
INITIATIVES FOR THE SAFETY OF PEDESTRIANS IN ASIAN COUNTRIES: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Walking is a standard communication mode around the world. Despite its' importance, walking facilities are less prioritized, and pedestrians are often prone to many accidents, which denotes the essence of pedestrians' safety. To date, very few studies focus on comparing safety initiatives in different countries. This literature review aims at presenting the initiatives taken for pedestrians' safety, specifically in Asian countries, where the pedestrian death rate is on the rise. With the keywords (initiatives, safety, pedestrians), databases (WoS, Scopus, Science Direct), eligibility and exclusion criteria for the systematic literature review, 20 articles are selected using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method. From the extracted data, initiatives taken for the safety of pedestrians are divided into two themes and eight sub-themes: for Specific Area (5 sub-themes) and Parts of Roadways (3 sub-themes). The result shows that most of the safety initiatives focused on different sections of roadways compared to the needs of areas specified for the respective affairs of a group of people. Also, regarding studies on safety initiatives, there is an insufficient exploration of safety measures for pedestrians by researchers. Thus, this study gives an idea of the initiatives prevailing for pedestrians' safety and the aspects that require special attention from the related authorities of different Asian countries. Researchers are recommended to conduct future research on sidewalk safety, adapt qualitative study and PRISMA method for improved systematic review reporting.

Keywords: Safety, Pedestrians, Initiatives, Asian Countries

1. INTRODUCTION

Walking is considered the most sustainable and universal travel mode, including many social and individual benefits (Vale and Pereira, 2016, as cited in Bivina and Parida, 2019). It has been beneficial to society in many ways. Adapting walking in daily life can benefit people socially (Litman, 2003; Forsyth, 2015), economically (Litman, 2003; Ullah, 2007; Ratna, 2012), adds benefits to the health of the people (World Health Organization, n.d.; Kim, Choi and Kim, 2014) and improves the quality of environment (McLaren, 2016; Victoria Walks, 2019).

The importance of walking is also reflected in the Sustainable Development Goals (S.D.G.s) (United Nations Development Programme n.d.). Goal 3 of S.D.G. puts importance on the healthy life and well-being of all. One of the targets of this goal is a call for action against non-communicable diseases, and walking proves to be beneficial in this case (World Health Organization, n.d.). One of the targets of Goal 11 is to ensure the availability of a "safe, affordable, accessible and sustainable transport system for all", which also shows the importance of walking in daily life. People nowadays prefer to live in a walkable area, which gives them the ability to avoid driving (Gilderbloom and Meares, 2020). This is how the increasing importance of walking among people are contributing to the improvement of the environment.

Even after the importance and benefits, walking is not prioritized while planning cities (World Health Organization, 2018). A report published by World Health Organization (2018) reflects that 26% of all deaths include pedestrians and cyclists. 1.35 million people are killed on roadways around the world every year (C.D.C., 2019). Road traffic injuries are also leading global causes of deaths for children and people of 5-29 years of age (C.D.C., 2019).

According to United Nations Economic and Social Commission for Asia and the Pacific (ESCAP,2019), "pedestrians, cyclists and motorized two and three-wheelers represented more than half of all global and Asia-Pacific region deaths" in 2016. In the Asia-Pacific region, 13% of all deaths constitute pedestrians (United Nations ESCAP, 2019). With 37%, the East and North-East Asia sub-region had the highest number of pedestrian traffic deaths (United Nations Economic and Social Commission for Asia and the Pacific [ESCAP], 2019).

The reports on Asian countries mentioned above lead to the question for this study which seeks to gather information about the initiatives taken for the safety of the pedestrians of Asian countries. This study aims to conduct a systematic literature review to gather all the information about the initiatives designed for pedestrians' safety around Asian countries. The study also helps to identify the information gaps prevailing in this topic.

2. METHODOLOGY

This section discusses the research method used to collect articles on safety measures for pedestrians followed in countries of the Asian continent. Preferred Reporting Items for Systematic Reviews and Meta-Analyses process, also known as PRISMA, is used for this systematic literature review exercise. Web of Science, Scopus and Science Direct – these three databases are used for the study, followed by eligibility and exclusion criteria, the review process, abstraction of data and analysis.

2.1 PRISMA

The literature review of this study was led by the PRISMA statement, which researchers often use for Systematic Literature Review and Meta-Analysis. PRISMA statement has some advantages, which are "1) defining clear research questions that permit a systematic research, 2) it identifies inclusion and exclusion criteria and 3) it attempts to examine the large database of scientific literature in a defined time" (Sierra-Correa et al., 2015; cited by Shaffril, Krauss and Samsuddin 2018). Furthermore, mentioned earlier, this paper aims to review initiatives conducted on pedestrian safety in Asian Countries. Thus, the PRISMA process is followed closely.

2.2 Resources

The review uses two primary databases – Web of Science (WoS) and Scopus. In addition, to cover efficient search, Science Direct has also been used.

WoS is a prominent database that includes more than 34,600 journals of over 250 disciplines (Clarivate n.d.). In addition, the "comprehensive backfile and citation data" of more than 100 decades are included in WoS and are ranked by "three separate measures: citations, papers and citations per paper" (Shaffril, Krauss and Samsuddin 2018).

Scopus is considered "the largest abstract and citation database of peer-reviewed literature" covering the fields of "science, technology, medicine, social sciences and arts & humanities", with "content from 24,600 active titles and 5,000 publishers" (Elsevier, n.d.a).

Science Direct is a "leading platform of peer-reviewed scholarly literature" by Elsevier, covering over 3,800 journals (Elsevier, n.d.b). Science Direct covers journals from different disciplines under four core disciplines: 'Physical Sciences and Engineering, 'Life Sciences', 'Health Sciences' and 'Social Sciences and Humanities' (Elsevier, n.d.b).

2.3 Eligibility and exclusion criteria

Some criteria for eligibility and exclusion of articles vary among the databases (see Table 1, 2 and 3). Firstly, regarding the timeline, one of the standard criteria, a specific period of the last five years (2016-2016), is selected, containing an adequate number of articles related to the literature review. The second standard criteria are the document types. Only the empirical articles (research articles) are selected, and the rest of the available document types are excluded from the literature review. The publication stage, language and country are standard criteria for only WoS and Scopus. Articles that are in the final stage are selected, and articles in press are excluded. Only English has been selected as the criteria for language. As the objective includes the Asian countries, articles related to non-Asian countries are excluded. This literature review focuses on the safety of pedestrians. Therefore, articles only from social science, multidisciplinary, arts and humanities are selected from the database 'Scopus'. In the case of Science

Direct, selected publication titles are from 'Accident Analysis and Prevention', 'Safety Science', 'Transportation Research Procedia', 'Transportation Research Part A: Policy and Practice', 'Journal of Transport and Health', 'Sustainable Cities and Society'.

Table 1: Eligibility and Exclusion Criteria (Web of Science – WoS)

Criteria	Inclusion	Exclusion
Timeline	2016-2020	<2016
Document type	Research article	Review article, Early access, proceedings paper, book chapter
Publication stage	Final	Article in press
Language	English	Non-English
Country	Asian countries	Non-Asian countries

Table 2: Eligibility and Exclusion Criteria (Scopus)

Criteria	Inclusion	Exclusion
Timeline	2016-2020	<2016
Document type	Research article	Review article Book chapter, conference paper, book, short survey, note, editorial, letter, conference review, erratum, retracted, data paper, report, business article, abstract report, undefined
Publication stage	Final	Article in press
Language	English	Non-English
Country	Asian countries	Non-Asian countries
Subject area	Social Science, Multidisciplinary, Arts and Humanities	Engineering, Environmental Science, Psychology, Health Professions

Table 3: Eligibility and Exclusion Criteria (Science Direct)

Criteria	Inclusion	Exclusion
Timeline	2016-2020	<2016
Document type	Research article	Review article, Encyclopedia, book chapters, conference abstracts, book reviews, case reports, conference information, correspondence, data articles, discussion, editorials, errata, examinations, mini reviews, news, practice guidelines, product reviews, short communications, software publications, video articles, others
Publication title	Accident Analysis and Prevention, Safety Science, Transportation Research Procedia, Transportation Research Part A: Policy and Practice, Journal of Transport and Health, Sustainable Cities and Society	Transportation Research Part F: Traffic Psychology and Behavior, Journal of Cleaner Production, Science of the Total Environment, Cities

2.4 Systematic review process

The review was conducted in October 2020. The review process includes four stages: Identification, Screening, Eligibility and Included. In the first phase, keywords like the words 'Initiative', 'Safety' and 'Pedestrian' were used for the search process (see Table 4).

Table 4: Search Strings for Systematic Literature Review

Databases	Keywords
Web of Science (WoS)	TS=((initiate* OR strategy* OR measure* OR step*) AND (safe* OR protection* OR secure* OR welfare*) AND (pedestrian* OR walk* OR foot traveler* OR person on foot*))
Scopus	(initiate* OR strategy* OR measure* OR step*) AND (safe* AND protect* OR secure* OR welfare) AND (pedestrian* OR walk*)
Science Direct	(initiatives OR strategies OR measures OR steps) AND (safety OR protection OR security) AND (pedestrians OR walkers)

After adding the eligibility and exclusion criteria (see Table 1, 2 and 3), 2,979 articles have been screened. At this stage, 2,868 articles are which includes duplicates and articles from different study disciplines.

The remaining 111 have been considered for eligibility assessment. After careful examination, 91 articles are excluded due to the following reasons: Article in press; studies about bicycle safety, attributes other than safety, safety identification method, nature of traffic, non-Asian countries, pedestrians' behaviour and opinion, safety lacking. Excluded articles also include studies discussing drivers, vehicles, and different structures. In the last stage, 20 articles were used for qualitative analysis (see Figure 1).

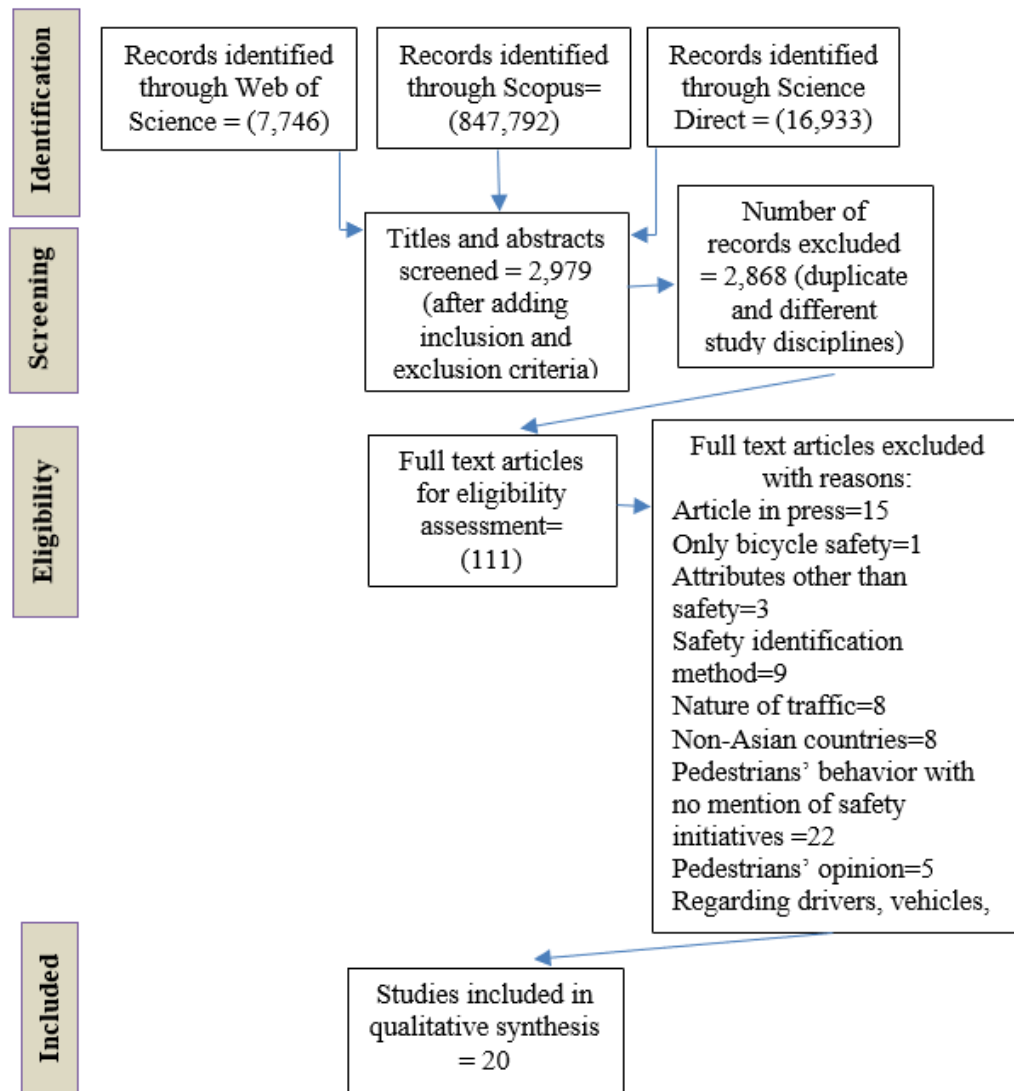


Figure 1: PRISMA flow diagram

2.5 Data abstraction and analysis

Articles eligible for the literature review are assessed and analysed. Abstracts have been read through first to collect the selected articles' ideas, followed by the whole articles. Then, using content analysis, themes based on the 'safety for pedestrians' are extracted from the papers. Content analysis helps to arrange data in "words and themes", making it convenient to interpret the results (Bengtsson, 2016). Later, sub-themes have been extracted from the themes and arranged accordingly (refer to Table 5).

Table 5: Themes of Safety Initiatives

Author	Research Method	Country	Specific Area			Parts of Roadway				
			Educational	Intersection	Location with Flyovers	Pedestrian Crossing (mid-block)	Historical	CBD	Areas for Elderly pedestrians	Mixed-use
Bian et al., 2020	Qt	Beijing, China		✓						
Leung and Loo, 2020	Qt	Hong Kong	✓							
Ma, Lu and Zhang, 2020	Qt	Guangzhou, China		✓						
Mukherjee and Mitra, 2020	Qt	Kolkata, India		✓						
Rankavat and Tiwari, 2020	Qt	Delhi, India		✓	✓					
Zafri et al., 2020	Qt	Dhaka, Bangladesh		✓						
Bivina and Parida, 2019	Qt	Kerala, India						✓		
Choi et al., 2019	Qt	Seoul, South Korea		✓		✓				
Hanan, 2019	Qt	Kedah, Malaysia	✓							
Mohanty and Chani, 2019	Qt	Puri district, Odhisa, India					✓			

Author	Research Method	Country	Specific Area			Parts of Roadway				
			Educational	Intersection	Location with Flyovers	Pedestrian Crossing (mid-block)	Historical	CBD	Areas for Elderly pedestrians	Mixed-use
Wang, Wong and Goh, 2019	Qt	Singapore							✓	
Choi, Yoon and Jung, 2018	Qt	Seoul, South Korea							✓	
Jiang, et.al., 2018	Qt	Hefei, China		✓						
Meetiyyagoda, 2018	Ql	Kandy, Sri Lanka					✓			
Guo, et.al., 2017	Qt	Hong Kong								✓
Xu, et.al., 2017	Qt	Hong Kong		✓						
Chen, Saleh and Pai, 2016	Qt	Taiwan	✓							
Kim, Kim and Lee, 2016	Qt	Seoul, South Korea		✓						

*Qt = Quantitative
Ql = Qualitative

2.6 Synthesis

For this systematic literature review, narrative synthesis has been considered. A narrative synthesis is an approach used in the systematic review and "synthesis of findings from multiple studies" relying primarily on "the use of words or texts" for summarizing and explaining "the findings of the synthesis" (Popay et al., 2006). Therefore, narrative synthesis is suitable for this literature review as it contains a different range of studies and aims at searching for initiatives related to pedestrians' safety.

3. RESULT

Information related to pedestrians' safety has been collected mainly from the description of respected study areas of the selected 20 articles. In stage 1, the analysis of the articles has resulted in two themes based on the safety initiatives taken according to the type of study areas: for Specific Areas and Parts of Roadways. In stage 2, the two main themes are divided into a total of 8 sub-themes, five sub-themes under 'Specific Areas' and three sub-themes under 'Parts of Roadways'.

Theme 'Specific Areas' includes safety initiatives taken for the areas dominated by 'specific' affairs or people in the urban context. With 'Parts of Roadways', this literature review presents initiatives for pedestrians' safety in different sections of roadways intended for vehicles.

The reviewed articles are focused on nine countries of the Asian continent. Information from 3 studies is about the safety in Parts of Roadways provided in different parts of China (Bian et al. 2020; Ma, Lu and Zhang 2020; Jiang et al. 2018). Hong Kong-based two studies mentioned safety for pedestrians of Specific Areas (Leung and Loo 2020; Guo et al. 2017) and one study for Parts of Roadways (Xu et al., 2017). The review includes 3 South Korea based studies, two of which fall under the theme 'Parts of Roadways' (Choi et al., 2019; Kim, Kim and Lee, 2016), and one study falls under the theme 'Specific Areas' (Choi, Yoon and Jung 2018). Most numbers of articles of the literature review focused on different states of India; among them, two articles are categorized under 'Specific Areas' (Bivina and Parida, 2019; Mohanty and Chani, 2019) and the rest two are organized under 'Parts of Roadways' (Rankavat and Tiwari, 2020; Mukherjee and Mitra, 2020). Four articles based on Singapore (Wang, Wong and Goh, 2019), Malaysia (Hanan, 2019), Sri Lanka (Meethiyagoda 2018) and Taiwan (Chen, Saleh and Pai 2016) have mentioned safety precautions taken for pedestrians of Specific Areas. One Bangladesh-based article (Zafri et al., 2020) includes pedestrians' safety precautions in Parts of Roadways.

3.1 Safety for pedestrians of specific areas

A total of five sub-themes are considered under 'Safety Precautions for Pedestrians of Specific Areas', which are as follows: Educational Areas, Areas with Historical Importance, Central Business District (CBD), Areas for Elderly Pedestrians and Mixed-use Areas.

3.1.1 Educational areas

Educational areas, mainly school zones, contain many young pedestrians who commute in a group or individually without adults (Joseph and Archana, 2019). As a result, these school zones have become a threat as pedestrians' safety is compromised in this zone "compared to the other locations" (Wickramasinghe, Edirisinghe and Dissanayake, 2018). Moreover, most students from different educational institutes require walking to commute around the campus, making them vulnerable to pedestrian injuries (Pollack et al., 2014). Keeping this in mind, respective authorities and governing bodies of different countries have taken initiatives for the safety of pedestrians in educational zones.

A Hong Kong-based study (Leung and Loo 2020) includes travel characteristics of school children aged five to twelve years old. There is a mention of the facilities for pedestrians around some primary schools. The study concludes that careful use of footbridges and escalators around the study areas is beneficial as it provides safety to pedestrians (Leung and Loo, 2020).

Hanan (2019) conducted a study based in Kedah, Malaysia, to identify the belief that can make the motorcyclists comply with the regulations to abide near school zones. According to the article (Hanan, 2019), the

zones are provided with the following safety initiatives for the pedestrians: fixed speed limit (30km/hr), warning signs, signalized crossing facilities, traffic calming measures such as speed bumps and transverse bars, zebra crossing, pedestrian bridges (also known as footbridges), traffic wardens and "Road Safety Education Program (RSEP)" for the students. Furthermore, the study mentioned that besides facilities for pedestrians, it is crucial to increase awareness and provide safety education among motorcyclists and maintain mandatory regulations for the safety of pedestrians in school zones (Hanan, 2019).

Chen, Saleh and Pai (2016) conducted a study around a university campus in Taiwan to assess the crossing behaviour of pedestrians. As a description of the study area, it is mentioned that the intersection near the campus includes an automatic pedestrian signal for the pedestrians' safety while crossing the road (Chen, Saleh and Pai 2016).

3.1.2 Areas with historical importance

It is essential to focus on the "pedestrian infrastructure facilities" for the stability of the areas besides "preserving its cultural heritage" to preserve the regions' preservation with historical values. (Caisarina, Harahap and Rani, 2018). Hence, the safety of pedestrians is ensured in areas with historical importance.

Mohanty and Chani (2019) conducted a study to assess pedestrians' travel experience at a holy city with historical importance based on accessibility, safety, comfort, and aesthetics. The study (Mohanty and Chani, 2019) mentioned that police personnel created a sense of "safety and security" among the pedestrians as a safety measure.

A study of Meetiyyagoda (2018) based on the city of historical importance, Kandy, Sri Lanka, mentions the initiatives proposed by the authorities for the safety of pedestrians. The proposed plans include implementing the aim of the Development Guide Plan (D.G.P.) to ensure safe road crossing facilities; provide "street-lamps, signage, traffic signals" where necessary; installing "traffic signal lights" and "traffic calming measures" (Meetiyyagoda, 2018).

The discussion denotes that, presence of police personnel as a safety measure proved to be providing pedestrians with a sense of safety and security mentioned in the study of Mohanty and Chani (2019). On the other hand, respective authorities have proposals for the protection of pedestrians in the heritage city of Kandy, Sri Lanka (Meetiyyagoda, 2018).

3.1.3 Safety for pedestrians in central business district

Central Business Districts (CBDs) being the zone for "Intense economic and social interaction" as well as "zones for pedestrian activities" (Amoako, Niminga-Beka and Cobbinah 2013), it is, therefore, necessary to ensure that the pedestrians are provided with sufficient facilities for their safety.

In the literature review, only one study mentions the initiatives to provide a secure environment for pedestrians in the CBD. Besides other attributes of walking, "police patrolling" ensured security for the pedestrians of Thiruvananthapuram, the capital city of Kerala, a state of India (Bivina and Parida, 2019). The study also mentions that "street lighting" is an essential factor in pedestrians' safety, though this facility is not provided adequately around the city (Bivina and Parida, 2019).

3.1.4 Safety precautions in the areas of elderly pedestrians

Some studies give importance to the safety needs of vulnerable road users, such as elderly pedestrians. Many factors can put elderly citizens at risk of pedestrian accidents: ageing and health issues, design complexities of the vehicles, the environment of the road, and traffic conditions (Oxley et al., n.d.).

Due to the increasing need for the safety of elderly citizens, studies were conducted in finding solutions. The Singapore-based research by Wang, Wong and Goh (2019) presented some findings: the initiatives for the safety of elderly pedestrians. Respective authorities in Singapore have initiated the "Silver Zone Program", under which several measurements have been applied in some areas such as "reducing speed limits of 40km/h, lane narrowing/median widening, raised zebra crossings and mini-roundabouts" (Wang, Wong and Goh, 2019).

A similar program is also undertaken in Seoul, South Korea, to reduce the possibility of "elderly pedestrian-vehicular collision" (Choi, Yoon and Jung, 2018). Silver Zone in Seoul includes the following measures: Reducing speed limit below 30km/h, using speed limit signs, road surface marked with color and lettering to make the drivers cautious on entering the zone (Choi, Yoon and Jung, 2018). Occasional measures are also taken in Silver Zone, which

is: fence beside the sidewalk, elevated crosswalk, reduced crosswalk slope, re-alignment to one-way traffic, widened pedestrian pathways, speed and sign cameras.

3.1.5 Safety for pedestrians in mixed-use areas

In a mixed-use area where "residential, commercial, cultural and institutional uses" are blended, "functions are integrated", and pedestrians' connections are formed (Plano, n.d.), the focus should be given to the safety of the pedestrians. Guo et al. (2017) conducted a study to identify the effect of road network pattern on the safety of pedestrians, where the authors mentioned the safety initiatives. The initiatives are pedestrian refuge island, roadway lighting, overpass and underpass (Guo et al., 2017).

3.2 Safety for pedestrians in parts of roadways

Total three sub-themes emerged under this section: Intersections, Locations with Flyovers and Pedestrian Crossings (midblock).

3.2.1 Intersections

Safety for pedestrians at intersections is essential as most fatalities occur in this part of the roadway (Schirokoff, Pilli-Sihvola and Sihvola, 2012). From the literature review, it is found that crosswalk with markings is the common initiative implemented at intersections in parts of different cities of Asian countries, which are: Beijing (Bian et al., 2020), Guangzhou (Ma, Lu and Zhang, 2020) and Hefei (Jiang et al., 2018) of China; Dhaka, Bangladesh (Zafri et al., 2020); Delhi (Rankavat and Tiwari 2020) and Kolkata (Mukherjee and Mitra, 2020) of India; Hong Kong (Xu et al., 2017) and Seoul, South Korea (Choi et al., 2019; Kim, Kim and Lee, 2016).

Description of the study areas from the selected articles gives an idea of other measures implemented at the intersection for pedestrians' safety. For example, at signalized intersections, pedestrian signals are used to "notify pedestrians when it is safe to cross the streets" (City and County of San Francisco, 2019). Furthermore, the installation of pedestrian signals is mentioned in studies focused on the following countries: Guangzhou, China (Ma, Lu and Zhang 2020); Kolkata, India (Mukherjee and Mitra, 2020); Hong Kong (Xu et al., 2017) and Seoul, South Korea (Choi et al., 2019; Kim, Kim and Lee, 2016). These studies show the initiative of pedestrian signal installation by the authorities is for the safety of pedestrians.

In the Hong Kong-based study (Xu et al., 2017), other initiatives at intersections. For example, pedestrian barriers, pedestrian refuge islands, overpass/underpass, streetlights are some of the characteristics of some signalized intersections of Hong Kong.

3.2.2 Locations with flyovers

"Flyover is a grade separator" constructed to ease the movements of vehicles (Rankavat and Tiwari, 2020). One article from the literature review mentions a facility used for the benefit of pedestrians. However, the study focused on Delhi, India, denotes those locations with flyovers have "clusters of pedestrian fatal crashes" (Rankavat and Tiwari, 2020). Therefore, either an underpass or overpass needs to be provided to the pedestrians to avoid crashes at these locations while crossing the roads (Rankavat and Tiwari 2020).

3.2.3 Pedestrian crossings (mid-blocks)

Pedestrian crossings are designated spots for pedestrians from where they can cross the roads. A study was to assess the older pedestrians' behaviour at the crosswalk (Choi et al., 2019). The research includes 30 crosswalks, ten of which are at intersections and 20 are at mid-blocks. The authorities provide safety initiatives for pedestrians in these spots, marked crosswalks and pedestrian signals (Choi et al., 2019).

4. DISSCUSIONS

Two themes emerged from this analysis: Specific Areas and Parts of Roadways. Most of the sub-themes placed under the more prominent setting's theme imply that most of the articles focused on the safety initiatives for pedestrians taken at a larger scene. The following sub-sections briefly discuss the initiatives based on the two main themes separately.

4.1 Initiatives for Specific Areas

Pedestrian safety remains an issue in any literature. Pedestrian safety is associated with the presence of motorcyclists in the educational zone (Hanan, 2019). Hanan (2019) emphasizes that it is crucial to consider the motorcyclists while preparing safety precautions for the educational zones, which can help to increase pedestrians' safety. Places with historical importance require facilities for pedestrians. For safety, Mohanty and Chani (2019) mentioned police personnel being a positive initiative. Based on the study by Meetiyaogoda (2018), proposals are to be implemented for the safety of pedestrians in the historical city of Kandy, Sri Lanka. The presence of police personnel proves to be a positive initiative for CBD as well (Bivina and Parida, 2019). Initiatives taken for the pedestrians' safety at a mixed-use area (Guo et al., 2017) focused on the road crossing facilities.

Studies made on the elderly pedestrians' safety undertaken in Singapore (Wang, Wong and Goh, 2019) and Seoul (Choi, Yoon and Jung, 2018) shows that similar plans are considered for the specific group of pedestrians. However, the Seoul based study includes those occasional initiatives are also taken. Authorities of both study areas (Wang, Wong and Goh, 2019; Choi, Yoon and Jung, 2018) considered initiatives to be followed by the automobile users for safety. A study by Hanan (2019) also shows a similar approach by the respective authorities regarding initiatives required for automobile users.

Following the above discussion, initiatives such as creating different types of zones will create a safer environment for pedestrians and increase the economic value of the areas (Litman, 2003). Furthermore, while considering the safety of the pedestrians, making regulations to be followed by the automobile drivers can increase the chance of safety. The implications of such actions will result in lower incidents of pedestrian fatalities (C.D.C., 2019).

4.2 Initiatives For Parts Of Roadways

Most of the articles of this literature review mentioned safety initiatives at intersections in different Asian countries. A visibly marked crosswalk is preferable (National Association of City Transportation Officials, n.d.), which makes it the common initiative considered in many countries (Bian et al., 2020; Ma, Lu and Zhang, 2020; Mukherjee and Mitra, 2020; Zafri et al., 2020; Rankavat and Tiwari 2020; Choi et al., 2019; Jiang et al., 2018; Xu et al., 2017; Kim, Kim and Lee, 2016). Pedestrian signals are installed (Ma, Lu and Zhang, 2020; Mukherjee and Mitra 2020; Choi et al. 2019; Xu et al. 2017; Kim, Kim and Lee 2016) to warn those pedestrians who attempt to cross the roads (National Association of City Transportation Officials, n.d.). Initiatives are taken for midblock crossings by Seoul, South Korea authorities, which are marked crosswalks and pedestrian signals (Choi et al., 2019).

Xu et al. (2017) also mentioned the use of pedestrian barriers that can separate pedestrians from interacting with automobiles, along with the help of pedestrian refuge islands, that can reduce the 'exposure time' at intersections by the pedestrians (National Association of City Transportation Officials, n.d.). Like more extensive settings, streetlights are considered at the junction for visibility and safety (Xu et al., 2017). In addition, underpass/overpass are installed at intersections (Xu et al., 2017) and the locations near flyovers (Rankavat and Tiwari, 2020).

The systematic literature review has provided information on the safety initiatives that have been considered in different countries of Asia. Although various aspects of urban fabric are considered, the study revealed that most safety initiatives are implemented on separate roadways. Most authoritative bodies do not focus on areas specified for different affairs or different groups of people. Therefore, it is important to address every aspect when the authorities come up with initiatives, to maximize the safety of the pedestrians.

5. RECOMMENDATIONS AND CONCLUSION

As mentioned earlier, authorities implemented initiatives by focusing mainly on structural aspects of roadways compared to the characteristics of the affairs or people of specific areas. Authorities should identify all the issues of every part that affect pedestrians' safety and minimize pedestrian fatality. Then, this measure will ensure walking is the safest mode of commuting.

Regarding research on this topic, information on safety initiatives followed by respective countries is availed mainly from the description of the study areas of the articles. The literature review on safety measures is insufficient. Thus, this situation should explain the similarities and dissimilarities among safety initiatives in different

countries. Furthermore, most of the research focused on intersections or other more extensive settings than the sidewalks. This action denotes those researchers should consider future studies regarding the sidewalk to fill the information gap. While conducting studies of safety measures for pedestrians in all environments, researchers can adopt a qualitative method. This approach can help researchers in documenting the effect of "physical interventions such as roads, buildings and infrastructures on spatial relationships" as well as the "less quantifiable impact" on human life (Dandekar, n.d.).

In conclusion, when one aspect of safety in the urban context is addressed, the other elements were given less priority. Studies on pedestrians' safety have included limited information that cannot present the whole condition of the facilities for pedestrians. Researchers are to consider sidewalks as their scope of study while searching for safety initiatives in the future.

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