Compromising building regulations and user expectations in the design of high-rise domestic kitchens

S.S.Y. Lau, Fuk Ming Li, D.K.C. Leung, Grace W.K. Tang, Baharuddin and A.L. Ye
Department of Architecture, the University of Hong Kong, Hong Kong, China
K.W. Chau
Research Group of Sustainable Cities, the University of Hong Kong, Hong Kong, China, and
S.K. Wong
Department of Real Estate and Construction, the University of Hong Kong, Hong Kong, China

Abstract

Purpose – The purpose of this paper is to discuss the significance and relevance of social and habitual behaviours of home occupants to the building design process. It argues that introducing quantitative measures such as daylight level alone may not result in a "healthy and functional" kitchen without appreciating or factoring-in the impacts of the social roles and user expectations of kitchens in high-rise and compact urban situations.

Design/methodology/approach – The study investigated three common types of apartment buildings in Hong Kong. Case studies suggested that it is crucial to include in a design process proper considerations of human behaviours by way of preferred approaches and modes of living, space usage, and weightings of end-user responses that would influence architectural design in a direct and crucial way.

Findings – The study noted that daylight quality of a kitchen is perceived by most families to be not as important as building control officials and designers thought it would. Instead, it is found that social and cultural factors are more important parameters for users. The study observed that designers rely on physical and quantitative approaches such as daylight factor, window size and window-to-room area ratio to qualify a design solution and ignore the socio-cultural parameters.

Originality/value – The paper calls for designers and building control officials to incorporate the study of functionality and socio-cultural preferences of users groups in the building design process. The study envisages that an integrated design methodology would enhance the living environment.

Keywords National cultures, Socialization, Structural design, Rooms, Residential property, People's Republic of China

Paper type Research paper

Research for this paper was supported by funding from the Hong Kong Government's Research Grants Council, Project Code HKU7202/02H. Thanks are due to Mr Lam Woo Hei, Will Yu, Patrick Tong, Kenneth Ip, Au Ka Ming, Chan Hok Ming for their professional comments/consultation on the paper, and the following who have contributed to this study with the production of the floor plans for use in this paper: Third Year architectural students (2004-2005): Leung Mei Wa, Leung Shun Ting, Mak Kin Sze Angela and Wong Hoi Ming. Thanks are also due for the sharing of information from the Hong Kong University survey 2002 carried out by Messrs S.S.Y. Lau, Q.M.M. Zaman and Xu Ziping *et al.* who have interviewed and visited about 100 households randomly selected from private and public residential estates in Hong Kong.

Structural Survey
Vol. 24 No. 3, 2006
pp. 212-229

0263-080X
DOI 10.1108/02630800610678869

Introduction

Hong Kong presents a unique case for studying the behaviours and preferences for high-rise living. Ever since the 1970s, economic expansion of the city has fueled demand for housing at a colossal rate. In no time, the average number of storeys for residential towers has risen from four to six storeys during the post-war period of the 1950s to 30 storeys in the 1980s, 40 storeys in the 1990s, and 60 storeys and more in the 2000s. The increase in residential building height has made Hong Kong an unprecedented candidate for the study of high-rise living by architects and planners. The livability and desirability of high-density and high-rise living at 330 feet (100 metres) or more above ground, coupled with the unexpected outbreak of Severe Acute Respiratory Syndrome (SARS) in March 2003 that affected some of the world's densely populated cities, such as Beijing, Singapore, Toronto, and Hong Kong, has prompted a review of the desirability and environmental performance of high-rise residences. As a result, building control officers, developers, and designers joined together to evaluate the designs-in-use for residential tower blocks. The review revealed an insufficiency in daylight and ventilation for kitchens and bathrooms as an apparent drawback in prevailing building designs, typically an eight number home-units planned around a centrally serviced point block (see Figure 1).

Design and planning control for high-rise domestic towers

Historically, Hong Kong building codes have embraced the objectives to guarantee a minimum standard of hygiene and safety for building occupants. Over the years, certain modifications have been incorporated in the Hong Kong building codes in response to the problems and concerns caused by rapid urbanization and construction booms. There were three important modifications with reference to living spaces. The first modification was on habitable spaces such as kitchens, bathrooms, living rooms, dining rooms, and bedrooms, which were mandated to have windows (HKSAR, 1997b).

The second one was that such windows must directly face a clearance area in order to guarantee air and day light passage. The clearance area is specified by a prescriptive rectangular horizontal plane (RHP) regulation (HKSAR, 1998). For the RHP approach, it is stipulated that the minimum distance between building blocks is determined by a minimum prescribed plane of 71.5°, when the window is in a room used for habitation such as bedroom or living room; or 76° from the horizontal when the window is in a room used as an office or as a kitchen. The minimum clearance of the building from the boundary is determined by a minimum prescribed plane of 81° when the window is in room used for habitation, or 83° when the window is in a room used as an office or kitchen. This value is obtained by assuming a rectangular horizontal plane, in front of the window, unobstructed and uncovered, and extends from the face of the window such that its length is at least 1/3 h, 1/6 h (for rooms for habitation) or 1/4 h, 1/8 h (for rooms as office or kitchen), where h is the height of building measured from the sill of the window concerned (refer to Figure 2). It is also stipulated that the rectangular horizontal plane should have a minimum width not less than 2.3m, with area not less than $21m^2$; and the window/floor ratio of any room should be at least 10 per cent.

The third modification was the requirement of an open space on the ground floor, or over a roof or podium deck, in order to govern the spacing and distance between towers

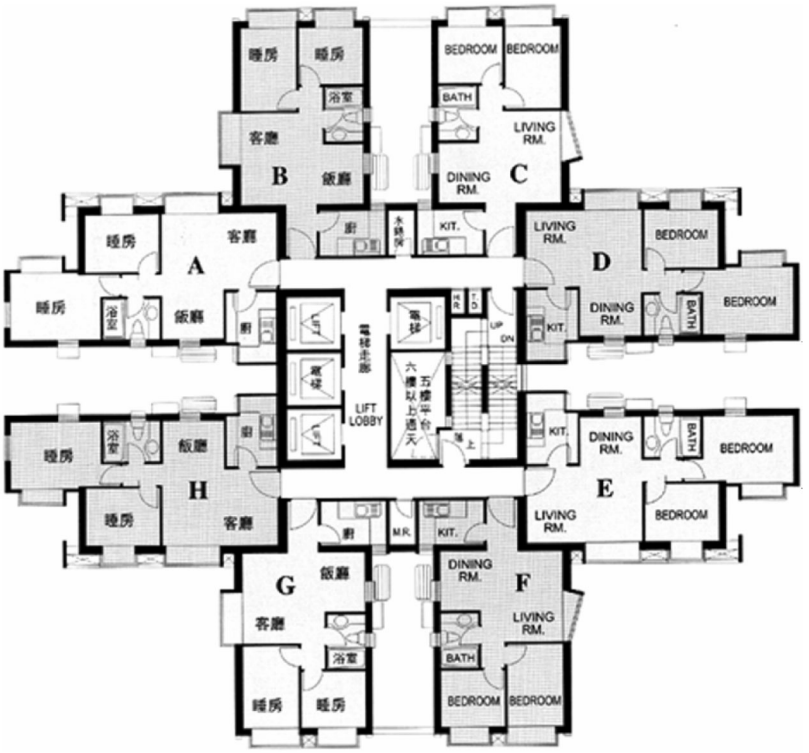


Figure 1.
Typical layout plan of a private domestic building

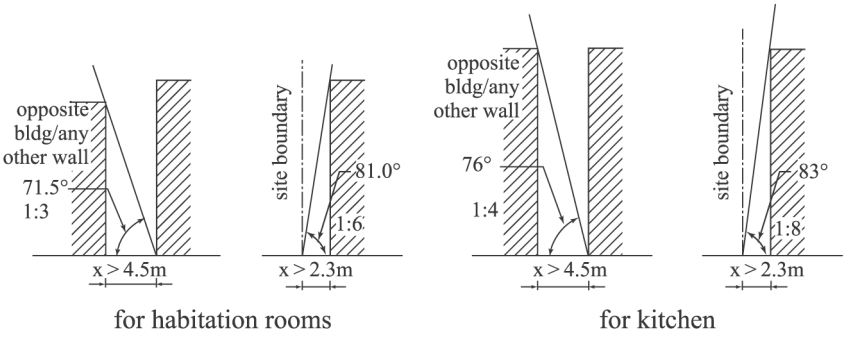


Figure 2.
The minimum prescribed clearance for habitation rooms and kitchen windows facing opposite building and site boundary of Hong Kong building codes

on the same site (HKSAR, 1997a). This was required because of the extraordinarily high development ratio for a given plot of land (maximum development potential for a residential site in Hong Kong could be as high as 800 per cent of the site area). In essence, the above three constraints had a significant impact on resultant building forms and livability, ending in a cruciform shaped building as the best-fit layout and an economically affordable housing design for the local market (see Figure 1).

Economic constraints and affordable homes

For a city with a limited physical land area – 1,103.72 sq.km, and a growing population – 6,882,600 according to the 2004 Census, it is unsurprising to find a residential property market in the hands of a few syndicate private developers. It is well-known that property prices in Hong Kong are very high – averaging US$1,000 per square foot for an average private mortgaged apartment. This unit price becomes an influential factor to determine the affordability of an average home, which has an average gross floor area of 600 (2-bedrooms) to 1,000 (3-bedrooms) square feet (60 to 100 sq.m.). This is far smaller than the average home in Europe or North America. As a result, most Hong Kong homes are tiny, leaving designers with limited scope for creative designs. As can be seen from Figure 3, the majority of residential units (apartment homes) (93.5 per cent) that were completed in 2002 are less than 1,000 sq.ft (100 sq.m.) each (HKSAR, 2002). This explains why developers and architects settled on a cruciform shape floor plan as an efficient layout from both investors' and users' points of view.

A 2002 survey (Lau and Li, 2002) undertaken by the University of Hong Kong revealed the preferences for homes from a social perspective. The results showed that 68 per cent of interviewed families preferred to live in urban areas for transportation and other convenience; 90 percent of the interviewed families agreed that convenient transportation is a major consideration for their choice of residence. This reflects a common phenomenon of a competitive working environment that makes most employees suffer from prolonged stressful working hours. Hence, minimizing the time spent on commuting between home and work is an important factor.

Cultural impacts – custom and traditional usage of residential kitchens in terms of spatial hierarchy and functions

The 2002 survey (Lau and Li, 2002) provided another interesting finding, which contrasted with most European and North American perceptions of kitchens. In Western countries such as the USA, besides the traditional role of the kitchen as a place for food preparation, today's kitchens have an additional role as the location for interaction between adults and children (Koontz and Dagwell, 1994). This role has been expanded to be a place for social interaction within families or communities. That is why in the Western society most kitchens are planned as open plan kitchens. In contrast, of the 100

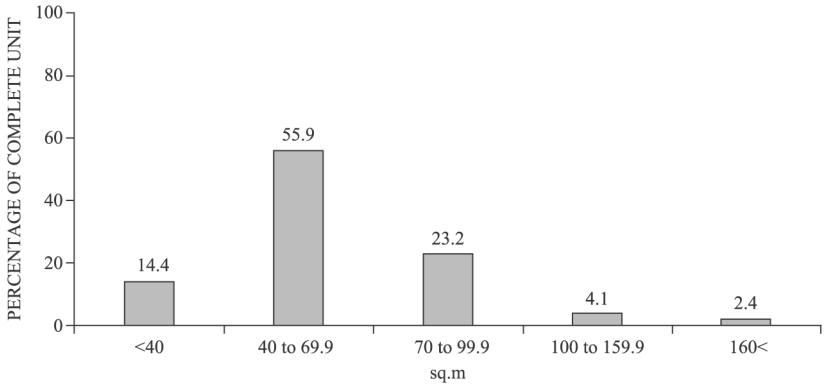


Figure 3.
Percentage of completed units in 2002

families visited in the 2002 survey, only one family has an open-type kitchen at home. This is mainly related to the social and functional role of kitchens for the predominantly Chinese migrant families (most of Hong Kong's population are second or third generation offspring from immigrants from Southern China who entered Hong Kong in the post-1949 era). In their replies to the questionnaires, many families were indifferent to the kitchen as a kind of social space. In the majority of these cases, a kitchen is often treated as a serving space primarily for food preparation and cooking, and also for other utilitarian activities such as laundry and storage.

Time-use tracking by the questionnaire also confirmed the indifferent attitude to a kitchen by these families. This finding contrasted sharply with the Western view of a kitchen as an active place for socializing in addition to utilitarian functions. The following is a generalization of how typical Chinese apartment homes displayed a particular preference for space planning of kitchens:

- A kitchen is a serving space inherited with a dirty and aesthetic problem. The role of a kitchen is for cooking and storage, unlike in the Western world, where it also serves as a living space where families not only eat, but also gather to read, chat, and conduct other social events.
- A kitchen tends to be tiny with poor lighting. As the sizes of apartment home in Hong Kong are small, the priority of area distribution would be in the following order: living room, bedrooms, kitchen, and toilet. The kitchen area, therefore, comes off poorly in the priority ladder.
- A kitchen is always isolated from other family spaces. The spatial planning hierarchy in Hong Kong encourages the kitchen to be near the main door, as raw food and other goods for kitchens are not expected to pass through the living room.
- An enclosed kitchen is always separated from the main living space by a door, while an open kitchen is not commonly found in private housing estates. This is because of the statutory building code and socio-cultural factors. By regulation, the kitchen has to be separated from the rest of the flat by a fire-rated enclosure when there is a supply of cooking gas to the kitchen. The traditional Chinese cooking style creates smoke and oily fumes, which would otherwise spread and dirty up the living space.

More surprising is the fact that a similar indifferent attitude towards kitchens and bathrooms is exhibited by the designers. The survey team noted, through further study, that architectural design of apartment homes is also subjected to a social and cultural preference. Space hierarchy studies have indicated that in designing an apartment building, local architects (regardless where they received their professional education or training) would prefer to provide living rooms and bedrooms with the best views available, while kitchens and bathrooms are left with secondary or inferior orientations, often facing an internalized or semi-enclosed light well, or referred to technically as "re-entrants" to satisfy appropriate building codes. Such design approaches arose from both a social as well as a professional consideration. The social bias design approach is explained by the common reasoning that most home-buyers prefer living rooms and bedrooms to have good if not the best views. The survey was able to find a positive correlation between sales price and the number of storey and

available views. The higher one's apartment is located, the better views it tends to enjoy, and the more value it commands in the housing market. Thus, recent trends have witnessed more residential buildings with enlarged clear-storey windows for living rooms or bedrooms, whilst kitchens and bathrooms continued to be command poorer daylight and views.

As for the design-bias approach, designers prefer to leave kitchens and bathrooms in back-of-the-house locations because they are messy to treat when dealing with the design of a building's façade for aesthetic articulation. Exhaust fans, water heater vents, drainage, and plumbing pipes are deemed eyesores in a building façade design. Besides, building service fixtures such as mechanical fans, plumbing, and drainage pipes associated with bathrooms and kitchens pose similar constraints for a façade elevation design. In addition, bathroom windows, for privacy purposes, are often fitted with translucent glass, and kitchen windows are always installed with security grilles to protect against theft and falling objects. All these constitute adverse design factors for a building's appearance and daylight access.

Case studies

Study of kitchens – non-quantitative versus quantitative parameters

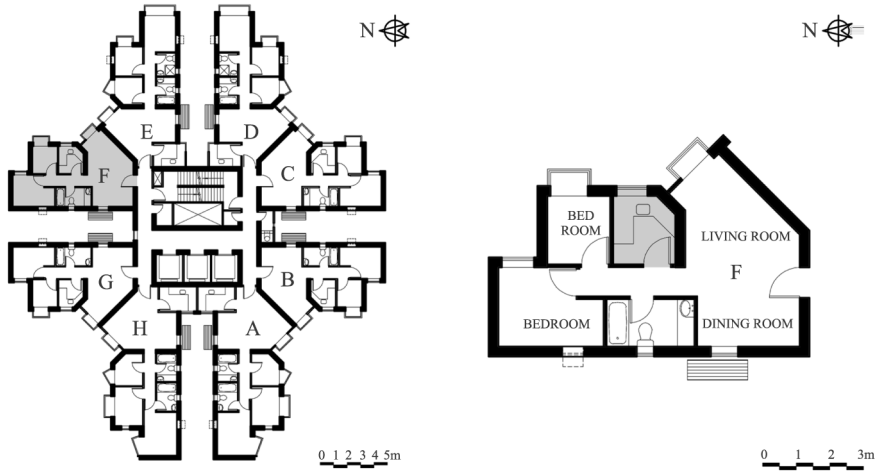
The team undertook three case studies using a non-quantitative approach: social and functional roles versus a quantitative and prescriptive approach in kitchen design for Hong Kong homes. The three cases were selected to represent prevailing design trends in apartment design – the Discovery Park (occupied since 1997), the Sham Wan Towers (occupied since 2004), and the South Horizons (occupied since 1996). The study adopted two design proxies – spatial hierarchy and the functional usage of a kitchen.

Case study 1 – Discovery Park

The Discovery Park development consists of 12, 40-storey tall, residential towers, which have been occupied since 1997. The studied kitchen is situated in an eight-unit floor plan with an average flat size of 515 sq.ft (48 sq.m.). The kitchen is of a diamond shape with an area of about 43 sq.ft (4 sq.m.) The size of the kitchen is quite small when compared to the overall size of the home unit, a common phenomenon for Hong Kong private domestic buildings (see Figure 4).

Internally, the kitchen is located farthest away from the entrance, but close to the bedrooms, which is an uncommon layout in apartments. In terms of daily usage, housewives or domestic helpers would carry uncooked food from the entrance through the living room to the kitchen, which represents an untidy circulation route. The studied kitchen only houses cooking utensils such as a gas stove, rice cooker, oven, and storage equipment like a refrigerator, cabinets, and shelves. The remaining area for food preparation is very small, and the kitchen can probably accommodate two people at the same time. All the wall surfaces inside the kitchen are fitted with cabinets, shelves and mechanical exhaust fan and duct, either under or over the work area. The only blank wall is the one at the rear of the gas stove, where a mechanical exhaust fan is installed.

This is a typical kitchen found in most residential buildings in Hong Kong. The size of the storage area is a common constraint for most Hong Kong families, due to the smallness of the kitchen and the home. Furthermore, even the two openings in the kitchen, i.e. the doorway and the window, are used for storage purposes. Residents



(a)

(b)

Figure 4.
(a) Floor plan and kitchen plan of Discovery Park; (b) photos of kitchen

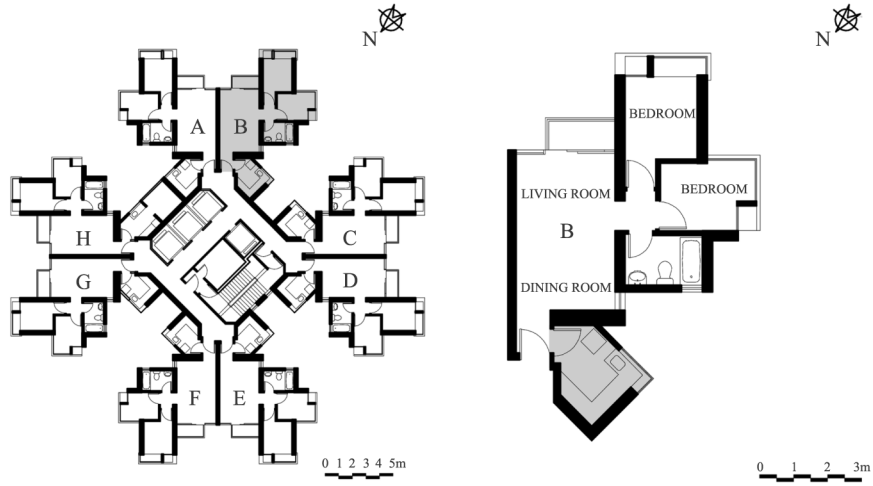
tend to place some objects in front of their kitchen windows or hang them from the window's security frames. In this kitchen, although its window faces a completely open area that allows the penetration of daylight, it is usually blocked by detergent bottles, cooking utensils, cutting boards, a microwave oven, and hanging racks for towels or other tiny objects. This case study shows that the need for storage always takes higher priority than the need for daylight penetration – a common occurrence in Hong Kong. This phenomenon is due to the lack of storage space in Hong Kong kitchens.

Case study 2 – Sham Wan Towers

The Sham Wan Towers development consists of three, 50-storey tall, domestic blocks, which have been occupied since 2004. The studied kitchen is situated in an eight-unit floor plan with a flat size of about 480 sq.ft (45 sq.m.). The non-rectilinear shaped kitchen is as small as that in Case Study 1, with an area of about 50 sq.ft (4.7 sq.m.) (see Figure 5).

Internally, the kitchen is isolated and located far away from the family spaces. The kitchen is next to the home entrance, which provides the housewife or domestic helper with an efficient delivery route for raw food from the entrance door. The kitchen is a serving space with cooking, washing, and storage purposes. All vertical surfaces are equipped with cabinets at low and high levels. The kitchen allows up to two people to work inside.

The cabinets contain all kinds of equipment like a washing machine, gas stove, micro-wave oven, and cupboards, which are in line with the functional role of a kitchen.



(a)

(b)

Figure 5.
(a) Floor plan and kitchen plan of Sham Wan Towers; (b) photos of the kitchen in Sham Wan Towers

Again, there is no unused space in the kitchen, with all walls mounted with cabinets or equipment. The efficient arrangement of work space in the kitchen provides the housewife with a tidy working environment. However, like the previous case, the need for storage space appears higher than the need for daylight, judging from the amount of stuff that is stored off the window. Fortunately, the kitchen still enjoys sufficient daylight penetration due to its improved (enlarged) window design and floor plan layout.

Case study 3 – South Horizons

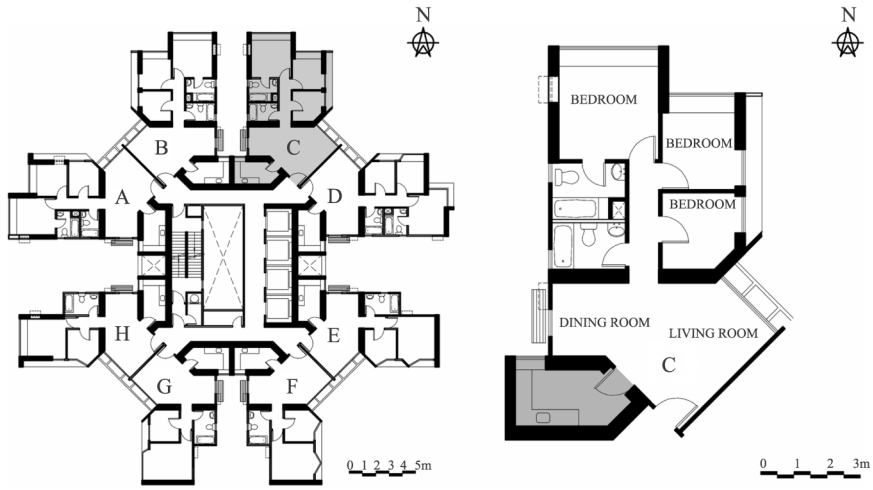
The South Horizons development consists of 34 towers ranging from 30 to 38 storeys tall. It was first occupied in 1996. The studied kitchen is again an eight-unit floor plan with an average flat size of 664 sq.ft (62 sq.m.) in a diamond shape, with a kitchen area of about 59 sq.ft (5.5 sq.m.) (see Figure 6). This kitchen is similar to the kitchens in the previous two cases. Like the kitchen in the Sham Wan Towers, the South Horizons kitchen is also isolated from the family spaces and located next to the entrance.

The kitchen is very narrow and just big enough for the installation of a work-top counter and cabinet installed on one side. This "single loaded" limitation reduces flexibility in the daily use of the kitchen, and provides inadequate space for storage. As can be seen from the photographs (Figure 6b), all the spaces above and underneath the suspended cabinets are used for storage purposes. The wall on which the window is situated also serves as a storage space for bottles, glasses, and even the rice cooker. The fully packed kitchen suggests that the need for storage is of the highest priority for this family. The functional role of a kitchen is obviously expressed here, in which storage seems to predominate over cooking and washing. Users have to turn on the lights when they work in the kitchen due to the poor design, in which the windows and the work-top counters are located opposite from each other. Users will inadvertently block daylight from entering. Furthermore, since the external environment outside the kitchen window is badly lit and poorly ventilated, the kitchen window rarely opens, thus aggravating the problem.

Findings of the three case studies

The three cases studies revealed some common characteristics about Hong Kong domestic kitchens. Generally, the kitchens are uniquely small, and are mainly serving and storage spaces without any social activities going on inside. These findings suggested that the design of a Hong Kong domestic kitchen is linked to the social-cultural considerations of the Chinese family lifestyle. It is necessary at the design stage to incorporate these user expectations and functional requirements for a kitchen. As Shaw (2005) stated "... designers need to go beyond the basics of feelings. Emotionally intelligent designers understand the reasons why certain things give pleasure. Hardwired responses, cultural influences and the desire for personal experiences are a few of the reasons, and will impact kitchen design." In order to understand user expectations, it is crucial to recognize in a design process the implications of the social and cultural habits of local families.

In most Hong Kong private residential buildings, the kitchen is often very small. Figure 7 describes the local norm. The studied kitchens, coincidentally, share a common non-rectilinear diamond shape.



(a)

(b)

Figure 6.
(a) Floor plan and kitchen plan of South Horizons; (b) photos of the South Horizons kitchen

The kitchen of a Hong Kong apartment is usually small and of a non-rectilinear shape because it is usually treated as a serving space. Judging from the area and shape of the kitchens, the kitchen is always ranked low on the priority scale, from both a marketing and socio-cultural perspective. Besides smallness of the kitchens, the three cases demonstrated the utilitarian role of a Hong Kong kitchen, where no socializing activities take place. The major role of kitchen is for storage, as all three kitchens are equipped with extensive wall-mounted cabinets. The small size of each unit forces the

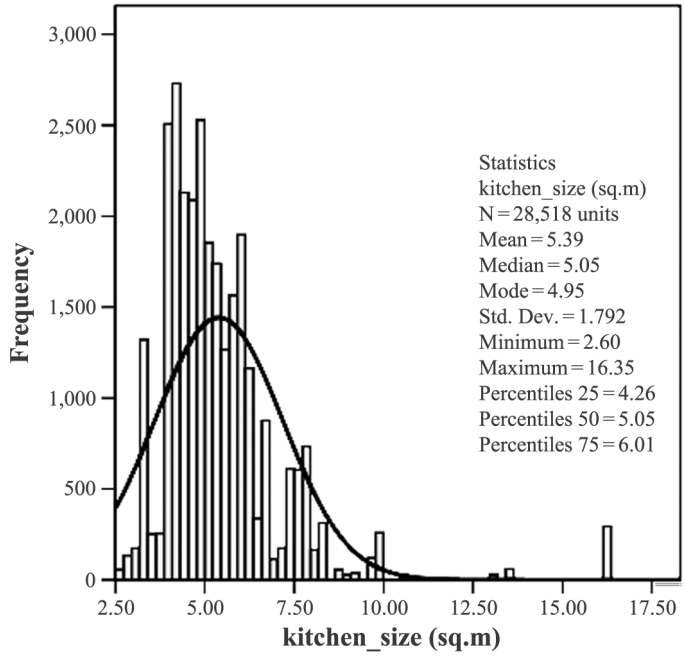


Figure 7.
A study of kitchen size and distribution

Source: Lau *et al.* (2006)

users to store things in the kitchen, despite the kitchen already being very small. Users also place objects like cleaning bottles and electrical appliances in front of the windows, and hang towels, cooking utensils, and cutting boards on the window frames. The blockage of the windows by such objects suggests that the priority for storage is higher than that for daylight penetration.

Impacts of the socio-cultural attributes of kitchen usage

As there is no statutory control over the mandatory minimal area of domestic spaces, very small kitchens are seen in most Hong Kong homes. Because of the smallness and sometimes inconsiderate architectural design of windows and kitchen configurations, kitchens are sometimes poorly lit and used inefficiently. The above case studies, however, revealed that the socio-cultural considerations of usage patterns were not taken into account in the quantitative design approach. The following discusses some of the impacts.

Spatial hierarchy

Different family spaces perform different roles that contribute to the family's well being. Thus, there is a priority for spatial interaction and spatial hierarchy among family spaces. Traditionally, a kitchen has been treated as a secondary or serving space in terms of both functional and location aspects. A kitchen was used for slaughtering, cooking, and washing, and where unpleasant odours, noises, and sights were to be found. Due to the unpleasant environment of a kitchen, the Chinese believed

that "gentlemen or scholars" should get as far as possible away from it. Therefore, a kitchen was always near the entrance and isolated from the main family space in traditional Chinese homes. This is in contrast with Nyström (2003) who that stated that the kitchen must be seen as an important area in order to achieve better and healthier settlements.

This deeply rooted perception towards the kitchen is still in practice today. The 2002 survey supports the above observation (Lau and Li, 2002). Furthermore, due to the low priority of the kitchen in an apartment layout, its resultant size has always been small. The floor area of a kitchen has a corresponding impact on the resultant window size in terms of statutory control. Regulations require the window to be one-tenth of the floor area, but do not define an absolute minimum area as does the China building code. Therefore, given a tiny kitchen of area, say 50 sq.ft or 5 sq.m., the overall size of the kitchen window should be a mere 5 sq.ft or half a square metre. The poor lighting inside a kitchen is therefore only to be expected. In the Hong Kong condition where external obstructions are common and sky conditions are dominated by cloudy skies, the minimum window area should be increased (Grosslight, 1993). Given the limited perimeter of each of the eight home units in a tower, the more perimeter occupied by a kitchen window wall, the less perimeter would be left for the rest of the other spaces such as living space.

In practice, kitchen and toilet windows are rarely exposed in the main façades of Hong Kong buildings due to their unpleasant appearances, which affect the overall image of a development. The 2002 survey showed that 69 percent of the interviewees preferred bigger areas for their next homes, which implied dissatisfaction with the size of their present homes (see Figure 8). All these factors explain the cause and problem of small kitchens in today's apartments in private residential buildings in Hong Kong.

Perception of the social role of a kitchen – Chinese and Western views

The different lifestyles of Chinese and Western households have led to the different styles and functions of their kitchens. In the European and North American model, the kitchen is an active family space that also serves as a working space for users – reading, socializing, listening to radio, watching television, as well as cooking and eating. In a majority of Western homes, a kitchen is often well-equipped and big enough to accommodate dining or socializing by the entire family and their friends as well.

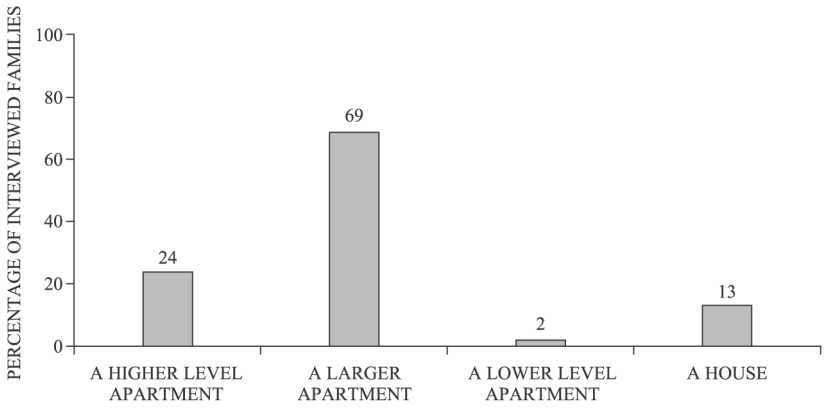


Figure 8.
Preferable future housing types

In many cases, the kitchen is an extension of one's living space, and is in no way treated as an inferior or utilitarian space, as in the Chinese home (see Figure 9 and Figure 10).

This habit of non-food preparation related usage of kitchens contrasts sharply with that of Chinese families. In the Chinese household, dining is a formal activity dissociated from the kitchen, while reading and chatting on the phone are associated with living spaces instead. The use of a kitchen is often for cooking and related tasks performed by specific users, usually housewives and live-in domestic helpers at specific hours of the day. Therefore, a Hong Kong kitchen is usually compact in size, and designed to allow only one to two persons to work in it at any one time (see Figure 11).

As for the role of food preparation and cooking, many families that were interviewed by the authors replied that breakfast and lunch are often taken at nearby restaurants, whereas dinner is usually prepared and taken at home during weekdays. Soup (notably cooked non-stop for 24 hours) is a popular dish for Hong Kong families, and could be prepared with minimum surveillance by a small electric pot. This probably explains why Hong Kong families could cope with small kitchens, contrary to their Western counterparts.

Because of this inherent cultural difference in the use of a kitchen, considerations in the planning and design stages for Hong Kong homes are quite different from those for Western homes. From the case studies, it is obvious that the least emphasis is placed on kitchens in Hong Kong, whereas kitchen and living areas are often integrated in the design of Western homes. A study of the kitchens in the West implies that they are

Figure 9.
(a) Social functions and family gatherings held in a Western kitchen;
(b) Western kitchen with table for eating and working

Figure 10.
(a) The kitchen with a TV serves as an extension of the living room; (b) the kitchen as an extension of the living room; (c) the kitchen as an extension of one's living and work space

(a)

(b)

Figure 11.
(a) Typical Hong Kong style kitchen – very compact allowing space for only one person to use at one time; (b) typical Hong Kong style dining room – functions of the kitchen and dining room are separated

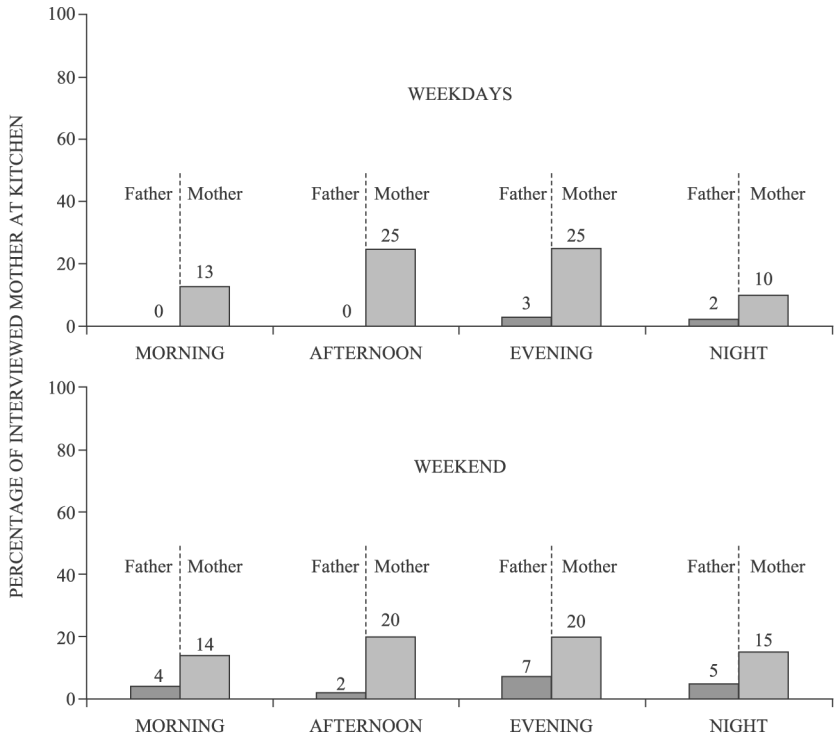
more extensively used by the family and the quality of finishes and furnishings is better. From the images shown, Western kitchens are spacious with good daylight penetration. In this way, it is seen that daylight design and quality is closely related to the preferred roles of kitchens in a family.

The 2002 survey enquired about the possibility of an open-kitchen type arrangement, but of the 100 or so home visits made, only one family had an open kitchen. The remaining families had separate and compartmentalized kitchens. A popular explanation of these interviewees centred on the steam and smoke generated by traditional Chinese cooking, which precludes an open-kitchen arrangement. Another popular view focused on the Chinese concept of spatial hierarchy; a kitchen is considered a workplace, or a space that belongs to servants (in Hong Kong today, there are over 400,000 hired live-in domestic helpers serving over two million families). In this way, practically no socializing activities take place in the Chinese kitchens, due to their functional role, which results in their small size and isolation from family spaces.

Time usage

Families from different social and income classes have different patterns of time usage and expectations of homes (see Figure 12). In this paper, we studied the eight-unit plan-form of high-rise private residential buildings that usually house middle class households, which tend to have a stable income source, usually with every adult contributing to the family income.

The 2002 survey examined the time and space relationship and socio-cultural habits of Hong Kong families. The findings suggested that most families consisted of two to four members, which is usually a couple with one to two children. As expected, the survey results showed that most family members were not at home during the daytime. This was because during the daytime, parents are usually at work and children are usually at schools. Moreover, due to the advent of the full-day high school



Note: This question tries to find out the usage of kitchen for meals (breakfast, lunch, dinner, etc.) during weekdays and weekends. The chart shows that the usage is actually quite low regardless of weekdays or weekends (for instance, it ranges from 10 to 25% of mothers would cook at home during weekdays, and 14 to 20% of mothers cook at home during weekends). It means that most Hong Kong families in the interview prefer eating out. It also indicates the decline of importance for kitchen for most families as discussed in text

Figure 12.
The time that Mothers and Fathers stay in the kitchen at different times and days

system in Hong Kong, only those pre-school or kindergarten children will be at home during daytime, and are looked after by housewives or domestic helpers. This social pattern accounts for our observation that most households are often "empty" during daytime. Thus, the relevance of improving daylight quantity for kitchens becomes negligible. Moreover, in this study, kitchens were found to be actively used only during evenings or at night when the housewife or her domestic helper is preparing dinner, so the concern for daylight also becomes an insignificant concern.

The changing role of kitchens

Socio-cultural and economic changes in recent years have altered family sizes, their time behaviour, and lifestyles. Consequently, the role of kitchens in today's homes has also changed significantly. One important change has been the working atmosphere for our studied sample, the middle class, who have become increasingly stressed due to longer work hours. In such a setting, most people do not have the time and energy to prepare meals at home. Thus, eating out for breakfast, lunch, and even dinner has

become very common for Hong Kong workers. Many families no longer rely on kitchens for meals as much as before. Instead, their kitchens have simply become places for boiling drinking water or for food storage and laundry. Consequently, time spent by housewives in their kitchens might only last fifteen to thirty minutes per day during weekdays, compared to two hours per day in the past.

The declining importance of food preparation at home has lowered the importance of kitchens, in relation to other rooms in a home even more. Our interviews also showed that a majority of the families ranked bedrooms, living rooms, dining rooms, and bathrooms above kitchens in order of importance. The study also showed the time pattern of each family member (mother, father, and child) and how each spent his/her time in individual family space on weekdays and weekends. As expected, the findings showed that they spent most of their time in the bedroom, living room, dining room and so on. Moreover, the study showed that even most mothers no longer spent long hours in the kitchen. Most middle class couples no longer show an interest in preparing meals at home after working long hours at work everyday, and hence resort to eating out.

All these findings suggested that the roles of kitchens in a contemporary Hong Kong family have drifted away from the designer's concern for day light provision.

Re-prioritize daylight provision

In a residential unit, the four main family spaces, namely living room, dining room, bedrooms, and kitchen, are required to have a similar window requirement relating to daylight provision. Despite the fact that the statutory required windows in these family spaces are stipulated according to the spaces in which they are located, along with some prescriptive external limitations for each window. For instance, the bathroom window is mainly concerned with ventilation rather than daylight provision. Furthermore, under the new regulations, bathrooms are allowed to be window-less provided that they are equipped with mechanical ventilation. In summary, although kitchens are found to be small and hence the kitchen window, whether the kitchen needs that good daylight quality or view is questionable if we take into consideration how contemporary families view their kitchen in terms of functional usage and social spatial importance.

The competition for windows and views between kitchen and living room is found in some new domestic buildings under the latest building codes, in which kitchens enjoy the same outward facing windows as living rooms and bedrooms do. With this new planning priority, kitchens enjoy better daylight penetration and outward views different from those in the above case studies. However, end-users may question whether the new lucrative positions of kitchens actually come at the expense of living rooms and bedrooms, since from the socio-cultural perspective discussed above, user expectations of the quality of day-lit kitchens is insignificant compared with other family spaces.

With improvements in living quality, better daylight penetration has been achieved due to the use of large windows in all habitable spaces. Also, the size of kitchens in new residential buildings is more spacious, with better daylight and ventilation performance and better views. The results of the 2002 survey support the belief that good views are essential for residential buildings. Sixty-one percent of the interviewees believed that the biggest reason for the higher prices of flats located on higher floors is "View" (see Figure 13).

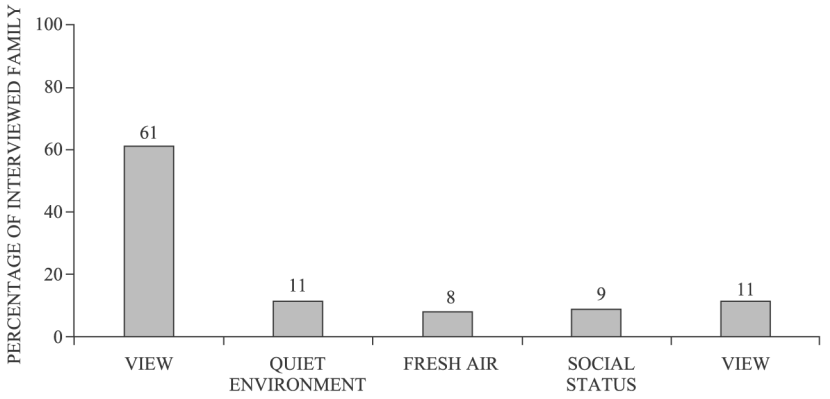


Figure 13.
Top reasons for the higher prices of higher apartments

However, from the kitchens surveyed, kitchen daylight performance was never considered a critical issue, especially in small kitchens where storage space is inadequate. Therefore, we may ask, "Do most end users really need better daylight provision for their kitchens?" If the socio-cultural factors and lifestyles remain unchanged for most Hong Kong families in the long run, it will be difficult to endorse the new legislation and design initiatives to enhance daylight improved kitchens.

Conclusion

All the above findings of social and lifestyle changes help explain the causes and effects of small kitchens, which result in poor spatial quality, usage and daylight penetration. Undoubtedly, better daylight penetration is an essential factor for a better living environment; however, improving daylight quality of a kitchen is shown not as important a concern for the user which contrasts with what legislators and designers have assumed. Socio-cultural considerations should have been taken into account in the building design process. The authors believe that a quantitative design process should integrate with both the functional and social activities of the user, in order to formulate a meaningful environmental solution.

References

Grosslight, J. (1993), *Lighting: Kitchen and Baths*, Durwood, Tallahassee, FL.

HKSAR (1997a), *CAP 123F Building (Planning) Regulations – Regulation No. 25 Space about Domestic Buildings*, The Government of Hong Kong SAR, China.

HKSAR (1997b), *CAP 123F Building (Planning) Regulations – Regulation No. 30 Lighting and Ventilation of Rooms Used or Intended to Be Used for Habitation or as Office or Kitchen*, The Government of Hong Kong SAR, China.

HKSAR (1998), *CAP 123F Building (Planning) Regulations – Regulation No. 31 Minimum Requirements of Windows*, The Government of Hong Kong SAR, China.

HKSAR (2002), *Monthly Digest Jan 2002-Dec 2002*, Buildings Department, Hong Kong.

Koontz, T. and Dagwell, C.V. (1994), *Residential Kitchen Design: A Research-based Approach*, Van Nostrand Reinhold, New York, NY.

Lau, S.S.Y. and Li, P.K. (2002), "A survey of user response on high-rise living in Hong Kong", University of Hong Kong, Hong Kong, unpublished report.

Nyström, M. (2003), "Kitchen design: energy and health in the eyes of the beholder", *Energy for Sustainable Development*, Vol. 7 No. 3, pp. 8-29.

Shaw, A. (2005), "Home cooking", *Kitchen and Bath Design News*, Vol. 23 No. 8, pp. 73-5.

Further reading

Lau, S.S.Y., Baharuddin, Lee, W.Y.W., Leung, D.K.C., Ye, A.M., Amato, A., Chau, K.W. and Wong, S.K. (2006), "Reconsidering day-lighting design paradigms for tall buildings in a densely built city, Australia", *Architectural Science Review* (forthcoming).

Corresponding author
S.S.Y. Lau can be contacted at: ssylau@gmail.com