RESEARCH ARTICLE

Enhancing Inclusive Mobility for Elderly Pilgrims in Indian Religious Cities: A Case Study of Haridwar

Swapneel Jaiswal[1,*], **Amit Singh Baghel**[2], **Sremmant Basu**[3], **Pradyut Anand**[4,*], **Sudheer Kumar Yantrapalli**[1] and **Denise-Penelope N. Kontoni**[5,6]

[1] Department of Civil Engineering, Madanapalle Institute of Technology and Science, Andhra Pradesh, India
[2] Vernacular Consultancy Services Private Limited, Lucknow, India
[3] Department of Management Studies, Madanapalle Institute of Technology and Science, Andhra Pradesh, India
[4] Department of Civil Engineering, School of Engineering & Technology, Noida International University, Uttar Pradesh, India
[5] Department of Civil Engineering, School of Engineering, University of the Peloponnese, GR-26334 Patras, Greece
[6] School of Science and Technology, Hellenic Open University, GR-26335 Patras, Greece

Abstract

Pilgrimage tourism in India is a cultural and deeply spiritual journey, especially for elderly individuals who view it as a cherished life milestone. However, their mobility and accessibility needs are often under-addressed in policy and planning. This study examines inclusive mobility challenges faced by elderly pilgrims in Haridwar through qualitative and quantitative data from 225 participants, including interviews, group discussions, and field observations. Findings reveal physical, sensory, and cognitive barriers that restrict freedom, dignity, and spiritual fulfilment. Existing infrastructure and services, such as signage and pathways, are frequently inadequate. The research highlights a strong link between inclusive mobility features and enhanced independence and travel experiences. Comparative best practices inform evidence-based recommendations for policymakers and planners, proposing a framework that integrates spiritual needs with universal design for more equitable and accessible pilgrimage experiences.

Keywords: inclusive pilgrimage tourism, elderly pilgrims, travel challenges, haridwar, India.

1 Introduction

Religious tourism and accessible tourism are often studied as separate subfields within tourism literature. However, in the Indian context, where spirituality is embedded in everyday life and mobility is a path to religious fulfilment, the two domains are deeply intertwined. Religion serves as a critical motivator for travel in India, with nearly the entire adult population identifying with some form of religiosity and aspiring to undertake religious travel at least once in their lifetime [1, 2]. Further, most Indian tourist destinations either originate from or incorporate religious significance, making pilgrimage tourism

Submitted: 06 April 2025
Accepted: 25 July 2025
Published: 23 September 2025

Vol. 1, **No.** 2, 2025.
10.62762/SII.2025.431581

***Corresponding authors:**
✉ Swapneel Jaiswal
drswapneeljaiswal@gmail.com
✉ Pradyut Anand
pradyut.bitmesra@gmail.com

Citation
Jaiswal, S., Baghel, A. S., Basu, S., Anand, P., Yantrapalli, S. K., & Kontoni, D. P. N. (2025). Enhancing Inclusive Mobility for Elderly Pilgrims in Indian Religious Cities: A Case Study of Haridwar. *Sustainable Intelligent Infrastructure*, 1(2), 74–92.

a vital and omnipresent aspect of domestic travel [3, 4]. Religious tourism, particularly pilgrimage, plays a pivotal role in the lives of elderly Indians, who often view such journeys as a culmination of spiritual obligation and personal fulfilment [5].

At the same time, aging brings physical, sensory, and cognitive limitations that require thoughtful planning and accessible infrastructure. The World Health Organization estimates that 35% of individuals aged 65 and above have some form of disability that could impact travel [6]. This reality underscores the essential connection between religious and accessible tourism, making it crucial to address both jointly [7–9]. The concept of inclusive tourism is thus central to this study and refers to practices that ensure accessibility, dignity, and equal participation for all travelers, especially those with mobility, sensory, cognitive, or age-related challenges [10–12]. In India's spiritual context, where pilgrimage is often tied to one's sense of karma, salvation, and cultural belonging, inclusive tourism is not merely a convenience—it is a right and a cultural necessity [13–16].

While accessibility is acknowledged as a core value in global tourism policy, academic and field-based research in India still lacks comprehensive studies that analyze the lived travel experiences of elderly pilgrims [17–23]. Elderly individuals, particularly those aged 60 and above, represent a growing and underserved population in the tourism economy. Studies have shown that older travellers face multiple, interrelated barriers including poor health, lack of appropriate travel information, safety concerns, and financial limitations [24–30]. Despite this, there is no unified consensus in existing literature on how to define, segment, or respond to the travel needs of elderly tourists [31–38].

1.1 Literature Review and Research Gap

Globally, the intersection of accessible tourism and elderly travel has received increasing scholarly attention [39–41]. However, within the Indian context, especially in religious or spiritual travel settings, there remains a stark gap in focused studies on elderly pilgrims [42–45]. Most research in the field has prioritized physical health concerns, often ignoring infrastructural, psychosocial, and informational barriers that disproportionately affect elderly pilgrims [46–57]. The elderly's travel behavior is further influenced by factors such as reduced stamina, fear of exploitation, unclear travel signage, and a lack of basic services like seating areas and ramps [58–68]. These limitations reduce travel frequency, autonomy, and dignity for senior travelers [69–78].

Studies by Kazeminia et al. [7] have emphasized health-centric limitations among elderly travelers, but our study broadens this by foregrounding infrastructural and sociocultural barriers unique to Indian pilgrimage sites—such as the inaccessibility of ghats, lack of tactile paths, and the absence of elderly-friendly public transport. Further barriers include ageist stereotypes, neglect in emergency services, insufficient rest zones, and information asymmetry [79–89]. In Haridwar specifically, issues such as overcrowded streets, sloped ghats without railings, and inaccessible temple queues pose unique risks for elderly travelers [90–100]. Despite scattered insights, no holistic or India-specific framework has yet emerged that integrates religious motivations, aging-related limitations, and urban inaccessibility into one inclusive planning strategy [101–110].

Recent contributions reinforce this gap. For example, Sustainable Religious Tourism Practices in South Asia (2023) calls for ethical models of elder tourism but lacks empirical data. Inclusive Design in Public Spaces for Elderly Pilgrims (2022) discusses case studies from Kashi and Puri but does not cover Haridwar. Indian research, including studies by Agarwal et al. [43] and Gupta et al. [46], highlights infrastructural gaps but stops short of proposing data-driven or statistically supported mobility interventions. This study builds upon and goes beyond these works by employing a mixed-method, socio-spatial, and statistical approach to analyze travel challenges faced by elderly pilgrims in Haridwar.

1.2 Theoretical and Contextual Relevance

In the Indian cultural milieu, pilgrimage is not simply tourism—it is dharma. For elderly individuals, completing a pilgrimage is often synonymous with life fulfillment. Hence, pilgrimage towns like Haridwar are not leisure zones but spiritual epicenters. Yet, the lack of inclusive infrastructure, accessible information, and safety measures creates a paradox where sacred spaces become exclusionary. From a rights-based perspective, inclusion in spiritual tourism becomes a critical indicator of social justice, especially for aging populations.

As the elderly population in India continues to grow, there is a pressing need to design pilgrimage towns that serve the physical, emotional, and spiritual mobility of older citizens. This study adopts a

socio-spatial lens supported by statistical models such as Chi-square, Binary Logistic Regression, and ANOVA, combined with K-means clustering, to segment elderly pilgrims based on needs and satisfaction levels. This innovative combination enhances the precision and applicability of findings.

1.3 Statement of the Problem

Elderly pilgrims visiting Haridwar face numerous barriers that hinder their ability to navigate spiritual spaces with independence and dignity. The town's existing infrastructure lacks ramps, directional signage, rest areas, and trained personnel to support elderly mobility. These physical, sensory, and cognitive challenges compromise not just safety but also the overall pilgrimage experience—leading to frustration, marginalization, and spiritual dissatisfaction.

1.4 Research Questions

- What are the mobility challenges faced by elderly pilgrims in navigating Haridwar, and how do these challenges impact their overall experience?
- What is the current state of infrastructure and services for elderly pilgrims in Haridwar, including accessibility features, signage, and assistance services?
- How does inclusive mobility impact the overall experience of elderly pilgrims, including their sense of independence, dignity, and spiritual fulfilment?
- What are the best practices and innovative solutions for enhancing inclusive mobility in Indian religious places like Haridwar?
- What recommendations can be made to policymakers, urban planners, and stakeholders to enhance inclusive mobility in Haridwar and accessibility for elderly pilgrims?

1.5 Objectives of the Study

- To identify the mobility challenges faced by elderly pilgrims in Haridwar, including physical, sensory, and cognitive barriers.
- To assess the current state of infrastructure and services for elderly pilgrims, including signage, accessibility features, and human assistance.
- To examine the impact of inclusive mobility on the independence, dignity, and spiritual fulfilment of elderly pilgrims.
- To identify best practices and scalable innovations for enhancing inclusive mobility in Indian pilgrimage cities.
- To offer policy recommendations for government bodies, NGOs, tourism boards, and local urban authorities.
- To develop a comprehensive framework for inclusive mobility rooted in empirical evidence and tailored to Indian religious settings.

1.6 Hypotheses

H1: There is a significant relationship between mobility challenges and the overall pilgrimage experience (independence, dignity, fulfilment) of elderly pilgrims.

H2: The current infrastructure and services in Haridwar are inadequate and require improvement to support inclusive mobility.

H3: Implementing inclusive mobility solutions in Haridwar will positively impact the travel experience of elderly pilgrims and contribute to scalable models for other Indian religious cities.

2 Methodology

This section outlines the methodological framework adopted to investigate the inclusive mobility challenges faced by elderly pilgrims in Haridwar. The study is based on a mixed-method approach, incorporating both quantitative and qualitative data collected through structured surveys and direct field observations over a one-year period.

2.1 Study Area Selection

The study was conducted in Haridwar, one of the seven holiest Hindu cities (Sapta Puri) and a major pilgrimage destination in northern India. Renowned for its mythological and religious significance, Haridwar draws over 11 million visitors annually, particularly during events such as the Kumbh Mela and Kanwar Yatra. The city's spiritual gravity, coupled with its overwhelming footfall, makes it a pertinent site for analyzing the accessibility and travel experiences of elderly pilgrims.

To capture the diversity of mobility and infrastructure conditions across the city, the study area was divided into three functional zones based on travel density, religious importance, and access routes:

- Zone 1: Har-Ki-Pauri to Shantikunj (Core Ghat Area and Spiritual Institutions)

- Zone 2: Bus Stand to Har-Ki-Pauri (Transport Hub to Pilgrimage Entry Point)
- Zone 3: Kankhal to Bus Stand (Peripheral Pilgrim Areas and Residential Zones)

Figure 1 displays the geocoded address points of survey respondents across these zones, enabling spatial insights into mobility conditions.

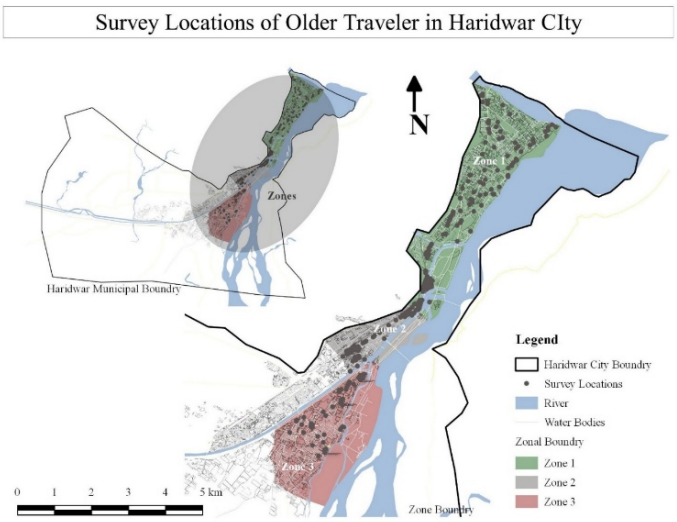

Figure 1. Study area and the geocoded address of the respondents.

2.2 Sample Size and Characteristics

The empirical data for this study were obtained through a structured survey administered in 2023. The target population consisted of elderly pilgrims aged 60 years and above. A total of 225 valid responses were collected, selected using purposive sampling to ensure demographic and geographic diversity.

- Mean age: 71 years
- Standard Deviation: 7.5 years
- Gender ratio: 152 males and 73 females

The sample size meets minimum criteria for applying parametric tests, enabling robust statistical analysis. Descriptive and inferential statistical tools, including frequency analysis, Chi-square, Binary Logistic Regression, and ANOVA, were employed to validate relationships between variables and infer patterns in satisfaction, accessibility, and perceived spiritual fulfilment.

2.3 Instrument Design

The survey questionnaire was developed based on an extensive literature review and refined through expert consultations and a pilot study. It comprised three structured sections:

- Demographic Profile – age, gender, education, income, health condition.
- Travel Behavior and Patterns – mode of transport, accommodation type, trip frequency, and group size.
- Pilgrimage Experience and Accessibility Perception – challenges faced, ease of mobility, access to services, and overall satisfaction.

Open-ended questions and Likert-scale responses were used to gather both qualitative impressions and quantifiable data points. The instrument was validated for content relevance and internal consistency before deployment.

2.4 Data Collection Procedure

Data collection was conducted over a 12-month period (January to December 2023) to account for seasonal and festival-induced variations in pilgrimage experiences. Surveys and interviews were carried out at peak periods such as Kumbh Snan dates, Navratri, and Somvati Amavasya, when elderly pilgrim inflow is highest.

Locations covered included:

- Religious ghats (e.g., Har-Ki-Pauri)
- Pilgrim shelters and dharmshalas
- Major roads, transport nodes, and temple entrances

Field teams conducted face-to-face interviews using digital recorders and mobile devices to ensure precision in data capture. All interviews were voluntary, with prior informed consent, anonymity assurances, and the opportunity for respondent review to validate entries.

2.5 Response Rate and Sampling Justification

Out of 275 distributed questionnaires, 225 were completed and valid, reflecting a response rate of 81.8%. The high response rate is indicative of strong participant engagement and data reliability. Participants were selected through convenience and purposive sampling, targeting pilgrims above 60 years of age with recent or ongoing pilgrimage experience in Haridwar. This sample size is statistically adequate for conducting inferential tests, meeting assumptions

for parametric analysis and ensuring generalizability within the study's scope.

2.6 Ethical Considerations

The study followed ethical research practices in line with social science research protocols:

- Informed consent was obtained from all participants.
- Voluntary participation was emphasized, with the option to withdraw at any time.
- Data privacy and anonymity were strictly maintained.
- The study received prior clearance from the host institution's ethics committee.

2.7 Analytical Techniques Used

The following analytical techniques were applied to extract insights and test hypotheses:

- Descriptive Statistics for summarizing demographic and behavioural data.
- Chi-square Tests to explore associations between categorical variables (e.g., gender and satisfaction).
- Binary Logistic Regression to identify predictors of overall travel satisfaction and accessibility perception.
- One-Way ANOVA to examine variance in satisfaction scores across age groups and zones.
- K-Means Clustering to segment elderly pilgrims based on experience profiles, identifying groups like "Mobility-Challenged Frequent Visitors" and "First-Time Visitors with Sensory Impairments."

This multi-tiered analysis framework strengthens the empirical validity of the study and enables actionable interpretation of results in the context of inclusive pilgrimage planning.

3 Results And Findings

3.1 Profile of Elderly Traveller

Through the data collected, the profiling of the elderly respondents has been done with respect to their personal characteristics. This is discussed in the subsequent sections.

3.1.1 *Age, Gender and Ability Profile*

Most of the respondents (48.9%) belong to the age group of 60–69 years, with males (152) significantly outnumbering females (73) at a ratio of approximately 2.14:1. Among the reported disabilities, mobility issues were the most prevalent (32.7%), followed by visual impairments (28.3%) and hearing difficulties (12.1%). Inferential analysis using the Chi-square test revealed a statistically significant association between age and mobility issues, with elderly individuals in the 60–69 age group more likely to face such challenges ($\chi^2 = 10.23$, $p < 0.01$). Furthermore, a significant association was found between gender and visual impairments ($\chi^2 = 5.13$, $p < 0.05$), indicating that female pilgrims are more susceptible to vision-related issues. Binary logistic regression further confirmed that both age ($OR = 1.03$, $p < 0.05$) and mobility impairments ($OR = 2.15$, $p < 0.01$) are strong predictors of visual disabilities. Table 1 shows the Profile of elderly respondents depending on their age, gender and physical ability.

Table 1. Profile of elderly respondents depending on their age, gender and physical ability.

Age	Gender		Total	Ability			
	M	F		Mobility	Visual	Hearing	Multiple
60-69	80	29	109	41	53	10	5
70-79	46	25	71	21	26	7	17
>79	26	19	45	11	14	10	10
Total	152	73	225	73	93	27	32

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

3.1.2 *Group and Income Source*

In terms of group travel and income status, most elderly respondents (44.2%) preferred to travel in groups of 6–10 people. A notable portion (50.5%) continued to have a source of income post-retirement. Statistically significant associations were observed between age and both group size ($\chi^2 = 24.13$, $p < 0.01$) and income after 60 ($\chi^2 = 10.23$, $p < 0.05$). The 70–79 age group was particularly more inclined to travel in larger groups and maintain a source of income. Logistic regression revealed age ($OR = 1.02$, $p < 0.05$) and group size ($OR = 1.15$, $p < 0.01$) as predictors for having income after 60. Looking at Table 2, the insights highlight the need for designing group-friendly, affordable travel packages and ensuring economic inclusivity for elderly tourists.

3.1.3 *Frequency of Visit*

Regarding the frequency of visits to Haridwar, the data shows that the 60–69 age group tends to visit once or

Table 2. Profile of elderly respondents depending on their group size and income source after 60.

Age	Family/Group Size					Income Source after 60	
	Single	Double	3-5 persons	6-10 persons	>10 persons	Yes	No
60-69	0	17	36	41	15	74	35
70-79	3	0	18	43	7	27	44
>79	0	0	3	14	28	11	34
Total	3	17	57	98	50	112	113

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

Table 3. Profile of elderly respondents depending on their frequency of visits.

Age	Frequency of Visit				
	Once in a Year	Twice in a Year	Thrice in a Year	Rarely	First Time Visit
60-69	26	18	10	15	40
70-79	24	7	6	9	25
>79	4	3	4	12	22
Total	54	28	20	36	87

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

twice a year, whereas those aged 70 and above are more likely to be rare or first-time visitors. Chi-square analysis confirms a significant association between age and frequency of visits ($\chi^2 = 24.56$, $p < 0.01$), and logistic regression results show that with every additional year in age, the odds of frequent visits decrease by 3% ($OR = 1.03$, $p < 0.05$). These findings underscore the influence of age on travel frequency and suggest a declining trend in repeat visits as age increases. Table 3 shows the profile of elderly respondents depending on their frequency of visits.

3.1.4 Purpose of Visit

Table 4 highlights that pilgrimage, either alone or combined with recreation, is the most common purpose of travel among elderly respondents, emphasizing the deep-rooted spiritual inclination within this age group. Most respondents aged between 60–79 prefer to travel for pilgrimage combined with recreational activities, indicating a desire to balance spiritual fulfilment with leisure. A smaller yet significant proportion travel for medical reasons, social visits, or to attend religious discourses, particularly among those aged 60–69. These findings underscore the central role of religion and health-related needs in shaping the travel behavior of the elderly population, with pilgrimage emerging as a dominant motive across all age brackets.

3.1.5 Length of Stay

Interestingly, it has been seen that the elderly respondents who the first-time visitors or who do not visit frequently have planned their travel for a long-term stay. Majority of respondents like to stay in Haridwar either for a long time or at least for one or two days (Table 5).

3.2 Travel Behavior of Elderly

After doing the profile study of the elderly respondents, their travel behavior has been studied based on their travel choices and travel preferences. It includes mode choice for travel and preferred place of stay. The preference for places of visits has also been studied.

3.2.1 Mode of Arrival

Approximately equal number of elderly respondents used public transportation systems as their mode of arrival in the city i.e. 100 by rail transportation system and 95 by bus transportation system. Only 30 respondents used private cars or taxis as their mode of arrival (Table 6). The reasons for preferring public transportation system as their arrival mode, as mentioned by the elderly respondents, are 1. it is safe and comfortable for long-distance travel, and 2. public transportation is cheap and economical.

3.2.2 Mode Preferred to Travel within the City

As shown in Table 7, autos and walking are the most preferred mode of travel by the elderly respondents.

Table 4. Profile of elderly respondent' depending on their purpose of visits.

Age	Purpose of Visit				
	Recreation with pilgrimage	Pilgrimage only	Social	Medication	Discourse
60-69	45	16	12	24	12
70-79	36	16	2	9	8
>79	24	13	2	3	3
Total	105	45	16	36	23

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

Table 5. Profile of elderly respondents depending on their length of stay.

Age	Length of Stay				
	Half Day	One day	One day & One Night	Two Days & One Night	Long term stay
60-69	5	8	20	28	48
70-79	0	0	18	15	38
>79	0	6	11	13	15
Total	5	14	49	56	101

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

Table 6. Mode of arrival of the elderly respondents.

Age	Mode of Arrival		
	Bus	Train	Car/Taxi
60-69	44	44	21
70-79	40	23	8
>79	11	33	1
Total	95	100	30

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

The share of traveling by auto and walking are approximately the same i.e. 187 and 185, while the battery rickshaws and cycle rickshaws are also quite equally preferred by the respondents for traveling. However, four-wheeler and animal-drawn modes are less preferred for traveling. This shows that, as mentioned earlier, as age increases the shared mode of transportations are more preferred for traveling then the hired or private mode.

Table 8 indicated that most of the elderly respondents preferred a particular mode of travel due to the reason of easy availability that they do not have to wait for long. Secondly, affordability is the major criteria to prefer a particular mode. However, some respondents also prefer to travel in the mode which covers a long distance, and they do not have to interchange during the travel. Some respondents also gave importance to the comfort and safety while choosing a particular mode to travel.

It has been seen that, though four-wheelers are the least preferable mode of travel, the average distance travelled is highest as compared to the other modes. The second highest average distance travelled is by autos. Average distance travelled by cycle rickshaw, battery rickshaw and walking are approximately the same as shown in Table 9. This shows that faster mode of transportation is generally preferred for a long distance traveling as it saves time and covers large distances than other. While elderlies traveling alone mostly preferred walking, cycle rickshaw or shared mode to travel, all other elderlies coming in groups likes to travel in share mode of transportation for traveling within the city.

3.2.3 Preferred Place to Stay

Table 10 shows the stay preferences by the elderly pilgrim travellers. Majority of elderlies would like to stay in hermitage and hospice. It has been observed that elderlies traveling in a group or with family members like to stay in hermitage and hospice. Only nine percent respondents like to stay in luxurious and budget hotels as they are not affordable for many. The results also indicate that elderly are statistically are likely to stay with groups or family.

Table 11 shows reasons for stay preferences of elderly traveller. Affordability and closeness to the places of visits are the main reasons to prefer place to stay for many elderlies. In addition, some elderly respondents give their importance to comfort and

Table 7. Age Wise Mode preferred to travel within the city.

Age	Mode Preferred within the city					
	Walk	Cycle Rickshaw	4 W	Shared/Hired Auto	Animal Drawn	Battery Rickshaw
60-69	87	64	19	86	41	68
70-79	58	43	8	63	19	48
>79	40	30	1	38	11	35
Total	185	137	28	187	71	151

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

Table 8. Reasons of preferring mode for traveling.

Age	Reason of Mode Preference				
	Affordable	Easily Available	Covers long Distances	Comfortable & Safe	No other options
60-69	38	28	17	11	15
70-79	11	18	15	21	6
>79	9	16	15	2	3
Total	58	62	47	34	24

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

Table 9. Average distance travelled by mode.

Age	Average Distance Travelled within city (km)					
	Walk	Cycle Rickshaw	4 W	Shared/Hired Auto	Animal Drawn	Battery Rickshaw
60-69	3.60	3.55	7.84	5.31	1.71	4.10
70-79	3.42	3.19	11.00	4.97	1.32	3.27
>79	3.54	3.53	12.00	5.29	2.18	3.76
Total	3.52	3.42	10.28	5.19	1.73	3.71

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

Table 10. Preferred place to stay.

Age	Preferred place to stay						
	Luxurious Hotel	Budget Hotel	Guest Houses	Hermitage	Hospice	With Family	Not Stayed
60-69	2	17	3	47	26	4	10
70-79	0	0	0	30	39	2	0
>79	0	2	0	14	21	2	6
Total	2	19	3	91	86	8	16

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

easily availability of accommodation. Few were select the accommodation because they had no other option for stay.

Majority of the elderly respondents accepts that they travel at Haridwar to mainly pay their visits at riverfront followed by temples and hermitage. Along with that, most of the respondents were visiting riverfront and temples followed by visiting temples and hermitage and few were visiting for paying their presence at hermitage and riverfront (Table 12). In addition, only five percent respondent visit all the three places i.e. riverfront, temples and hermitage.

3.2.4 *Effect of Travel Behaviour*

A One-Way Analysis of Variance (ANOVA) was conducted using SPSS to explore whether significant differences exist in travel behaviours and spending patterns among three elderly age groups: 60–69 years, 70–79 years, and above 79 years. The analysis

Table 11. Reasons of preferring place to stay.

Age	Reason of Preferring place to stay						
	Affordable	Easily Available	No other options	Comfortable	Closeness to the places of visit	Closeness to the terminals	Not required
60-69	48	8	6	9	18	6	14
70-79	36	5	4	2	20	2	2
>79	6	5	6	6	14	0	8
Total	90	18	16	17	52	8	24

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

Table 12. Places of visits.

Age	Places of Visits					
	River Fronts	Temples	Hermitage	Riverfront and Temples	Temples & Hermitage	Hermitage& Riverfront
60-69	134	40	24	31	14	8
70-79	128	77	45	36	27	9
>79	93	93	66	33	34	8
Total	355	210	135	100	75	25

The Pearson Chi-Square is significant at $p < 0.05$. Source: Authors.

considered five dependent variables: Frequency of Visit, Total Spending in Travel, Length of Stay, Affordability, and Group Size. The ANOVA results revealed that four out of the five variables—Total Spending in Travel ($p = .015$), Length of Stay ($p = .041$), Affordability ($p = .003$), and Group Size ($p = .012$)—show statistically significant differences across the age groups, while Frequency of Visit ($p = .057$) did not reach statistical significance, though it approached the threshold, indicating a possible trend.

Table 13. ANOVA Summary for Travel Behaviour.

Dependent Variable	F Value	p-value	Interpretation
Frequency of Visit	2.986	.057	Not significant at $p < .05$
Total Spending in Travel	4.401	.015	Significant difference exists
Length of Stay	3.272	.041	Significant difference exists
Affordability	6.159	.003	Highly significant difference
Group Size	4.772	.012	Significant difference exists

To further investigate where the differences lay, a Tukey HSD post-hoc test was performed. The analysis showed that respondents aged above 79 spent significantly less on travel and had shorter stays than those aged 60–69. In terms of affordability, the oldest age group perceived travel as less affordable compared to both younger groups. Additionally, individuals over 79 tended to travel in smaller groups than those aged 60–69. No significant differences were found between the 60–69 and 70–79 or the 70–79 and >79 age groups in most categories.

These findings suggest a distinct pattern: the oldest participants exhibit more conservative travel behaviours, likely influenced by declining health, mobility, and financial independence. The insights highlight the importance of age-sensitive travel planning. For policymakers, tourism planners, and service providers, tailoring travel packages with increased affordability, shorter and more manageable itineraries, and enhanced comfort and accessibility features could promote greater engagement from the elderly, particularly those above 79 years.

3.3 Travel Problems Faced by Elderly

After understanding the profile of elderly traveller coming into the city and their travel behavior, the various problems faced by them during the travel has been studied. This has been done by observing their travel patterns and mapping the obstacles they are facing in their travel path. Apart from this, questions were asked about their experiences during the travel and the kind of problems they were facing during the travel were discussed. The travel experience of the elderly has been shown in Table 14. A 1 to 5 rating scale is applied to experiences expressed by the elderly traveller (1 for the worst/very low, 2 for the poor/low, 3 for the average, 4 for the good/high and 5

Table 14. Experiences expressed by the respondents (Mean, Standard Deviation and Rank) (n=225).

S. No.	Parameters	Inside Terminals			On Streets			At Places of Visits		
		Mean	Std. Dev.	Rank	Mean	Std. Dev.	Rank	Mean	Std. Dev.	Rank
1	Accessibility	2.77	1.076	2	2.28	1.012	5	2.55	1.008	6
2	Information and Way Finding	2.53	1.102	4	2.20	0.996	8	2.46	1.056	7
3	Crowd/Traffic Management	2.8	1.417	1	2.54	1.236	3	2.57	1.248	5
4	Amenities	2.71	1.226	3	2.27	0.807	6	2.67	1.228	4
5	Demand Services	1.92	0.761	7	1.96	0.566	9	1.88	0.616	9
6	Attitude of Staffs/locals	0.89	1.014	9	2.62	0.970	2	2.92	1.235	1
7	Comfort	2.32	0.942	6	2.22	0.966	7	2.74	1.156	3
8	Fear/ Safety feeling	1.59	0.553	8	2.70	1.109	1	2.76	1.226	2
9	Cleanliness/ Maintenance	2.39	0.895	5	2.45	1.052	4	2.03	0.866	8

Z-test is significant at $p < 0.05$. Source: Authors

for the best/very high experiences). These experiences have been categorised into eight parameters, and the ranking has been given based on the mean value of each parameter from lowest (i.e. lowest mean) to highest (i.e. highest mean) experience level.

From the above table, it has been seen that inside the transport terminal respondents has highly concerned about the attitude of staffs followed by their concern of safety and demand services. Whereas, on streets, they are highly concerned about the demand services, information and wayfinding and comfort. However, at the places of visits, most of the respondents have concerns about demand services, cleanliness and maintenance, information and wayfinding.

According to the interview from the elderly respondents, the reactions for the incidents are considered as mediating variables which will have a high impact on long-term travel behavior. A high negative influence mainly indicates that elderly respondents are facing travel problems in a pilgrimage environment. Whereas a high positive influence indicates that elderly respondents are having a satisfactory travel experience in a pilgrimage environment. As seen in Table 13, a large majority of elderly respondents have spoken about their low satisfaction level of travel.

The author has developed a classification system based on the critical reactions on the negative incidents by the elderly respondents in the interview. The critical reactions have been viewed within a framework of cognitions, emotions, and travel behaviours of the elderly pilgrim. Table 15 presents specific cognitive, emotional and behavioural reactions according to each of the three classifications identified in the data. The negative critical cognitive, emotional, and behavioural reactions in the three themes were: (1) Travel Restrictions, (2) unpredictability in travel, (3) inappropriate behaviour towards elderly. Each of these classifications will be presented in the following five sections. Notably, these classifications mainly represent reactions to the physical problem faced by the elderly respondents during traveling in the pilgrimage environment.

3.3.1 Travel Restrictions

Several elderlies reported that they had encountered critical negative incidents that were highly difficult to overcome and creates problems in their travel. The respondents described about their few negative experiences that have emotional influence on them.

Elderly individuals face a range of challenges that significantly hinder their mobility and comfort in urban environments. Accessibility remains a major concern, as many reach points, vehicles, buildings, facilities, and services are not designed with elderlies in mind, and level differences on streets and at

attractions often go unaddressed. Public transport vehicles are frequently inaccessible, further limiting their options. During peak periods, crowded transport terminals and popular destinations create threatening situations, compounded by heavy street traffic that increases the risks for elderly pedestrians. As shown in Figure 2, being dropped at an unsafe or random location can create a strong sense of fear for elderly pilgrims.

Figure 2. Vehicle dropping off an elderly pilgrim at a random location on side of the street creating a reaction of fear on her.

The lack of public utilities—such as telephones, toilets, and water taps—at convenient locations exacerbates these difficulties. Essential demand services, including accessory support, assistance, and mobility aids, are often unavailable in terminals, on streets, and at attractions. Comfort is compromised by discontinuous, obstructed travel paths, with illegal vending and parking operations further impeding safe passage. Cleanliness and maintenance issues, including broken streets and poor garbage management, pose additional health hazards. Safety concerns are heightened by the absence of pedestrian crossings, the presence of stray animals, and a general fear of crime, all of which deter elderly people from traveling alone. Collectively, these issues create a challenging and often inhospitable environment for elderly travellers.

These problems generally lead elderlies to a critical reaction such as "feeling excluded" from various travel activities. When encountering these barriers, the travellers' critical reactions were that they had been "cut off from traveling altogether" or "forced to choose alternative ways of traveling." In a riverfront location at Har-Ki-Pauri, one interviewee found herself trapped halfway down the steps. Because of the lack of handrails, she was unable to get up or down and needed help from another pilgrim (Figure 3). In the long term, she changed her travel behaviour by avoiding certain trips, because of the critical reactions of dizziness and the fear of falling in the travel situation. An interviewee with balance problems at stations with a long staircase would travel only in the company because of vertigo. If she travelled alone, she would make a detour to another path with shorter stair.

Figure 3. Travel Restriction of elderly pilgrim: An elderly woman having a problem in climbing the steps at Har-ki-Pauri riverfront and needed help in taking a holy bath.

The impossibility of overcoming such travel problems was typically more or less taken as fact and other options had to be chosen. In the long term, a firm restriction would evoke the emotional reaction of resignation. The long-term behaviours for dealing with such barriers were either to find other ways of traveling (e.g., taxi instead of bus) or not to make the trip at all. For some interviewees, traveling in the company had become the only long-term solution, resulting in dependency.

3.3.2 Unpredictability in Travel

For many travellers, unpredictable events were a source of worry and insecurity, and such events would leave the interviewees feeling helpless. A long-term consequence of this critical reaction might be apprehensive expectations before each trip: "It's an adventure every time, it's because of my balance. I become completely perplexed if the elevator is not there or if there are no stairs/steps to climb vertically. Then I suppose I would have to go back. I do try to calm down before a trip. I leave my stay place earlier to reach the destination place in time without any nervousness. Before coming here, I thought 'I will never travel again,' but then I forced myself, thinking that I cannot be stuck here" (Interviewee A, woman, various functional limitations, reduced functional ability). Upon arrival at Haridwar station, several elderly interviewees had found that there is no elevator or ramp inside the station. An immediate critical reaction was worry, while a longer-term reaction was apprehensive expectations, and one interviewee found it difficult to sleep the night before a trip. Another interviewee got lost because she could not use the usual exit; her reaction was to "feel stupid" and stressed. Her travel behaviour was affected such that she initially avoided traveling. On the train, some interviewees could not relax because they were unable to keep an eye on their luggage, which they would have preferred to have near at hand. The same situation arose with them when they were at the public place with their luggage.

The interviewees sometimes did not know beforehand whether a driver would stop near the drop-off point or somewhere else along the street. This would induce critical reactions of fear because they were afraid of falling, especially if the interviewees had to lift their walkers off the vehicle. One interviewee had fallen when the share auto started moving before she was seated, and several other interviewees reported being afraid of falling in similar situations. This would evoke critical reactions of anxiety before and during the trip: "I thought I would fall. It happens so easily if you're not young like my grandchildren, who can jump from the balcony without anything happening. The drivers are stressed and don't have time. Most often, they are sympathetic, but when there are lots of passengers, there might not be enough time for them to think of it" (Interviewee B, woman, one functional limitation, somewhat reduced functional ability). About travel behaviour, unpredictability may create a dilemma: whether to travel and risk encountering the barrier or choose safety and avoid traveling. For some interviewees, a resulting travel behaviour was to choose the Special Transport Service, although they could have travelled by public transport if the driving had been more careful and predictable. Some interviewees stopped traveling altogether by public transport and were instead driven by car by friends and family. Some continued traveling by public transport but only in company. Others made only minor travel behaviour changes such as talking to the driver instead of just pushing the stop button before getting off the bus.

Lack of information induced critical reactions of irritation and worry, for example, during delays or when managing unexpected changes in travel mode if carrying luggage. A short-term behavioural consequence for one interviewee was getting on the wrong bus. A long-term travel behaviour consequence was to travel by bus instead of a train unless one could travel by train the whole distance. During a delay, another interviewee experienced critical reactions of worry and discomfort, not because of the delay itself, but because of being unable to inform her daughter, who was about to pick her up at the destination station. These stressful critical reactions, in turn, reminded her of her heart condition and that she should avoid stress: What would happen if she became ill and needed a doctor? After this event, a long-term travel behaviour was to cease travelling by long-distance train.

3.3.3 Inappropriate behaviour towards elderly

Some interviewees developed strained relationships with transport providers because they felt that the transport system had treated them disrespectfully or unfairly. Various computerised solutions were perceived as barriers by the interviewees because they felt excluded from traveling on the same terms as others. Some interviewees did not have a computer or had difficulties using one, while others felt forced to use a computer. Some interviewees had stopped traveling by long-distance train, partly for this reason. The interpretation of "being treated unequally" followed, for example, the worry of being left alone with an impossible-to-figure-out ticket machine or having to order the ticket over the Internet to get the best price. One participant experienced first-class train as similar to "cattle trucks," because the carriages were cramped and unstable; the resulting travel behaviour was that this participant would "never get on-board such a train again." Notably, the interpretation of a situation as "unfair" evoked emotional reactions of irritation, anger, and humiliation. Ticket prices

Table 15. Overall travel experiences expressed by the elderly respondents.

S. No.	Parameters	Inside Terminals		On Streets		At Places of Visits	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1	Overall Experiences	2.649	1.020	2.538	0.991	2.449	0.990
2	Accessibility for PWDs/Elderlies	1.747	0.466	2.049	0.683	2.089	0.583

Z-test is significant at $p < 0.05$. Source: Authors

that fluctuated depending on departure time were conceived as deceptive, particularly if the ticket was booked close to departure time and, therefore, had increased in price. Long queues, faulty booking information, or windy, unprotected platforms were other critical incidents experienced as a disrespectful treatment by the transport system. A resulting travel behaviour was to choose the bus instead of the long-distance train.

Although these critical incidents were attributed to the (external) transport system, some travelers partly blamed themselves (i.e., internal attribution) for their reactions, for example, not being able to learn how to overcome the barriers. Perceived external control (and thus low internal control) possibly impoverished the relationship with the transport provider, which was interpreted as a counterparty not interested in passenger needs. One interviewee even described this relationship as "having an enemy" and, consequently, avoided any further train travel. Some interviewees also felt insulted by the general acceptance of mobile-phone conversations on-board trains; they found themselves "listening almost compulsively," though not wanting to, and found the situation to be "unbearable."

In summary, it has been seen that most elderly respondents have less than average travel experiences which means that they are not satisfied with the existing travel situations in the pilgrimage tourism environment of Haridwar city. It has also been seen that majority of elderly respondents feel that there is a high need for accessibility provisions for elderlies and persons with disabilities to make the travel environment of Haridwar more inclusive. The questions have been asked with the elderly respondents during the interview with the intention of knowing their overall mobility and travel experiences in Haridwar city and the perception of their accessibility to various travel activities. The mean ratings given by the elderly pilgrim respondents on the overall travel experiences and their accessibility perception at different levels of their travel are shown in Table 15.

4 Conclusion

This study has highlighted the unique challenges and needs of elderly travellers in Haridwar, a prominent pilgrimage destination in India. The findings reveal that elderly pilgrims face significant barriers related to accessibility, mobility, comfort, safety, and information, which often result in less-than-satisfactory travel experiences. Physical limitations, dependency on others, and a preference for affordable and accessible transportation and accommodation options further shape their travel behavior. Most elderly travellers prefer group travel and extended stays, emphasizing the importance of supportive environments and inclusive services.

Despite these challenges, the growing elderly population offers significant opportunities for pilgrimage tourism, provided that their needs are adequately addressed. The survey underscores the urgent requirement for inclusive infrastructure, such as pedestrian-friendly pathways, accessible public transport, clear signage, and well-maintained public utilities. The adoption of Universal Design principles and the active involvement of policymakers, urban planners, service providers, and the local community are crucial to creating a travel environment that is accessible, safe, and enjoyable for all. A better understanding of the needs and experiences of elderly travellers, combined with collaborative efforts from all stakeholders, is essential for making pilgrimage destinations like Haridwar truly inclusive. By prioritizing accessibility, safety, information, and comfort, and by adopting Universal Design principles, cities can not only enhance the travel experiences of elderly pilgrims but also set new standards for inclusive religious tourism across India.

4.1 Suggestions and Recommendations

Improving Accessibility and Infrastructure

- **Pedestrian-friendly pathways:** Ensure well-maintained, wide pathways with adequate seating and resting areas.
- **Accessible auto and taxi services:** Design vehicles with elderly-friendly features and ensure affordability.
- **Ramps and elevators:** Install these at public buildings, transport hubs, and tourist attractions to facilitate easy access.

Enhancing Transportation Options

- **Shared transportation:** Promote battery rickshaws and cycle rickshaws tailored to elderly needs.
- **Elderly-friendly public transport:** Modify systems to include priority seating and easy payment options.

Information and Communication

- **Clear signage:** Install easy-to-read signs at key locations.
- **Elderly-friendly information systems:** Provide large-print materials and audio announcements.
- **Accessible communication:** Ensure public address systems are user-friendly for elderly passengers.

Safety and Security

- **Secure pedestrian areas:** Eliminate hazards such as uneven pavement and poor lighting.
- **Elderly-friendly safety features:** Incorporate grab bars and non-slip flooring in public spaces.
- **Emergency response:** Establish systems prioritizing elderly assistance.

Training and Awareness

- **Staff training:** Educate staff on elderly-friendly services and accessibility.
- **Public awareness:** Promote campaigns and tourism initiatives focused on elderly needs.

For Policymakers and Urban Planners

- **Develop accessible infrastructure:** Ensure public spaces are equipped with elderly-friendly facilities.
- **Implement inclusive transport systems:** Adapt public transport for elderly comfort and safety.
- **Promote universal design:** Apply these principles in all new developments.

For Stakeholders and Service Providers

- **Provide assistance services:** Offer escort and luggage help for elderly pilgrims.
- **Promote elderly-friendly tourism:** Develop initiatives that cater to elderly preferences.

For Enhancing Inclusive Mobility in Religious Places

- **Comprehensive frameworks:** Develop and implement best practices and innovative solutions.
- **Toolkit development:** Create practical guides for inclusive mobility in religious cities.

For Future Research

- **Further studies:** Explore the impact and effectiveness of inclusive mobility solutions in other religious cities.
- **Toolkit creation:** Develop resources for policymakers and planners to support inclusive environments.

Data Availability Statement

Data will be made available on request.

Funding

This work was supported without any funding.

Conflicts of Interest

The authors declare no conflicts of interest.

Ethical Approval and Consent to Participate

Not applicable.

References

[1] Census of India. (2011). Office of the registrar general & census commissioner, India. *Census of India*.

[2] Gillovic, B., & McIntosh, A. (2020). Accessibility and inclusive tourism development: Current state and future agenda. *Sustainability, 12*(22), 9722. [Crossref]

[3] Pasca, M. G., Elmo, G. C., Arcese, G., Cappelletti, G. M., & Martucci, O. (2022). Accessible tourism in protected natural areas: an empirical study in the Lazio region. *Sustainability, 14*(3), 1736. [Crossref]

[4] De Matteis, F., Notaristefano, G., & Bianchi, P. (2021). Public—Private partnership governance for accessible tourism in marine protected areas (MPAs). *Sustainability, 13*(15), 8455. [Crossref]

[5] Gillovic, B., McIntosh, A., Darcy, S., & Cockburn-Wootten, C. (2018). Enabling the language of accessible tourism. *Journal of Sustainable Tourism, 26*(4), 615-630. [Crossref]

[6] Burnett, J. J., & Baker, H. B. (2001). Assessing the travel-related behaviors of the mobility-disabled consumer. *Journal of Travel Research, 40*(1), 4-11. [Crossref]

[7] Kazeminia, A., Del Chiappa, G., & Jafari, J. (2015). Seniors' travel constraints and their coping strategies. *Journal of travel research, 54*(1), 80-93. [Crossref]

[8] Bowtell, J. (2015). Assessing the value and market attractiveness of the accessible tourism industry in Europe: a focus on major travel and leisure companies. *Journal of Tourism Futures, 1*(3), 203-222. [Crossref]

[9] Cockburn-Wootten, C., & McIntosh, A. (2020). Improving the accessibility of the tourism industry in New Zealand. *Sustainability, 12*(24), 10478. [Crossref]

[10] Patterson, I. R. (2006). *Growing older: Tourism and leisure behaviour of older adults*. Cabi. [Crossref]

[11] Patterson, I., & Balderas, A. (2020). Continuing and emerging trends of senior tourism: A review of the literature. *Journal of Population Ageing, 13*(3), 385-399. [Crossref]

[12] Sedgley, D., Pritchard, A., & Morgan, N. (2011). Tourism and ageing: A transformative research agenda. *Annals of Tourism Research, 38*(2), 422-436. [Crossref]

[13] Jang, S. S., & Wu, C. M. E. (2006). Seniors' travel motivation and the influential factors: An examination of Taiwanese seniors. *Tourism management, 27*(2), 306-316. [Crossref]

[14] Nimrod, G. (2008). Retirement and tourism themes in retirees' narratives. *Annals of tourism research, 35*(4), 859-878. [Crossref]

[15] Otoo, F. E., Kim, S., & Choi, Y. (2020). Understanding senior tourists' preferences and characteristics based on their overseas travel motivation clusters. *Journal of Travel & Tourism Marketing, 37*(2), 246-257. [Crossref]

[16] Curl, A., Nelson, J. D., & Anable, J. (2011). Does accessibility planning address what matters? A review of current practice and practitioner perspectives. *Research in Transportation Business & Management, 2*, 3-11. [Crossref]

[17] Farrington, J., & Farrington, C. (2005). Rural accessibility, social inclusion and social justice: towards conceptualisation. *Journal of Transport geography, 13*(1), 1-12. [Crossref]

[18] Geurs, K. T., & Van Wee, B. (2004). Accessibility evaluation of land-use and transport strategies: review and research directions. *Journal of Transport geography, 12*(2), 127-140. [Crossref]

[19] Durán-Sánchez, A., Del Río, M. D. L. C., Oliveira, C., & Álvarez-García, J. (2019). Religious tourism and pilgrimage: Study of academic publications in Scopus. In *Handbook of research on socio-economic impacts of religious tourism and pilgrimage* (pp. 1-18). IGI Global. [Crossref]

[20] Timothy, D. J., & Olsen, D. H. (Eds.). (2006). *Tourism, religion and spiritual journeys* (Vol. 4). London: Routledge. [Crossref]

[21] Edusei, A. K., Aggrey, S. M., Badu, E., & Opoku, M. P. (2015). Accessibility and participation of persons with disabilities in tourism: Perspective of tourism workers in the Ashanti region of Ghana. *Disability, CBR & Inclusive Development, 26*(3), 97-110. [Crossref]

[22] Gassiot Melian, A., Prats, L., & Coromina, L. (2016). The perceived value of accessibility in religious sites–do disabled and non-disabled travellers behave differently?. *Tourism Review, 71*(2), 105-117. [Crossref]

[23] Lin, H. H., Chang, K. H., Tseng, C. H., Lee, Y. S., & Hung, C. H. (2021). Can the development of religious and cultural tourism build a sustainable and friendly life and leisure environment for the elderly and promote physical and mental health?. *International journal of environmental research and public health, 18*(22), 11989. [Crossref]

[24] Litman, T. (2017). *Evaluating accessibility for transport planning*. Victoria, BC, Canada: Victoria Transport Policy Institute.

[25] Collia, D. V., Sharp, J., & Giesbrecht, L. (2003). The 2001 national household travel survey: A look into the travel patterns of older Americans. *Journal of safety research, 34*(4), 461-470. [Crossref]

[26] Hjorthol, R. J., Levin, L., & Sirén, A. (2010). Mobility in different generations of older persons: The development of daily travel in different cohorts in Denmark, Norway and Sweden. *Journal of Transport Geography, 18*(5), 624-633. [Crossref]

[27] Liu, W., Lu, H., Sun, Z., & Liu, J. (2017). Elderly's travel patterns and trends: The empirical analysis of Beijing. *Sustainability, 9*(6), 981. [Crossref]

[28] Rosenbloom, S. (2001). Sustainability and automobility among the elderly: An international assessment. *Transportation, 28*(4), 375-408. [Crossref]

[29] O'Fallon, C., & Sullivan, C. (2009). Trends in older people's travel patterns: analysing changes in older New Zealanders' travel patterns using the Ongoing New Zealand Household Travel Survey. *New Zealand Transport Agency Research Report*, (369).

[30] Schmöcker, J. D., Su, F., & Noland, R. B. (2010). An analysis of trip chaining among older London residents. *Transportation, 37*(1), 105-123. [Crossref]

[31] Su, F., & Bell, M. G. (2009). Transport for older people: Characteristics and solutions. *Research in transportation economics, 25*(1), 46-55. [Crossref]

[32] Su, F., Schmöcker, J. D., & Bell, M. G. (2009). Mode choice of older people before and after shopping: A study with London data. *Journal of Transport and Land Use, 2*(1), 29-46. [Crossref]

[33] Fatima, K., Moridpour, S., & Saghapour, T. (2021). Spatial and temporal distribution of elderly public transport mode preference. *Sustainability, 13*(9), 4752. [Crossref]

[34] Kim, S. (2011). Assessing mobility in an aging society: Personal and built environment factors associated with older people's subjective transportation deficiency in the US. *Transportation research part F: traffic psychology and behaviour, 14*(5), 422-429. [Crossref]

[35] Spinney, J. E., Scott, D. M., & Newbold, K. B. (2009). Transport mobility benefits and quality of life: A time-use perspective of elderly Canadians. *Transport policy, 16*(1), 1-11. [Crossref]

[36] Wretstrand, A., Svensson, H., Fristedt, S., & Falkmer, T. (2009). Older people and local public transit: Mobility effects of accessibility improvements in Sweden. *Journal of Transport and Land Use, 2*(2), 49-65. [Crossref]

[37] Somenahalli, S., & Taylor, M. A. (2007). *Elderly mobility: Issues, opinions and analysis of trip making in Adelaide* (Doctoral dissertation, ETM Group of Companies).

[38] Mohd, S., Abdul Latiff, A. R., & Senadjki, A. (2019). Travel behavior of elderly in George Town and Malacca, Malaysia. *Sustainability, 11*(19), 5251. [Crossref]

[39] Lee, K. S., Eom, J. K., Lee, J., & Ko, S. (2021). Analysis of the activity and travel patterns of the elderly using mobile phone-based hourly locational trajectory data: Case study of gangnam, korea. *Sustainability, 13*(6), 3025. [Crossref]

[40] Bandara, T. N., Higgs, C., Zapata-Diomedi, B., Gunn, L., Turrell, G., & De Livera, A. (2023). The longitudinal effects of the built environment on transportation and recreational walking, and differences by age and sex: systematic review protocol. *Archives of public health, 81*(1), 184. [Crossref]

[41] Brüchert, T., Hasselder, P., Quentin, P., & Bolte, G. (2020). Walking for transport among older adults: a cross-sectional study on the role of the built environment in less densely populated areas in northern Germany. *International journal of environmental research and public health, 17*(24), 9479. [Crossref]

[42] Kim, S. (2003). Analysis of elderly mobility by structural equation modeling. *Transportation research record, 1854*(1), 81-89. [Crossref]

[43] Agarwal, A., Lubet, A., Mitgang, E., Mohanty, S., & Bloom, D. E. (2020). Population aging in India: Facts, issues, and options. In *Population change and impacts in Asia and the Pacific* (pp. 289-311). Singapore: Springer Singapore. [Crossref]

[44] Morrison, R. S., Meier, D. E., & Capello, C. (Eds.). (2003). *Geriatric palliative care*. Oxford University Press.

[45] Zunzunegui, M. V., Beland, F., & Otero, A. (2001). Support from children, living arrangements, self-rated health and depressive symptoms of older people in Spain. *International Journal of Epidemiology, 30*(5), 1090-1099. [Crossref]

[46] Gupta, P., Mani, K., Rai, S. K., Nongkynrih, B., & Gupta, S. K. (2014). Functional disability among elderly persons in a rural area of Haryana. *Indian journal of public health, 58*(1), 11-16. [Crossref]

[47] Joshi, K., Kumar, R., & Avasthi, A. (2003). Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India. *International journal of epidemiology, 32*(6), 978-987. [Crossref]

[48] Shankar, R., Tondon, J., Gambhir, I. S., & Tripathi, C. B. (2007). Health status of elderly population in rural area of Varanasi district. *Indian journal of public health, 51*(1), 56-58.

[49] Swami, H. M., Bhatia, V., Dutt, R., & Bhatia, S. P. S. (2002). A community based study of the morbidity profile among the elderly in Chandigarh, India. *Bahrain Med Bull, 24*(1), 13-16.

[50] Garber, C. E., Greaney, M. L., Riebe, D., Nigg, C. R., Burbank, P. A., & Clark, P. G. (2010). Physical and mental health-related correlates of physical function in community dwelling older adults: a cross sectional study. *BMC geriatrics, 10*(1), 6. [Crossref]

[51] Sapranaviciute-Zabazlajeva, L., Sileikiene, L., Luksiene, D., Tamosiunas, A., Radisauskas, R., Milvidaite, I., & Bobak, M. (2022). Lifestyle factors and psychological well-being: 10-year follow-up study in Lithuanian urban population. *BMC Public Health, 22*(1), 1011. [Crossref]

[52] Tinetti, M. E., Speechley, M., & Ginter, S. F. (1988). Risk factors for falls among elderly persons living in the community. *New England journal of medicine, 319*(26), 1701-1707. [Crossref]

[53] Yeom, H. A., Fleury, J., & Keller, C. (2008). Risk factors for mobility limitation in community-dwelling older adults: a social ecological perspective. *Geriatric nursing, 29*(2), 133-140. [Crossref]

[54] Dey, S., Nambiar, D., Lakshmi, J. K., Sheikh, K., & Reddy, K. S. (2012). Health of the elderly in India: challenges of access and affordability. *Aging in Asia: Findings from new and emerging data initiatives, 371*, 86.

[55] Cornoni-Huntley, J. C., Foley, D. J., White, L. R., Suzman, R., Berkman, L. F., Evans, D. A., & Wallace,

R. B. (1985). Epidemiology of disability in the oldest old: methodologic issues and preliminary findings. *The Milbank Memorial Fund Quarterly. Health and Society*, 350-376. [Crossref]

[56] Hosain, G. M. (1995). Disability problem in a rural area of Bangladesh. *Bangladesh Medical Research Council Bulletin, 21*(1), 24-31.

[57] Kapoor, M., Ambade, M., Ravi, S., & Subramanian, S. V. (2024). Age-and gender-specific prevalence of intellectually disabled population in India. *Journal of Autism and Developmental Disorders, 54*(4), 1594-1604. [Crossref]

[58] Ganesh, K. S., Das, A., & Shashi, J. S. (2008). Epidemiology of disability in a rural community of Karnataka. *Indian journal of public health, 52*(3), 125-129.

[59] Velayutham, B., Kangusamy, B., Joshua, V., & Mehendale, S. (2016). The prevalence of disability in elderly in India–Analysis of 2011 census data. *Disability and health journal, 9*(4), 584-592. [Crossref]

[60] Dupre, M. E., Liu, G., & Gu, D. (2008). Predictors of longevity: Evidence from the oldest old in China. *American journal of public health, 98*(7), 1203-1208. [Crossref]

[61] Chandwani, H., Jivarajani, P., & Jivarajani, H. (2009). Health and social problems of geriatric population in an urban setting of Gujarat, India. *Internet J Health, 9*(2), 10-5580.

[62] Malmstrom, T. K., Miller, D. K., Simonsick, E. M., Ferrucci, L., & Morley, J. E. (2016). SARC-F: a symptom score to predict persons with sarcopenia at risk for poor functional outcomes. *Journal of cachexia, sarcopenia and muscle, 7*(1), 28-36. [Crossref]

[63] Tinetti, M. E., & Kumar, C. (2010). The patient who falls:"It's always a trade-off". *Jama, 303*(3), 258-266. [Crossref]

[64] Guralnik, J. M., Ferrucci, L., Simonsick, E. M., Salive, M. E., & Wallace, R. B. (1995). Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. *New England Journal of Medicine, 332*(9), 556-562. [Crossref]

[65] Agrawal, A. (2016). Disability among the elder population of India: A public health concern. *Journal of Medical Society, 30*(1), 15-19. [Crossref]

[66] Sudha, S., Suchindran, C., Mutran, E. J., Rajan, S. I., & Sarma, P. S. (2006). Marital status, family ties, and self-rated health among elders in South India. *Journal of Cross-Cultural Gerontology, 21*(3), 103-120. [Crossref]

[67] Pandey, M. K. (2012). Poverty and disability among Indian elderly: evidence from household survey. *Journal of Disability Policy Studies, 23*(1), 39-49. [Crossref]

[68] Alsnih, R., & Hensher, D. A. (2003). The mobility and accessibility expectations of seniors in an aging population. *Transportation research part a: policy and practice, 37*(10), 903-916. [Crossref]

[69] Rosenbloom, S., & Morris, J. (1998). Travel patterns of older Australians in an international context: Policy implications and options. *Transportation Research Record, 1617*(1), 189-193. [Crossref]

[70] Schwanen, T., Dijst, M., & Dieleman, F. M. (2001). Leisure trips of senior citizens: determinants of modal choice. *Tijdschrift voor economische en sociale geografie, 92*(3), 347-360. [Crossref]

[71] Yau, M. K. S., McKercher, B., & Packer, T. L. (2004). Traveling with a disability: More than an access issue. *Annals of tourism research, 31*(4), 946-960. [Crossref]

[72] Musselwhite, C., & Haddad, H. (2010). Mobility, accessibility and quality of later life. *Quality in ageing and older adults, 11*(1), 25-37. [Crossref]

[73] Kim, S., & Ulfarsson, G. F. (2004). Travel mode choice of the elderly: effects of personal, household, neighborhood, and trip characteristics. *Transportation Research Record, 1894*(1), 117-126. [Crossref]

[74] Dieleman, F. M., Dijst, M., & Burghouwt, G. (2002). Urban form and travel behaviour: micro-level household attributes and residential context. *Urban studies, 39*(3), 507-527. [Crossref]

[75] Best, H., & Lanzendorf, M. (2005). Division of Labour and Gender Differences. [Crossref]

[76] Chen, S. C., & Shoemaker, S. (2014). Age and cohort effects: The American senior tourism market. *Annals of Tourism Research, 48*, 58-75. [Crossref]

[77] Lee, S. H., & Tideswell, C. (2005). Understanding attitudes towards leisure travel and the constraints faced by senior Koreans. *Journal of Vacation Marketing, 11*(3), 249-263. [Crossref]

[78] Huang, L., & Tsai, H. T. (2003). The study of senior traveler behavior in Taiwan. *Tourism management, 24*(5), 561-574. [Crossref]

[79] Nimrod, G. (2007). Retirees' leisure: Activities, benefits, and their contribution to life satisfaction. *Leisure Studies, 26*(1), 65-80. [Crossref]

[80] Patterson, I., & Pegg, S. (2013). Marketing the leisure experience to baby boomers and older tourists. In *Marketing of tourism experiences* (pp. 156-174). Routledge.

[81] Spasojević, B., & Božić, S. (2016). Senior tourists' preferences in the developing countries–measuring perceptions of Serbian potential senior market. *European Journal of Tourism, Hospitality and Recreation, 7*(2), 74-83. [Crossref]

[82] Przybysz, K., & Stanimir, A. (2022). Tourism-related needs in the context of seniors' living and social conditions. *International Journal of Environmental Research and Public Health, 19*(22), 15325. [Crossref]

[83] Patterson, I., Balderas-Cejudo, A., & Pegg, S. (2021). Tourism preferences of seniors and their impact on healthy ageing. *Anatolia, 32*(4), 553-564. [Crossref]

[84] Jamei, E., Chan, M., Chau, H. W., Gaisie, E., & Lättman, K. (2022). Perceived accessibility and key influencing factors in transportation. *Sustainability, 14*(17), 10806. [Crossref]

[85] Hennah, C., Ellis, G., & Doumas, M. (2021). Dual task walking in healthy aging: Effects of narrow and wide walking paths. *Plos one, 16*(12), e0261647. [Crossref]

[86] Che Had, N. H., Alavi, K., Md Akhir, N., Muhammad Nur, I. R., Shuhaimi, M. S. Z., & Foong, H. F. (2023). A scoping review of the factor associated with older adults' mobility barriers. *International journal of environmental research and public health, 20*(5), 4243. [Crossref]

[87] Roman, M., Bhatta, K., Roman, M., & Gautam, P. (2021). Socio-economic factors influencing travel decision-making of Poles and Nepalis during the COVID-19 pandemic. *Sustainability, 13*(20), 11468. [Crossref]

[88] Chua, B. L., Al-Ansi, A., Lee, M. J., & Han, H. (2021). Impact of health risk perception on avoidance of international travel in the wake of a pandemic. *Current Issues in Tourism, 24*(7), 985-1002. [Crossref]

[89] Aziz, N. A., & Long, F. (2022). To travel, or not to travel? The impacts of travel constraints and perceived travel risk on travel intention among Malaysian tourists amid the COVID-19. *Journal of Consumer Behaviour, 21*(2), 352-362. [Crossref]

[90] Kim, H., Woo, E., & Uysal, M. (2015). Tourism experience and quality of life among elderly tourists. *Tourism management, 46*, 465-476. [Crossref]

[91] Townsend, B. G., Chen, J. T., & Wuthrich, V. M. (2021). Barriers and facilitators to social participation in older adults: a systematic literature review. *Clinical gerontologist, 44*(4), 359-380. [Crossref]

[92] Noh, S. H., & Joh, C. H. (2012). Analysis of elderly travel patterns in Seoul metropolitan area, South Korea, through sequence alignment and motif search. *Transportation research record, 2323*(1), 25-34. [Crossref]

[93] Maresova, P., Krejcar, O., Maskuriy, R., Bakar, N. A. A., Selamat, A., Truhlarova, Z., ... & Vítkova, L. (2023). Challenges and opportunity in mobility among older adults–key determinant identification. *BMC geriatrics, 23*(1), 447. [Crossref]

[94] Kim, M., Choi, K. H., & Leopkey, B. (2021). The influence of tourist risk perceptions on travel intention to mega sporting event destinations with different levels of risk. *Tourism Economics, 27*(3), 419-435. [Crossref]

[95] Musselwhite, C. B., & Shergold, I. (2013). Examining the process of driving cessation in later life. *European Journal of Ageing, 10*(2), 89-100. [Crossref]

[96] Zhou, F., Zhang, H., Wang, H. Y., Liu, L. F., & Zhang, X. G. (2024). Barriers and facilitators to older adult participation in intergenerational physical activity program: a systematic review. *Aging clinical and experimental research, 36*(1), 39. [Crossref]

[97] Kim, T. K. (2015). T test as a parametric statistic. *Korean journal of anesthesiology, 68*(6), 540-546. [Crossref]

[98] Wiśniowski, A., Sakshaug, J. W., Perez Ruiz, D. A., & Blom, A. G. (2020). Integrating probability and nonprobability samples for survey inference. *Journal of Survey Statistics and Methodology, 8*(1), 120-147. [Crossref]

[99] Lohr, S. L. (2021). *Sampling: design and analysis*. Chapman and Hall/CRC. [Crossref]

[100] Qurashi, M. E., & Elhafian, M. H. (2023). The Impact of Sample Size on the Probability Samples to Estimate the Total population Number. *Indian Journal of Science and Technology, 16*(39), 3316-3324. [Crossref]

[101] Kovacs, M., van Ravenzwaaij, D., Hoekstra, R., & Aczel, B. (2022). SampleSizePlanner: A tool to estimate and justify sample size for two-group studies. *Advances in Methods and Practices in Psychological Science, 5*(1), 25152459211054059. [Crossref]

[102] Perera, K. D. R. L. J. (2021). Checking the assumptions for using parametric tests in relation to low socio-economic districts early adolescents motivation and engagement levels in learning. *International Journal of Education Humanities and Social Science, 5*(03), 119-131. [Crossref]

[103] Kim, H. Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative dentistry & endodontics, 38*(1), 52. [Crossref]

[104] Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. *International journal of endocrinology and metabolism, 10*(2), 486. [Crossref]

[105] Fagerland, M. W. (2012). t-tests, non-parametric tests, and large studies—a paradox of statistical practice?. *BMC medical research methodology, 12*(1), 78. [Crossref]

[106] Faizi, N., & Alvi, Y. (2023). Parametric tests. *Biostatistics Manual for Health Research. Elsevier*, 63-86. [Crossref]

[107] Faizi, N., & Alvi, Y. (2023). *Biostatistics manual for Health Research: A practical guide to data analysis*. Elsevier. [Crossref]

[108] Fávero, L. P., Belfiore, P., & de Freitas Souza, R. (2023). *Data science, analytics and machine learning with R*. Academic Press. [Crossref]

[109] Campbell, M. J., & Shantikumar, S. (2016). Parametric and Non-parametric tests for comparing two or more groups. *HealthKnowledge. Viitattu, 2*, 2020.

[110] Verma, J. P., & Abdel-Salam, A. S. G. (2019). *Testing statistical assumptions in research*. John Wiley & Sons. [Crossref]

Dr. Swapneel Jaiswal is an accomplished transportation planning professional with over 16 years of experience in research, consulting, and academia. He holds a Ph.D. from IIT Roorkee, India and a Master's in Transport Planning from School of Planning & Architecture, New Delhi, India. His work focuses on sustainable transportation, travel behavior modeling, and accessibility planning. Dr. Jaiswal has contributed to numerous national-level projects, published extensively in peer-reviewed journals, and remains actively involved as an expert with key transportation planning firms. (Email: drswapneeljaiswal@gmail.com)

Amit Singh Baghel is an Architect and Transport Planner with over 16 years of experience in conceptualizing and implementing multidisciplinary projects across the domains of urban mobility, public transport systems, multimodal logistics, and sustainable transport planning. He holds a Master's degree in Transport Planning from the School of Planning and Architecture, New Delhi, and has worked extensively with both public and private sector clients at national and international levels. As Director of Vernacular Consultancy Services Pvt. Ltd., he has led several key assignments involving comprehensive mobility plans, multimodal integration strategies, and infrastructure development across Indian cities and abroad. (Email: amitsinghbaghel@vernacular.global)

Dr. Sremmant Basu is a seasoned academic and human resource management expert with over four decades of experience spanning industry, academia, training, and consultancy. He holds dual postgraduate degrees in Human Resource Management and General Management, and earned his Ph.D. from IIT Kharagpur. He has held senior leadership positions in reputed corporates and contributed to global HR integration efforts, including assignments in Southeast Asia and Central Asia. As Dean – Administration, International Relations & UGC Affairs at Madanapalle Institute of Technology & Science (A Deemed to be University), he has been instrumental in forging international academic partnerships. His research interests include mentoring, leadership development, and performance management, and he has published in both national and international forums. (Email: drsremmantbasu@mits.ac.in)

Dr. Pradyut Anand is an Assistant Professor in the Department of Civil Engineering at Noida International University, India. He holds a Ph.D. in Concrete Technology and an M. Tech in Structural Engineering from Birla Institute of Technology, Mesra. His research focuses on sustainable construction practices, particularly the integration of construction and demolition waste into aerated concrete blocks, and the application of advanced machine learning models for material property prediction. With a strong interdisciplinary approach, he has published extensively in high-impact journals and actively contributes to the fields of structural materials, concrete durability, and civil infrastructure sustainability. (Email: pradyut.bitmesra@gmail.com)

Dr. Sudheerkumar Yantrapalli is an Associate Professor in the Department of Civil Engineering at Madanapalle Institute of Technology & Science (A Deemed to be University), India. He holds a Ph.D. in Geo-Environmental Engineering and an M. Tech in Geotechnical Engineering from the National Institute of Technology, Warangal. His research interests focus on the geotechnical behavior of soils under environmental influences, landfill liner performance, and heavy metal migration through clayey soils. He has published in peer-reviewed journals and conferences, and holds patents related to geotechnical instrumentation. With expertise in both academic and laboratory settings, Dr. Yantrapalli has also contributed significantly to consultancy, NABL-accredited geotechnical labs, and civil engineering education and outreach. (Email: sudheerkumatry@mits.ac.in)

Denise-Penelope N. Kontoni is an Associate Professor in the Department of Civil Engineering, School of Engineering, University of the Peloponnese, Patras, Greece (E-mail: kontoni@uop.gr). Assoc. Prof. Dr. Kontoni is the author of 110 Journal Papers, 3 Book Chapters and 110 full Conference Papers, which have received more than 1795 Citations (Google Scholar). She is a reviewer in many international journals and is an academic editor and guest editor in international journals. (Email: kontoni@uop.gr and kontoni.denise@ac.eap.gr)