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Socio-Economic Segregation in Hong Kong - Social Exclusion and the Provision of Public Services in Spatially Segregated Areas

香港的社會經濟隔離問題 – 社會排斥與空間隔離地區的公共服務

Project Final Report

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Table of Contents

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Executive Summary

Abstract

This project explores socio-economic segregation and the provision of public services in spatially segregated areas in Hong Kong by looking at the accessibility of public services in those areas that are identified as spatially segregated. It contends that even though the urban planning system and public housing schemes in Hong Kong do install excellent infrastructure and provide admirable public service packages for the majority of the population, an inadequate understanding of the diversified needs of the disadvantaged groups in the segregated spatial areas may undermine the efficacy of public service provision and the urban governance system. There are three objectives for the project,

1. To identify areas of high concentration of poor and disadvantaged households
2. To examine the impacts of housing and other urban attributes on socio-economic segregation.
3. To assess the access to public and community services in areas of high concentration of poor and disadvantaged households.

Using data that are extracted from the micro dataset of the By-Census 2016 as well as using data-crawling techniques in collecting information on public service provision from open data sources on the internet, this projects employs a sophisticated instrument of local segregated index on a fine spatial scale at the Large Street Block Group level to produce a more accurate picture of socio-economic.

The findings of this project have verified some conjectures in previous research which were based on anecdotal evidence. Our findings have revealed the contributing impact of public housing in reducing socio-economic segregation but such an impact disappears when information of the build environment is taken into account. On the other hand, presence of large private housing estate has no impact on socio-economic segregation. In fact, socio-economic segregation in Hong Kong's poor households is not serious and they tend to mix with their middle-class counterparts.

This may reflect a successful "unintended" social mix policy (e.g., public housing) that enhances the mix between the rich and the poor. However, our findings also reflect the complex interaction between housing tenure, characteristics of the build environment and profile of residents in shaping socio-economic segregation.

Public services are also very accessible in Hong Kong, particularly on public transport and retail and leisure facilities. Those areas which do not have easy access to public services are mostly located in the rural parts of the New Territories. Yet areas which are the most segregated have worse access to medical and social services though the access to public transport and retail and leisure services is still good. Even so, some of the residents in segregated areas, particularly in New Territories, do have to walk a bit further to access public services. Yet these segregated areas in the New Territories are also areas with a much lower population density.

Not only is it desirable to formulate an explicit social mix or social inclusion policy to further strengthen the "unintended" social mix policy we have mentioned, it would also help to reduce the negative impact of NIMBY (Not in My Backyard) toward speeding up the provision of public housing (as local residents object to the development of public housing in the vicinity of their residences).

Whilst the comprehensive town planning and efficient and elaborate public transport system have made public services easily accessible for most people, services to residents in segregated areas may need special considerations. An explicit neighbourhood policy for enhancing neighbourhood cohesion and creating harmonious neighbourhoods. Amidst the recent review of local administration and the creation of the Community Care teams, such consideration should be put into the policy agenda. At the same, process of data collection of this project also reflects the need to further enhance open data provision and accessibility.

Layman Summary of Policy Implications and Recommendations

This project has a few policy implications and recommendation. One important policy implication on socio-economic segregation in Hong Kong is the discovery of

the “unintended” social mix policy (albeit it is weak) that is produced by our public housing programmes. Public housing in Hong Kong accumulates not only the poorest households as income eligibility spreads from the absolutely poor to households who are near to the median income level of the city (hence over 40% of households in Hong Kong are eligible for public rental housing), building assisted homeownership estates close to public rental housing also facilitates a social mix as nearly three quarters of households in Hong Kong are eligible to apply for such housing schemes. However, our findings also reflect the complex interaction between housing tenure, characteristics of the build environment and profile of residents in shaping socio-economic segregation.

It may be desirable to formulate an explicit social mix or social inclusion policy. Not only would such a policy help to enhance the “unintended” social mix policy we have mentioned, it may also help to reduce the negative impact of NIMBY (Not in My Backyard) that is dragging down our progress toward speeding up the provision of public housing (as local residents object to the development of public housing in the vicinity of their residences).

Our project also uncovered the very satisfactory access to public services wherein the overwhelming majority of residents only have to walk a short distance to the nearest public services provision spots. This is perhaps the benefit of Hong Kong being a compact city (albeit it is not an intentional policy). Our comprehensive town planning and efficient and elaborate public transport system make a good contribution. However, the most segregated areas, both in the urban areas and in the New Territories, may not enjoy equal benefits. There are always some special circumstances in specific neighbourhoods that the “one-size-fits-all” policies are incapable of handling in a satisfactorily way. This happens also in segregated areas in the urban core or in the first-generation new towns.

Having an explicit social mix or social inclusion policy would help with offering definitive guidelines for creating a socially mixed, accommodative and harmonious society. Whilst such an explicit policy would further reinforce the already existing “unintended” social mix policy, it may also continue to improve our social mix even

when the favourable environment that created the “unintended” social mix policy may have been weakened (e.g., public housing is becoming residualised).

Hong Kong may also need an explicit neighbourhood policy for enhancing neighbourhood cohesion and creating harmonious neighbourhoods. This would definitely help to fill up the gaps in the provision of public services in segregated areas. This is perhaps the right time to do so when the HKSAR Government is redesigning the local institutions involved in district administration. At the time when the Government is expanding the services of the Community Care teams, such consideration should be put into the policy agenda for the re*vamping* of district administration.

Lastly, the difficulties this project had in data collection reflects the inadequate provision and limited accessibility to big data in the public domain. Amidst the Government having accelerated the momentum towards developing Hong Kong as a smart city, many of the data in the public domain are either incomprehensible or far from easily accessible. There may need to be a continual push in data assembly and accessibility.

行政摘要

本研究探討在空間隔離區域中公共服務的可及性，以及空間隔離區域的社會經濟隔離狀況和公共服務的提供。儘管香港的城市規劃體系和公共房屋建設具備了優良的基礎設施，並為絕大多數人口提供了令人滿意的公共服務配套；但對處於隔離區域的弱勢群體，社會對他們的多元化需求的了解不足，可能會減弱公共服務和整個城市治理體系的效率。本項目有四個目標，

1) 找出貧困戶和弱勢家庭高集中區；
2) 研究住房和其他城市屬性對社會經濟隔離的影響；
3) 評估貧困和弱勢家庭高度集中地區獲得公共和社區服務的情況；

本項目使用 2016 年中期人口普查的數據，以及使用數據爬蟲技術從互聯網上的開放數據源收集有關公共服務提供的信息，本項目採用了一種複雜的本地隔離索引工具在大街區組層面的精細的空間尺度，以生成更準確的社會經濟圖景。

本項目的分析驗證了先前研究中基於有限證據的一些猜想。我們的研究結果揭示了公共住房在減少社會經濟隔離方面的貢獻，但如果考慮建築環境的信息，這種影響就會消失。另一方面，大型私人住宅區的存在對社會經濟隔離沒有影響。事實上，香港貧困家庭的社會經濟隔離並不嚴重，他們往往與中產階級混居。

這可能反映了一項成功但“非刻意”的社會混合政策（例如，公共住房）加強了貧富之間的混合。然而，我們的研究結果也反映了住房保有權、建築環境特徵和居民背景在塑造社會經濟隔離方面的複雜相互關係。

香港的公共服務其實十分便利，尤其是在公共交通、零售和休閒設施方面。公共服務不便的地區大多位於新界鄉郊地區。然而，儘管公共交通、零售和休閒服務在這些地區仍然十分方便，但隔離最嚴重的地區獲得醫療和社會服務的機會較差。儘管如此，一些居住在隔離區的居民，尤其是新界區的居民，確實需要走得更遠一些才能使用公共服務。然而，新界的這些隔離地區也是人口密度低得多的地區。

在這方面，我們可能需要製定更明確的社會融合或社會包容政策，以進一步加強我們前面提到的“非刻意”的社會混合政策，這也有助於減少 NIMBY（不在我家後院）對加快公共住房的興建（因為當地居民反對在其住所附近開發公共住房）。

雖然香港全面的城市規劃和高效完善的公共交通系統使大多數人都能輕鬆獲得公共服務，但為隔離區域的居民提供的服務可能需要特別考慮。明確的鄰里政策，既可以增強鄰里凝聚力，也可以創造和諧鄰里。在近日對地方行政的檢討和地區關愛隊的創建中，應將這種考慮納入政策議程。同時，本項目的數據收集過程也按揭示了進一步加強開放數據的需要。

Chapter 1: Introduction

Background of the Study

Segregation, which is broadly defined by the European Commission against Racism and Intolerance (ECRI) as "the act by which a (natural or legal) person separates other persons on the basis of one of the enumerated grounds without an objective and reasonable justification", has been identified as an imminent social concern in multiple social settings and in Hong Kong. It is in such a context that this research was carried out. As a developed global economic center, Hong Kong not only features the manifest characteristics of having high-level social economic segregation with a high Gini coefficient and a noteworthy income disparity, but also an absence of a social exclusion policy agenda. Despite some media attention being paid to the concern about a "city of sadness" in areas like Tin Shui Wai, most commentaries attribute the rise of this problem to the failure of town planning instead of to its negative connection with the issue of socio-economic segregation. Comprehensive research on the impact of spatial and social segregation at the neighborhood level is also sparse, if not non-existent.

Starting from this point, this project took the social exclusion and public services supply in spatially segregated areas in Hong Kong as its key research unit. The basic aim of the whole project is to investigate the pattern of social-economic segregation in Hong Kong by looking at the accessibility of public services in those identified segregated areas. It contends that even though the urban planning system and public housing scheme in Hong Kong does install excellent infrastructure and does provide admirable standard public service packages for the vast majority of the population, an inadequate understanding of the diversified needs of the disadvantaged groups in the segregated spatial units may undermine the efficacy of public service provision and the whole urban governance system. Therefore, taking public service supply and access carefully into account becomes an urgent issue that may carry far-reaching theoretical implications for academia and be of practical significance to policy makers in Hong Kong society.

Project Aim and Objectives

The basic focal point of this project is the situation in Hongkong wherein social-economic segregation exists and the relevant public services are provided in spatially segregated areas. Its primary concern is how various factors such as the verticality of the buildings, city compactness, and the housing regime affect the different aspects of social-economic segregation. Meanwhile, the project is also interested in looking at what access to some kinds of essential public services in segregated areas is available and what available policy recommendations are at work. The specific project aims are summarized as the following:.

1. To identify areas of high concentration of poor and disadvantaged households
2. To examine the impacts of housing and other urban attributes on socio-economic segregation.
3. To assess the access to public and community services in areas of high concentration of poor and disadvantaged households.

Policy Implications

The remarkably high degree of income disparity and relative poverty puts Hong Kong among the ranks of the poor countries in Africa and Latin America regarding the income gap between the rich and the poor. In fact, Hong Kong ranked fourth highest among the 25 cities in a comparative study of socio-economic segregation, coming only after Cape town in Africa, and Buenos Aires and Paramaribo in South America (van Ham, 2021). Whilst policy on poverty alleviation has been at the top of the government's policy agenda since the government recently introduced the official poverty line , the implications of the spatially uneven distribution of the poor and other disadvantaged groups in Hong Kong has not been fully understood. Currently, the Hong Kong government is working hard to tell good stories about Hong Kong and address people's concerns and difficulties in daily life to chart a course for a brighter tomorrow for this city (the Chief Executive Policy Address, 2022). Against this backdrop, a systematic investigation of the social-economic segregation giving serious

consideration to the spatial unevenness of the poor and the distribution of disadvantaged groups in Hong Kong is expected to promote social cohesion further, enhance the urban planning system, and lead to the provision of public services that more effectively target those who need them the most. To take this point further, the results of this research project that identifying the patterns of socio-economic segregation, and examining the gap in the provision of public services in highly segregated areas, will offer the evidence necessary to improve the efficiency of the current policy of poverty alleviation, and contribute to the equity, harmony and stability of Hong Kong society.

Structure of This Report

This project report is structured as follows. Chapter one is an introduction, which provides a brief background to this study, its project aims, policy implications and the structure of this report. The second chapter is a review of literature on a summary of the current academic discussions about social segregation in general and relevant research on Hong Kong in particular. Chapter three focuses on method, detailing how the empirical data was collected and analysed. The fourth chapter presents the key findings of this project. It is followed by Chapter five, which consists of a reflection on this segregation problem and provides concrete policy recommendations. Chapter six describes how findings of this project is disseminated and chapter seven is a conclusion to this report.

Chapter 2 Literature Review

Segregation

Segregation, which takes various forms such as ethical segregation, residential segregation, aging segregation, and social-economic segregation, has aroused widespread public debate and academic interest worldwide. For example, in the United States, racial segregation has been found to be associated with discrimination against black people, reduced demands for public services and the increase in crime and poor health (Massy, 1990; Glaster and Keeney, 1988; LaVeist, 1989). In Europe, social-economic segregation has been on the increase over the past several decades due to the progression of globalization, the unfolding ofthe neo-liberal policy, changes in economic structure, and international immigration (Andersen, 2002, Dhalmann & Vilkama, 2009). Asian cities in China, India and Japan also suffer from segregation in terms of residence, public service provision, income inequity and rural-urban migration, all of which can be attributed to the special connection between income and occupation statues, differentiation under the caste system, housing marketisation (gated communities for example), in-group favouritism, and internal migrants. These were respectively identified as the factors that contributed to segregation the most (He et al., 2015; Deng, 2017; van Ham et al., 2021; Madrazo and van Kempen, 2012; Fujita and Hill-Child,1997; Bharathi, et al. 2022).

Academic investigation into segregation began in the early 20th century. The Chicago school of human ecology argues that the existence of segregated subcommunities is the result of "natural areas" being formed as an ecological process of adapting to urban life. Such subcommunities are perhaps also drivers of social development as they would ensure the survival of the fittest via a serial process of succession and invasion, which is similar to the behaviour of plants and animals in the natural ecological system (Park et al., 1925). To generate a systematic understanding of the cause of social-economic segregation, current research has proposed a multi-factor approach that covers various factors like globalization, economic restructuring,

the historical pathway institutional setup, and the residential segregation of social groups (Tammaru, et al., 2016). It is argued that the position of a city in the global city hierarchy would have an impact on the restructuring of the city's economy, which would in turn shape the occupational structure and income distribution, and hence the patterns of income inequality and the resulting patterns of housing segmentation. Meanwhile, important institutional setups, which include the welfare state efforts and state intervention in land and housing, would shape policy on income redistribution and social protection, and would mitigate the negative impacts of housing market segmentation via state provisions and subsidies for housing as well as restrictions on land use and urban renewal. The historically contingent pathway of a city, including a variety of attributes of the city, like the historically grown urban, economic, state and social layers embedded in the trajectories of development within the cultural, geographical and morphological uniqueness of the city, would also have a long-lasting impact on the pattern of segregation in specific societies (Mustard and Kovacs, 2013, Maloutus, 2012).

Whilst segregation is not necessarily an evil on its own, it is, however, being perceived as an essential ingredient that hampers social inclusion and undermines social equity in areas like employment, education, and political participation, thus leading to the creation of an underclass that is left to endure poverty and continuous urban decay (Wilson, 1987; Musterd, 2003; Anderson, 2002). Thus, socio-economic segregation has triggered wide ranging discussion about the need for policy efforts that aim to combat segregation and enhance social integration. Given that segregation is basically a geographical problem, multi-dimensional factors such as evenness, exposure, concentration, centralization and clustering have been proposed to measure the level of spatial division (Massey and Denton, 1998). In this respect, segregation indices such as the dissimilarity index (DI), and the regional and local segregation index, were also proposed (Wong, 2002; Wong, 2003; Duncan and Duncan, 1955). Meanwhile, a discourse on the prevention of social exclusion, which aims to reduce segregation, has emerged in some European countries. Defined by Giddens (1998:104) as "mechanisms

that act to detach groups of people from the social mainstream," social exclusion was advocated in the policy debates in the European Union in the late 1980s and has recently become an important social policy objective in its Agenda 2020 (EU, 2020). Considering that a direct measurement of social exclusion is difficult (Levitas, 2006), the Social Protection Committee of the European Union has adopted an indirect measurement of social exclusion using a range of indicators, like the concentration of low income households, the persistence of poverty, the level of unemployment (particularly long term unemployment), the number of early school leavers, health status, life expectancy, etcetera, for which governments are already collecting data as a routine exercise (Social Protection Committee, 2001). In this way, assessment of socio-economic segregation has become a workable approach that can be used to identify spatial areas that have a high risk of social exclusion.

One of the area-based policy initiatives that targets the mitigation of social exclusion is the social mix policy. Defined in general terms "as a combination of diverse shares of social groups in a neighborhood" (Galster and Friedrichs, 2015:176), variants of the social mix policy can be traced back to policies used in European and North American cities in the 1970s. The most common policy prescription is to create heterogenous neighborhoods, via state intervention in housing provision or directed subsidies for housing consumption (Kintrea, 2013). By allocating housing for poor people in middle-class neighborhoods or encouraging middle class families to move into poor neighborhoods, concentration of the disadvantaged group could be directly diluted. The efficacy of people (e.g., schooling, employment, life coping mechanisms etc.) in the disadvantaged group would be enhanced via the "neighborhood effect" in heterogenous neighborhoods. (Galster & Zobel, 1998). Additionally, a more direct intervention to mitigate social exclusion may involve working with the individuals and families to alleviate their poverty, or to work on directly enhancing community access to public services in segregated neighborhoods (Pantazis et al., 2006). In fact, the enhancement of local service provision can be perceived to be a means for directly tackling the roots of social exclusion, i.e., the denial of public services. In addition, the

enhanced provision of public services would offer an effective way to redistribute resources in favour of the disadvantaged group (Fisher and Bramley, 2006). In North America, having access to public services is also being perceived as a paramount requirement for the urban poor to compensate for their lack of financial resources (Apparicio and Seguin, 2006).

Social-economic segregation in Hong Kong

Hong Kong, although known as an important financial centre at the top of the global economy, is also a place where social-economic segregation develops. Never being a welfare state, the rapid economic restructuring in Hong Kong has not only made this city a post-industrial one with the service sector contributing 93% of the GDP in 2019, it has also resulted in a high level of income disparity with a high Gini coefficient of 0.53 in 2016 (Census and Statistics Department, 2021). As a matter of fact, Hong Kong was the fourth highest among the 25 cities in a comparative study of socio-economic segregation, coming only after Cape town in Africa, and Buenos Aires and Paramaribo, both of which are in South America (van Ham, 2021). In spatial terms, it is confirmed that the affluent classes in Hong Kong continue to be concentrated in traditionally central locations in urban areas, while the less well-off tend to be marginalized and live in remote new towns (Ng. et al., 2021). At the same time, the social-economic segregation in Hong Kong also demonstrates unique characterizes as the households in the top income decile group were twice as segregated as those households in the lowest income decile group (Monkkonen and Zhang, 2014). This contrasts with the U-shape pattern commonly found in cities in Europe and North America (Reardon and Bischoff, 2011) , which indicates the high and low social groups are more segregated than the middle social groups. In other words, the poor and low social groups in Hong Kong are more likely to mix with the middle social groups (Yip, 2006, 2012). Moreover, Vertical segregation, which has been identified in some cities like Paris (Preteceille, 2007) and Athens (Maloutas, 2020), is also found in Hong Kong

(Forrest et al.,2020), despite there being no direct evidence to show whether this vertical pattern is generalized or not.

To account for the dynamics of the social-economic segregation in Hong Kong, the multiple-factor model developed by Tammurn et.al (2016) proved to be workable. For example, current research has found that income, race and occupation were common factors in determining the clustering of population in Hong Kong in the 1960s and 1970s in which non-Chinese households and high paid (often expatriate) professionals tended to reside in areas which were once exclusive to the European population in the early colonial years (Lo, 1975). The very rich and upper middle-class households were found to be located in centralized residential enclaves in the 1990s, while a high concentration of the poor and the disadvantaged is absent in those areas (Forrest et al., 2004). The public housing scheme has acted to prevent the impact of the big income inequality from being translated into a high level of socio-economic segregation (Ng et.al.2021). Yet, whether or not the large and nearly universal public housing scheme has created socially mixed neighborhoods for the middle and low social groups has not been well tested or supported with data.

To date, current research on social-economic issues in Hong Kong has not stirred up any influential policy agendas. On the one hand, the interlink between the high level of income inequality in Hong Kong and socio-economic segregation has not been adequately understood. There isn't even unequivocal evidence for whether Hong Kong has a low or a high level of socio-economic segregation. Despite some neighborhoods such as Tin Shui Wai and Sham Shui Po having attracted some scholarly research due to the problems of the low level of community participation, lack of social capital, and a high level of unemployment (see, Fung and Hung,2014; Rochelle, 2015; Lau,2010), the output from this research has so far failed to arouse any public discourse on socio-economic segregation and social exclusion. Most discussion on the media has been concerned about the high concentration of public housing in poor neighborhoods or the spatial mismatch between housing and employment and the barrier high commuting costs and long commuting times can present to employment. Very little attention was given to the roots of the social exclusion or the causes of socio-economic segregation.

On the other hand, in terms of the provision of public services, Hong Kong has a long history of comprehensive town planning and heavy investment in the provision of public services and public transportation, which helps to mediate the negative effects of socio-economic segregation and mitigate the impact of social exclusion. Yet, rapid economic restructuring and the loss of jobs in manufacturing has meant the creation of local economic agglomeration and employment in the new towns has failed to materialize (He et al., 2020). This forges the spatial mismatch between housing and employment and seriously hampers the efficacy of town planning with regard to reducing segregation. Taking the public housing program as an example, although the provision of public services such as markets, schools, and public transport is the standard protocol for every public housing estate, little research has been done to directly measured the accessibility of these public goods and services. In this respect, it should be noted that the standardized protocol for public services provision in public housing estates may not match the needs of public tenants in spatially segregated housing estates, and thus a detailed understanding of socio-economic segregation patterns and accessibility of residents in segregated areas would be beneficial. In summary, Hong Kong's unique characteristics, with its compact urban design, verticality, and a large public housing sector as well as well-planned and well-provided public services, offer a valuable testing ground for the theory of socio-economic segregation, particularly regarding the effect of the factors mediating socio-economic segregation.

Multi-factors approach to Socio-economic Segregation

With the progression of globalization, the unfolding of neo-liberal policy in the last few decades which curtails welfare state efforts, and the increase in international migration, the spatial segregation of the poor and minority households began to increase in the 1990s in most European countries. For instance, in the more equalitarian countries in Northern Europe like Finland, changes in the economic structure (e.g., over-reliance on a single IT company and its subsequent collapse) and

the influx of immigrants have widened the gap between the rich and poor as well as the gap between different ethnic groups, and the spatial concentration of disadvantaged groups (like poor families and ethnic minority groups) has increased (Dhalmann & Vilkama, 2009). Likewise in Norway, segregation has also increased along with increased international migration and the segmentation of the housing market (Andersen, 2002).

Despite socio-economic segregation (spatial segregation of the poor, and disadvantaged groups) in Europe having been on the increase in recent years, it has still been contained at a modest level. A higher level of social protection and income transfer are believed to have cushioned the impact of globalisation and economic restructuring on socio-economic segregation (Mustard, 2005). In addition, contextual factors as well as historically contingent and path-dependent layers or spheres in the economic, state, social and socio-spatial arenas have also been found to be important in shaping the socio-economic segregation patterns of a city (Mustard and Kovacs, 2013; Malotus, 2012, van Ham, 2021).

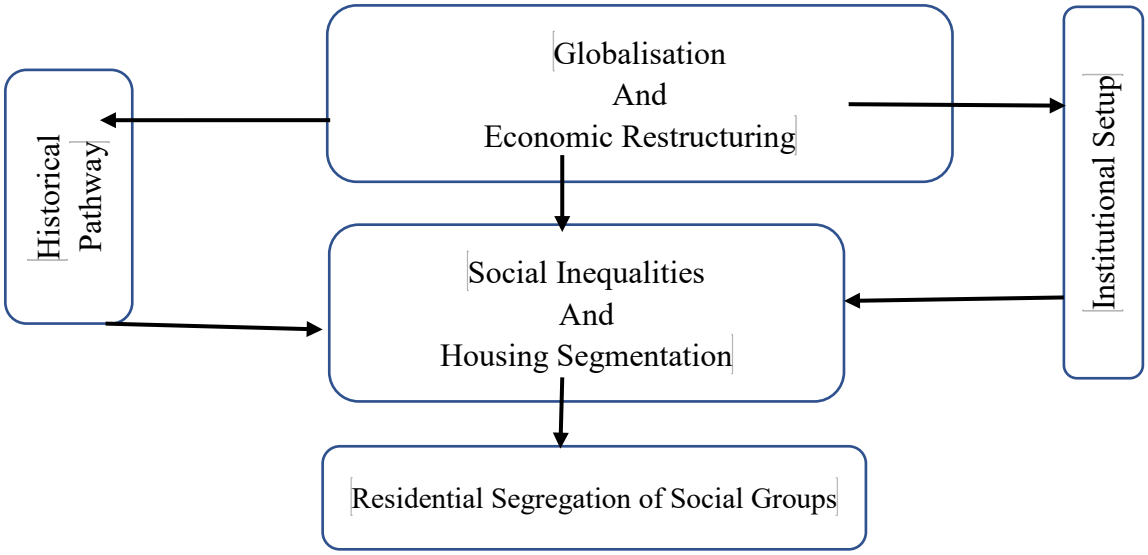
The institutional setup and the historical pathways of a city work in a different way to shape the socio-economic segregation found in Asian cities. An earlier study on Osaka by Fujita and Hill-Child (1997) found a low level of segregation. This was attributed to the special connection between income and occupational status in Japan. A more recent comparative study by van Ham et al. (2021) found that spatial segregation of the high and low socio-economic groups of four Asian cities (Tokyo, Jakarta, Mumbai, Shanghai) were ranked at the bottom among the 25 cities they surveyed (Hong Kong was an exception which will be elaborated on in a latter section), despite most of them having a higher income inequality than the rest of the cities on their list (mostly European and North American cities). All these Asian cities have a much lower proportion of foreigners in their populations (except Hong Kong). In Jakarta, the seemingly socially mix city was created by the informal housing in the city centre and the gentrification in the outskirts of the city whereas in Mumbai, differentiation among castes due to the caste system is the dominating determinant of

segregation. In Shanghai, housing marketisation and internal migrants fuels the residential segregation rather than it being between socio-economic groups.

Informed by a meso-level study of existing literature, a multi-factor approach has been put forward by Tammaru et al (2016) to streamline the study of socio-economic segregation, particularly in the case of international comparative investigations (figure 1). Globalization and its associated economic restructuring would be the factors of top-most importance regarding socio-economic segregation. The position of a city in the global city hierarchy would have an impact on the restructuring of the city's economy. This would in turn shape the occupation structure and income distribution and hence the patterns of income inequality and the resulting patterns of housing segmentation. This would determine the residential segregation pattern of the various social groups.

In addition, there are two other factors involved in the institutional setup and the historical pathway of a city which would mediate the impact of these two main generic factors. The important institutional setups are the welfare state effort and state intervention in land and housing. The former would shape policy on income redistribution and social protection and hence the patterns of income inequality, whereas the latter would mitigate the negative impacts of housing market segmentation via state provision and subsidies for housing as well as restrictions on land use and urban renewal. The historically contingent pathway of a city would be another significant contextual factor. This would include a variety of attributes of the city, like the historically grown urban, economic, state and social layers embedded in the trajectories of development within the cultural, geographical and morphological uniqueness of the city (Mustard and Kovacs, 2013, Maloutus, 2012).

Figure 1 Multi-factors approach to Socio-economic Segregation



Source: Tammaru et al (2016) figure 1.3

Social exclusion and the provision of public services

The concern over socio-economic segregation goes beyond the scholarly interest in social change and the transformation of urban space. The segregation of the poor and ethnic minorities has been perceived to be directly connected to the creation of the underclass (Wilson, 1987) and generating a vicious cycle of urban decay (Anderson, 2002). Segregation is also found to have hindered social integration, not only among migrants but also among people in low social positions, though the effect is not as strong and deterministic (Musterd, 2003). It, nevertheless, has triggered widespread concern about the need for a policy that aims to combat segregation and enhance social integration. Within such a context, a discourse on the prevention of social exclusion has emerged in some European countries. Despite the conceptualisation of social exclusion finding its lineage coming through the concept of relative poverty, in essence the policy measurement and policy prescription for social exclusion bears a direct connection to the study of socio-economic segregation (spatial concentration of the disadvantaged groups).

Social exclusion was advocated in the policy debate in the European Union in the late 1980s and has recently become an important social policy objective in its Agenda

2020 (EU, 2020). Giddens (1998) defines exclusion as “mechanisms that act to detach groups of people from the social mainstream.”(p104). A more detailed definition is offered by Letitas et al.(2007) who portray social exclusion as “the lack or denial of resources, rights, goods and services, and the inability to participate in the normal relationships and activities, available to the majority of people in a society, whether in economic, social, cultural or political arenas.” (Levitas et al., 2007: 9)

However, making a direct assessment of the social exclusion of an individual is difficult (Levitas, 2006), because social exclusion is complicated as it is multi-dimensional (involves an array of activities), relational (relative to mainstream society) and dynamic (changes over time) (Lucas, 2012). Wide-ranged and continuous monitoring of the whole population is prohibitively expensive. Instead, the Social Protection Committee of the European Union has adopted an indirect measurement of social exclusion using a range of indicators from which governments are already collecting data as a routine exercise, like the concentration of low-income households, the persistence of poverty, the level of unemployment (particularly long-term unemployment), early school leavers, health status, and life expectancy, etc. (Social Protection Committee, 2001). In this respect, the assessment of socio-economic segregation would help to identify spatial areas that are at a high risk of experiencing social exclusion.

One of the area-based policy initiatives that targets the mitigation of social exclusion is the social mix policy. Defined in general terms “as a combination of diverse shares of social groups in a neighbourhood” (Galster and Friedrichs, 2015:176), variants of the social mix policy can be traced back to those of the 1970s used in European and North American cities. The most common policy prescription is to create heterogenous neighbourhoods, via state intervention in housing provision or directed subsidies for assistance with housing consumption (Kintrea, 2013). Allocating poor people to live in middle class neighbourhoods or encouraging middle class families to move to poor neighbourhoods would directly dilute the concentration of the disadvantaged groups. The idea being that the efficacy of the people in disadvantaged groups (e.g., schooling, employment, life coping mechanisms etc.)

would be enhanced via the "neighbourhood effect" in heterogenous neighbourhoods. (Galster & Zobel, 1998). However, despite the idea of the social mix (and also the neighbourhood effect) having been queried, both on theoretical and empirical grounds (Galster and Friedrichs, 2015), such policy is perhaps the easiest to visualise and implement. The social mix approach to combating social exclusion will be relevant to the discussion of the socio-economic segregation in Hong Kong in a later section.

While the social mix policy presents an easy and visible solution, its impact on social exclusion is indirect as it needs to work through the neighbourhood effect. More direct intervention to mitigate social exclusion may involve working on the individuals and families to alleviate their poverty, or working on the community by directly enhancing access to public services in segregated neighbourhoods (Pantazis et al., 2006). In fact, the enhancement of local service provision can be perceived to be a means to tackle directly the roots of social exclusion, i.e., the denial of public services. In addition, the enhanced provision of public services would offer an effective way of redistributing resources in favour of the disadvantaged group (Fisher and Bramley, 2006). In North America, access to public services is also being perceived as paramount for the urban poor to compensate them for their lack of financial resources (Apparicio and Seguin, 2006).

At the forefront of globalization, and with its economic restructuring proceeding at a rapid pace, Hong Kong would have both a high degree of income inequality and socio-economic segregation as predicted by the multi-factor framework of Tammaru et al. (2016) we mentioned previously. The position of Hong Kong as an important centre at the top of the global economy is not only an assessment made by Time magazine, which coined and popularised the neologism Nylonkong in 2008, it has also been confirmed by rigorous academic studies. For instance, Hong Kong is classified as being at the top of the Alpha+ city group in the world city hierarchy of Taylor (2010) and Derudder & Taylor (2016), only coming after the two Alpha++ cities of London and New York. Rapid economic restructuring also has pushed the city into being a post-industrial city with the service sector contributing 93% of the city's GDP in 2019 (Census and Statistics Department, 2021). At the same time, the

income inequality of the city in 2016 was very high with the Gini coefficient of income distribution being as high as 0.53 (Census & Statistics Department, 2017), which made Hong Kong the most unequal city among those of the developed world.

The model by Tammaru et al (2016) predicts high levels of income inequality would translate into high levels of socio-economic segregation. This seems to have been confirmed by a recent empirical study by Ng et al. (2021), who found that in 2015, half (50%) of high socio-economic status households in Hong Kong would have to be relocated in order to balance the proportion of households of low socio-economic status in the city. Hong Kong was the fourth highest among 25 cities in a comparative study of socio-economic segregation, coming only after Cape town in Africa, and Buenos Aires and Paramaribo, both in South America (van Ham, 2021).

However, using a single aggregated index may have masked the complicated spatial patterns of segregation in the city. Working with the spatial segregation indices (in contrast to the non-spatial measurement used in Ng et al (2021)) of income decile groups, Monkkonen and Zhang (2014) found a contrasting pattern of segregation. Despite Hong Kong's non-spatial index of segregation being almost at the same level as the average of the 100 metropolitan areas in the US which in 2000 had a lower level of income inequality than Hong Kong (Reardon and Bischoff, 2011), in 2006 the top income decile group in Hong Kong was twice as segregated as households in the lowest income decile group (Monkkonen and Zhang, 2014). This matches the findings by Yip (2012), who also found that in 2006, the top income decile group was 2.4 times more segregated than the bottom income decile group. This contrasts with the U-shape pattern that is commonly found in cities in Europe and North America (Reardon and Bischoff, 2011, Tammuru et. al, 2016) which indicates the high and low social groups are more segregated than the middle social groups. Yet in Hong Kong, the poor or low social groups are more likely to mix with the middle social groups.

The mediating factors of the welfare state effort and the housing regime, as well as the historically contingent spatial patterns mentioned in the model of Tammuru et. al (2016), are at work in Hong Kong. In fact, the high segregation of the rich (and the upper socio-economic groups) in Hong Kong can be traced back to the legacy of the

colonial era of Hong Kong. Lo (1975) found that income, race, and occupation were common factors determining the clustering of the population in Hong Kong in the 1960s and 1970s in which non-Chinese households and high paid (often expatriate) professionals tended to reside in areas which were once exclusive to the European population in the early colonial years. Forrest et. al. (2004) also identified residential enclaves for the very rich and upper middle-class households in the 1990s but there was no evidence of a high concentration of the poor and the disadvantaged in any one place. The latter group tend to live in mixed residential areas with middle income households. Similar patterns were in fact also observed in 2016 by Ng et al.(2021).

On the contrary, the welfare state effort and the specific housing regime work in opposite ways to produce the specific socio-economic segregation patterns seen in Hong Kong. On the one hand, a large income gap between the rich and the poor has been produced by the combined effect of a stringent welfare state regime with a low level of income transfer and poor retirement provision which suppress the income of the poor (after transfer), whereas a low tax regime has boosted (relatively) the after-tax income of the rich. The large public housing sector, on the other hand, has acted to prevent the impact of high income inequality from being translated into a high level of socio-economic segregation (Ng et.al.2021). It is hypothesised that the large amount and nearly universal presence of public housing that offers rental as well as owner-occupied housing for which nearly three quarters of the households are eligible, has created socially mixed neighbourhoods for the middle and low social groups (Ng et al., 2021, Yip, 2012, Monkkenon & Zhang, 2014). However, there is no direct empirical verification of such a hypothesis.

Yet, the lack of extensive socio-economic segregation may not be an indication of the existence of an equal community. Nearly all research on socio-economic segregation has made their measurement on a horizontal scale which may have masked the presence of micro-segregation in close spatial proximity in vertically compact cities (Karadimitriou et.al., 2021). Vertical segregation has been witnessed in Paris (Preteceille, 2007) and Athens (Maloutas, 2020). This dimension of segregation in Hong Kong has been explored in Forrest et al. (2020) using a single high-rise block

as a case study and some initial supporting evidence has been found. However, whether this is a generalised pattern has yet to be verified through further empirical study.

Despite Hong Kong having a high level of income inequality, the impact of this on socio-economic segregation and social exclusion has not been adequately understood. There is not even unequivocal evidence to show whether Hong Kong has a low or a high level of socio-economic segregation. Yet Hong Kong, with its unique characteristics of compact urban design, verticality, and a large public housing sector as well as well-planned and well-provided public services, offers a valuable testing ground for the theory of socio-economic segregation, particularly for the effect of the factors mediating socio-economic segregation.

The absence of a social exclusion policy agenda in Hong Kong

On the policy side, apart from a short spell of media concern with Tin Shui Wai as a "city of sadness", systematic research on the impact of spatial segregation at the neighbourhood level is sparse, perhaps with the exception of a few pieces of research on Tin Shui Wai and Sham Shui Po. Both Fung and Hung (2014) and Rochelle (2015) examined Tin Shui Wai as a neighbourhood with a low level of community participation, owing to the lack of social capital, community diversity and trust, whereas Lau (2010) investigated the high level of unemployment in Tin Shui Wai as a result of a spatial mismatch between housing and employment that led to long distance commuting and high transport costs which act as obstacles to employment. The research by Wong (2011) directly examines social exclusion in six suburban districts that include Tin Shui Wai and connects the lack of social participation to a low level of social capital. Yet these pieces of research were unable to stir up any public discourse on socio-economic segregation and social exclusion. Most discussion on the media concerned the high concentration of public housing in poor neighbourhoods or the spatial mismatch between housing and employment and the obstacle high commuting costs and long commuting times presented to employment.

Very little attention was paid to the roots of social exclusion or the causes of socio-economic segregation.

On the public services side, Hong Kong has a long history of comprehensive town planning and heavy investment in the provision of public services and public transportation which help to mediate the negative effect of socio-economic segregation and mitigate the impact of social exclusion. Yet, rapid economic restructuring and the loss of jobs in manufacturing have caused the creation of local economic agglomeration and employment opportunities in new towns to fail to materialise (He et al., 2020). This forges a spatial mismatch between housing and employment and seriously hampers the efficacy of town planning in reducing segregation. At the same time, conventional planning for the provision of public services only makes reference to the size but not the composition of the population in the neighbourhood. An uneven spatial distribution of the disadvantaged groups would weaken the efficiency of service provision.

Public housing provision, which has been mentioned previously with respect to its offering a dampening effect on socio-economic segregation, would also have guaranteed public housing dwellers have adequate access to essential public services like markets, schools, and public transport etc., as such provision is standard protocol for every public housing estate. It has been indirectly verified by Wang and Cao (2017) that there is no difference in the activity-travel patterns between public tenants and other tenure groups in different locations of the city, which indicates that public tenants in more remote locations did not have to travel far to get access to public goods and services. Yet the research relies only on data from one-day travel diaries, and also, it has not directly measured the accessibility to public goods and services. In this respect, a standardised protocol for public services provision in public housing estates may not match the needs of public tenants in spatially segregated housing estates, and thus the lack of a detailed understanding of socio-economic segregation patterns might result in a mismatch of public services provision. Having this understanding would help to enhance the spatial planning of such services.

Chapter 3: Methodology

Data Source

This project has employed the most recent Census data, the by-census 2016, for the empirical study. Even though a new full Census will be conducted in mid 2021, micro-data for academic study will not be available until after mid to late 2023. Data on personal, household and housing characteristics as well as number of households in poverty (defined by the relevant official poverty lines) and income decile groups was extracted from the full dataset of the 2016 by-census, excluding domestic helpers at the Large Street Block (LSBG) level. LSBG are small areas which is created for the purpose of data collection in the census. There are 1623 LSGB released by the Census and Statistics Department for our project which have, on the average 4324 people. Each LSBG has a distinct label but it is not possible to correspond each LSBG to commonly known locations which enable readers a convenient identification of where the LSBGs are. As a compromise, this report will mention the district a particular LSBG is located in the discussion and relevant tables.

Working directly on the micro-data increased the time and cost of the project. Yet this was the most appropriate way of manipulating the data this project requires and other means of data access was not appropriate. For instance, the output tables of the 2016 By-census could be assessed online, yet the tables are based on a dataset that includes live-in domestic helpers. All domestic helpers belong to the lowest income decile group and the elementary worker group, hence including them in the analysis would create distorted pictures of household income (which includes the income of the domestic helpers) and social class mix (as they lived with their employers). However, tables that are based on the dataset which excludes domestic helpers offer limited information at the LSBG (Large Street Block Group) level. The research team also initially enquired to see if tables on the LSBG with the relevant data the project requires on the dataset which excludes domestic helpers could be purchased from the Census and Statistics department. This would have substantially reduced the cost of collecting the data. Unfortunately, the Census and Statistics Department was unable to

produce all the tables that we requested. Another alternative which is popular among researchers in Hong Kong is to work with the 5% sample data on 2016 By-Census. This project also inspected that data but found that data at the LSBG level are not available from the 5% sample set. Hence, the project had to employ research assistants to work on site at the C&S Department to extract the output via the Self-Tabulation service of the Census and Statistic Department. We thus conducted three rounds of data processing and generated the data necessary for the project.

This project also extracted location information from various websites to quantify the degree of public service accessibility for each spatial unit. Addresses or geographic locations of public and private hospitals, public transport stops, leisure and retail facilities in Hong Kong (see the appendix 4 for a list) were collected from open sources in the internet. Geocoding API was employed to extract the GPS coordinates of the locations where public services are provided, and that was supplemented by manual processing using Google Maps. A total of 7,987 medical services (both public and private hospitals) locations, 30,010 public transport stops / terminals, 3,514 locations at which social services are offered (e.g., youth centres, community centres, elderly service centres etc.), and 7,076 retail and leisure locations were included. ArcGIS was used to evaluate the shortest distance from the service location to the centroid of the areal unit of concern.

Information on buildings used in this report is based on the database of buildings provided on the Home Affairs Department website. Information was extracted from the internet and the geographical location of the buildings were processed by locating the address of the building on Google maps (see the sources of information in appendix 4).

Measuring Segregation

Segregation is a multi-dimensional phenomenon and can be understood in five dimensions – evenness, exposure, concentration, centralisation and clustering (Massey and Denton, 1998). Without engaging too much in technical detail, this

project chose only the first two and also the most frequently quoted dimensions of the concept.

The first dimension, evenness, is perhaps the easiest to interpret and is most relevant to policy. Two social groups are not segregated if they are evenly distributed in all areal units of the city (i.e., their relative proportion in any given areal unit is the same as their relative proportion over the whole city). The dissimilarity index, DI, is the most commonly cited measurement of evenness. It evaluates the proportion of people in a particular social group who would have to be reallocated across areal units in order to achieve an even distribution of the two groups.

The dissimilarity index ranges from 0 (totally even) to 1 (totally uneven). Both the dissimilarity index and its variant, the index of segregation, will be used.

$$DI = \frac{1}{2} \sum_{i=1}^{N} \left| \frac{a_i}{A} - \frac{b_i}{B} \right| \quad \text{(formula 1)}$$

Where N is the number of areal units (e.g., neighbourhoods); a_i and b_i are respectively the population of reference group 1 and 2 in area i and A and B are their proportion in the whole city.

To supplement the dissimilarity index, a variant of the dissimilarity index, the index of segregation, is also quoted. It measures how much the population of the given group differs from the population of all other groups in the areal units.

$$IS = \sum_{1=1}^{n} \left(\left| \left(\frac{x_i}{X_T} \right) - \left(\frac{t_i - x_i}{T_T - X_T} \right) \right| \right) \text{(formula 2)}$$

Where *N* is the number of areal units (e.g., neighbourhoods); x_i and X_T are respectively the number of people in reference group 1 in areal area i and their total number in the whole city; t_i andT_T are respectively the total number of the other groups in areal unit *i* and the whole city.

The second dimension, exposure, assesses the chance of one social group meeting another social group within the areal unit in which they reside. A commonly used measurement is the isolation index which assesses the exposure of a social group only to members in the same group, and is the weighted average of the proportion of that group in the areal unit. Yet this index is heavily influenced by the size of the group in

concern and hence this project adopted a modified isolated index, MII, which takes into account the relative size of the group in question in the city.

$$MII = \frac{\left(\sum_{i=1}^{n}\left(\frac{x_i}{x}\right)*\frac{x_i}{t_i}\right)-\frac{x_i}{t_i}}{\left(1-\frac{X}{T}\right)} \text{ (formula 3)}$$

Where N is the number of spatial units. X and x_i are the number of given groups in areal unit i and the whole city; t_i is the population of areal unit i and T the population of the whole city.

Whilst these two aforementioned indices are simple to manipulate, they are aspatial, which means they are not connected to the spatial divisions of the areal units, but at the same time, their values are extremely sensitive to how the areal units are divided (Wong, 2002). Hence this project adopted the local segregation index developed by Wong (2002), who modified the aspatial segregation index (the reverse of the isolation index) and took into account the possible interaction with neighbouring units. This reduced the boundary effect, though was not able to eliminate it entirely (Wong, 2002). It also allowed the generation of a segregation index for each areal unit which allowed the modelling of segregation together with other factors.

The local segregation index S_i*g is formulated as.

$$S_i = 1 - \frac{\sum_{g}^{n} P_{ig} \sum_{j}^{m} \sum_{k}^{n} w_{ij} \ P_{jk}}{\sum_{g}^{n} P \ _{ig} \sum_{j}^{m} \sum_{k}^{n} P_{jk}} \text{ (formula 4)}$$

Where S_i is the local segregation index of all groups in areal unit i among a total of n areal units in the city whereas g is a relevant population of a group among a total of m groups in the city. Pig is the population count of group g in areal unit i and w_{ij} is the relevant element in the generic spatial weights matrix (see below). The numerator is the quantity of potential actions among the reference groups weighted by the distance between the areal units, whereas the denominator is the *number* of potential actions of the groups regardless of the spatial unit they are in. For the sake of simplicity, the project started with a simple binary adjacency matrix as the spatial weight matrix for wij, where 1 indicates unit i and j are neighbours and 0 indicates otherwise, and i can be equal to j and then w_{ij} would be equal to 1. A more

sophisticated spatial weights matrix of w_{ij} in which a biweight kernel function was used as the distance decay function (Reardon et al. 2008) was also explored. The function is less steeply sloped than a standard inverse distance function would be and hence places greater importance on nearby cells.

$$\emptyset(p,q) = \begin{bmatrix} \left[1 - \left(\frac{d(p,q)}{r}\right)^2\right]^2 & if \;\; d(p,q) < r \\ 0 & otherwise \end{bmatrix} \text{ (formula 5)}$$

Where d(p,q) is the distance between point p and q, and r is the maximum range of the decay (beyond which the value is 0).

Defining Disadvantaged Groups

This project used different definitions of disadvantaged groups to explore the patterns of socio-economic segregation. These groups partly overlap and this was intended to capture different aspects of socio-economic segregation. Three definitions of disadvantaged groups were used:

1. households in poverty (defined by the official poverty line of 2016),
2. poorest income decile group,
3. the elderly (who constitute a large proportion of households in poverty).

Other disadvantaged groups like ethnic minority groups and tenants in sub-divided units are also vulnerable and worth public attention. However, the census data does not provide the necessary information to identify whether the rental units consist of subdivided units, or they are shared flats. This would cause an over-estimate of the number of subdivided units and hence this project decided not to include tenants in subdivided units in the analysis. Ethnic minority groups are not included as they constitute a small proportion of the total population. In 2016, only 3.7% of the population (excluding domestic helpers) were non-Chinese and only 1.3% of the total population were people from South and South-east Asia, who we often describe as being more vulnerable groups. Some LSBG would only constitute a small but non-zero population of the ethnic minority groups and the policy of the Census Department on privacy prevents the divulgence of such figures. As this would

seriously affect the integrity of the data, ethnic minority groups were not be included in this project. They deserve a more in depth and dedicated project to uncover their specific issues.

The spatial indices and the dissimilarity index, as well as the spatial measurement of local segregation index of each of the disadvantaged group was evaluated to reveal the socio-economic segregation patterns of Hong Kong. The statistical language of the SAS ver 9.4 has been employed to extract the Census 2016 data, and ArcGIS Pro 3.0.0 was used to manipulate the spatial data and the local segregation indexes as well as provide visualisation of the output. The descriptive statistics and regression models were generated by the statistical software Stata ver 17.

Factors related to socio-economic segregation

The local segregation index offers dis-aggregated information on the segregation of each areal unit. This enabled the investigation of factors that are connected to socio-economic segregation. An ordinary least square regression analysis has been run with the disaggregate local segregation index of the three disadvantaged groups (households in poverty, households in the poorest income decile group, and elderly population) as the dependent variable against an array of independent variables.

Inspired by the literature on the socio-economic segregation of Hong Kong by others and work done by the principal investigator, the main concern was to look at the connections of socio-economic segregation using the following structural variables-

1) verticality – to explore whether the number and height of high-rise buildings is significant to segregation. The average building height and the number of high-rise buildings which are higher than 20 storeys in the relevant areal unit will be used as a proxy.
2) compact city – the population density of the areal unit is used as a proxy to examine the impact of urban compactness.

3) housing regime – to include the variables of housing and urban policy in the analysis. The proportion of public housing (both rental and homeownership) units is used to indicate state intervention in housing, whereas the existence of large private housing estates (private residential developments that consist of more than two buildings and 500 units) is employed.
4) Building age is included to test the impact of old (and often dilapidated) buildings on segregation. The thresholds for old buildings are set at respectively 40 and 50 years in order to test for the sensitivity of this variable.

Other socio-economic and household characteristics, like family type, age, occupation, education and housing tenure were added as control variables.

Access to essential services in segregated areas

With no local research into what public services are considered to be essential in Hong Kong, this project makes reference to the 17 essential or desirable public services identified by Fisher and Bramley (2006) in the 1999 Poverty and Social Exclusion Survey of the UK. Five categories of essential services are identified in their study (Fisher and Bramley (2006) figure 8.4). They are:

1. medical services (doctor, dentist, hospital, chemist, optician);
2. transportation (petrol station, public transport, public transport for children, train/tube service);
3. social services (youth club, public community village);
4. retail and leisure (bank, supermarket, corner shop, pub, cinema);
5. place for worship.

Adapting such categories to the local context, we have dropped the place for worship (as it is not too relevant for the majority of people in Hong Kong) and redefined the remaining four categories.

1. medical services (government clinics and private medical general practitioners),
2. public transport (MTR, franchised buses, green minibuses),

3. social services (non-residential services for the elderly, family services, children's, youth services and rehabilitation services run by the government or an NGO),
4. retail and leisure (supermarkets, wet markets, parks, libraries).

There are two popular measurements of accessibility (Luo & Wang, 2003). The gravity model connects an index of accessibility of a particular areal unit to a specific service by summing the capacity of the provision of all possible sources of the service and the travel time between the areal units and the location of a particular provision point such that the distance to be traveled was augmented by a damping factor to reflect the increasing difficulty of access with the increase in distance. There is also a modified gravity model that takes into account the potential demand for the specific service by adding the population size of the areal unit and the travel time between the service location and the areal unit (Weibull, 1976). The second measurement is the floating catchment area model which is assessed in two steps. The first step evaluates the ratio of the population to service provision in each of the service provision spots within the predefined radius of a "catchment area", and the second step sums up all such proportions to arrive at an aggregate index of the accessibility of that particular service (Luo & Wang, 2003). In both models, travel time is an important indicator which depends both on the distance traveled and the travel mode.

Such measurements either attempt to access the accessibility of all service provision spots in the city or to evaluate, from the perspective of the service providers, the service demand in their catchment areas. It also assumes most people will use private cars and hence they have choice beyond the nearest spot of provision. However, in the context of Hong Kong, the private car is not an option for transportation for the majority of the population and the access to service spots by public transportation would depend on whether there is direct link between the spots and the location of the person needing the service, or else time will be consumed during public transport transfers or long walks. Hence this project took into account the ingredients of these popular measurement models but used a simple approach to measure accessibility which took into account only walking and direct public

transportation linkages. It also looked at the accessibility from the perspective of the users.

A qualitative categorisation of the accessibility of the nearest public service provision of the respective items is defined as:

1. Within easy walking distance – within a radius of 500 metres from the centroid of the areal unit (7-8 minutes' walk),
2. Accessible by walking – a distance between 500m to 1000m (walk within 10-15 minutes),
3. Easily accessible by public transport - between 1-5 km (about 10 minutes by bus) from the centroid of the areal unit and directly linked by public transport between the two points,
4. Not easy to access – a distance of over 5 km or there are no direct public transport links.

Chapter 4: Research Findings

Concentration of Disadvantaged groups

This project employs three definitions of the term "disadvantaged group":

1) households in poverty (defined by the official poverty line of 2016),

2) poorest income decile group,

3) the elderly households (members of the households are over the age of 65).

Table 4.1 shows Large Street Blocks with the highest concentration of disadvantaged groups. Large Street Block #11318 has the highest concentration of both households in poverty and those in the lowest income decile group. The area is located in Sai Ying Pun (a few minutes walk from Sai Ying Pun MTR station) and consists of only around 1000 residents in 12 buildings. Two thirds of the buildings are old low-rise buildings which were developed in the 1950s and early 1960s. It is a typical gentrifying area in which elderly households are over-represented (over one quarter are elderly households). The rest of the LSBGs (Large Street Block Groups) with high concentrations of households in the lowest income decile groups are all in the New Territories rural areas and have a very low population density. All the 10 most segregated LSBGs do not contain any public housing and the proportion of private tenants is higher than the city's average (at 17).

Likewise, the majority of LSBGs that have a high poverty rate are in New Territories rural areas with very low population densities (Table 4.2). There are a few LSBGs with high poverty rates in the urban area such as LSBG#24014 in Kowloon City where all buildings are over the age of 60 and low rise, and LSBG#32601 in Tsuen Wan having only 6 buildings with all except one over the age of 50 (perhaps also with a high concentration of sub-divided units). The situation is similar in LSBG#24708L and LSBG#24801L. Both are in Kowloon City and all their buildings are also low-rise old buildings. The only exception is LSBG#65238 which is located in Sha Tau Kok and contains a small public housing estate operated by the Hong Kong Housing Society which is not a very typical public housing estate. Otherwise,

the pattern is very similar to that of households in the lowest income decile group in which private renters are over-represented.

The patterns of the concentrations of elderly households are different (Table 4.3). Of the top 10 areas with the highest concentration of elderly households, most of them consist of public housing areas except for LSBG#294401L, LSBG#95014L, and LSBG#54401L. The latter three LSBGs are in the rural parts of the New Territories that have a low population density.

Table 4.1 Households in the Lowest Income Decile Group

LSBG	Lowest Income Decile Group	Person per sq km	Total Households	Public Tenants	Private Tenants	Elderly Households
11318 (SYP)	59	25863	500	0	20	22
64201L (TP)	36	281	556	0	33	17
51205L (YL)	36	1490	877	0	51	26
94401L(IS)	36	783	843	0	15	40
53306L (YL)	35	131	379	0	15	19
51401L (YL)	34	824	1402	0	17	26
97608L (YL)	34	4821	481	0	25	19
92006L (IS)	32	2724	615	0	34	27
54401L (YL)	31	611	1064	0	24	29
42507L (TM)	31	3451	817	0	21	18

Source: Authors' analysis based on By-Census 2016
Note: (SYP) Sai Ying Pun; (TP) Taipo; (YL) Yuen. Long; (IS) Islands District; (TM) Tuen Mun; all figures are percentage except the total number of households and persons per kilometer; The LSBG labels are assigned by the Census and Statistic Department which have no easy locational identifiers.

Table 4.2 Households below the Poverty Line

LSBG	Lowest Income Decile Group	Person per sq km	Total Households	Public Tenants	Private Tenants	Elderly Households
11318 (SYP)	59	25863	500	0	20	22
72306L (TP)	52	148947	464	0	60	5
65238(TP)	49	31109	490	100	0	13
64201L (TP)	48	281	556	0	33	17
24104 (KLC)	48	264598	642	0	62	7
32601 (KC)	46	203049	884	0	66	5
51401L (YL)	43	824	1402	0	17	26
64202L (TP)	42	379	479	0	37	25
24708L (TKW)	42	32358	532	0	47	10
28401L (KLC)	42	11171	895	0	53	7

Source: Authors' analysis based on By-Census 2016

Note: (SYP) Sai Ying Pun; (TP) Taipo; (KLC) Kowloon City; (KC) Kwai Tsing; (YL) Yuen Long; (TKW) To Kwa Wan; all figures are percentage except the total number of households and persons per kilometer; The LSBG labels are assigned by the Census and Statistic Department which have no easy locational identifiers.

Table 4.3 Elderly Households

LSBG	Lowest Income Decile Group	Person per sq km	Total Households	Public Tenants	Private Tenants
29456 (KT)	57	14785	980	99	0
23425L (KLC)	55	22683	436	74	3
28332L (KLC)	52	24336	1297	100	0
94401L (IS)	40	783	843	0	15
26812L (SSP)	30	10225	1178	87	1
29712L (KT)	30	89791	2971	99	0
95014L (IS)	30	430	377	0	29
54401L (SS)	29	611	1064	0	24
32404L (TW)	29	27619	3285	94	5
51025 (TSW)	28	56431	5493	100	0

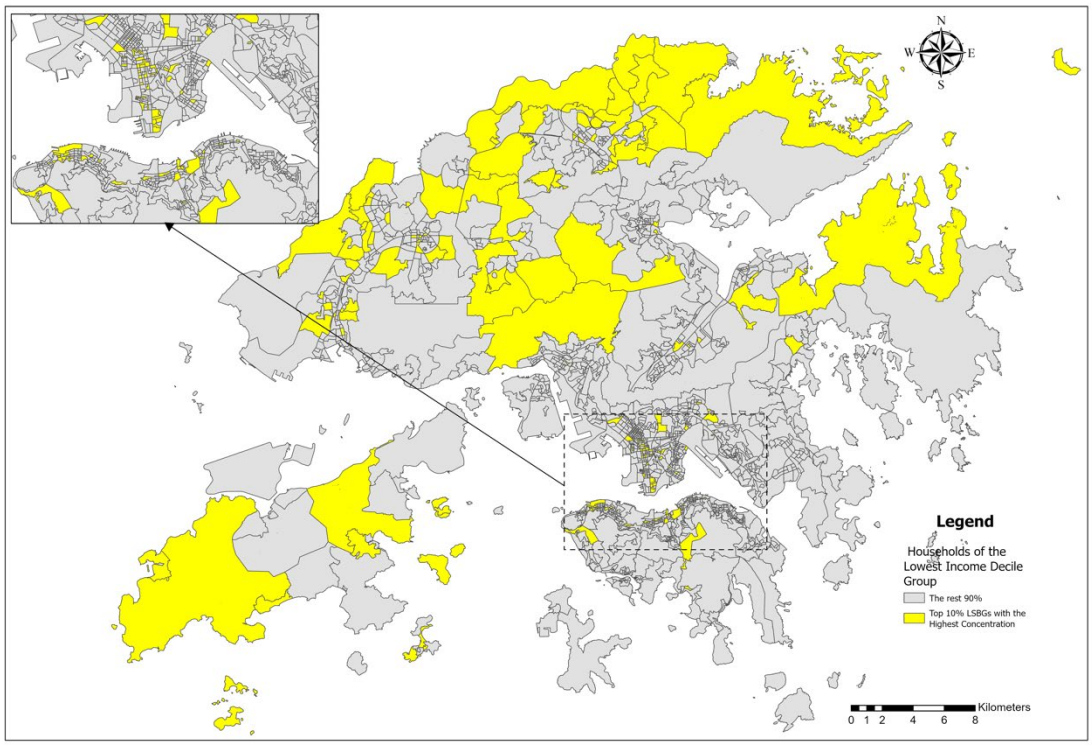
Source: Authors' analysis based on By-Census 2016

Note: (KT) Kwun Tong; (KLC) Kowloon City; (IS) Islands District; (KC) Kwai Tsing; (SSP) Sham Shui Po; (KT) Kwun Tong; (IS) Islands District; SS (Sheung Shui); TW (Tsuen Wan); (TSW) Tin Shui Wai; all figures are percentage except the total number of households and persons per kilometer; The LSBG labels are assigned by the Census and Statistic Department which have no easy locational identifiers.

Figures 4.1 to 4.3 show the distribution of the top 10% (about 160 LSBGs) with the highest concentration of disadvantage groups. In the case of the LSBGs with the highest concentration of households who belong to the lowest income decile group, half of such LSBGs are in the rural parts of the New Territories where the population density is only one quarter of the city's average population density. A similar pattern is found in the LSBGs with the highest poverty rates. There are about 44 such LSBGs in the New Territories that have only two thirds of the average population density of the city. Most of the LSBGs with the highest proportion of elderly households in them (58) are in the urban areas or the first-generation new towns (Tsuen Wan, Kwai Ching, and Shatin), whereas the LSBGs which are located in the New Territories only have one third of the city's average population density.

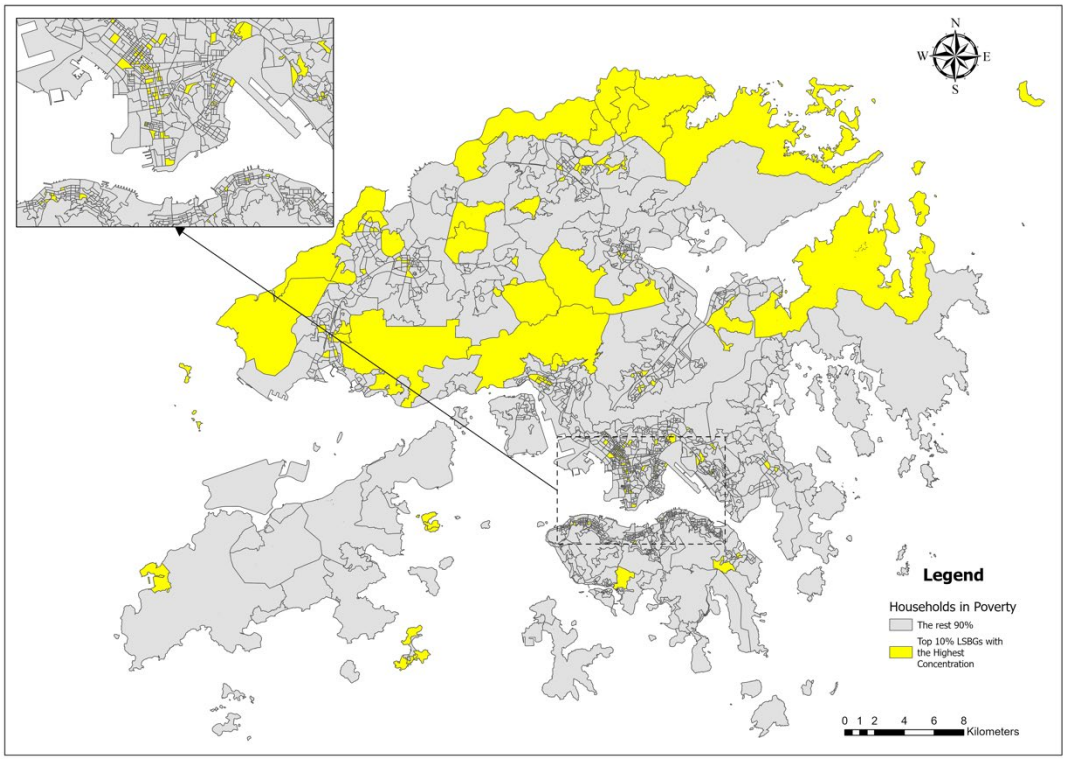
Such patterns largely match what Forrest et al (2004) found in Hong Kong using the 1996 By-census data and Yip (2012) found using the Census data of 2006. Despite both the researchers using TPU (Tertiary Planning Unit, census tract and also being used in town planning) as the unit of analysis (compared with the finer spatial scale of LSBGs used in this research), they found that areas with a higher concentration of poor households (they both use the lowest income decile group as an indicator) are overwhelmingly in the rural parts of the New Territories where there is a much lower population density.

Figure 4.1 Top 10% LSBGs with the Highest Concentration of Households in the Lowest Income Decile Group



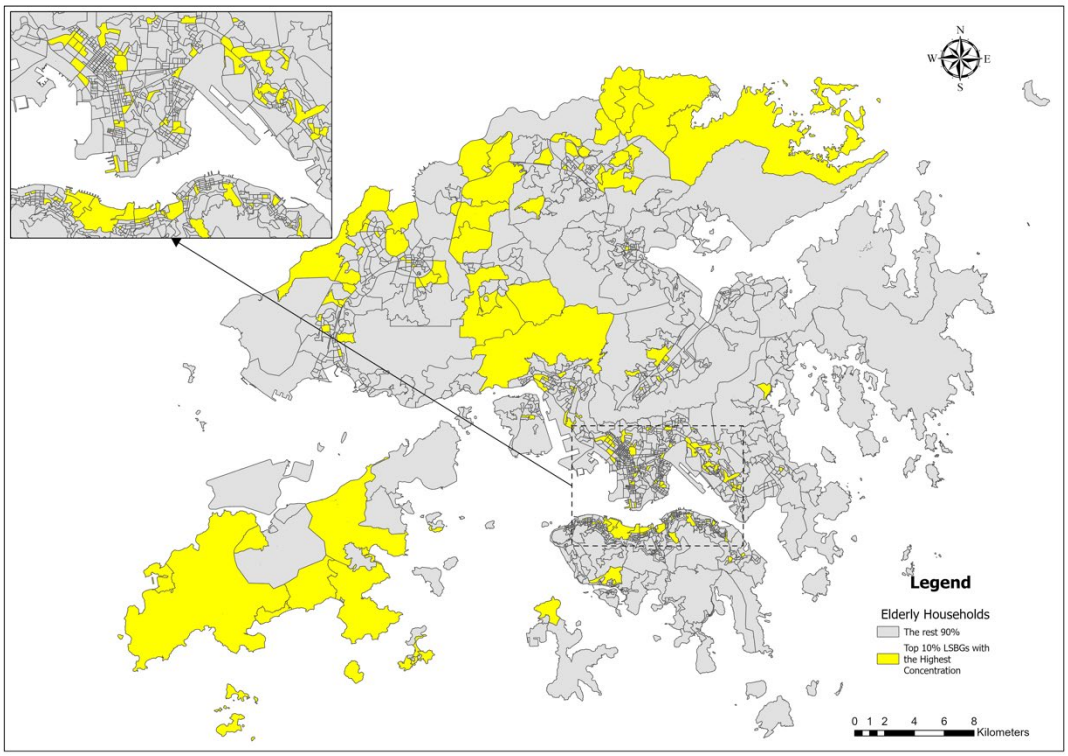
Source: Authors' analysis based on By-Census 2016

Figure 4.2 Top 10% LSBGs with the Highest Concentration of Households in Poverty



Source: Authors' analysis based on By-Census 2016

Figure 4.3 Top 10% LSBGs with the Highest Concentration of Elderly Households



Source: Authors' analysis based on By-Census 2016
Note: All household members are over the age of 65

Segregation Patterns of Disadvantaged Groups

Results of various indexes of segregation are shown in table 4.4. The overall (aspatial) dissimilarity indexes (refer to formula 1) of the disadvantaged groups- 1) households in poverty (defined by the official poverty line of 2016); 2) the lowest income decile group. Households in the lowest income decile group and households in poverty have a respective dissimilarity index of 0.20 and 0.19. This means 20 of the households in the lowest income decile group and 19 of the households in poverty have to be moved to other areas with a higher incidence of non-poor households in order to equalise the proportion of poor and non-poor households in each areal unit. For elderly households, the corresponding figure is a slightly higher figure of 22. The corresponding segregation indexes (refer to formula 2) are in general in the same level as the dissimilarity indexes, 0.22 for households in the lowest income decile group, 0.27 for households in poverty and 0.25 for elderly households.

Comparing similar indexes for 1996 and 2006, it can be seen that the overall segregation of households in the lowest income decile group and the elderly households indicates a steady decreasing trend with a reduction of over one third in the dissimilarity index of households in the lowest income decile group over the twenty-year period from 1996 to 2016. A similar level of reduction, 37% (not reporting in the table), is witnessed for elderly households. Yet in the same period, income distribution has worsened with the Gini coefficient of income distribution having increased from 0.518 in 1996 to 0.539 in 2006 (Census and Statistics Department, 1997a & 2017a), and the population is continuously aging giving rise to an increase in the number of people over the age of 65 from 10% in 1996 to 16 in 2016 (Census and Statistics Department, 1997b & 2017b). This means that whilst the income gap between the poor and the non-poor has widened, they have become increasing mixed over the period. Likewise, as the elderly population has increased, there is no evidence that elderly households tend to be spread more evenly across the city.

Table 4.4 Various Indexes of Segregation

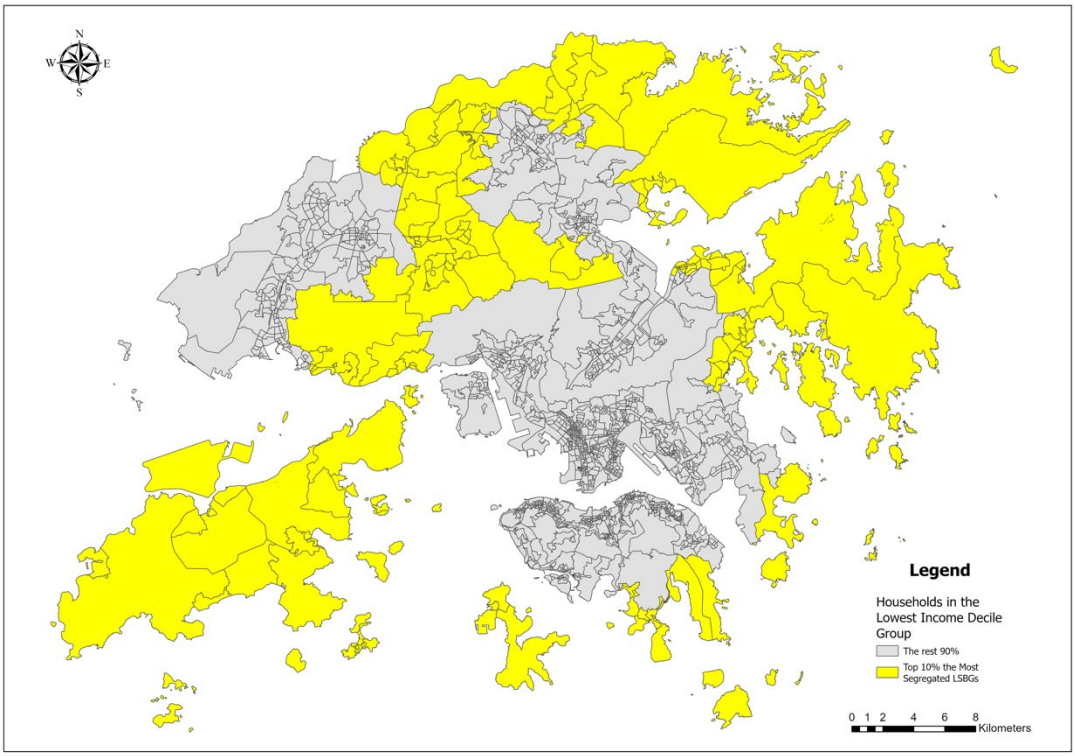
Reference Group	1996	2006	2016
Dissimilarity Index			
Lowest Income Decile Group	0.31	0.24	0.20
Households in Poverty	-	-	0.19
Elderly Households	0.35	0.31	0.22
Index of Segregation			
Lowest Income Decile Group			0.22
Households in Poverty			0.27
Elderly Households			0.25

Source: figures for 1996 and 2006 Yip (2012); figures for 2016 Authors' analysis

To evaluate the degree of segregation in each LSBG, local segregation indexes (formula 4) for each LSBG were computed. Distributions of the top 10% most segregated areas are shown in figures 4.4 to 4.7.

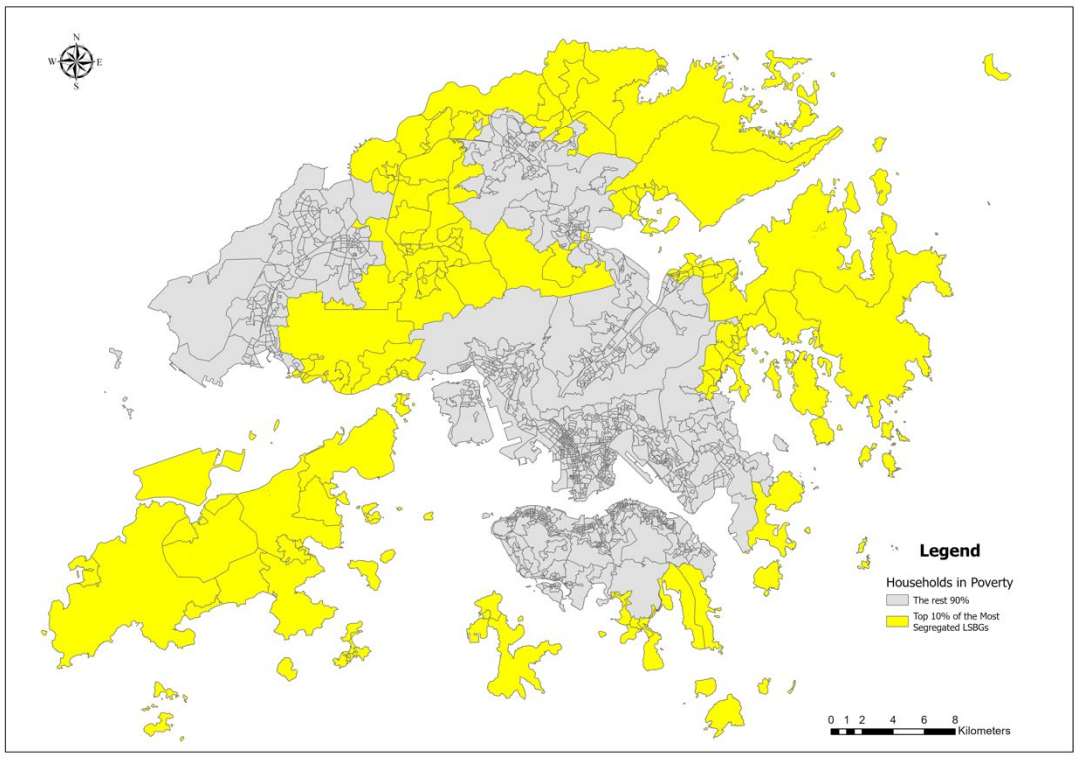
Over-whelming majority of the top 10% LSBGs are in the rural parts of the New Territories and only 12 are in the urban areas. The most segregated LSBGs in the urban areas are in fact located in low density population pockets in the rugged terrain of the urban areas where temporary housing or bungalows can still be found. Again, the lists of the three disadvantaged groups over-lap to a very high degree. In fact, only a few LSBGs (3 of the total) show differences between the lists.

Figure 4.4 Top 10% the Most Segregated LSBGs with respect to Households in the Lowest Income Decile Group



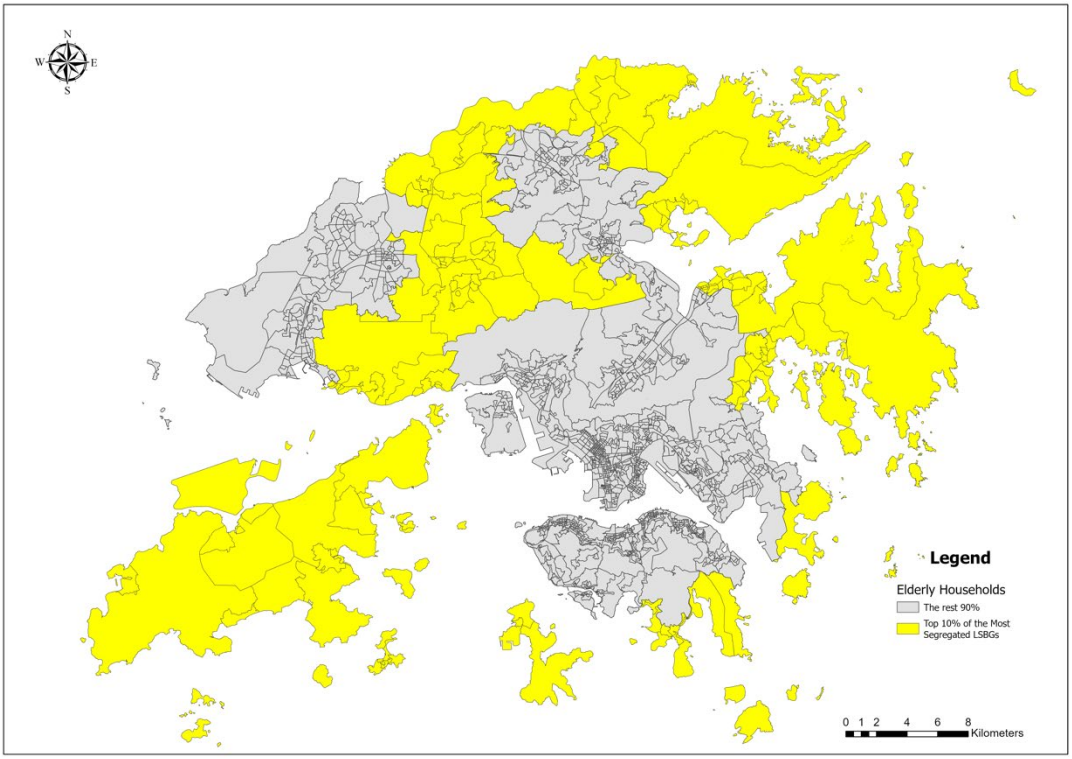
Source: Authors' analysis based on By-Census 2016

Figure 4.5 Top 10% of the Most Segregated LSBGs with respect to Households in Poverty



Source: Authors' analysis based on By-Census 2016

Figure 4.6 Top 10% of the LSBGs with respect to Elderly Households



Source: Authors' analysis based on By-Census 2016
Note: All household members are over the age of 65

The top ten most segregated LSBGs are shown in tables 4.5 to table 4.7. There are a couple of observations on the distribution of the most segregated areas worth highlighting.

First, all of the most segregated LSBGs are in the rural parts of the New Territories and the overwhelming majority of them have small populations (70 of the areas have less than 750 households compared with the average size of an LSBG which is 1,524 households) and are sparsely populated (the most densely populated LSBG on the list has only 3,119 persons per sq km whereas the average density for all LSBGs is 89,050 persons per sq km.

Second, the lists of the top ten most segregated areas have a high degree of consistency. The list of segregated areas for households in the lowest income decile group is identical to both the list of households in poverty and the elderly households.

Third, 70 of the LSBGs are all private housing. Despite three LSBGs (LSBG#94401 in Tai O, Lantau Island and LSBG#65201L and LSBG#65238 in Sha

Tau Kok near the border with Shenzhen) being the exception, the public housing estates there are not typical public housing estates, but ones developed as replacement estates for indigenous inhabitants whose homes were confiscated for infrastructure development. It is believed the overwhelming majority of public tenants living there are indigenous New Territories inhabitants (particularly in the case of Sha Tau Kok which is within the frontier closed area).

Table 4.5 Top 10 Most Segregated areas of Households in the Lowest Income Decile Group

LSBG	Person per sq km	Total Households	Public Tenants %	Private Tenants %	Elderly Households %
81201L (SK)	21	200	0	24	12
74108L (ST)	37	690	0	29	13
94401L (TO)	783	843	0	15	40
93201 (IS)	1390	590	0	32	26
65201L (STK)	5014	583	64	0	23
65238 (STK)	31109	490	100	0	13
65212L (STK)	59	853	0	28	21
94411 (IS)	23536	507	25	29	15
93202L (IS)	27	437	0	27	25
91101L (IS)	88	790	0	45	12

Source: Authors' analysis

Note: (SK) Sai Kung; (ST) Shatin; (TO) Tai O; IS (Islands District); (STK) Sha Tau Kok; The LSBG labels are assigned by the Census and Statistic Department which have no easy locational identifiers.

Table 4.6 Top 10 Most Segregated areas of Households in Poverty

PL	Person per sq km	Total Households %	Public Tenants %	Private Tenants %	Elderly Households %
81201L (SK)	21	200	0	24	12
74108L (ST)	37	690	0	29	13
94401L (TO)	783	843	0	15	40
93201 (IS)	1390	590	0	32	26
94411 (IS)	5014	583	64	0	23
65238 (STK)	31109	490	100	0	13
65212L (STK)	59	853	0	28	21
65201L (STK)	23536	507	25	29	15
93202L (IS)	27	437	0	27	25
91101L (IS)	88	790	0	45	12

Source: Authors' analysis

Note: (SK) Sai Kung; (ST); Shatin; (TO) Tai O; IS (Islands District); (STK) Sha Tau Kok; The LSBG labels are assigned by the Census and Statistic Department which have no easy locational identifiers.

Table 4.7 Top 10 Most Segregated areas of Elderly Households

Elderly Households	Person per sq km	Total Households	Public Tenants %	Private Tenants %	Elderly Households %
81201L (SK)	21	200	0	24	12
74108L (ST)	37	690	0	29	13
94401L (TO)	783	843	0	15	40
93201 (IS)	1390	590	0	32	26
94411 (TO)	23536	583	64	0	23
65201L (SKT)	5014	507	25	29	15
65212L (STK)	59	853	0	28	21
93202L (IS)	27	437	0	27	25
91101L (IS)	88	790	0	45	12
65238 (STK)	31109	490	100	0	13

Source: Authors' analysis

Note: (SK) Sai Kung; (ST); Shatin; (TO) Tai O; IS (Islands District); (STK) Sha Tau Kok; The LSBG labels are assigned by the Census and Statistic Department which have no easy locational identifiers.

Segregation: Regression Analysis

This project explores the factors connected to socio-economic segregation with a multi-factor approach put forward by Tammaru et al (2016) (see figure 2.1). Three

factors are identified- globalisation and the resulting restructuring of occupation; historical pathway and institutional setup. Constrained by the availability of data (from 2016 By-Census and other geographical and building data from open sources), this project is only able to represent these factors indirectly. Impact of globalization and the associated economic restructuring would be represented by educational level and occupation of residents as well as the demographic characteristics of households in the respective LSBG whereas institutional setup would be represented by the distribution of housing tenure, housing affordability and information of the built-environment to capture the important of housing and urban policy. Percentage of immigration, ethnicity and whether residents are locally born are used as proxy for historical pathway.

Eight variables are employed as indicators for the impacts of globalisation and economic restructuring – one person households, elderly households, lone parent households, economically inactive persons, people with only primary education and below, people with a university degree or above, managers and administrators and peoples in elementary occupations. Variables for the institutional factors have twelve variables which include households in public renting, households in homeownership, households in the assisted homeownership sector (homeownership scheme, the private sector participation scheme and tenant purchase scheme), household which are hard pressed in housing cost payment (who spent over 30% of their income on rent or mortgage repayment), location of the LSBG (urban or New Territories), population density, high rise buildings, low rise buildings, building age (buildings which are older than 50 years), large private housing estates and the presence of houses. Historical pathway would have three variable and they are new immigrants, persons who are born in Hong Kong, people who are of south of South East Asian origin.

Table 4.8 shows the results of the regression analysis with the local segregation index of the LSBG as the dependent variable. Two indexes using respectively the lowest income decile group (Lowest DG) (Model 4.1 and 4.3) and household in poverty (model 4.2 and 4.4) are employed to evaluate the local segregation indexes. Demographic and housing tenure information (which are extracted from the Census

data) are first added to the models (model 4.1 and 4.2), Percentage of people who have only primary education or below is significant in both models (4.1 and 4.2) which increases segregation of the LSBG. People with low level of education are expected to be in a disadvantaged position in a globalised city and often end up on a low paid job or be in unstable employment. Other variables that are significant in both models include the percentage of lone parent households, and percentage of households who are hard pressed in paying for their housing costs (including rent and mortgage repayment) but their impacts are negative (i.e. decrease segregation of the LSBG). This may indicate that households who are hard-pressed with housing cost payment may not be poor and so are lone parent households. Yet percentage of people with higher education and high-status occupation as well as percentage of people in elementary occupation and percentage of residents who are out of the labour market are not significant. This may indicate the impact on globalisation and economic restructuring is not straight-forward. Another interesting finding is the high significance of the variable on percentage of residents in the LSBG who were born in Hong Kong. Thnis variable has a high contribution (which is statistically significant at 1% level) in increasing segregation of the LSBG whereas percentage of new immigrants which is insignificant and percentage of ethnic south-east or south Asian residents which is significant at 10% level only in model 4.1 but insignificant in model 4.2. This may suggest new immigrants may be more mobile and more evenly distributed across a large area and ethnic minority groups also do not concentrate in a few districts (their small proportion in the population may also make them more dispersed geographically). Whereas many of the locally born residents may be less mobile and those who are poor are particularly immobile and be easily clustering in areas they may have stayed for their entire life.

Most housing tenure groups are significant in the model 4.1 and 4.2. Percentage of public tenants and owners in assisted homeownership schemes are significant at 10% level and have a negative impact in model 4.1 which matches with the conjecture of public housing having a damping effect on socio-economic segregation in previous literature on socio-economic segregation of Hong Kong. Yet in model 4.2, percentage

of private homeowners in the LSBG is also significant (at 10% level) which may need further exploration.

However, the explanatory power of model 4.1 and 4.2 is not high, only having a R square of respectively 0.14 and 0.12 which mean only 14% and 12% of the variation of the data are explained by the models.

Geographic and building variables are added in model 4.3 and 4.4. One apparent improvement is the explanation power of the models in which respectively 47% and 45% of the variation of the data are explained by the models 4.3 and 4.4. Yet addition of the geographic and building data also has squeezed out factors that are significant in previous models (4.1 and 4.2) and at the same time introduces a different set of variables that are statistically significant.

Housing tenure groups are no longer significant, so is the percentage of residents with primary education or below. Instead, percentage of residents in elementary occupation becomes highly significant (at 1% significance level) and increase the degree of segregation of the LSBG with regression coefficient at respectively 0.40 and 0.45 in model 4.3 and 4.4. This indicates the significant impact of economic restructuring on socio-economic segregation. However, percentage of residents having a degree or above also become highly significant (at 1% level) as well as in a high occupation status group of administrators and managers have a high and positive contribution to segregation (at respectively 0.23 and 0.30 in model 4.3 and 4.4). The explanation of such variable perhaps requires further exploration.

Population density and whether the LSBGs are located in the urban areas reduce the degree of segregation. It means that LSBGs which have higher population density and are located in the urban areas or first-generation new towns are likely to be less segregated. This matches with the expectation that densely populated urban areas may be more diversified in terms of the population profile and hence less segregated. However, the significant but negative contribution of percentage of buildings in the LSBG which are older than 50 years does not match with the expectation that older buildings may supply more cheaper and affordable housing for poor households which would lead to a higher degree of segregation. This again requires further exploration.

At the same time, percentage of locally born residents is only significant at a much lower level of significance (10%) which means the variation (the standard error) within this variable is much larger in model 4.3 and this variable even becomes insignificant in model 4.4. Percentage of ethnic south-east and south Asian groups is now significant (at 5% in model 4.3 and 1% in model 4.4) but has a negative sign which mean a reduction in segregation. Again, conclusions are not straightforward to draw.

Two points are worth noting in the models. First, the addition of geographic and building variable greatly improves the explanatory power of the models (an increase of three to four times). Hence the impact of the build environment appears to be more significant that the profile of the residents. Second, factors related to globalisation and economic restructuring, institutional setup and historical pathway all contribute to the patterns of segregation. However, no clear picture of the contributing factors is witnessed. It is premature to conclude on their relative contribution nor to identify distinct factors that are influential on socio-economic segregation. Further exploration is necessary.

Table 4.8 Regression Models on Factor Connected to Socio-Economic Segregation

	M4.1	M4.2	M4.3	M4.4
	Lowest Income Decile Group	Households in Poverty	Lowest Income Decile Group	Households in Poverty
Factors related to globalisation and economic restructuring				
Single person households	-0.07*	-0.06	-0.016	-0.00
Elderly households	0.11	0.12	0.05	0.06
Lone parent households	-0.27***	-0.26***	-0.05	-0.04
Primary education or below	0.14**	0.14*	0.07	0.06
University degree or above	-0.02	0.04	0.23***	0.30***
Managers and professionals	-0.03	-0.05	-0.13	-0.14*
Elementary occupation	0.08	0.12	0.41***	0.45***
Economic inactive	0.02	0.03	0.007	0.02
Factors related to institutional setup				
Public Renting	-0.09*	-0.10*	-0.05	-0.06
Private homeownership	-0.08	-0.08*	-0.03	-0.04
Assisted homeownership	-0.08*	-0.09*	-0.02	-0.03
Private Renting	-0.04	-0.03	0.02	0.03
Hard pressed by housing costs	-0.10*	-0.10*	-0.00	-0.01
Population density (log)			-0.01***	-0.01***
Urban district				
Urban			-0.12***	-0.13***
New Territory			reference group	
High rise Buildings			0.00	0.00
Low rise buildings			0.007	0.01
Big private housing estates			0.009	0.01
Houses			0.00	0.00
Buildings older than 50 years			-0.05***	-0.05***
Factors related to historical pathway				
Born in Hong Kong	0.23***	0.23***	0.06*	0.06
New immigrants	0.0925	0.06	-0.01	-0.04
South East and South Asia Origins	-0.12*	-0.09	-0.12**	-0.09*

Constant	0.74***	0.73***	0.93***	0.90***
N	1410	1410	1409	1409
R^2	0.14	0.12	0.47	0.45

Source: Authors' analysis

Note -All variables are the percentage of the respective group in the relevant LSBG; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; refer to Appendix 3 for definitions of the variables

Provision of Public Services

This project adopted four categories of public services provision to the local context:

1) medical services (government clinics and private medical general practitioners),
2) Public transport (MTR, franchised bus, minibus),
3) Social services (non-residential services for the elderly, the family, and children, and youth services and rehabilitation services run by the government or an NGO),
4) Retail and leisure (supermarkets, wet markets, parks, and libraries).

In the context of Hong Kong, a simple approach to measuring accessibility which only takes walking and direct public transportation linkage into account was adopted and the measurement was taken as a qualitative categorisation of accessibility of the nearest public service provision of the respective items for each LSBG:

1. Within easy walking distance – within a radius of 500 metres from the centroid of the relevant LSBG (7-8 minutes' walk),
2. Accessible by walking – a distance between 500m to 1000m (walk within 10-15 minutes),
3. Easily accessible by public transport - between 1-5 km (about 10 minutes by bus) from the centroid of the areal unit and directly linked by public transport between the two points,
4. Not easy to access – at a distance of over 5 km or no direct public transport links.

A summary of the distances to the nearest public service provision spot is shown in table 4.9 A total of 7,987 medical services (both public and private hospitals) locations with a mean accessibility distance of 333 meters were identified. For public transport, 30,010 public transport stops / terminals were identified within a mean distance of 162 metres. For social service and leisure and retail facilities, respectively 3,514 and 7,076 offering locations were identified with a mean accessibility distance of respectively 318 metres and 159 metres. Yet for the worst cases, the accessibility distance can be very long, nearly 8km for medical and social services and over 4km for public transportation and retail and leisure facilities.

Table 4.9 Distance to Nearest Public Service Provision Spots

Public Services	N	Mean (m)	Max (m)
Medical Services	7987	333	7790
Public Transport Stops	30100	162	4696
Social Service centres	3514	318	7901
Retail & Leisure Facilities	7076	159	4696

Source: Authors' analysis

Hong Kong is a relatively small city in terms of surface and has well-planned public services. Despite the big variation in the distance to the nearest points of public services provision shown in table 4.x2, the overwhelming majority of the nearest locations of public services are within simple walking distance (of less than 500m) in the urban districts. In the first-generation new towns, services are mostly within walking distance for most residents. Only 1% of the residents in LSBGs using medical services and 2% in LSBGs using social services centres have to walk for 1 to 5 km (or take a short trip on public transportation) to get access to the nearest service points. In fact, nearly all LSBGs have their nearest public transportation stops and retail and leisure facilities within a short walking distance of 10 minutes. In only 9% of the LSBGs have medical services provision spots more than 1 km from the centroid of the LSBG. Likewise, only 7% of LSBGs are more than 1 km from their nearest social services provision spots. The provision of public transport and retail and leisure

services is particularly well developed. The nearest stops or facilities in nearly all LSBGs are within 1 km from the centroid of the LSBG. The provision of public services in urban areas and first-generation new towns is particularly good.

New Territories districts (excluding first generation new towns) are slightly less convenient with respect to accessing public services spots, with residents needing to take public transport to the nearest medical service points in over one quarter of the LSBGs, and in 18 LSBGs, residents need public transportation to access the nearest social service spots. Residents do not live within walking distance of retail and leisure facilities and also need to take a short trip by public transport in another 5% of the LSBGs . However, public transportation is relatively well provided even in New Territories districts. Only in 6% of the LSBGs are residents not able to walk easily to the nearest public transportation stops.

Table 4.10 Accessibility of the Nearest Public Services (All LSBGs)

Public Services	Within 500m %		501m-1000m %		1001m-5000m %		More than 5000m %	
	Urb	NT	Urb	NT	Urb	NT	Urb	NT
Medical Services	95	58	4	14	1	27	0	1
Public Transport Stops	99	85	0.4	8	0.2	6	0	0
Social Service centres	96	62	3	17	1	20	0	1
Retail & Leisure Facilities	99	82	1	13	0	5	0	0
	All LSBGs							
Medical Services	84		7		9		0.2	
Public Transport Stops	95		3		2		0.0	
Social Service centres	86		7		7		0.3	
Retail & Leisure Facilities	94		5		2		0.0	

Source: Authors' analysis

Notes : Urb (Urban districts and first-generation new towns), NT (New Territories districts other than the first generation new towns) Refer to appendix 1 for the list. Percentages sum to 100 across the row for respectively urban districts and New Territories districts. Total LSBGs – Urban districts (1077), NT (545). Percentages may not sum to 100 owing to rounding up.

Segregation and the Accessibility to Public Services

Despite the very favourable access to public services we have shown in table 4.10, it is a different story for LSBGs which belong to the top 20% of the most segregated

areas. Table 4.11 shows a comparison of the accessibility of public services between the most segregated areas and less segregated areas. Figures for the degree of segregation, which is measured with reference to the three reference indicators (households which belong to the lowest income decile group, households in poverty, and elderly households), are shown in table 4.11. As the patterns are very similar for the three reference groups, only figures using the lowest income decile group with be quoted for discussion.

If the pattern of the degree of accessibility is distributed randomly across the segregated and less segregated areas, their respective proportions should be 20% and 80%. Among the LSBGs in which services are within easy walking distance, the most segregated areas are under-represented regarding medical services and social services (respectively 16% and 17%), but over-represented regarding public transport and retirement and leisure facilities (both at 22%) (table 4.11) However, for LSBGs in which the nearest public service provision spots are located further away than within easy walking distance, the most segregated areas are seriously over-represented. For instance, LSBGs in which the residents have to walk 20-30 minutes for public transport are 4 times over-represented. It is worse for LSBGs where residents have to walk for at least half an hour to access the nearest public transport stops; they are at least 4.5 times over-represented. Similar patterns are found for retail and leisure facilities and social services.

Table 4.11 Accessibility of the Nearest Public Services by degree of Segregation

	Within 500m %		501m-1000m %		1001m-5000m %		More than 5000m %	
Low Income Decile Group	Seg	Nseg	Seg	Nseg	Seg	Nseg	Seg	Nseg
Medical Services	16	84	50	50	86	14	100	0
Public Transport Stops	22	78	82	18	91	9	0	0
Social Service centres	17	83	64	36	85	15	100	0
Retail & Leisure Facilities	22	78	71	29	80	20	0	0
Households in Poverty								
Medical Services	12	88	42	58	80	20	100	0
Public Transport Stops	17	83	78	22	85	15	0	0
Social Service centres	12	88	55	45	76	24	100	0
Retail & Leisure Facilities	17	83	62	38	68	32	0	0
Elderly Households								
Medical Services	16	84	50	50	85	15	100	0
Public Transport Stops	22	78	80	20	91	9	0	0
Social Service centres	17	83	65	35	83	17	100	0
Retail & Leisure Facilities	22	78	69	31	76	24	0	0

Source: Authors' analysis

Notes : Seg (Top 20% most segregated LSBG), NSeg (LSBG other than the top 20%) Percentage of Segregated and Non-segregated within an accessibility group sum to 100. Percentage may not sum to 100 owing to rounding up.

The under-representation of segregated LSBGs regarding their accessibility and that of their non-segregated counterparts, compared between the urban areas and the New Territories, is illustrated in table 4.12 As the patterns for the figures generated by the three reference groups (income decile group, households in poverty and elderly households) are extremely close, figures for segregation based on the lowest income decile groups are shown here for reference (A full list is shown in appendix 2).

The access of public services in general has decreased, and the degree of such decrease is more apparent among segregated areas that are in the urban areas or first-generation new towns. Whilst residents in nearly all LSBGs in the urban area and first-generation new towns can early travel to the nearest medical service provision on foot, this is only possible for residents in two thirds of the most segregated LSBGs. The situation is similar for social services, and the impact of segregation is less apparent for areas of segregation in the urban areas and first-generation new towns.

The proportion of LSBGs whose residents have to travel further to the nearest public service provision spots is increasing across the board. Yet the impact is more apparent for LSBGs in the New Territories whose residents already have to walk a distance of over 500m or need to take transportation to access public service provision spots. Yet nearly all these LSBGs are not densely populated. Over half of the LSBGs have a population density in the lowest quartile of the population density distribution of Hong Kong and only 10% of the LSBGs are in the first quartile of the population density distribution.

Table 4.12 Accessibility of the Nearest Public Services - Top 20% Most Segregated LSBGs and All LSBGs by whether the LSBGs are in the Urban Area

Public Services		Within 500m %		501m-1000m %		1001m-5000m %		More than 5000m %	
Low Income Decile Group		Urb	NT	Urb	NT	Urb	NT	Urb	NT
Medical Services	Seg LSBG	67	53	21	12	12	34	0	1
	All LSBG	95	58	4	14	1	27	0	1
Public Transport Stops	Seg LSBG	93	82	3	10	3	8	0	0
	All LSBG	99	85	0.4	8	0.2	6	0	0
Social Service centres	Seg LSBG	74	55	9	19	17	24	0	1
	All LSBG	96	62	3	17	1	20	0	1
Retail & Leisure Facilities	Seg LSBG	93	80	7	15	0	6	0	0
	All LSBG	99	82	1	13	0	5	0	0

Source: Authors' analysis

Notes : Urb (Urban districts and first-generation new towns), NT (New Territories districts other than the first generation new towns) Refer to appendix 1 for the list. Segregated LSBG (Top 20% most segregated LSBG); Percentages sum to 100 across the row for urban districts and New Territories districts respectively. Total LSBG – Urban districts (38), NT (287). Percentage may not sum to 100 owing to rounding up.

Chapter 5: Policy Implications and Recommendations

Project Summary and Reflections

Segregation has been an imminent social concern in many cities across the globe including Hong Kong. As a developed and rich global financial center, Hong Kong's high-level socio-economic segregation and high rate of poverty, has long been acknowledged as a problem to which Hong Kong has to pay serious attention. It is also believed to be one of the root causes of Hong Kong' serious housing affordability problem. Whilst economic prosperity progressed over the last decades, so did the gap between the rich and the poor. The Gini coefficient of income inequality has grown over the last few decades to where it ranks Hong Kong among the under-developed countries in Africa.

Despite the extensive media attention paid to the "city of sadness" in areas like Tin Shui Wai back around the turn of the 21st century, concern about socio-economic segregation and the associated social inclusion policy are still largely absent. Comprehensive policy research on the impact of spatial and social segregation at the neighborhood level is also limited. Social exclusion and its impact on the livelihood of people in the poorly serviced areas, which has triggered lots of policy concern in western Europe, has rarely been on the policy agenda of the Hong Kong Government in recent years.

This project has made an effort to investigate the pattern of social-economic segregation in Hong Kong and its connection with the accessibility of public services. It has explored the patterns of social-economic segregation in Hong Kong (e.g., with the help of the dissimilarity index, index of segregation, isolation index and local segregation index) and regression models have been employed to identify the factors that are associated with the socio-economic segregation in Hong Kong. This project has also investigated the relationship between the accessibility of public services and socio-economic segregation in Hong Kong. Policy recommendations for

counteracting the adverse effects of socio-economic segregation in Hong Kong have also been put forward.

Data collection is perhaps the most demanding work for the project. With few of the needed datasheets being readily available, the project has had to spend labour intensively as well as use sophisticated tools for data collection. As the Census and Statistics Department was unable to provide the data this project needed, the project had to deploy research assistants to extract the data from the 2016 By-Census micro-dataset at the office of the Census and Statistics Department. Likewise, public service provision location spots were painstakingly collected from a wide range of open but often not well-organised data sources. With specifically written computer programmes, addresses of the locations were extracted and were then fitted into the API of google maps to return their respective GPS information. Such GPS information was then fed into GIS software to match the information from the Census to evaluate the local segregation indexes and to assess the accessibility of public services. Statistics software was them employed to model the connection between segregation and other demographic and geographic factors.

The findings of this project have confirmed some conjectures in previous research done by the PI which were based on anecdotal evidence. Our findings are also able to reveal the trend of socio-economic segregation in Hong Kong. Both Forrest et al (2004) and Yip (2012) have speculated on the contribution of public housing and large-scale private housing estates to having a dampening effect on socio-economic segregation in Hong Kong. This project found nearly no public housing in highly segregated areas (with the exception of a few public housing areas when elderly households were used as a reference in assessing segregation). Likewise, the overwhelming majority of the most segregated areas are not areas with a high proportion of large private housing estates. Using a more sophisticated measurement instrument (the local segregation index) and a finer spatial scale (the LSBG). this project has confirmed the impact of public housing provision in reducing socio-economic segregation, albeit the impact is very small and disappears when information of the build environment is taken into account. However, this project

found no significant impact of the presence of large private housing estate on socio-economic segregation.

The results of this project also echo what previous research has found about the absence of the segregation of poor households (e.g., Ng et al., 2021, Yip, 2012, Monkkenon & Zhang, 2014). Unlike what was found in most North American cities that have a U-sharp pattern in which the richest and the poorest population were often more segregated than the middle-class households (Reardon and Bischoff, 2011), Hong Kong's poor tend to mix with their middle-class counterparts. In fact, this project even found that the segregation of the poor households and elderly households has been continually decreasing over the last two decades, without an explicit social mix policy for mixing the rich and the poor. This may reflect some "unintended" social mix policy (e.g., public housing) is at work that enhances the mix between the rich and the poor.

Public services are also very accessible in Hong Kong. Nearly all LSBGs (95%) in Hong Kong have public transport stops and retail and leisure facilities within walking distance (of less than 1 km) whereas for medical services and social services, the corresponding figure is 85%. Those areas which do not have easy access to public services are mostly located in the rural parts of the New Territories. Yet areas which are the most segregated have worse access to medical and social services though the access to public transport and retail and leisure services is still good. Even so, some of the residents in segregated areas, particularly in New Territories, do have to walk a bit further to access public services. Yet these segregated areas in the New Territories are also areas with a much lower population density.

Despite due diligence being been done in verifying and checking the accuracy of the data, both manually and by machine, given the huge volume of data that have been collected, there is no guarantee the data are comprehensive and entirely accurate. There are likely to be omissions (e.g., data on the web may not be the most update), errors (e.g., made by human or machine during the processing), and duplications (e.g., a small typo in an addresses may prevent us from detecting the duplication). Some of the data sources also may not be of good quality. For instance, when extracting data

for private buildings in Hong Kong, we found many buildings have been missed out and some buildings do not have the necessary building information (e.g., year of completion and height).

The measurement we used in the project also has room for improvement. For instance, there is no fine differentiation between services within a broad category, which may cause the importance of some significant services to be missed (for instance, we treated hospitals the same as private medical clinics). Likewise, only the distance to the nearest service point is used as the indicator of accessibility, which may have masked the significance of the density of provision (e.g., only one service spot in the area within a short distance may not be equal to many service spots just slightly further away). In the measurement of accessibility, only a straight-line distance is used, not the actual walking distance along walking paths or roads, which might be substantially further (which is limited by the absence of such information in all areas).

Lastly, the project only considered segregation that is generated by hard data and cold figures but has not taken into account the experiences of residents (i.e., users of public services). The terrain of the areas, the quality of the walking paths or the roads, and special circumstances pertaining to the segregated areas may all have impacts the hard data are unable to reflect. Taking the above into account was suggested in the original research proposal but was not accepted by the funder.

Policy Implications

One important policy implication associated with this project on socio-economic segregation in Hong Kong is the discovery of the "unintended" social mix policy (albeit it is weak) that is produced by our public housing programme. Public housing in Hong Kong accumulates not only the poorest households as income eligibility spreads from the absolutely poor to households who are near to the median income level of the city (hence over 40% of households in Hong Kong are eligible for public rental housing). Building assisted homeownership estates close to public rental housing also facilitates

a social mix. Buyers of Homeownership Scheme flats are either well-off public tenants or middle-class private tenants as nearly three quarters of households who do not own their property in Hong Kong are eligible to apply for such housing schemes.

However, our findings also reflect the complex interaction between housing tenure, characteristics of the build environment and profile of residents in shaping socio-economic segregation. Factors in the town planning system on density (in which denser areas are likely to be less segregated as it may have increased the diversity of population in the area). Yet higher population of ethnic minority groups is likely to increase segregation. Although town planning policy may not be able to determine location of residence of these groups, facilitating their access to public housing is definitely something the government can do to mitigate the risk of segregation of these groups.

At the same time, it may be desirable to formulate an explicit social mix or social inclusion policy. Not only would such a policy help to legitimate further the "unintended" social mix policy we have mentioned, it may also help to reduce the negative impact of NIMBY (Not in My Backyard). NIMBY is a complicated issue to handle. On the one hand, empirical research on the acceptability of public housing shows a very high approval rate of public housing, among public tenants and private homeowners alike as an instrument in solving our housing problem as well as a policy to maintain social equity, there are many occasions that the development of public housing was opposed by residents in the vicinity of development sites as well as District Council of the relevant districts. As there is a consensus in Hong Kong on the constructive function of public housing as a merit good (that is contributive to the well-being of the society as a whole), people would still see public housing development as undesirable in their vicinity as it is seem to be a factor that would have a negative impact on their housing value. This is a stigmatization of public rental housing as venues which have a high concentration of poor people. The promotion of a social mix policy / social inclusion policy, which advocates the benefit of the rich and the poor in achieving social harmony can be set as a moral benchmark. This would help to create moral pressure in counteract the NIMBY issue and reduces the opposing force to public housing development.

Our project also uncovered the very satisfactory access to public services wherein the overwhelming majority of residents only have to walk a short distance to the nearest public services provision spots. This is perhaps the benefit of Hong Kong being a compact city (albeit it is not an intentional policy). Our comprehensive town planning and efficient and elaborate public transport system make a good contribution. However, the most segregated areas, both in the urban areas and in the New Territories, may not enjoy equal benefits. There are always some special circumstances in specific neighbourhoods that the "one-size-fits-all" policies are incapable of handling in a satisfactorily way. This happens also in segregated areas in the urban core or in the first-generation new towns.

There is also a need to further analyse our findings as at the moment, we do not differentiate different kinds of public services. Whilst public transportation is perhaps the most accessible public services, there may be different accessibility to different mode of public transport. A finer measurement on the access to different mode of public transport has to be made. At the same time, demography of the segregated areas also has to take into consideration. For instance, to walk a short distance for younger people may not be an issue but this would create inconvenience for older people. Likewise, there is a big difference in the provision of medical services in which public and private provision of medical service may create different implications for people in segregated areas.

Policy Recommendations

Having an explicit social mix or social inclusion policy would help with offering definitive guidelines for creating a socially mixed, accommodative and harmonious society. Such an explicit policy would further reinforce the already existing "unintended" social mix policy. Given our public housing programme may become residualised as both the eligible criteria for entering into public housing (only poor households are allowed to apply) and the housing subsidy policy (to terminate tenacy of well-off tenants from public housing) are tightening up, more poor tenants may be

increasingly concentrated into public housing. Our aging population also would increase the need for public housing. Social mix policy would help to support the favourable environment that created the “unintended” social mix policy when it may have been weakened because of the residualisation of public housing.

Hong Kong may also need an explicit neighbourhood policy for enhancing neighbourhood cohesion and creating harmonious neighbourhoods. This would definitely help to fill up the gaps in the provision of public services in segregated areas. This is perhaps the right time to do so when the HKSAR Government is redesigning the local institutions involved in district administration. At the time when the Government is expanding the services of the Community Care teams, such consideration should be put into the policy agenda for the revamping of district administration. It is more efficient to concentrate the not so adequate resources on the new community services to areas that are more segregation.

Lastly, the difficulties this project had in data collection reflects the inadequate provision and limited accessibility to big data in the public domain. Amidst the Government having accelerated the momentum towards developing Hong Kong as a smart city, many of the data in the public domain are either incomprehensible or far from easily accessible. There may need to be a continual push in data assembly and accessibility.

Chapter 6: Details of the Public Dissemination

The preliminary findings of the study will be presented via a joint webinar "A Webinar On Segregation in Hong Kong" jointly organised by the Urban Research Laboratory of the Department of Public and International Affairs, City University of Hong Kong, and the Housing Policy and Social Development Research Cluster, Centre of Urban Studies and Urban Planning, The University of Hong Kong on 18 May 2023. The principal investigator (Prof Yip Ngai Ming) will present on the Socio-economic Segregation and the Provision of Public Services in Hong Kong, and the other speaker will be Dr Mandy Lau of the University of Hong Kong. Dr Lau will present on *Age segregation in rapidly aging cities: Evidence from Hong Kong,* while the Co-investigator of the project, Dr Jing Li, will be the moderator of the webinar.

Further analysis of the research findings will continue and the results will be disseminated at academic conferences and in journals.

Chapter 7 Conclusion

This project explores socio-economic segregation and the provision of public services in spatially segregated areas in Hong Kong by looking at the accessibility of public services in those identified segregated areas. It contends that even though the urban planning system and public housing scheme in Hong Kong does install excellent infrastructure and does provide admirable standard public service packages for the vast majority of the population, an inadequate understanding of the diversified needs of the disadvantaged groups in the segregated spatial units may undermine the efficacy of public service provision and the whole urban governance system.

Using data that are extracted from the micro dataset of the By-Census 2016 as well as using data-crawling techniques to collect information on public service provision from open data sources on the internet, this project employs a sophisticated instrument of local segregated index on a fine spatial scale at the Large Street Block Group level to produce a more accurate picture of socio-economic.

The findings of this project have verified some conjectures in previous research which were based on anecdotal evidence. Our findings has revealed the contributing impact of public housing in reducing socio-economic segregation but such an impact disappears when information of the build environment is taken into account. On the other hand, presence of large private housing estate has no impact on socio-economic segregation. In fact, socio-economic segregation in Hong Kong's poor hosueholds is not serious and they tend to mix with their middle-class counterparts.

This may reflect a successful "unintended" social mix policy (e.g., public housing and large-scale private housing estates) that enhances the mix between the rich and the poor. However, our findings also reflect the complex interaction between housing tenure, characteristics of the build environment and profile of residents in shaping socio-economic segregation.

Public services are also very accessible in Hong Kong, particularly on public transport and retail and leisure facilities. Those areas which do not have easy access to public services are mostly located in the rural parts of the New Territories. Yet areas

which are the most segregated have worse access to medical and social services though the access to public transport and retail and leisure services is still good. Even so, some of the residents in segregated areas, particularly in New Territories, do have to walk a bit further to access public services. Yet these segregated areas in the New Territories are also areas with a much lower population density.

It may be desirable to formulate an explicit social mix or social inclusion policy to further strengthen the "unintended" social mix policy we have mentioned, but also helps to reduce the negative impact of NIMBY (Not in My Backyard) toward speeding up the provision of public housing (as local residents object to the development of public housing in the vicinity of their residences).

Whilst the comprehensive town planning and efficient and elaborate public transport system has made public services easily accessible for most people, services to residents in segregated areas may need special considerations. An explicit neighbourhood policy for enhancing neighbourhood cohesion and creating harmonious neighbourhoods. Amidst the recent review of local administration and the creation of the Community Care teams, such consideration should be put into the policy agenda.

Our research only looks at the accessibility of public services at an aggregate level and has not yet examined the difference in accessibility of different subtypes of public services particularly vital public services like hospital services. Further works have to be done in such area.

References

Andersen, H. S. (2002). Excluded places: the interaction between segregation, urban decay and deprived neighbourhoods. *Housing, Theory and Society*, *19*(3-4), 153-169.

Apparicio, P. & Seguin, AM (2006) Measuring the Accessibility of Services and Facilities for Residents of Public Housing in Montreal, *Urban Studies*, 43(1):187–21.

Bharathi, N., Malghan, D., Mishra, S., & Rahman, A. (2022). Residential segregation and public services in urban India. *Urban Studies*, *59*(14), 2912-2932.

Bharathi, N., Malghan, D., Mishra, S., & Rahman, A. (2022). Residential segregation and public services in urban India. *Urban Studies,* 59(14), 2912-2932.

Census and Statistics Department (2021) Gross Domestic Product (GDP) by major economic activity - percentage contribution to GDP at basic prices, Hong Kong: Census and Statistics Department.

Chief Executive Policy Address.(2022). Charting a Brighter Tomorrow for Hong Kong , https://www.policyaddress.gov.hk/2022/public/pdf/policy/policy-full_en.pdf

Deng, F. (2017). Gated community and residential segregation in urban China. *GeoJournal*, 82, 231-246.

Dhalmann, Hanna & Æ Katja Vilkama (2009) Housing policy and the ethnic mix in Helsinki, Finland: perceptions of city officials and Somali immigrants, *Journal of Housing and the Built Environment,* 24:423–439.

Duncan, O. D., & Duncan, B. (1955). A methodological analysis of segregation indexes. *American sociological review,* 20(2), 210-217.

European Union (2020) EUROPE 2020 A European strategy for smart, sustainable and inclusive growth, https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%

20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf.

Fisher, Tonia, Glenn Bramley (2006) Social Exclusion and Public Services. in Pantazis, Christina, Gordon, David, Ruth Levitas (ed) *Poverty and Social Exclusion in Britain: The Millennium Survey*, Bristol, UK : Policy Press.

Forrest, R., La Grange, A., Yip, N.M. (2004) "Hong Kong as Global City? Social Distance and Spatial Differentiation", *Urban Studies,* 41 (1:207-227.

Forrest, Ray, Ka Sik Tong and Weijia Wang (2020) Residential stratification and segmentation in the hyper-vertical city, in Musterd, Sako (2020) *Handbook of Urban Segregation*, Edward Elgar.

Fujita. M. and Child-Hill. C. R. (1997) Together and equal: place Stratification in Osaka. in P.P. Karan and K. Stapleton, (Ed.) *The Japanese City*, Lexinglon:Kentucky University.

Fung, Kwok Kin, Hung, Suet Lin (2014) Strengthening a community of poverty in an affluent society: strategies to build social capital in Tin Shui Wai North in Hong Kong, *Community Development Journal*, 49(3):441-457.

Galster, G. & Zobel, A. (1998) Will dispersed housing programmes reduce social problems in the US? *Housing Studie*s, 13(5), pp. 605–622. doi:10.1080/02673039883128.

Galster, George & Jurgen Friedrichs (2015) The Dialectic of Neighborhood Social Mix: Editors' Introduction to the Special Issue, *Housing Studies,* 30:2, 175-19

Galster, George C. & W. Mark Keeney (1988) Race, Residence, Discrimination, and Economic Opportunity: Modeling the Nexus of Urban Racial Phenomena, *Urban Affairs Review,* 24:87-116.

Galster, George C. & W. Mark Keeney (1988) Race, Residence, Discrimination, and Economic Opportunity: Modeling the Nexus of Urban Racial Phenomena, *Urban Affairs Review*, 24:87-116.

Giddens, Anthony. 1998. *The Third Way and Its Critics*. Cambridge: Polity.

Hao, P. (2015). The effects of residential patterns and Chengzhongcun housing on segregation in Shenzhen. *Eurasian Geography and Economics*, 56(3), 308-330.

He, S., Li, S. M., & Chan, K. W. (2015). Migration, communities, and segregation in Chinese cities: introducing the special issue. *Eurasian Geography and Economics,* 56(3), 223-230.

He, Sylvia Y.; Wu, Dan; Chen, Huiwei, Hou, Yuting; Ng, Mee Kam (2020) New towns and the local agglomeration economy, *Habitat International,* 98:102-153.

Karadimitriou, N., Maloutas, T., & Arapoglou, V. P. (2021). Multiple deprivation and urban. development in Athens, Greece: Spatial trends and the role of access to housing. *Land*, *10*(3), 290.

Kintrea, K. (2013) Social mix: International approaches, in: M. van Ham, D. Manley, N. Bailey, L. Simpson & D. Maclennan (Eds) *Neighborhood Effects or Neighbourhood Based Problems*? pp. 133–155.Dordrecht, NL: Springer Verlag).

Lau, Joseph Cho Yam (2010) The influence of suburbanization on the access to employment of workers in the new towns: A case study of Tin Shui Wai, Hong Kong, *Habitat International,* 34(1):38-45.

Laveist, Thomas A. (1989) Linking Residential Segregation and Infant Mortality in U.S. Cities. *Sociology and Social Research*, 73:90-94.

Levitas, R., Pantazis, C., Fahmy, E., Gordon, D., Lloyd, E., Patsios, D., 2007. The multi- dimensional analysis of social exclusion Department of Sociology and School for Social Policy, University of Bristol, Bristol.

Levitas, Ruth (2006) Cconcept and measurement of Social Exclusion, in Pantazis, Christina, Gordon, David, Levitas, Ruth (ed) P*overty and Social Exclusion in Britain: The Millennium Survey*, Bristol, UK : Policy Press

Li, Si-ming. 2012. “Housing Inequalities Under Market Deepening: The Case of Guangzhou, China.” *Environment and Planning A* 44: 2852–2866.

Lo, C.P. (1975) Changes in the ecological structure of Hong Kong 1961- 1971, *Environment and Planning* A, 7 (8) :941-963.

Lucas Karen (2012) Transport and social exclusion: Where are we now? Transport Policy 20:105–113.

Luo, W., Wang, F. (2003) Measures of spatial accessibility to health care in a GIS environment: synthesis and a case study in the Chicago region. *Environment and Planning B: Planning and Design,* 30:865-884.

Madrazo, B., & van Kempen, R. (2012). Explaining divided cities in China. *Geoforum*, 43(1), 158-168.

Maloutas, Thomas (2012) Introduction in Maloutas, Thomas. and Fujita, Kuniko (ed) *Residential Segregation in Comparative Perspective: Making Sense of Contextual Diversity*, Aldershot: Ashgate.

Maloutas, Thomas (2020) Vertical social differentiation as segregation in spatial proximity, in Musterd, Sako (2020) *Handbook of Urban Segregation*, Edward Elgar.

Massey, Douglas S. (1990) American Apartheid: Segregation and the Making of the Underclass.*American Journal of Sociology,* 96(2): 329-357.

Massey, Douglas S. and Nancy A. Denton (1998) The Dimensions of Residential Segregation, *Social Forces* :281-315.

Monkkonen, Paavo & Zhang, Xiaohu (2014) Innovative measurement of spatial. segregation: Comparative evidence from Hong Kong and San Francisco, *Regional Science and Urban Economics* 47:99–111.

Musterd, Sako & Kovacs, Zoltán (2013) P*lace-making and Policies for Competitive Cities*, Oxford: Wiley-Blackwell.

Musterd, Sako (2003) Segregation and integration: A contested relation, *Journal of Ethnic and Migration Studie*s, 29 (4): 623-641.

Musterd, Sako (2005) Social and Ethnic Segregation in Europe: Levels, Causes, and Effects, *Journal of Urban Affairs*, 27 (3):331-348.

Ng, Mee Kam, Yuk Tai Lau, Huiwei Chen, and Sylvia He (2021) Dual Land Regime, Income Inequalities and Multifaceted Socio-Economic and Spatial Segregation in Hong Kong, in van Ham, M., T.Tammaru, R. Ubarevičienė, H. Janssen (ed) *Urban Socio-Economic Segregation and Income Inequality: A Global Perspective*, Springer.

Pantazis, Christina, Gordon, David, Levitas, Ruth (2006) Introduction in Pantazis, Christina, Gordon, David, Levitas, Ruth (ed) *Poverty and Social Exclusion in Britain: The Millennium Survey*, Bristol, UK: Policy Press

Park, E, Burgess, E.; Mckenzie, R. (1925) *The City: Suggestions for Investigation of Human Behavior in the Urban Envrionment*, Chicago: Chicago University Press.

Preteceille, Edmond (2007) Is gentrification a useful paradigm to analyse social. changes in the Paris metropolis? *Environment and Planning A*, 39 (10):3-18.

Reardon, S.F., Bischoff, K., (2011) Income inequality and income segregation. *American Journal of Sociology,* 116, 1092–1153.

Reardon, S.F., Matthews, S.A., O'Sullivan, D., Lee, B.A., Firebaugh, G., Farrell, C.R., Bischoff, K., (2008) The geographical scale of metropolitan racial segregation. *Demography* 45, 489–514

Rochelle, Tina L. (2015) Diversity and Trust in Hong Kong: An Examination of Tin Shui Wai, Hong Kong's 'City of Sadness', *Social Indicator Research*, 120:437–454.

Social Protection Committee (2001) Report on Indicators in the field of poverty and social, exclusion, https://docplayer.net/4380889-Social-protection-committee.html

Census and Statistics Department (1997a, 2017a) Thematic Report: Household Income Distribution in Hong Kong, Hong Kong: Census and Statistics Department.

Census and Statistics Department (1997b, 2017b) Population By-Census Main Report: Household Income

Tammaru, T, Musterd, S., van Ham, Maaten, Marcinczak. Z. (2016) A multi-factor Approach to Understanding Socio-economic Segregation in European Capital Cities, in Tammaru, T.; Marcinczak, Z.; van Ham, Maaten; Musterd, S. (ed) *Socio-economic Segregation in European Capital Cities*, Oxon: Routledge.

van Ham, M., T.Tammaru, R. Ubarevičienė, H. Janssen (2021) Rising Inequalities and a Changing Social Geography of Cities, in van Ham, M., T. Tammaru, R. Ubarevičienė, H. Janssen (2021) *Urban Socio-Economic Segregation and Income Inequality: A Global Perspective*. Springer.

Wang, Donggen & Xinyu Cao (2017) Impacts of the built environment on activity-travel behavior: Are there differences between public and private housing residents in Hong Kong?, Transportation Research Part A, 103:25–35.

Weibull, J.W. (1976) An axiomatic approach to the measurement of accessibility. *Regional Science and Urban Economics*, 6:357–379.

Wilson, W.J. 1987. *The Truly Disadvantaged: The Inner City, the Underclass, and the Public Policy.* Chicago: University of Chicago Press.

Wong, D. W. (2002). Modeling local segregation: a spatial interaction. approach. *Geographical and Environmental Modelling*, 6(1), 81-97.

Wong, David W. S. 2003. “Spatial Decomposition of Segregation Indices: A Framework Toward Measuring Segregation at Multiple Levels.” *Geographical Analysis 35*: 179–194.

Wong, Hung.(2011). Quality of Life of Poor People Living in Remote Areas in Hong Kong, *Social Indicator Research* 100:435–450.

Yip, N.M. (2012). Residential Segregation in an Unequal City: Why are There No Urban Ghettos in Hong Kong? In Maloutas, Thomas. and Fujita, Kuniko (ed) Residential Segregation in Comparative Perspective: Making Sense of Contextual Diversity, Aldershot: Ashgate.

Appendix 1 Urban Districts, First Generation New Town and New Territories Districts

Urban	First Generation New Towns	New Territories
Central and Western District	Tsuen Wan	Taipo
Wanchai	Kwai Tsing	Yuen Long
Eastern District	Shatin	North District
South District		Tuen Mun
Kwun Tong		Sai Kung
Wong Tai Sin		Islands
Kowloon City		
Sham Shui Po		
Yau Tsim Mong		

Appendix 2 Accessibility to the Nearest Public Services (Most segregated 20% of LSBG) by whether the LSBG are in the Urban Area

Public Services	Within 500m %		501m-1000m %		1001m-5000m %		More than 5000m %	
Low Income Decile Group	Urb	NT	Urb	NT	Urb	NT	Urb	NT
Medical Services	45	10	10	3	29	2	1	0
Public Transport Stops	70	13	9	0	7	0	0	0
Social Service centres	47	11	16	1	21	2	1	0
Retial & Leisure Facilities	68	13	13	1	5	0	0	0
Households in Poverty								
Medical Services	41	7	12	2	34	2	1	0
Public Transport Stops	70	11	10	1	8	0	0	0
Social Service centres	46	7	18	1	22	4	2	0
Retial & Leisure Facilities	69	11	14	1	5	0	0	0
Elderly Households								
Medical Services	42	7	12	2	33	2	1	0
Public Transport Stops	70	10	10	1	8	0	0	0
Social Service centres	46	7	19	1	22	4	2	0
Retial & Leisure Facilities	70	10	13	1	5	0	0	0

Source: Authors' analysis

Notes : Urb (Urban districts and first generation new towns), NT (New Territories district other than the first year new towns) Refer to appendix1 for the list. Percentages sum to 100 across the row for respectively urban districts and New Territories districts. Total LSBG – Urban districts (1077), NT (545)

Appendix 3 Definition of Variables in Table 4.

Factors related to globalisation and economic restructuring	
Single person households	Percentage of one person households in the relevant LSBG
Elderly households	Percentage of households in the relevant LSBG whose members are all over the age of 65
Lone parent households	Percentage of households in the relevant LSBG headed by single parent
Primary education or below	Percentage of people in the relevant LSBG who have education at primary or below
University degree or above	Percentage of people in the relevant LSBG who have education at undergraduate degree of above
Managers and professionals	Percentage of people in the relevant LSBG who work as a manager of professional
Elementary occupation	Percentage of people in the relevant LSBG who work as a manual labourer or in elementary occupation
Economic inactive	Percentage of person in the relevant LSBG who are economically inactive
Factors related to institutional setup	
Public Renting	Percentage of Households who are tenants in public housing in the relevant LSBG
Private homeownership	Percentage of private owner occupiers Households in the relevant LSBG
Assisted homeownership	Percentage of Households in Homeownership scheme, private sector participation scheme and tenant purchase scheme in the relevant LSBG
Private Renting	Percentage of Households who are private tenants in the relevant LSBG
Hard pressed by housing costs	Percentage of households in the relevant LSBG who have to pay more than 30% of their income on rent or mortgage repayment
Population density (log)	Logarithm of population density of the relevant LSBG
Urban district	Refer to appendix 1
Urban	Refer to appendix 1
New Territory	Refer to appendix 1
High rise Buildings	Percentage of buildings in the relevant LSBG which are lower than or equal to 9 storeys

Low rise buildings	Percentage of buildings in the relevant LSBG which are higher than 9 storeys
Big private housing estates	Percentage of Private building cluster in the relevant LSBG which are identified as an estate with at least two blocks and more than 500 households
Houses	Percentage of buildings which are houses (lower than 3 storeys)
Buildings older than 50 years	Percentage of buildings which are old than the age of 50
Factors related to historical pathway	
Born in Hong Kong	Percentage of new immigrant people in the relevant LSBG who reside in Hong Kong for less than 7 years
New immigrants	Percentage of residents who migrate to Hong Kong less than 7 years
South East and South Asia Origins	Percentage of people who are of South East Asia (Philippines, Thailand, Vietnam, Cambodia, Indonesia, Malaysia, Myamma, Loas) or South Asia (India, Pakestan, Sri Lanka, Bangladesh)

Appendix 4 Data Sources of Public Service Provision Spots

Private clinics (Chinese medicine)

https://www.edr.hk/speciality/cmp

Private clinics (Western medicine)

https://www.finddoc.com/practices

Private hospitals

https://www3.ha.org.hk/ntec/content/privatehospital.asp

Public hospitals (including Specialist Out-patient Clinics and General Out-patient Clinic.)

https://www.ha.org.hk/visitor/ha_visitor_index.asp?Content_ID=10036&Lang=ENG&Ver=HTML

Transportation

https://moovitapp.com/index/zh-tw/%E5%85%AC%E5%85%B1%E4%BA%A4%E9%80%9A-Hong_Kong-2741

Public Libraries

https://www.hkpl.gov.hk/en/common/attachments/library-notices/Annex%20IV_Opening%20hours%20of%20bookdrop%2020200929.pdf

https://www.hkpl.gov.hk/tc/common/attachments/about-us/services/library_list_chi.doc

https://www.hkpl.gov.hk/tc/locations/community-libraries.html

Parks

https://www.lcsd.gov.hk/tc/facilities/facilitieslist/parks_map.html

Supermarkets & convenience store:

https://www.7-eleven.com.hk/zh/store

https://www.circlek.hk/store

https://www.pns.hk/zh-hk/store-finder

https://www.wellcome.com.hk/zh-hant/our-store

https://www.boci.com.hk/pdf/chi/shop/shop130.pdf

https://www.watsons.com.hk/zh-hk/store-finder

https://www.mannings.com.hk/store-finder?lang=zh_TW

https://shop.wingon.hk/zh-hant/store_locations

https://www.jhceshop.com/zh/Home/footer1?foot=INF0004

https://www.sincereonlinestore.com/pages/sincere-department-stores?utm_source=Google&utm_medium=GoogleSearchAD&utm_campaign=20230414toryburch&gclid=CjwKCAjw__ihBhADEiwAXEazJuoRKyF4yVy957Sq5m8A6zI-CYE-lIeY6uc8bZVkxz4AgI2a_jEwqBoCYGoQAvD_BwE

https://www.yuehwa.com/zh-hk/locator

Social services

https://www.swd.gov.hk/tc/index/site_download/page_listofserv/

Building information

https://bmis2.buildingmgt.gov.hk/bd_hadbiex/content/searchbuilding/building_search.jsf?renderedValue=true

End of the report