education 7. Master or above

E3. Age _____

E4. Your relationship with the house owner

- 1. Myself 2. Spouse 3. Children 4. Parents 5. Friend
- 6. Tenant 7. Others _____

E5 . I am currently a permanent registered resident in _____City_____Province

E6 . My occupation is

- 1. Farming, Forestry, pasturing, Fishery and mining
- 2. Manufacturing and construction industry
- 3. Transportation , storage and postal services
- 4. Real estate sector
- 5. Leasing and Business Service Industries
- 6. Hospitality and catering industry
- 7. Wholesale & Retail industry
- 8. Domestic service industry
- 9. Public Service Units
- 10. Financial and insurance industries
- 11. Education, Science and Technology

12. Others (Please specify: _____)

E7. My job is

1. Professional / researcher (including teacher in university or colleges)
2. Teacher (excluding those teaching in university or colleges)
3. Senior management (e.g., general manager, factory director or Bureau-level cadres)
4. Middle management (e.g., manager, executive or section level cadres)
5. Junior management (e.g., contractor, production executive or county level cadres)
6. Clerk
7. Technician
8. Non-skilled worker or labourer
9. Waiter
10. Self-employed entrepreneurs
11. Casual laborer
12. Others (Please specify: _____)

E8. My average income per month is _____

Below \$500	\$500~\$999	\$1000~\$1999	\$2000~\$2999
\$3000~\$3999	\$4000~\$4999	\$5000~\$7999	\$8000~\$15000
\$15000 or above			

F. Open-ended questions

F1. Compare with your life before moving in this community, which three aspects below affect your life the most or need to be improved (living environment, transportation, education, medical and hygiene, commercial and cultural facilities, and property maintenance)? What kinds of ancillary facilities do you think a good community should have? (medical, education, hygiene, entertainment, sport & recreation, commercial facilities, train / bus station, bank, etc.)

F2. What is your comment on your daily travelling and commuting? Which aspects of transportation do you think should be improved (e.g., extension of service hours, increase of operation of night bus, construction of metro line, increase of public transportation line's coverage, etc)?

F3. How long is a reasonable commuting time (one way) from your residence place to working place in your opinion?

Appendix Three

The Interview Outline and Document Checklist for Investigation of the Current and Past Situation of Social Housing Development in Guangzhou

——Governmental department version

To the Representatives of Guangzhou Social Housing Management Office:

To investigate "the Current and Past Situation of Social Housing Development in Guangzhou", the focus group meeting tries to have a clear insight of political context of social housing policy in Guangzhou, and better understanding of social housing development in Guangzhou, socioeconomic characteristic and commuting pattern of social housing residents. This kind of interview benefits exploring the practical experience and implementation process of social housing policy from the angle of policy makers.

Thank you very much for your kind assistance and cooperation which facilitate to complete my doctoral research. Please feel free to give me kind support and comment on this interview outline. Should you have any question or comment, please feel free to contact Ms Chen Tingting (Tel: 134302).

Chen Tingting

Ph. D. student, Department of Building and Real Estate

Hong Kong Polytechnic University

September 2013

Interview questions:

1. According to media reports, the performance of Guangzhou social housing development is one of the most efficient housing policies in China. What kinds of achievement of social housing development of Guangzhou have been received in the past five years? Could you please provide some specific examples? Until now, how many urban households with housing difficulties have been addressed (are there any concrete electronic dataset regarding the above issues)?
2. As reported on the media, all of the low-income households who registered in the official files have been solved their housing problems at the end of 2011. Would you please explain the future development tendency of social housing in Guangzhou for the coming five to ten years? Which targeted groups will be given the high priority in the future social housing policies?
3. A great amount of new residential communities have been built after launching social housing construction in Guangzhou since 2006. Among those practical experiences and development process, are there any relatively successful cases or management methods that you think it is more advantage approach than that in other Chinese cities? Which kinds of other aspects are below expectation in the planning and implementation process?
4. What is the current approval process of application of social housing units in Guangzhou? How do the relevant authorities ensure that those unqualified applicants will be eliminated? Is there any changes on the entry and exit mechanism?
5. During the twelfth Five-year Plan, central government commanded an enormous quantity of social housing construction programme. How many construction projects of Guangzhou have been finished? Are there any difficulties or challenges in the process? How local government and housing authorities make a quick response when facing the new tasks? Regarding the large-scale housing construction programme of social housing by a top-down approach, is there any political enforcement from central government? In other words, does the Guangzhou Municipal Government insist to initiate the construction programme without the command of central government?

6. Regarding transportation facilities at the neighborhood level, how does Guangzhou Social Housing Management Office seek and satisfy the need for social housing residents? According to field observation from our team, some new communities with poor accessibility to public transportation have no nearby subway station and few bus routes, and thus, how the Office tackle with this sort of situation?
7. What are the main considerations when selecting the available site to construct a large-scale social housing project? Are there any specific criteria of site selection? How does social housing strategic planning integrate with Guangzhou Master Planning, Land Use Planning and the Twelfth Five-year Plans? It is well known that many residents who lived in the outskirts need to spend over two hours for medium and long distance to work or to school. As for policy makers and urban planners, are there any feasible measures to solve this kind of hard nut?
8. Do local authorities have the publication of figures in terms of employment rate, occupation, and employment condition of social housing residents? Are there any strategies or subsidies from local government when confronting with high unemployment rate and longer commuting pattern of those residents?
9. Are there any neighborhood surveys or residence satisfaction surveys for residents living in new social housing communities in Guangzhou? What is the main conclusion?
10. Do you have some documental materials regarding the socioeconomic characteristics of residents (e.g., income, family structure, occupation, company address, etc.) from the newly constructed housing estates like Jinshazhou New Housing Estate in Baiyun District, Fanghe Estate in Liwan District, Gaungdan Estate in Tianhe District, and Jude Estate in Haizhu District?
11. As to the low income and middle lower income households who are deemed spatial disadvantage group, do their socio-economic features affect the community planning and physical design process? Are there any new physical design or innovation building for them, especially comparing with commercial housing community? (e.g., layout of building, public facilities, population size, transportation network, open space, etc.)

12. Does the Office make any consultants from the public, particular urban residents in the social housing waiting lists, during the design process? What channels do you use to collect the public opinion?

❖ **Document checklist :**

1. The achievements of Guangzhou Social Housing Development (the list of the completed and new constructed housing projects, geographical distribution, the different provision of housing units, the number of households, socioeconomic characteristic, etc);
2. The strategic planning for Guangzhou Social Housing Development (including long-term and short-term programme);
3. The basic socio-economic information of typical social housing communities in Guangzhou like Jinshazhou Housing Estate in Baiyun District, Fanghe Housing Estate in Liwan District, Jude Housing Estate in Haizhu District and Gaungdan Housing Estate in Tianhe District, etc. (e.g., residents' income, family structure, occupation, job location, etc);
4. The reports on the residents' satisfaction, and sampling survey on living condition of Guangzhou social housing community;

The detailed description of social housing policies and codes of administration for different target groups from Guangzhou Social Housing Management Office.

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