

Article

History of Open Space and Physical Activities of China's Danwei Neighborhood: The Case Study of Community Hua

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Abstract

The danwei community emerged as a basic socio-spatial unit in China's urban landscape, primarily constructed in the mid-20th century. Today, amid population aging and the deterioration of service facilities supporting health environment, the mental and physical conditions of danwei residents are increasingly challenged. Through an investigation of the built environment history and physical activity patterns in Community Hua, a typical case of former danwei community in Chengdu, China, this paper indicates that danwei communities have accumulated health-promoting legacies rooted in their historical spatial planning and collective lifestyle. The tangible legacy includes an open space system centered around green facilities, while the intangible legacy encompasses a diverse range of well-organized sports and cultural events. Following the reform of unit society in China in the late 1990s, these health-promoting legacies continue to exist within the danwei communities. Consequently, this study suggests that future renewal of open spaces within danwei neighborhood should be based on community history, thus the spatial legacy benefiting residents' health can be preserved and utilized.

Keywords: community history; community heritage; open space; sustainable urban renewal; physical health

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1. Introduction

In recent years, leveraging community environmental renewal as a vehicle to advance public health has emerged as a pivotal objective in urban development research and practice [1,2]. Interdisciplinary research spanning urban planning, architecture, and psychology has established that the social-spatial characteristics of community exert multifaceted influences on residents' physical and mental well-being by shaping behaviors including mobility patterns, leisure engagement, and social interaction dynamics [3–5]. The effect of well-designed green infrastructure, including green/blue spaces, sports and recreation facilities, has been formally recognized by global public institutions and government as a critical determinant in advancing population health outcomes [6–8]. In many local authorities' guidelines for community planning and design, community open spaces usually include green and blue space, outdoor venues and facilities for sports and other public activities [9,10].

The development of healthy living environments is increasingly emphasized within China's planning and architectural design academia and practice [11]. The "Healthy China Action—Healthy Environment Promotion Action Implementation Plan (2025–2030)"

released in 2025 explicitly requires the integration of environmental health concepts into policies in various fields [6]. It is widely regarded that danwei community should be taken as a key subject in China's urban renewal due to its unique spatial form and the previous lifestyle of residents [12,13]. To achieve healthy and sustainable development at a community and city level, the renewal of open space inside danwei communities is essential. Moreover, with China's reforms in urban economy, land use, and local governance over the past decades, many danwei communities have to cope with a series of health challenges related to its aging populations, the collapse and remodel of the social and built environment, and the increasing separation of work and residence [14,15].

Utilizing multi-source data, including historical documents, questionnaire surveys, interviews, and on-site observations, this study systematically outlines the historical evolution and current status of open space forms within Community Hua, a representative danwei neighborhood, alongside the organizational patterns of residents' outdoor activities. It identifies tangible and intangible health legacies embedded in danwei communities, which are rooted in the unique historical formation of this residential typology and thereby distinguish it from other urban neighborhood types. To preserve these legacies and support residents' healthy lifestyles, this study proposes targeted design strategies. Consequently, the study contributes theoretically by advancing the historical understanding of the physical and social construction of danwei communities. Practically, it offers actionable methods for future community development, which aim to integrate established traditions and community open spaces with contemporary demands for healthy and sustainable renewal.

2. Literature Review

2.1. Open Space in Danwei Neighborhoods

Danwei, or work-unit, refers to various institutions and organizations whose establishment can be traced back to the era of China's planned economy, including party and government agencies, schools, hospitals, and state-owned enterprises [11,13]. From the very beginning, a danwei is designed not only as a place of work, but also as a way to implement social governance and provide social welfare, including housing, clubs, and medical and health facilities. These facilities that guarantee social reproduction are usually arranged in a relatively concentrated zone that together constitute the social-spatial concept of a danwei community.

The built environment of danwei communities tends to have the following characteristics: (1) it is often a walled and gated space that forms a relatively enclosed block; (2) it usually consists of areas for work, public activity, and housing, and the latter two usually have a closer spatial relationship; and (3) the general layout usually adopts a symmetrical form, with the overall architectural style rooted in rationalism and modernism [16,17]. The open space in danwei communities, in particular, constantly changed in the way they were used and developed in different historical periods. During the period of a planned economy, the open spaces and social amenities in a danwei community were usually planned and designed by the government enterprises and institutions under a planned economy, and were exclusively used by the danwei employees [18].

After the reform and the overall transformation of China's economy and society, many danwei gradually disintegrated and communities' boundaries became less rigid and finally merged with external urban open spaces [11]. A few surviving danwei began to reshape their spatial characteristics more actively to construct a new image to attract opportunities for further development. One example is the state-owned Shougang Steel Factory, which has taken a series of measures to renew its open space to promote an image of a "garden factory" and the development of industrial theme tourism [19]. But in most of the cases in the management of danwei neighborhood after mid-2000s, the residential committee, which

is a part of China's urban governance system, has replaced danwei and played the leading role. The changing of community management system and property rights has been related to the heterogeneity and complexity of physical space in danwei communities [13].

The reformed community governance and social-economic context in China began to play leading roles to the renewal of old neighborhoods since 2010s [11]. Studies have pointed out the importance of renew green infrastructure to support the healthy aging of communities among the world [20,21]. The necessity of social capital and public participation in green development of aging neighborhood has also been highlighted in academia and practice [22]. Specific to danwei communities, the evolution of green spaces can be conceptualized as a socio-spatial dialectic shaped by institutional transformations and collective memory [23].

2.2. Health-Promoted Activities in Danwei Communities

Previous studies on urban residents' physical activity patterns in China have revealed that danwei neighborhoods typically exhibit superior conditions in both sports facility provision and sports participation rates compared to other residential typologies, including commercial housing complexes, historic urban districts, and urban villages [24,25]. Since their establishment, danwei communities have historically maintained a routine of organizing regular recreational and athletic activities for residents, including midday group exercises, worker sports competitions, and evening leisure event [11,17]. Danwei communities traditionally also provided work–housing proximity for residents, allowing them to have greener and healthier choices for commuting, such as walking or cycling [26,27].

However, since many danwei communities were established in the 1950s and 1960s, the aging of population and the built environment has generally appeared within the socio-spatial compound [1,28]. Public health investigations reveal that residents of danwei communities exhibit significantly lower self-rated health scores compared to those in commercial housing estates, affordable housing complexes, and other residential typologies [29]. Danwei communities' aging population is indicative of residents' lower health levels, in terms of either subjective health or objective health [30,31]. The aging of danwei communities' built environment also impacts the public health of the community. Related studies pointed out that common issues include: (1) a reduction in greening and sports facilities and venues due to the increase in parking areas, space privatization and lack of maintenance, resulting in a lack of space for residents to practice physical activities [18,32]; (2) chaotic traffic conditions that threaten the safety of pedestrians and cause noise and air pollution [28]; and (3) the social and cultural context of open space is disappearing, making it difficult for the remaining daily activities for promoting residents' collective memory and neighborhood belongingness [23,33].

The literature review offers different perspectives on the study of danwei community, including some contrasting narratives. Early studies indicate its environment can promote residents' participation in outdoor physical activity [26,27], while recent investigations point out challenges to residents' health due to aging facilities and populations, and disintegrating social networks [1,14]. This tension between structural advantages and emergent vulnerabilities necessitates targeted intervention strategies that bridge historical assets with contemporary urban health demands. It also raises research questions for the study, including: How might the spatial characteristics of danwei community's outdoor space in history affect the health of its current residents? What are the traditions of outdoor activity among these residents? How do changes in their social identities and age affect these traditions today? Furthermore, how can potential healthy heritages be transformed into practical approaches to sustainable community renewal? By addressing these questions above, the study aims to contribute to the growing body of knowledge on the history and

development of the danwei community, and offering insights that can support future socio-spatial strategies on the renewal for healthy aging of these communities.

3. Materials and Methods

3.1. Case Selection

This study chooses the Community Hua, located in eastern Chengdu, as a case study for two main reasons. Firstly, this community is a typical workers' neighborhood of a former state-owned danwei. Secondly, since 2021, the residents' committee of Community Hua has been preparing for the renewal of its open spaces, intending to use these spaces to benefit residents' health. This creates a practical demand for relevant research. Choosing this community as a research subject facilitates a positive interaction between theoretical findings and the practice of spatial renewal. In the past, the neighborhood served as a residential area for the factory, making it significantly representative in terms of spatial structure and resident composition. Due to the "Third Front" (The "Third Front" program, also known as the Third Line construction, was a large-scale industrial and infrastructure development initiative in China in the late 1960s. Aimed at creating a strategic rear area in inland and southwestern provinces to safeguard against potential external threats. It involved the relocation of industries and skilled workers from coastal regions to more inland and mountainous areas. The program had long-lasting impacts on regional development and economic geography of China. Related research includes Tan et al. [34] and Webster et al. [35].) program initiated by Mao Zedong in the 1960s, a strategic relocation of industries and national defense facilities to interior China [36], numerous danwei were relocated to the suburbs of Chengdu, a western Chinese city [37,38]. Over time, these neighborhoods currently face similar challenges regarding the aging population and space deterioration. Up to 2022, the total population of Community Hua is 7151, of which 2173 are over 60 years old, accounting for 30.39% of the residents. Therefore, taking it as a case study can provide valuable insights for many danwei communities with similar issues.

The history of Community Hua epitomized the development process of many danwei communities involved in Third Front program. The process starts with the first stage under the macro influence of the Third Front policies, followed by the second stage of relocation, and the third stage of transforming from a suburban to an urban community. The first stage of development of Community Hua happened between 1966 and 1987. The danwei was built in a remote mountainous area along the Jialing River in eastern Sichuan. Owing to the mountainous terrain, the layout of the danwei was similar to "a palm with fingers" (Interview A01, Figure 1): the production workshops were scattered among four valleys with the residential area built on a small piece of flat land where the valleys meet. The residential area was subdivided into an eastern area comprising 23 apartment buildings and a western area with 20 apartment buildings. The buildings were no higher than three stories and were usually arranged in two or three rows parallel to the contour line.

Community Hua's second development stage as a suburban spatial compound occurred between 1988 and 2002. After the 1980s, with the changes in political and economic situations both domestically and abroad, many Third Front projects across China were gradually relocated and re-planned. In 1988, allowed by the provincial government, the danwei was relocated to the eastern suburban area of Chengdu. The new development started in 1991, the blueprint of planning was made in 1993, and the construction was mostly completed by the end of 1996. The third stage of development began in 2003. In 2002, the state-owned danwei was reorganized into a limited company. Therefore, it gradually diminished the role of the traditional danwei as a production unit, a provider of social welfare, and a social management agency. Some public buildings planned in the 1993 blueprint of the community, including a hotel, a kindergarten, a swimming pool, and

an athletic field, were never built due to the lack of financial support after the reform of the danwei. These sites were eventually taken by green spaces, shops, and apartment buildings (Figure 2). In 2003, the Residents' Committee of Community Hua was established. It replaced the danwei as the main administrative body of the community, indicating that the community was officially incorporated into China's current urban administrative system.

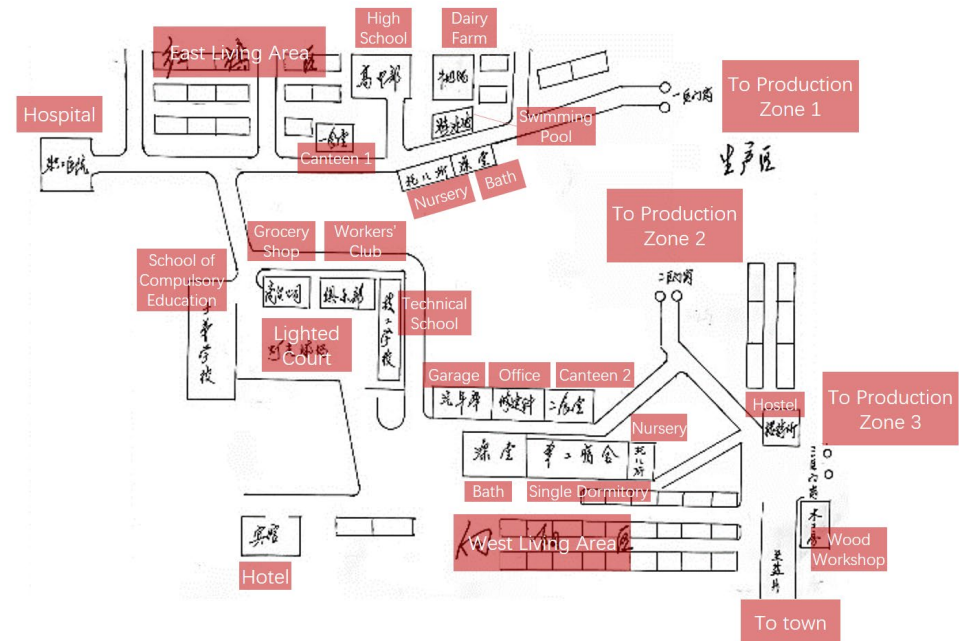


Figure 1. Layout of Community Hua in the 1960s–1980s.

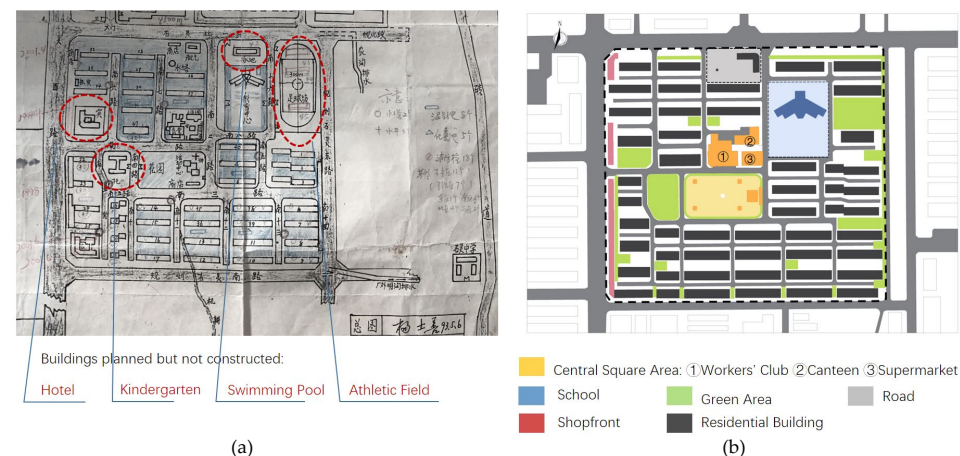


Figure 2. Blueprint plan of the neighborhood, 1993 (a) and its current layout (b).

3.2. Data Collection

This study employs multiple data sources, including literature, site investigations, questionnaires and in-depth interviews. The literature includes the four-volume Factory History (1966–2016) compiled by the danwei (currently a state-owned company) that have developed Community Hua, and photo files provided by the residential committee and residents that record the forms and usage of open spaces in the community at various stages, as well as material from the Chengdu Urban Construction Archives and open-published articles.

Site investigations are made during 3 years of fieldwork (from January 2021 to December 2023). The research team has observed and recorded the community's daily use of open space in different seasons (29 June 2022; 27 March 2022; 28 December 2021, 8:00–20:00).

The data has been recorded on sitemaps by three authors of this article and 6 students of architecture and landscape, and process with ArcGIS 10. Two rounds of questionnaire surveys were also conducted (December 2021 and January 2022) to understand residents' workout habits and preferences for open space (Figure 3). The questionnaires were distributed randomly to community members online and on site. 100 printed questionnaires were distributed on-site within the community by the researchers, while the community committee staff also help to distribute 100 questionnaires via the community residents' social network groups. In total 200 questionnaires were randomly distributed to community members, and 196 valid answers were collected.

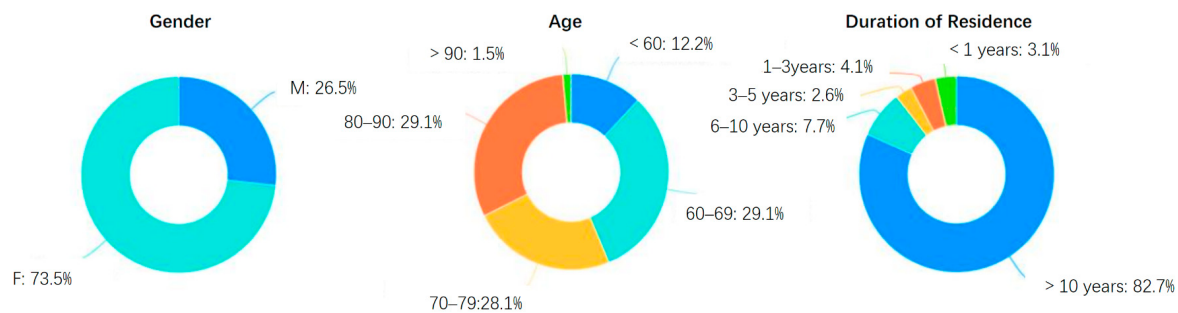


Figure 3. Basic information of questionnaire participants.

The questionnaire investigates how the residents used the community's open space for healthy activities in the past and present. The study also conducted semi-structured interviews with key informants (Table 1). Through oral descriptions of the community history, drawing mental maps, and identifying old photographs and blueprints, our interviewees provided rich details on the utilizations and forms of the community's open space at different times. These nuanced descriptions of historical contexts enabled cross-verification of certain items in the questionnaire survey.

Table 1. Basic information of key interviewees.

Number	Sex	Social Role in the Community	Years of Stay in the Community
A01	M	Retired secretary of the construction department of the danwei	Since 1972
A02	M	Retired staff member of the construction department of the danwei	Since 1970
A03	M	Retired director of the production department of the danwei	Since 1977
A04	F	Retired staff member of the management department of the danwei	Since 1970
A05	M	Retired party branch secretary of the danwei	Since 1968
A06	M	Retired main director of the danwei	Since 1967
B01	F	Director of the community committee	Since 2003
B02	M	Deputy director of the community committee	Since 2013
C01	M	Director of an NGO based in the community	Since 2019
C02	F	Staff member of an NGO based in the community	Since 2019

Findings from the questionnaire and interviews are summarized and visualized in Section 4. Using these findings, Section 5 discusses a renewal strategy that aims to promote community public health based on the spatial characteristics and traditions of outdoor activities in danwei community.

4. Findings: The Health Heritage in Danwei Neighborhood

4.1. The Tangible Legacy: Physical Conditions of Open Space

Throughout the three stages of development, Community Hua has made great efforts to develop open spaces to accommodate various health-promoting functions for residents, such as community agriculture and sports activities. In the first stage of development, the majority of open spaces in Community Hua were basically wild environments, with a few man-made outdoor spaces interspersed by natural or agricultural land. In the second stage, planned and man-made green areas and outdoor sports venues became key components of the community's open space. In the third stage, which continues to this day, minor spatial changes have taken place in the planned open space system in Community Hua. In all three phases, the major open space in the community acts like the nucleus of this residential unit (Figure 4).

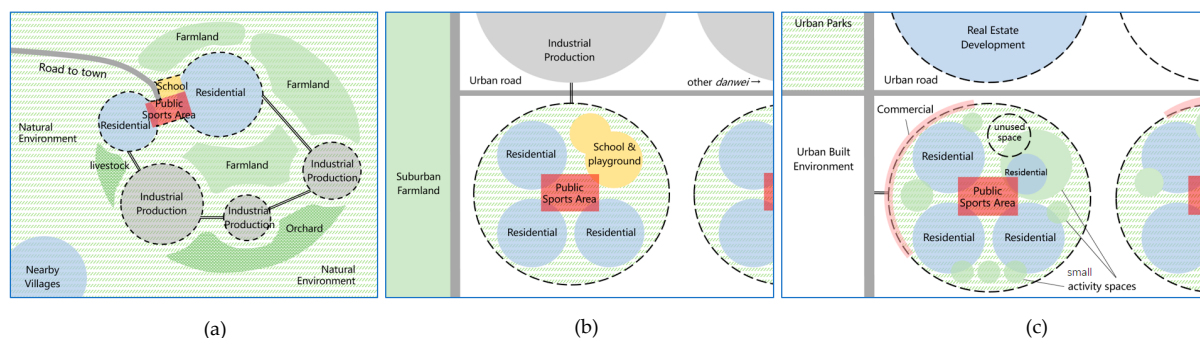


Figure 4. Patterns of Community Hua's open space in the 1960–80s (a), the 1990s (b), and after 2003 (c).

In the 1960s, Danwei Hua, as the developer of Community Hua, followed the principle of “prioritizing the development of production before living conditions”, as advocated by Third Front construction policies. In pursuit of speed, which was also required by the Third Front construction policies, the planning, design, construction, and use of the neighborhood's buildings proceeded almost simultaneously. There was no specific design for the landscape and hardly any man-made green areas. However, greenery still existed in its natural form outside the built environment of the community. According to one of the residents interviewed:

Why do we need to build green belts or gardens? There were no such (economic) conditions at that time. However, out of the buildings and roads, there were grass and wildflowers everywhere. . . it was wild nature. (Interview A01)

At the same time, a considerable amount of open space in the community was also used for agricultural production. In the 1970s, in response to the central government's call to encourage “industrial workers to learn from agriculture” and to ensure self-sufficiency, the community started a dairy farm and a piggery on the fringe of the living area. A greening department was also established to develop orchards, which successfully provided the community with tons of citrus annually.

The natural environment surrounding the community provided residents with plenty of space for outdoor activities. Residents made the best of the existing conditions to organize activities by, for instance, using the ring road between the living areas and the production areas as the venue for track running competitions. After the production and residential buildings were largely completed, the community planned and constructed the most important man-made venue for sports and cultural activities between its two living areas, namely the light court and the adjacent workers' club. The basketball court was constructed on precious flat land and at the center of the living areas (Figure 5).



Figure 5. Workers' Winter Running Race, 1983 (a) and workers constructing a basketball court, 1984 (b).

The remote location of the community was an important reason for the residents to develop their own cultural and sports facilities. In the early days of the factory, most of the employees were young people. They usually came from industrial towns and cities, and many of them had experienced life on a school campus and in the army. Therefore, they were used to having physical, social, and other forms of collective entertainment. At the same time, the development of public facilities for outdoor activities not only responded to the needs of the young workers, but also the demand for playgrounds for the two schools affiliated with the danwei. According to a retired employee of Danwei Hua:

The living conditions were very difficult when the factory was first built. Nobody had anywhere to go after work. . . The young people gathered together and wanted to have a venue for activities, so we decided to fill in a recess in front of the school and built a basketball court. It was planned and constructed by the workers. Afterwards, basketball and volleyball became very popular, and the factory's team played well in local sports games. (Interview A05)

In the second stage of development, the danwei was relocated to the east of Chengdu, at the fringe of the urban built area and rural land. In this development, the danwei made a special community landscape design. The design was prepared by Danwei's Environmental Protection Department and strictly complied with the design specifications issued by the Chengdu City Greening Committee. The implementation of the design was contracted by an outside greening team and completed approximately at the same time as the residential buildings. After the greening work had been accepted, danwei's environmental protection department took over its management.

It is worth noting that when Community Hua was relocated, there were four other Third Front relocation projects under construction in the adjacent blocks. Therefore, Community Hua was surrounded by construction sites. Due to the unpleasant external environment and the long-term lifestyle of self-sufficiency in the danwei system, Community Hua and its neighboring communities planned, designed, and managed the open spaces themselves to form a highly homogeneous spatial structure. The open public spaces in the communities were isolated from the outside world and were used exclusively by the residents of each community.

The 1990s' blueprint of Community Hua placed two important sports and cultural venues, namely the central square and the workers' club next to it, in the center of the residential area. Similarly to the lighted basketball court and workers' club in the community in the 1960s, these new open spaces gain spatial significance as the most welcomed place for residents' outdoor activities and communal interactions, thus forming a physical and social central area of the community (Figure 6). The community's design also included

a standard track and field playground and a swimming pool in the northeastern corner of the residential area, adjacent to the danwei's school for compulsory education. The remaining open spaces in the community were evenly distributed. The residential buildings were all oriented north–south, arranged parallel to one another with almost equal areas of belt-shaped greenery. The layout of greenery as well as apartment buildings adhered to principles of equity.



Figure 6. The central square of Community Hua in the early 90s (a), Workers' Tug-of-War Game, 1998 (b).

In the third stage of development, there were no longer large-scale construction activities in the neighborhood. Some buildings (such as hotels and hospitals) included in the previous design were not constructed, and some social functions were also removed from the community (such as the school). A few newly designed residential buildings were added to the unconstructed areas, and rows of shops were added onto the fringe of the community.

Since 2020, the residential committee has made a few changes to benefit outdoor activities, which include the installation of outdoor fitness equipment, occupying an area of approximately 100 square meters around the central square; the addition of a few table tennis tables between some residential buildings, and the construction of a roofed stage and four small pavilions on the central square to allow residents to exercise on rainy days. Several residents also spontaneously transformed the external area of their apartment entrance into public spaces. They took out chairs and plants and used the spaces for resting, sunbathing, chatting, and gardening. Some added canopies at the building corners, enabling more complex functions such as drinking tea, playing cards, and exhibiting their paintings (Figure 7). These small spaces formed highly accessible places for exercise and leisure activities and provided residents with alternatives to the central square, forming a network of outdoor space and spatial interactions (Table 2). Using ArcGIS and data from the field surveys conducted in December 2021 and March and June 2022, Figure 8 showed that the community's central and secondary public spaces provided venues for exercise groups of varying densities during hot, mild and cold seasons (Figure 8).

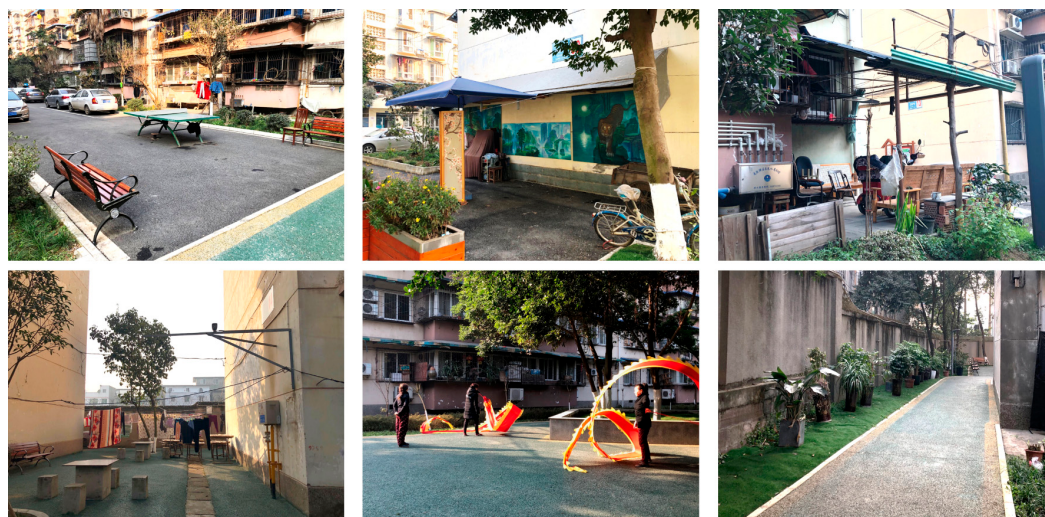
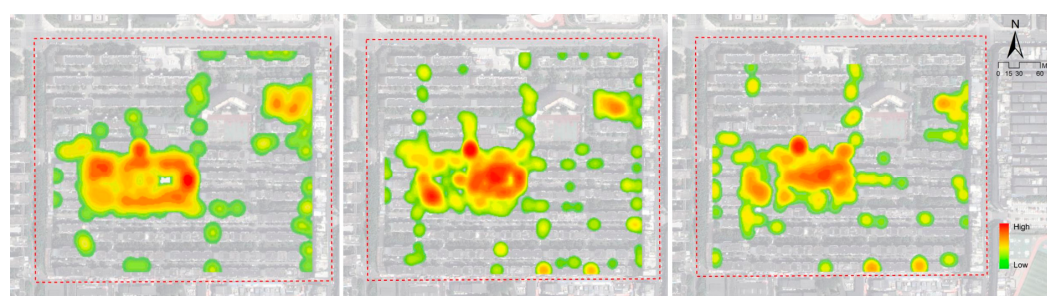


Figure 7. Small open spaces in Community Hua.

Table 2. Features of open spaces in Community Hua. Source: community archive and site investigations by the authors.

Name	Area m ²	Quan	Feature	Map
a. Central square	5800	1	Planned in the 1993 plan, following the tradition of having central sport venue in the danwei community	
b1. Children's garden and sports facilities	1300	1	Using the land of unbuilt kindergarten, developed after 2003 by the Committee	
b2. Public posting area	300	1	Using the land of unbuilt hotel, developed after 2003 by the Committee	
b3. Leisure sports area	1500	1	Using the land of unbuilt track field, developed after 2003 by the Committee	
c. Small open space	80–200	Multi	Using land between apartments, developed continuously by the residents	



Data collected on: 29 June 2022 (left); 27, Mar 2022 (middle); 28 Dec 2021 (right), all from 8:00–20:00

Figure 8. Core density of outdoor activities in the community in different seasons.

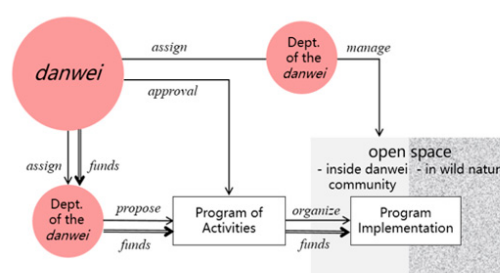
4.2. The Intangible Legacy: Traditions of Outdoor Activities

The practice of outdoor activities in the community is closely relevant to the availability of the internal open spaces. In the three stages of spatial development, the residents of Community Hua maintained their tradition of using open spaces for cultural and sports activities. But the types of activities, the mode of activity organization, and conditions of participation in each stage have changed from time to time.

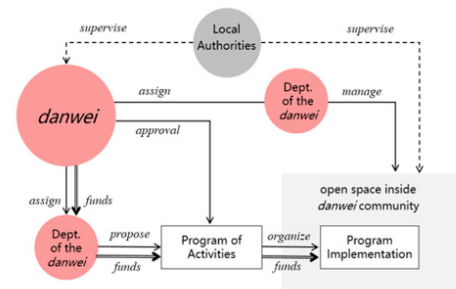
During the planned economy period, the danwei served as the agency between the highest authority and everyday life in China's social governance system [39]. This

role turned danwei into an efficient vehicle to implement various national policies on environmental sanitation and public health within its spatial scope. In 1982, Community Hua (shortly after the Central Committee of the Communist Party of China launched the Month of Promoting Civilization and Courtesy) the danwei established a special committee and a leaders' group to mobilize all employees to improve the environment of both the production and living areas. A series of public health regulations and related activities were formulated and implemented, including collective cleaning work and sanitary inspections every Saturday afternoon, a "responsibility system" that allocated cleaning work to specific people, and a mechanism to select and appraisal "model residential buildings."

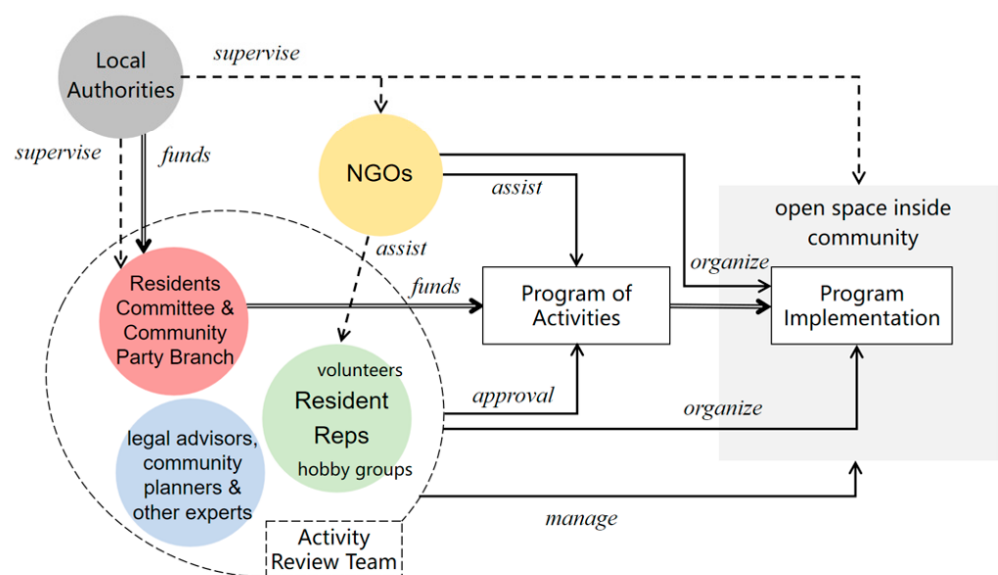
Similarly to the promotion of environmental sanitation campaigns, the promotion of cultural and sports activities also relies on the organization and sponsorship of the danwei (Figure 9, Upper left). Activities were open to all members, and included activities such as the factory's sports games and sub-danwei activities such as hikes and picnics organized by different workshops and offices. At the same time, upper-level danwei also regularly mobilized their subordinate danwei to participate in various kinds of events related to outdoor activities, such as sports competitions, arbor days, and environmental sanitation inspections. In the case of Community Hua, Danwei Hua was subordinate to the National Department of Machinery Industry. Under the organization of the department, basketball, volleyball, and other sports competitions, and cultural performances were frequently held between subordinate danwei. To perform better in these events, danwei would frequently recruit workers with talented sports, dancing, singing, or other expertise.



The organization of health activities in the 60s–80s



The organization of health activities in the 90s



The organization of health activities after 2003

Figure 9. Organization of outdoor activities in Community Hua: the 60s–80s (upper left), the 90s (upper right) and after 2003 (Below).

After the danwei was relocated to Chengdu, the tradition of organizing collective outdoor activities continued. In 1997, the second year after the completion of the basic construction of the new community, the danwei launched factory sports games. The event used the central square and the unfinished school playground as the main venue. There were a total of 24 events, including ball games, track and field events, and tug-of-war, in which more than 1500 people from the factory participated. In 1999, the selection of “model residential buildings,” which was interrupted during the relocation process, was also resumed.

During the second stage of development, the environmental sanitation and public health management of Community Hua were increasingly subject to the supervision and intervention of the urban governance system (Figure 9, Upper right). The planning and construction processes of residential areas were evaluated and monitored by the city’s environmental protection department. Local governments regularly inspect the community for environmental protection, sanitation, and security issues. In 2001, in response to the inspection of “model civilization danwei”, conducted by the provincial, municipal and district offices, Danwei Hua organized a series of “environmental beautification” activities, rearranged a few sections of the greenery, organized cleaning works, and raised the internal standard of sanitation.

In the third stage of development, the agencies responsible for organizing the community’s cultural and sports activities were further diversified by the residential committee in collaboration with non-governmental organizations (NGOs) and interest groups organized by the residents (Figure 9). Such a trend of multilateral interactions is in line with the dissolution of the danwei system and the promotion of neighborhood self-governance in China since the late 1990s [40]. Currently, there are four NGOs in Community Hua. They assist the elders of the community, who have spontaneously formed more than 10 hobby groups to organize daily activities and events at least every two months on average. These groups were founded by retired workers due to their interests in several types of physical activities, including Tai Chi, jogging, singing, and dancing, which were promoted by the collective life of danwei decades ago. Nowadays, benefiting from NGOs’ support, the community’s interest groups, despite their members’ ages, have actively organized and participated in various local and national health-promoting events, including chorus and group dance competitions, and gained multiple government awards. This indicates that modern urban governance for public health and community members’ health awareness have become the motivation and standards for the spontaneous organization of relevant activities.

Our survey reveals that residents of Community Hua still maintain the tradition of participating in collective cultural and sports activities. In total, 128/196 participants of the study report they involvement in two or more outdoor activities a day, and 151/196 of the residents report that they tend to use the open space in groups. The most frequently used venue is the open space inside the community (Table 3). It is worth noting that many of the workers with specialties enrolled by the danwei decades ago now play a leading role in these group activities, according to then interviewee:

Our factory sports teams used to be famous among fellow danwei. When the workers in our basketball, volleyball, and publicity teams retired in recent years, their specialty and love for sports, singing, and dancing still exist, so they are keen to organize hobby groups among retired workers. (Interview A06)

While influenced by traditions formed in the past, residents’ current participation in outdoor activities has also changed. First, activities involving public participation became more diverse. In the 1960s and 1990s, most residents participated in activities focused on environmental cleaning and beautification. In contrast, at the current stage, residents’

participation in sports, cultural, and greening activities has increased significantly in addition to continued public involvement in environmental sanitation and community governance (Table 4).

Table 3. Basic information of outdoor activities in Community Hua.

Features of Outdoor Activities	Choices	
The choice of an open space for outdoor activities	Open spaces inside the community	43.9%
	Pocket parks close to the community	33.2%
	Large urban and suburban parks	23.0%
The number of companions in outdoor activities	More than 3	77.0%
	No more than 3	17.0%
	Alone	6%
Frequency of outdoor activities	More than 2 times per day	65.3%
	Once a day	20.4%
	Once every two to three days	11.2%
	No more than once in a week	3.1%
Length of single outdoor activity	≥1 h	56.0%
	Between 30 min and 1 h	41.0%
	Less than 30 min	3.0%
Physical intensity of outdoor activities	High intensity (basketball, volleyball, cycling, etc.)	2.9%
	Moderate intensity (jogging, leisure dance, Tai Chi, etc.)	40.8%
	Low intensity (walking, chess and card games, singing, chatting, etc.)	56.3%

Table 4. Comparison of the type and participation in outdoor activities.

		1960s–1990s	After 2003
Types of activities	Sports (in competition and daily workout)	5.8%	12.4%
	Cultural events (outdoor parties, etc.)	8.3%	10.1%
	Cleaning (sanitation campaign, etc.)	31.1%	25.8%
	Greening (arbor day, gardening, etc.)	2.5%	11.8%
	Community governance (the selection of model residential buildings, etc.)	53.3%	34.8%
	Educational activities	2.5%	3.9%
	Other types of activities	0	0
	Never participated	0.8%	1.1%
Motivation of participation	Required by the danwei/residential Committee	61.2%	38.4%
	Personal interests or needs	30.6%	27.7%
	Pursuing a sense of community	8.2%	29.4%
	Attracted by material awards	0	4.5%
	Other reasons	0	0

Second, the frequency and physical demands of the activities in which the residents participate have changed. Field investigations of the study on site of the community open space recorded a total of 142 instances of outdoor activities, including different types of behaviors (Figure 10). It is worth noting that the most popular outdoor activities in the past, such as ball games, tug-of-war, and competitive track and field events, have been replaced by daily exercises that are physically less demanding, such as Tai-chi/dancing (52/142), walking/jogging (85/142), and sunbathing (56/142). This trend is consistent

with the aging of the community. The danwei was established more than half a century ago, and employees from the early years started to retire in the late 1990s. About a third of the community's residents are over the age of 60, far exceeding the ratio of 18% for Chengdu [41].

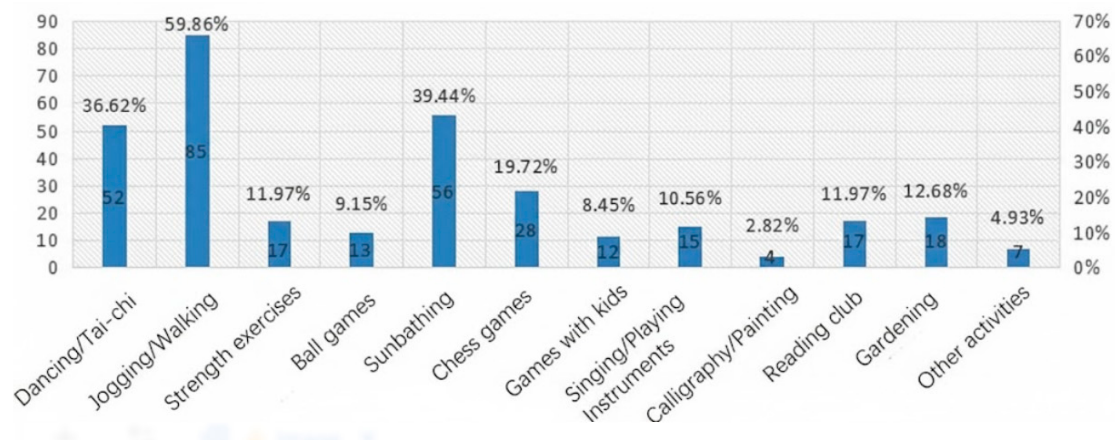


Figure 10. Types of outdoor physical activities in Community Hua.

Third, residents' motivation to participate in public activities has gradually shifted from external driving forces to internal interests. Both questionnaires and interviews indicate that the residents' participation in activities in the 1960s and the 1990s was based on the requirements of the danwei. Today, however, there has been a significant increase in the proportion of residents who participate in activities spontaneously out of a sense of community (Table 4).

The interest groups established by residents on their own initiative have also actively accepted newcomers into the community, so that participation in activities has changed from members of the same work unit to members of the same residential area. Such a change reflects the residents' awareness and actions of constructing and sharing social and cultural life as one community. The community's volunteer team currently serves nearly 300 residents each year, providing services that include day care for older residents, cultural and physical education, environmental cleaning, and other tasks closely related to public health.

The changing nature of open space, the way in which outdoor activities are organized, and participation in activities have put new demands on the renewal of open spaces in communities. How to respond to these demands using appropriate community planning and design strategies will be discussed in the next section.

5. Renewal Strategies Based on Health Heritage

Studies have pointed out that the accessibility of green infrastructure, including green space, well-designed sports and leisure facilities, and the social interactions enabled by the use of green infrastructures exert a combined influence on the physical and mental health of residents [24,42,43]. The investigation into the history and current situation of Community Hua shows that the danwei community has advantages in many of the abovementioned aspects, including the availability of ample open spaces, green areas, sports facilities, and the tradition of organizing public outdoor activities. These advantages reflected the spatial and social capitals related to the development of a health community [44,45]. Therefore, the tangible and intangible legacies of the community should be preserved and prolonged as a valuable heritage resource in community renewal.

Several changes were also observed regarding the form of open spaces, modes of organizing outdoor activities, and the residents' participation in activities in Community Hua. First, there is the formation of a network of open space. The primary hub is the central square, which has taken shape since the community was planned and built. After that, a few smaller and secondary squares gradually appeared out of the original design of the neighborhood. Finally, smaller-scale open spaces have been developed spontaneously by the residents next to their apartment buildings. Based on personal hobbies and social groups, these spaces are built to suit residents' everyday outdoor activities.

The spatial changes are in line with social changes in the community over the last two decades. The aging of residents and their changing preferences for activity modes and intensity have raised new requirements for the design of outdoor spaces. An appropriate strategy for the renewal of danwei communities should be based on a comprehensive understanding of both the historical and the newly emerged social and spatial phenomena in the socio-spatial compound in order to make full use of the advantageous traditions on public health in this specific type of community (Figure 11). The strategy proposes not only to upgrade the community's existing open spaces into a health-supportive environment, including age-inclusive fitness facilities and accessible transportation, but also to preserve health traditions in the usage of space, including community-led health initiatives and long-term engagement of communal events.

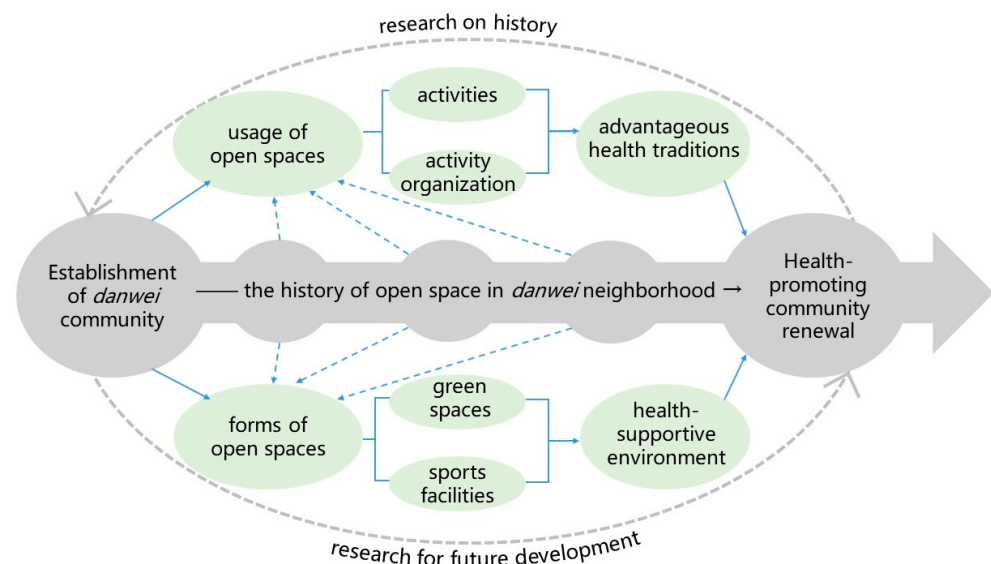


Figure 11. Renewal strategy based on the history of open space in danwei community.

Following the strategy demonstrated above, Community Hua launched a program to renew its open spaces within five years. The practice chose to start with the design and construction of an ecological garden in a secondary open space in the community. The garden is on the boundary of the open space system, leaving the central area, commonly used by residents to exercise, intact. The planning and renewal of the community garden fully respects the current mode of organizing outdoor activities in the community, which is driven by the collaboration of community committees, residents, designers, and NGOs that have already assisted with health-promoting events for the community. All the actors took part in design workshops, which led to the joint decision-making on the spatial form, materials, and landscape elements used in the garden.

At the same time, the garden project's goal is not to deliver a static outcome, but rather to form an open process of community engagement. It is equipped with a set of composting containers that rely on residents to collect organic material to produce fertilizer

for community greening. A workers' choir, formed during the collective life of the past, acted as a volunteer group that maintains the community garden, demonstrating the positive influence that the danwei community's healthy legacy can have on its renewal today. It not only continues the community's tradition of collective participation in outdoor activities but also introduces new knowledge and an awareness of ecological sustainability to the residents (Figure 12).



Figure 12. Public-participated design workshop (a), plan selection (b), and maintenance of the community garden (c).

6. Conclusions

6.1. Health Heritage of Danwei Community

Through an in-depth historical and contemporary analysis of Community Hua, this study has revealed the significant health heritage embedded within the danwei community, comprising both tangible open spaces and intangible traditions of organized physical activities. The tangible heritage includes a system of open space consisting of a central square and smaller open spaces and sports facilities. The intangible heritage includes the tradition of organizing multiple types of public physical activities, which can be traced back to the collective lifestyle and social networks of the danwei.

Previous studies have demonstrated the positive impacts of community green infrastructure on physical and mental health [20,21]. The ample open space that danwei communities have historically provided to its residents therefore has been a fundamental foundation for their healthy lifestyle. The public nature of these open spaces has provided venues for residents to engage in social activities, including sports and various cultural events. The importance of these activities for health aging have also been demonstrated by many studies [24,42]. Therefore, for the health aging in danwei communities, the effects of social and physical setting share equal importance. Both the social-spatial factors constitute valuable resources that merit conservation and perpetuation within neighborhood revitalization efforts.

6.2. Targeted Renewal Strategies

To effectively leverage the community's health heritage for sustainable renewal, a targeted strategy is proposed. Based on the unique heritage of danwei community, the strategy moves beyond a generic approach and can be systematically classified into three interconnected dimensions. On the spatial dimension, it is suggested to conserve the hierarchical open space network of danwei community and refurbish the fitness infrastructure with age-friendly equipment. On the social dimension, it indicates that activating and sustaining the community's social capital and participatory traditions of outdoor activities is essential. Future development should consistently encourage resident-led hobby groups (e.g., choirs, sports teams) to take ownership of maintaining community gardens and organizing communal events that are familiar to many members of the former danwei. On the institutional dimension, the investigation of community history indicates a long-term collaborative relationship between individuals and the danwei. Therefore, the study

suggests to establish an interactive governance model that enables sustained engagement, long-term volunteer management and community-led maintenance programs. The practice of Community Hua shows that organizing co-design workshops involving neighborhood committees, residents, designers and non-governmental organizations is an effective way to collect public opinions and achieve common interests in community renewal projects.

6.3. Limitations and Future Research

The findings and the proposed strategy of the study are derived from a single, albeit typical case study of Community Hua. While this approach allows for deep socio-spatial-historical analysis, it limits the generalizability of the conclusions. The effectiveness of the tripartite strategy also needs to be tested and adapted across danwei communities of varying sizes, demographic compositions, and economic capacities. Following the implementation of the intervention strategy, a comprehensive evaluation framework integrating both qualitative and quantitative methodologies should be systematically employed. Future research can also prioritize comparative studies involving multiple cases to identify common challenges and differentiated solutions. As indicated by previous studies, due to the vast difference in population and socio-economic conditions, community interventions in China should be tailored to the specific characteristics of the local area [46,47]. Additionally, longitudinal monitoring of implemented projects, like the ongoing renewal in Community Hua, is essential to quantitatively and qualitatively evaluate the strategy's long-term impact on residents' health outcomes. In summary, by acknowledging its contextual boundaries and framing future actions within spatial, social, and institutional criteria, this study offers a structured yet adaptable pathway for harnessing the health heritage of danwei communities in contemporary urban renewal in China.

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