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Review article

Access to urban transportation system for individuals with disabilities

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ABSTRACT

Urbanization and aging population has become a significant issue in many global cities. It is necessary that the design of built environment to be supportive and provide adequate access to essential urban and social resources, e.g. employment, education, medical, social welfare and recreation etc., for all, including individuals with disabilities. Safe, efficient and accessible transportation is a key component of community integration. This study attempts to review the current practices and guidelines for accessible design of transportation, both access to and within transport facilities, based on the information from the United States, United Kingdom, and Hong Kong. Besides, the effects of accessible design of transportation on perceived level of service, accessibility, safety and travel behavior would be examined. Therefore, good practices of accessible design that could address the needs for all, especially the elderly and individuals with different types of disability including visual impairment, hearing difficulty and reduced mobility, could be recommended. Hence, quality of life of vulnerable group can be enhanced, and community integration will be achieved in the long run.

Contents

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1. Introduction

Urbanization is a significant issue in modern society. Presently around half of the world's population are living in urban areas. The urban population has been increasing much more rapidly than the overall population, and it is expected that more than two-third of the world's population will be living in urban areas by 2050. Asia is expected to be one of the concentrations for this growth in urban population [1]. Rapid urbanization often accompanies industrial revolution, rapid economic growth, and more prominently, reduced poverty. Urbanization could have a positive impact on individual quality of life, attributed to increased opportunity of employment, economic activity, consumer products, services, recreation, and entertainment. However, the urban built environment and access to essential facilities and services, including transportation and medical and social welfare services, may not always be sympathetic to the needs of vulnerable groups, including the elderly and individuals with disabilities.

Many developed societies are facing the problem of an aging population. In the United Kingdom, the proportion of the population above 65 years of age will be doubled in the next 15 years, while those over 80 years of age will be trebled [2]. In the United States, the proportion of the population above 65 years of age will be doubled by 2060 [3]. In Hong Kong, the proportion of the elderly population (above 65 years of age) is expected to increase from 12% (in 2015) to 25% (in 2035) over 20 years because of the increasing average life expectancy and declining birth rate [4]. An aging population poses numerous challenges including increased dependency on medical, social and welfare services. Increased access to these essential urban services induces a heavy burden on the urban transportation system.

Further, the needs of individuals with disabilities should not be neglected. In the United Kingdom about 20% of the population is considered to be disabled or impaired in some form, in which two-third are above 60 years of age and almost half of the disabled or impaired population were recognized as having difficulties of going out. In the United States, 12.6% of the total population are considered individuals with disabilities, while 35.5% of the population who are over 65 years of age are considered individuals with disabilities [5]. In Hong Kong, the number of persons with disabilities was estimated to be 578,600 (8.1% of population) in 2013. The definition of disability is having one or more visual, hearing, speech and mobility impairments for more than 6 months. For instance, the number of persons with a visual impairment, hearing difficulty, speech difficulty and mobility impairment was 174,800 (2.4% of overall population), 155,200 (2.2%), 49,300 (0.7%) and 320,500 (4.5%) respectively [2,6].

Community integration is an important issue for individuals with disabilities. Community integration refers to the extent of involvement, engagement, and participation of an individual in the same manner as the typical citizen in the community. It is essential that the built environment be supportive and provide access to community resources, including housing, employment, transportation, and community services, for all individuals. Therefore, design, planning, policy, practices and procedures should comply to appropriate guidelines for the enhancement of community integration for individuals with disabilities [7,8]. Accessible transportation is one of the key components that supports the community integration of individual with disabilities, with individuals with increased access to transportation reporting greater quality of life and lower levels of social isolation. In the United Kingdom, a national survey revealed that the number of trips made by the elderly increased by 12–19% and the travel distance of the elderly increased by 40–45% respectively during the 15-year period between 1985 and 1998, while the increases for the overall population were only 3% for the number of trips and 27% for travel distance over the same period. Better access to transport was correlated to the increase in mobility and social participation, and therefore more positive perception of quality of life [9].

Therefore, it is essential to review the current guidelines and practices governing the design and planning of transport facilities that could influence the travel behavior of individuals with disabilities. In this study, appropriate design of the outdoor environment and/or access to transport facilities (e.g. footpath, accessible route, ramp, curb and pedestrian crossing, etc.) and indoor environment and/or access within transport facilities (e.g. stair, escalator, movable walkway, lift, platform and transport vehicles, etc.) is identified. Further, the influence of accessible design of transportation on the perception and travel behavior of individuals with disabilities will be examined. The attributes concerned are quality of life, perceived level of service, accessibility, safety, activity pattern, and mode choice.

The overall purpose of this paper is to identify appropriate design of transport facilities and services that are accessible for all, including the elderly and individuals with disabilities; to enhance the awareness of accessibility needs in policy, legislation and procedures for strategic urban transport planning. Hence, community integration for all, both from the physical and physiological perspectives, will be improved. First, current practices and guidelines of accessible design for transport facilities in the United States, United Kingdom and Hong Kong will be reviewed in Section 2. Second, studies focused on the anticipated changes in perception and travel behavior of individual with disability in response to accessible transportation will be reviewed in Sections 3 and 4 respectively. Third, impacts on the design, construction, management and operation of transportation infrastructure and facilities for individual with different disabilities, including visual, auditory, and mobility impairment will be discussed in Section 5. Concluding remarks will be given in Section 6.

2. Accessible design for transportation

In the United States, accessibility design standards and guidelines for the built environment of transport facilities considering the need of individuals with disabilities, in accordance to the Americans with Disabilities Act (ADA) of 1990, was set out in 2002. The design specifications were based on ergonomic dimensions of both adult and children, and additional requirements of individuals with disabilities, such as wheelchair users. All newly constructed facilities and renovated parts of existing facilities should comply with these design specification [10]. In the United Kingdom, legislation on disability discrimination was introduced to require obligatory provision of access to buildings and facilities for individuals with disabilities in 1996. In response to this, the Department for Transport established a comprehensive guideline for the design of accessible transport facilities [11]. The requirements specified were applicable to the design and operation of the pedestrian environment, transport infrastructure, and public transport facilities. In Hong Kong, a design manual specifying the design requirements for building and facility access for individuals with disabilities, in accordance to the Disability Discrimination Ordinance 1995, were established in 2008 [12]. Again, the design manual was applicable to the design and construction of both new building and alternations or additions to existing building. Design standards and requirements for access to transport infrastructures, facilities, and vehicles as specified in the relevant guidelines of the United States, United Kingdom and Hong Kong are summarized in Table 1.

As illustrated in Table 1, accessible design guidelines for the United States specify the minimum required dimensions for numerous areas of buildings, including public access routes, ramps, doors and/or entrances, stairs, escalator, lifts, and requirements of transport facilities, including bus stops, railway platforms and railway stations [10]. The design guidelines of the United Kingdom, the capabilities and specific needs of individuals with different types of disabilities, including visual impairment and mobility impairment (i.e. person using white-tipped canes, person with assistance dog, and wheelchair user, etc.) were considered. These guidelines specified both minimum and desirable required dimensions for building infrastructures and facilities, including public access routes, ramps, entrances, stairs, escalators and lifts, traffic control facilities, including curbs, pedestrian crossings, footbridge and/