



CHINESE ART AND DESIGN OF BATHROOM SPACE FOR THE AGED



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CHINESE ART AND DESIGN OF BATHROOM SPACE FOR THE AGED

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This thesis focuses on the issue of ageing in China, with fieldwork in nursing homes in Dezhou City, Shandong province. The elderly care industry, especially elderly bathroom facilities, and the government has, in recent years, increased its investment in the construction of nursing homes and introduced relevant policies. However, when the material life of the elderly is satisfied, their moods and emotions in nursing homes are also affected by a variety of factors, such as psychological states, health conditions and living environments. In order to improve the quality of life of the elderly in nursing homes, the paper proposes to integrate Shandong art into the design of nursing bathrooms in order to increase their sense of well-being and belonging. Upon inspection, it was found that there were deficiencies in the design and facilities of the nursing homes, such as the lack of local design elements and safety facilities, and that the facilities were rather old and lacked a sense of experience. Shandong art is a favorite culture of the elderly, incorporating it into the design of senior bathrooms and improving safety, in terms of size and material chosen to be suitable for use by older people and making the elderly feel at home.

Keyword : Shandong art, Sense of well-being and belonging, Retirement bathrooms

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

China is facing the increasingly serious challenge of aging, and by 2050, the size of the elderly population in China is expected to reach nearly 500 million, accounting for more than one-third of the population. As one of the first provinces in the country to enter the ageing process, Shandong's elderly care industry has received strong policy support and has achieved a situation where more than 500 senior bathroom facilities are located all over the country, and the demand continues to climb. In the face of the complex and changing aging process, the emotional and affective needs of the elderly are of great concern. If Shandong's artistic elements are injected into senior care services, a sense of nostalgia and intimacy can be created, and the sense of well-being of the elderly can be enhanced. Being located at the lower reaches of the Yellow River and the eastern foot of the Taihang Mountains, Shandong has a reputation for being industrious and down-to-earth, and the people of the province have devoted their lives to not only making important contributions to society, but also giving selfless love to their families. As the years go by, these laborers want to live a quality life in their old age. To this end, Shandong has built many various types of elderly care institutions. However, there are still shortcomings in the design and facilities. First of all, some of the institutions lack regional characteristics. Although the modern architectural style is attractive, it is difficult to evoke a sense of identity among the elderly who are well versed in the traditional Shandong culture. A design with local characteristics of Shandong, combined with traditional cultural elements, can satisfy both physical and spiritual needs. Secondly, the design of facilities in elderly care institutions needs to be optimized and does not fully take the special needs of the elderly, such as mobility problems and vision loss, into account. Therefore, elderly care institutions need to be more meticulous and create more convenient facilities from the perspective of the elderly's physical and mental needs. Most notably, the design of bathrooms is prone to safety hazards, including inappropriate sizes and material choices, which can lead to

frequent accidents such as falls during bathing. These issues need to be addressed urgently to ensure the safety of the elderly in their old age. In addition, most of the current nursing homes that meet the spiritual and cultural needs of the elderly in the basic care are far from enough. Shandong elderly people generally have a high cultural quality, they look forward to far more than basic life care, but also need spiritual comfort, such as watching performances and enjoying exhibitions, including a variety of cultural activities, to meet their spiritual needs. In this way, the spiritual life of the elderly can be made more diversified, and their enthusiasm for life and sense of participation can be enhanced. In summary, nursing homes in Shandong need improvement in terms of design and facilities in order to serve the elderly population more effectively. This is not only out of gratitude for their lifelong commitment, but also to lay the cornerstone for the protection of the rights and well-being of the elderly.

This thesis hopes to bring emotional, physical, and spiritual comfort to the elderly in Shandong by designing bathrooms in nursing homes with Shandong artistic style, so that the elderly can live a better life.

## **1.2 Objective of the study**

1.By combining practical and aesthetic values, designing a bathroom environment for the elderly is both comfortable and safe. This environment not only meets their basic living needs, but also enhances their quality of life and strengthens their sense of well-being and belonging in the nursing home.

2.Considering the importance of Shandong traditional arts in the hearts of the elderly, this study aims to integrate these cultural elements into bathroom design. Such a design is not only an inheritance of Shandong traditional culture, but also a way to meet the spiritual and emotional needs of the elderly.

## **1.3 Research questions**

1.What is the bathroom design that elderly people need in Shandong.

2.How can we integrate the needs of the elderly for the bathroom and Shandong art style into the design of the bathroom space for the elderly.

#### 1.4 Significance of the study

Accompanied by the economic take-off and surging demand, the research and construction of China's elderly care institutions are increasingly progressing, thus ushering in improvements in both quantity and quality. However, the development of bathroom space, as a crucial link in elderly care services, is lagging, and has become a problem that needs to be solved urgently. Especially for the elderly who rely on others to take care of them, their physical and psychological needs are more difficult to be fully satisfied, thereby making many elderly people feel lonely and helpless.

In view of this background, we need to delve into the demands and concepts of the elderly in Shandong Province to further deepen the exploration of the artistic design of senior bathrooms in Shandong. With such a perspective of thinking, we can effectively make up for the lack of research in this field and provide a strong reference for improving the theoretical practice of senior bathroom facility design. On this basis, we will introduce elements of local cultural characteristics to improve the living environment of the elderly and devote ourselves to creating a more warm and comfortable family atmosphere.

#### 1.5 Scope of the study

The scope of the research is focused on three key areas

Questionnaire: 80 questionnaires were distributed in nursing homes in Dezhou City, Shandong Province, and 80 questionnaires were returned to collect data for designing the nursing bathrooms.

Interviews: In-depth interviews with interior designers to solve design confusions and enhance design value.

Shandong art and design: Lu brocade, Zibo's big fish and meat, and Shandong's traditional houses

Architecture was used in the design of a bathroom in a nursing home.

### 1.6 Definition of terms

Shandong Art: During five thousand years of historical development and evolution, Chinese art has formed its own national characteristics and traditional spirit, with unlimited vitality and creativity, which makes Chinese art enduring and everlasting.

Bathroom for the elderly: A convenient bathroom that meets basic functional needs but also has a personalized design concept.

Happiness and sense of belonging: come from their satisfaction with life, an emotional and psychological connection.





## CHAPTER 2

### LITERATURE REVIEW

This study focuses on the design of senior bathrooms using traditional Chinese art. The most important point is to combine the artistic elements with the daily needs of the elderly, to propose effective designs and strategies to create an aesthetically pleasing bathroom environment that enhances the bathing and emotional experience. This study takes nursing homes in Shandong Province as the object of research and applies the traditional art of Shandong Province to change the form of traditional cultural inheritance and make a pioneering development. Therefore, for the literature review, it is necessary to understand the previous work in the field to obtain relevant basic information and background knowledge before the fieldwork research. The literature review for this study can be divided into six sections: art in China, art in Shandong, color theory in aesthetics, sense of belonging and well-being of the elderly, principles of designing bathrooms for the elderly, and related studies at home and abroad.

#### 2.1 Chinese art

An overview of the development of Chinese art is given by Zhang and Kan (2023). Chinese art has a long history that spans thousands of years. During this long period of development, Chinese art has developed a unique style through continuous inheritance and innovation. From ancient bronzes to modern paintings and sculptures, each period has added new elements to the original while retaining traditional core values. Chinese art emphasizes harmony and balance, which is reflected in all forms of art. Whether in architecture, painting or sculpture, the pursuit of harmony and unity in form, color and spatial layout. This pursuit reflects the ancient Chinese philosophy of Yin and Yang, the theory of the five elements, which means that all things are born with each other to achieve a dynamic state of balance. There is a profound view of nature in Chinese art, and artists often take natural landscapes as the theme of their creations, which expresses their awe and love for the natural world through art. This reverence and imitation of nature are especially evident in the fields of landscape painting and garden

design. This view of nature is not only aesthetic, but also a philosophy of life. Chinese calligraphy and painting are the most representative parts of Chinese art. Calligraphy is not only the writing of words, but also an expression of emotion and mood. Painting, on the other hand, with its unique lines and ink colors, emphasizes the mood and rhythm of the picture, in contrast to Western perspective and color-heavy paintings. Chinese art is closely linked to everyday life. Traditional handicrafts, such as ceramics, brocade, and lacquer ware, are not only practical objects but also works of art. This combination of art and life has enabled Chinese art to find the perfect balance between practicality and beauty.

## 2.2 Shandong art

Shandong art and culture, as an important part of China's eastern seaboard, has deep historical roots and unique regional characteristics. The diversity of its art forms, ranging from traditional painting and sculpture to folk art, such as paper-cutting and shadow puppetry, show rich cultural connotations and aesthetic styles (Liu, 2023). Historically, due to its favorable geographical location and active cultural exchanges, Shandong has developed an eclectic, simple and vital art style. Shandong art is characterized by its close integration of local history, social structure and natural environment. For example, traditional paintings in Shandong are often known for their vivid depictions of people and affectionate expressions of natural landscapes. These works of art not only demonstrate the skill of the artists, but also reflect the lifestyle and values of the people of Shandong.

This study incorporates Shandong art elements in the design of senior bathroom, which means combining traditional art with modern design concepts. Patterns and colors that are unique in Shandong can be considered in the design, such as using plants and landscape patterns that represent Shandong culture. Based on respecting and inheriting Shandong art and culture, exploring innovation is the key to senior bathroom design. This includes not only modern interpretations of traditional elements, but also the use of new technologies and design concepts to improve the experience of the elderly. This design approach not only reflects respect for traditional

culture, but also demonstrates a deep understanding and care for the needs of the elderly.

### 2.2.1 History of Shandong art

Shandong, as one of the important birthplaces of Chinese history and culture, has a long and colorful history of art. Since ancient times, the region has been the focus of a multitude of cultures, which gives rise to unique and far-reaching artistic styles and forms.

For a study on the history of art in Shandong, Shi's (2023) research explained that the origins of art in Shandong can be traced back to the Neolithic period, with the earliest forms of art being mainly embodied in ceramics and jade. These early works not only showed exquisite craftsmanship, but also reflected the lifestyle and religious beliefs of the ancient Shandong people. During the Shang and Zhou periods, bronze and bronze art began to emerge, especially known for its fine bronze casting and decorative techniques. During the Qin and Han dynasties, Shandong's art style began to reflect more practicality and simplicity. The portrait stones and bricks of the Han Dynasty gave new life to Shandong art with their vivid depictions of people and precise lines. During the Tang and Song dynasties, Shandong's calligraphy and painting reached new heights, with landscape painting and figure painting being particularly prominent, which displays more subtle and profound artistic expression. During the Ming and Qing dynasties, Shandong art began to see more innovation and change based on inherited traditions. The artworks of this period paid more attention to the depiction of details, were more colorful, and also embodied more profound social and cultural connotations. Entering the modern era, Shandong art continued to develop in the mingling of tradition and modernity, thus forming unique regional characteristics and retaining the essence of classical art, while absorbing elements of Western art. Shandong's art history is an integral part of China's art history. From pottery and jade in the prehistoric period to the bronzes of the Qin and Han dynasties, to the calligraphy and painting of the Tang and Song dynasties, as well as the artistic innovations of the Ming and Qing dynasties onwards, each period had far-reaching impacts on the

development of art in Shandong and China as a whole. These art forms not only reflect the history and culture of Shandong, but also the evolution of ancient Chinese society and the inheritance of the national spirit.

### 2.2.2 Shandong artistic style

The design of senior bathrooms in this study is mainly carried out in Shandong Province. Therefore, in this study, the artistic elements embodied in the senior bathrooms refer to the artistic elements of Shandong Province. Yin's (2009) thesis "The Fusion of Tradition and Modernity - Research on the Inheritance and Innovation of Folk Art in Shandong Province" (2009) mentions that *"The culture and art of Shandong Province has the artistic characteristics of naturalness, celerity and colorfulness. It occupies an important position in Chinese culture"*. Culture and art are closely related to people's lives and change people's aesthetic concepts. The application of art in design can be understood as a cultural creation. Due to the inheritance and continuity of culture, culture has a profound influence on design, and plays a guiding role in the development of design to a certain extent. At the same time, this thesis also mentions that *"The art of Shandong Province has the characteristics of strict structure and proper simplicity; the patterns are mostly based on animals, plants and characters; the colors are warm and bright, elegant and simple, and the contrasts are strong. .. The art of Shandong Province is mainly divided into the following categories: painting(Figure 1), paper-cutting, weaving and embroidery, ceramics, architecture, and sculpture"*. Among them, painting(Figure2), paper-cutting(Figure3) and other aesthetically inclined categories have developed more smoothly in modern society. These disciplines are highly decorative and entertaining, these characteristics have been gradually strengthened in the current social development, and the transformation of values is natural. The inheritance and innovative development of the other three disciplines need to be further strengthened. Therefore, this study chooses the latter three artistic elements for research and design.



Figure 1 Gaomi Cashmere New Year's Paintings.

Source: <https://d.wanfangdata.com.cn/thesis/ChJUaGVzaXNOZXdTmJyMzA5MDESCFkxNTYxNzYyGggzODJ0ZGRhbw%3D%3D>



Figure 2 Rizhao Peasant Paintings

Source: <https://d.wanfangdata.com.cn/thesis/ChJUaGVzaXNOZXdTmJyMzA5MDESCFkxNTYxNzYyGggzODJ0ZGRhbw%3D%3D>



Figure 3 Folk paper cutting.

Source:<https://d.wanfangdata.com.cn/thesis/ChJUaGVzaXNOZXdTmJyMzA5MDESCFkxNTYxNzYyGggzODJ0ZGRhbw%3D%3D>

Layton et al. (2010) summarizes the social factors that have influenced the continued existence or development of traditional arts in Shandong Province. In the article, the author argues that traditional art in Shandong Province has a long history of centuries and uses many well-known symbols to represent local ideas, hopes and aspirations. Embroidery and hand-woven floral cloth are widely popular and closely related to people's daily lives. The Shandong textile technique known as "Lu brocade" also expresses people's good wishes for a prosperous future (Figure 4). Some scholars have argued that art has survived to the present day not only because of the inertia of tradition, but also the renewed economic value and cultural significance in today's Chinese culture. Therefore, elements of art and culture should be integrated into life and given new forms. Introducing traditional art and culture into senior bathrooms can increase the familiarity of the design, awaken people's awareness of preserving tradition, and bring art back to life.



Figure 4 Weaving in Shandong Province, China.

Source:[https://www.sohu.com/a/423050321\\_687828](https://www.sohu.com/a/423050321_687828)

Li (2017) examines the traditional folk culture of Lujin and its development. The article describes that the main feature of Lu brocade is the particularity of patterns and motifs, including pattern composition, high-toned and vivid color matching, and graphic symbolism (Figure 5). The author also pays great attention to the cultural background, modelling characteristics and emotional world of the brocade of Lu. He pointed out that the traditional art and culture of brocade of Lu are closely related to people's daily life and presents a strong folk-art characteristic. To promote the sustainable development of brocade in contemporary society, the application of brocade in various fields should be promoted, and new product ecology should be formed through the promotion of cross-border design, so as to continue the traditional cultural value. These literatures provide new ideas for the application of traditional art in design. Similarly, Xue et al. (2014) described the materials, patterns, and colors of traditional textiles from Shandong in their article "The Application of Folk Textiles from Southwest Lu in Modern Interior Design" (Figure 6). And they highlighted their innovative applications in interior environmental design. In the conclusion, they pointed out the challenges and solutions facing traditional culture, as mentioned above, to promote the industrial upgrading of traditional culture and art, release cultural creativity, and integrate them into modern life.





Figure 5 The process of making folk textiles.

Source: <https://www.scientific.net/AMM.587-589.427>

Shandong has a long coastline with the Yellow River running through it, thus forming an ancient cultural system centered on the Wen and Yi Rivers. Influenced by the regional source, the indigenous people of Shandong in the Paleolithic era had a close relationship with fish. He and Qiu's (2021) Shandong fish pattern modelling elements analysis, in which the Shandong fish plate fish pattern in the form of a typical head and tail rounded composition (Figure 6), identified as the embodiment of justice. The people's love of fish patterns has been passed down to the present day, and the significance of the different kinds of fish is also different. For example, the goldfish has a "gold and jade full of halls" of the beauty of the talk, so the goldfish symbolizes the "golden and jade full of halls," so the goldfish is the symbol of "full of gold and jade". For example, the goldfish has the beauty of "full of gold and jade", so the goldfish symbolizes wealth and status. The fish pattern of the carp is also known as the "fish algae pattern" in ancient times, which belongs to one of the "eight auspicious" patterns, and people will use items with fish scale patterns in their daily lives (Figure 7) to symbolize good fortune and smooth sailing.





Figure 6 Plate with fish motif, Shandong Province.

Source: [http://www.bjywxh.org.cn/html/2019/hyyy\\_0327/1451.html](http://www.bjywxh.org.cn/html/2019/hyyy_0327/1451.html)



Figure 7 Carp pattern pot.

Source: <https://mbook.kongfz.com/395962/5030469321/>

Moreover, traditional arts and culture in Shandong Province are not limited to handicrafts. Various kinds of decorations and traditional architecture are also an important part of local characteristics. Wang (2011) analyses traditional pottery fish motifs in Shandong province, which is an important part of local decoration and

aesthetics (Figure 8). Like textiles, ceramic fish is seen as an expression of regional cultural connotations and values. Gai (2018) mentioned the courtyard houses, seagrass house houses, stone buildings, and manor buildings in her article “Exploring the Design Methods for the Protection and Repair of Traditional Houses in Northern Shandong Province”, which has been studied by many scholars. However, the traditional houses studied by the author have not received much attention, and the author discusses the methods of preserving traditional houses today (Figure 9). The author suggests that *"material design is also an indispensable part of residential renovation. Material design mainly comes from people's visual and tactile sensations, which are dominant, and the focus of material design is on color, texture, and quality design. Color design is to protect the original style and characteristics of the residence, so the principles of 'similarity of main colors' and 'color harmony' should be followed.* This provides a principle for the bathroom interior design that follows in this paper. The earliest house in which the elderly lived was the house in the picture below. With the development of society, many traditional residential buildings have disappeared and been replaced by a block of high-rise buildings. Until today, traditional residential buildings in many places in Shandong have applied for architectural heritage protection.



Figure 8 Plate with fish motif, Shandong Province.

Source: [https://www.sohu.com/a/141798533\\_558426](https://www.sohu.com/a/141798533_558426)



Figure 9 Cases of traditional building renovation in Shandong province.

Source: <https://ojs.bbwpublisher.com/index.php/JARD/article/view/311/273>

Shandong is one of the birthplaces of Chinese traditional culture, and the elements of traditional art have profound connotations and cultural significance. Shandong culture is widely popular and closely connected with social life, with very distinctive national and regional characteristics. Lu brocade, fish patterns, and traditional architecture are popular representatives of local culture and art. These artistic elements reflect the traditional way of life of the people of Shandong Province. As times change, the carriers of art are constantly being mined and explored in various fields. When more traditional elements are integrated into life, they need to be constantly improved and researched. This thesis aims to select some art representatives of Shandong Province, dig deep into the cultural significance behind them, explore the communication links between them and sanitary ware design, and try to analyze the inheritance and development of Shandong art from the perspective of design.

### 2.3 Color theory of aesthetics

Color has a strong stimulating effect on human emotions, human personality and nervous system, and the good use of color can make people feel happy, grasp the master-slave relationship of color matching, pay attention to the reasonableness of product color matching, and pay attention to the coordination of products. Ru (2020) in the context of aging based on the optimal design of barrier-free bathroom research that warm bathroom facilities can improve the elderly's ability to resist disease and immunity,

but also accelerate blood circulation, red, yellow, orange is very suitable for the frail and sickly old people, and the cold tones can also play a role in pacifying their own emotions, which is conducive to the health of the elderly.

Designers believe that the elderly will experience memory loss and reduced sensitivity to color to varying degrees. In bathroom remodeling, the interface between the floor and wall can be highlighted through color contrast to help the elderly with spatial cognition. Usually red or yellow is easier for the elderly to recognize. Attention should also be paid to the vibrancy and saturation of the colors to achieve a comfortable and harmonious effect.

#### **2.4 Older people's sense of well-being and belonging.**

According to Sedikides et al. (2004), older adults' sense of belonging and well-being is closely related to their memories of the past and feelings of nostalgia. This study examines in detail the psychological mechanisms and emotional components of nostalgia and how it plays a role in older adults. Nostalgia is more than just a memory of the good old days, and it is a complex emotional experience that contains positive emotional components and a warm nostalgia for the past. This sense of nostalgia can help older people find a psychological comfort and a sense of belonging in the face of uncertainty and loneliness in their lives.

Nostalgia plays an important psychological and emotional role among older persons. It not only helps to strengthen personal identity, but also enhances the sense of belonging to cultural traditions and communities. By recalling past experiences and relationships, older persons can find continuity and meaning in life through nostalgia, thus enhancing their sense of well-being and life satisfaction. In addition, nostalgia can also serve as an emotional resource to help older persons cope with real-life challenges, such as health problems, loss of loved ones or changes in social roles.

Sedikides et al.'s (2004) study highlights the key role of nostalgia in the mental health and emotional well-being of older people, which reveals the importance of nostalgia in enhancing older people's sense of belonging and well-being. Nostalgia plays a key role in the mental health and emotional well-being of older adults. Through

nostalgia, older people are not only able to relive the good times of the past, but also find support and comfort in their current lives, thus enhancing their sense of belonging and well-being.

## 2.5 Principles of bathroom design for the elderly

Bathroom is an area that is considered very private, and art plays an important role in fine bathroom design. Deardorff and Birdsong (2005) argue that "a continuing trend in residential construction and remodeling has created a more intimate area and the role of art in fine bathroom design. In "Strategies for Working with Artists", they argued that *'a continuing trend in residential construction and remodeling is to personalize kitchen and/or bathroom design aesthetics to better reflect the tastes and needs of the client'*. Therefore, for seniors, a bathroom that meets their multidimensional needs is the right bathroom for them. Artistic elements in bathroom design can take many forms, such as paintings, photographs, and sculptures. As stated in the above article, there are many different materials that can be used in the bathroom design process, such as stained glass, murals and frescoes, faux finishes, patterns, mosaics and painted floor coverings. The type, style and theme of artwork varies in different design schemes. A high-gloss look, brilliant colors, natural patterns and quality materials can make bathroom interior a great space to experience a high-quality lifestyle.

Art can create a cozy and welcoming atmosphere and provide a better experience of use. Arpen (2015) analysed the fascination with the bathroom in eighteenth-century France by examining paintings, sculpture, printmaking, interior architectural spaces, and various other works of art, and the author analysed the eighteenth-century French fascination with the bathroom from an artistic perspective. At the same time, the authors focus on the relationship between the artistic design of the bathroom and the individual's sensory experience. They mentioned that *"well-documented examples go far beyond basic necessities; they are luxurious and richly decorated spaces designed to provide a sensory environment for the enjoyment of the bather and for presentation to guests"*. Art can mobilize a new awareness of the body, bring cultural and aesthetic aspects to the table, and make people feel more pleasant



and relaxed. For example, to create a warm and welcoming atmosphere, designers can add soft colors and patterns to the walls or use vibrant flowers and plants to enhance the sensory experience for the elderly.

With the development of the times and the advancement of technology, as an important element of bathroom design, art not only promotes the physical and mental health of the elderly, but also enhances their mood and experience, which provides them with a comfortable and pleasant environment. As mentioned by some scholars, bathrooms with artistic elements have become places that satisfy the physiological and aesthetic needs of individuals to a certain extent. As a result, bathrooms are no longer just for hygiene, and many have come close to becoming nurturing spaces for mind and body with aesthetic elements. For older persons, such spaces can truly enhance their quality of life.

## **2.6 Research on related literature domestic and abroad**

### **2.6.1 Abroad**

Abroad, research on bathroom design has focused on creating a space that combines art and comfort. Cho and Lee (2017) focused on flat bathroom design with the aim of reducing the risk of falls and increasing the self-reliance of older people. The study focused on analyzing the main causes of falls in older adults and proposed a series of targeted design strategies. These include, but are not limited to, the choice of flooring materials, anti-slip measures, proper layout of grab bars and handrails, and the provision of emergency call facilities. The study also highlights the importance of lighting in bathrooms and how operational complexity can be reduced by simplifying the design. The work of Cho and Lee (2017) provides practical guidance for improving the safety and independence of bathroom use for older people. Afifi et al. (2015) conducted a systematic study to explore the reduction of the risk of falls in bathrooms for older adults. They analyzed the main causes of falls in bathrooms for older adults by reviewing a large body of literature and made specific design recommendations based on these findings. The research recommendations included appropriate lighting, accessible entrances, the installation of grab bars and handrails, the use of sliding doors, and the

installation of emergency call systems. In addition, they discussed the importance of material choices, such as the use of non-slip floor tiles and easy-to-clean surfaces. This research is valuable in understanding how to integrate functionality and safety in design to meet the needs of older adults.

### 2.6.2 Domestic

In China, research on bathroom design has focused more on meeting the specific needs and cultural contexts of older people. Zheng (2015) provided an in-depth analysis of the use behavior of public bathroom space in elderly facilities in *Research on the Use Behavior and Design of Public Bathroom Space in Elderly Facilities*. This study presents design recommendations for improving public bathroom spaces based on observations of the behavioral patterns and needs of elderly facility users.

Zheng (2015) emphasized the humanization and personalization of design, and argued that design should take the physical and mental characteristics and personal habits of older persons into full account. She also pointed out that good design should be able to promote the physical health and social interaction of older people while ensuring safety and privacy. In her doctoral thesis, *Research on the Design of Public Bathing Spaces in Elderly Facilities* (Zhong, 2013), Zhong (2013) conducted a comprehensive study on the design of public bathing spaces in elderly facilities. The study focused on exploring how design can enhance the experience of older people using public bathing spaces. Zhong (2013) proposed a series of innovative design concepts, including improving spatial adaptability, enhancing safety, and optimizing environmental ambience. Her research highlighted the importance of considering the physical limitations and psychological needs of older people in the design process and suggests specific ways to incorporate these considerations into actual design practice. In terms of domestic government policy, Shandong Provincial Department of Civil Affairs (2021) issued "Shandong Province: Focus on cracking the problem to create a model for improving the quality of nursing home services," which proposes to promote the commissioning and operation of private nursing institutions as well as public-private nursing institutions, and invested nearly 1 billion yuan in classified rectification. As

China's aging is increasing, more elderly people choose to go to the nursing home life, but the elderly facilities still need to be improved. In recent years, the Shandong government has increased financial support for nursing home facilities for the elderly, which can improve the quality of life of the elderly, so that the elderly can not only eat, wear and warm, but also the pursuit of spiritual needs.

In summary, although there are differences between domestic and foreign studies on bathroom design for the elderly, the common point is that they all emphasize the creation of a safe, comfortable and artistic environment. Whether it is the artistic design in foreign countries or the cultural and safety considerations at home, they all reflect a deep understanding of and respect for the needs of the elderly. The government of Shandong Province has issued a policy to give high priority to nursing homes as well, so that elderly people who live in nursing homes can be cared for.

## 2.7 Summary

Traditional arts have been unearthed and created over thousands of years and are the crystallization of the wisdom of the Chinese nation. Shandong is also known as "Qilu Land", and the folk traditional art has a profound precipitation and accumulation. The rich and colorful contents and connotations have formed unique artistic and cultural characteristics. In the long history, some of these arts have been preserved, and some have been integrated into buildings, books, festivals, etc., thus making great contributions to the inheritance of Chinese culture. In terms of interior design, the introduction of traditional art and cultural elements is a thoughtful initiative that can achieve both cultural heritage and creative design, thereby truly realizing the integration of art and life.

Characterized by its historical depth and cultural heritage, Chinese art emphasizes harmony and balance, which reflects the Yin-Yang and Five Elements theory of ancient Chinese philosophy. Its art style seeks harmony and unity in form, color and spatial layout in various forms, such as architecture, painting and sculpture. In addition, the concept of nature in Chinese art, especially prominent in landscape painting and garden design, reflects reverence for and imitation of nature. Calligraphy



and painting, as its most representative art forms, emphasize mood and rhythm with distinctive lines and ink colors. The close connection between Chinese art and daily life is reflected in traditional crafts, such as ceramics, brocade, and lacquer ware, which finds a perfect balance between practicality and beauty. As an important part of Chinese art, Shandong art has deep historical roots and unique regional characteristics. From the pottery and jade of the Neolithic period to the bronze and bronze art of the Shang and Zhou periods, to the artistic styles of the Qin and Han periods, which emphasized practicality and simplicity and beauty, Shandong art has evolved through the ages. During the Tang and Song dynasties, Shandong's art of calligraphy and painting reached its peak, especially in landscape painting and figure painting, which demonstrated a delicate and profound artistic expression. After the Ming and Qing dynasties, Shandong art injected innovation and change into its tradition, which paid more attention to detail and the use of rich colors. In modern times, Shandong art continued to develop, thus forming a unique regional characteristic that blends traditional and modern elements.

Incorporating Shandong art elements in senior bathroom design means combining traditional art with modern design concepts. This not only shows respect for traditional culture, but also demonstrates a deep understanding and care for the needs of the elderly. By using patterns and colors unique to Shandong, such as plants and landscape patterns representing Shandong culture, a bathroom space that is both safe and regionally and culturally distinctive can be created.

As we age, the mobility of the elderly is restricted. Therefore, people should pay attention to their physical and mental health in many ways. The bathroom is both an important and troublesome space that has great impacts on the quality of people's daily life. Therefore, designers need to consider the daily needs of the elderly when designing, such as the height of door handles and the direction of door opening. In the bathroom space, attention should also be paid to anti-slip, and safety handrails need to be installed in some special places. In terms of the color and lighting of the entire bathroom space, the eyesight of the elderly is poor, so the space lighting design needs

to choose soft and bright lights. The above literature fully illustrates the factors that need to be considered in the design of senior bathroom, which provides a lot of reference and help for the subsequent design of this thesis. In addition, in order to improve the living environment of nursing homes, Shandong Province issued a financial policy, which plays a vital role in the construction of nursing homes. The investment of government funds ensures the implementation of the environmental renovation of nursing homes, which plays a vital role in the construction of nursing homes.

The aim of this study is to provide analysis and design solutions for the design of elderly toilets, and to provide design references for the practical application of elderly toilets in nursing homes and other institutions.



## CHAPTER 3

### RESEARCH METHODOLOGY

This study uses mixed methods. There are qualitative research and quantitative research to help the researcher design a senior citizen bathroom with Shandong characteristics. The researcher determined the design style and needs of senior bathrooms with the characteristics of Shandong through the two research methods of "questionnaire survey" and "in-depth interview".

#### 3.1 Research design philosophy and objectives

Researching design concepts and goals is an essential step in the process of designing for specific scenarios and problems. In senior bathroom design, it is important to identify design concepts and goals to better meet the needs and challenges of older adults.

Design concept refers to the value goal pursued by the designer, which reflects the designer's understanding and knowledge of the design object and the expectation of the design effect. In the design of senior bathroom, the design concept should focus on providing emotional value to the elderly in their later life and integrating Shandong art into the bathroom design, so that the elderly can have a sense of intimacy and awaken the previous memories, so that the elderly have a sense of affection, and as if returning to the previous time, so that the elderly can have the warmth of home in the nursing home and feel a sense of well-being and a sense of belonging, taking the simplicity of ease-of-use, comfort and warmth into account.

Design objectives, on the other hand, are clear and specific practical goals that define the goals and requirements of the design in terms of key functions and performance. In the case of senior bathroom design, the design objectives should include improving usability and operability, ensuring the physical health and safety of older people, and minimizing the risks and challenges associated with bathroom use. During the design process, design concepts and objectives need to be integrated with the actual needs of older people and validated and optimized through questionnaire

research and in-depth interviews to continuously improve the usability and sustainability of the bathroom. The design of senior bathrooms needs to be clear about design concepts and goals, focus on practicality and sustainability, and be able to be optimized and improved according to the actual needs of the elderly.

### 3.2 Designing the process.

1. Determine the design objectives: First of all, we should clarify the design objectives of the senior bathroom, give full consideration to the elderly sentiment for Shandong art, design the bathroom space that meets the mood and needs of the elderly, and improve the quality of life and safety of the elderly and so on.

2. Conduct research studies: Questionnaires and in-depth interview studies can help understand the elderly sentiments towards Shandong art, bathroom needs, and so on. This can provide valuable guidance for the design. A site visit was conducted to the nursing home in Dezhou City, Shandong Province, and the survey data were collated as a basis in the later design.

3. Developing a design programme: According to the results of user research, a design programme that meets the needs of the elderly was developed. The design scheme should include focusing on the artistic sense of the bathroom space, creating a bathroom space with artistic aesthetics through the layout of the bathroom and the modelling of the facilities, color matching and other aspects.

4. Identification of equipment and materials: Once the design is complete, it is necessary to identify equipment and materials such as non-slip flooring, easy-to-grip handles, ventilation, etc.

5. Multifaceted decision-making: The process of developing design programmes and selecting equipment and materials ensured that the needs of older persons are met as far as possible.

6. Costing: After determining the equipment to be purchased, the construction cost of a single bathroom was calculated on an economic level to facilitate decision-making at the nursing home level.

In short, the design process of elderly toilets needs to go through several stages, such as investigation and research, formulation of design plans, and selection of equipment and materials. In terms of the needs of the elderly, the layout of the bathroom should be in line with the needs of the elderly, considering that the elderly sit in cubic toilets, and it is appropriate to set up handrails to ensure safety and reduce the occurrence of accidents.

### **3.3 Research Sample and Data Collection**

#### **3.3.1 Research sample**

A total of 80 questionnaires were issued and distributed to the target group through online means. Out of these 80 distributed questionnaires, 80 valid questionnaires were returned.

#### **3.3.2 Data collection**

Fieldwork: The field visit to the nursing home in Dezhou City, Shandong Province helped the researcher to understand the needs of the elderly for bathrooms. Based on the results of the design study, fieldwork on senior bathrooms is needed for domestic senior bathrooms in Dezhou City, Shandong Province.

Literature Analysis: Literature on senior bathroom space design was reviewed through authoritative websites such as Wanfang and Wipu. By analyzing, collating, and summarizing the literature, enough theoretical support is provided for this study. Combined with the existing research results about Shandong nursing homes, more attention should be paid to the theories of Shandong art, senior bathrooms, and aesthetics, etc. This paper focuses on the emotional needs of the elderly. In addition, the architecture and decoration with local art style are also the unique features of bathroom space design in Shandong Province.

### 3.4 Framework of the research question

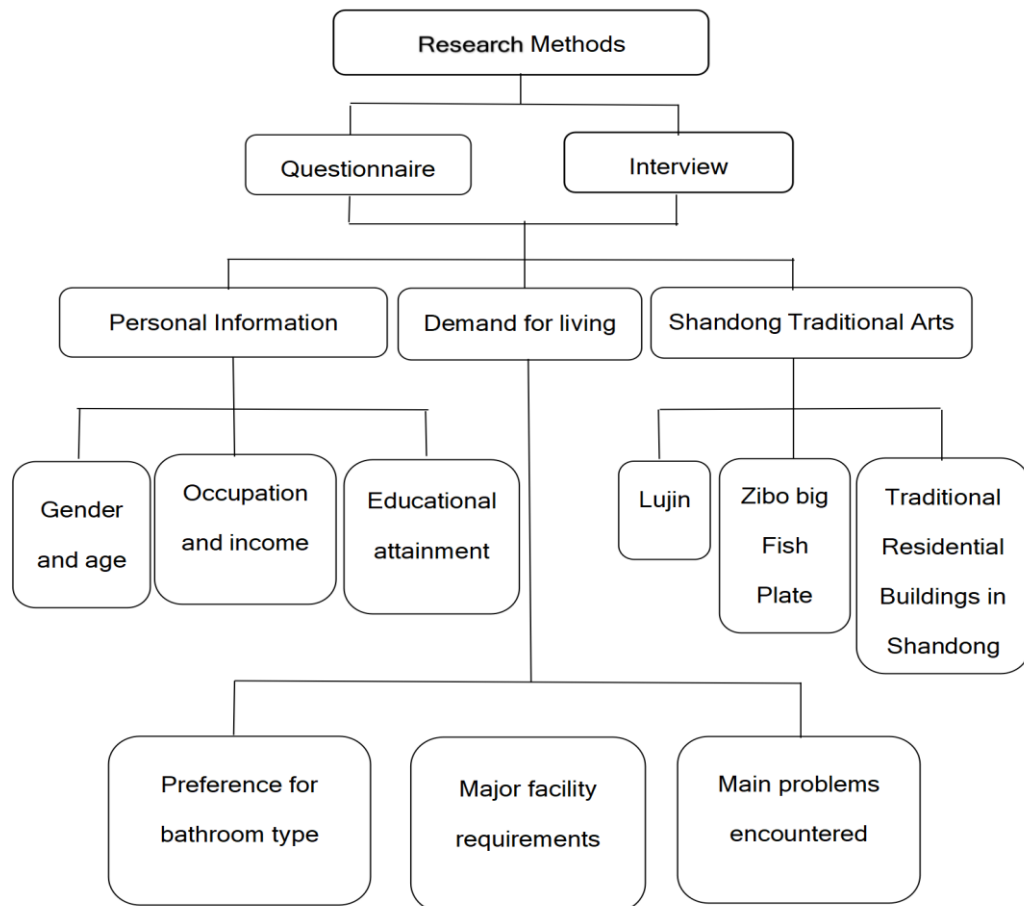


Figure 10 Framework of the research question

Source: By Researcher

### 3.5 Questionnaire

Questionnaire for Dezhou Sanatorium, Shandong Province.

Dear Grandparents: Hello! I am a postgraduate student at Sina Karin Willow. Taking part in this survey will keep your personal information confidential and you can choose as you see fit, thank you very much for your participation.

### Part I: Basic Personal Information

1. What is your gender?
  - Male  Female
2. Your age?
  - 60-70  70-80  Over 80
3. What is your salary?
  - Less than 1000 RMB  1000~2500
  - 2500~4000  Over 4000RMB
4. What is your occupation?
  - Military  General Employees  Agency  Other
5. What is your education?
  - Middle school and below  High school/Junior high school
  - University  Bachelor's degree  Master's degree or above

### Part II: Life Needs

6. What types of bathrooms do older people need?
  - Traditional cultural identity  Modern  Clean
7. What types of premium bathrooms do you use?
  - Pool bathroom  Shower room
8. What equipment is in the bathroom?
  - Water heater  Bathtub heater  Lighting fixtures  Showers
  - Sink  Mirror  Towel rack  Toilet seat  Basin
  - Ventilation fan  Bathtub
9. What do you think would be a more appropriate form of lighting in a fancy bathroom?
  - LED lighting  Warm yellow lighting  White lighting
10. How do you usually go to the toilet?
  - Walking without external assistance
  - Walking with crutches or railing or other assistance
  - Need the help of a wheelchair

### Part III: Shandong Art

11. What do you think is the representative of Shandong art?  
 Zibo big fish plate - fish scale  Traditional residential architecture of Shandong  Lu brocade
12. Do you agree that Chinese art should be incorporated into senior bathrooms?  
 Agree  Usually disagree
13. What are your favorite colors in Shandong art?  
 Red  Orange  Purple  Yellow

### Appendix II

#### In-depth interview questions

#### Part I: Personal Information:

1. Your age?
2. When did you start working in the field?

#### Part II: Life requirements

1. What do you think designers are looking for in a premium bathroom?
2. What are the characteristics of most premium bathrooms nowadays?
3. As a designer, how to improve the bathroom to better accommodate older people life?
4. As a designer, what design do you think need special attention in a retirement bathroom?
5. What suggestions do you have for the design of elderly bathrooms?
6. How do you see the wattage of lighting, as important in bathroom design?

#### Part III: Shandong Art:

1. As a designer, what do you think are the strengths of Shandong art?
2. How do you feel about the use of Shandong art in bathrooms for older people?
3. Which color or pattern do you think would work best in an older person's bathroom?



## CHAPTER 4

### DISCOVERIES

#### 4.1 Analysis of information from the questionnaire

Although there are a certain number of studies on senior bathroom spaces at this stage, most of them do not form a complete system of research. This chapter focuses on analyzing the actual needs of senior bathroom spaces. Through a series of questionnaires and in-depth interviews, it was necessary to categorize and generalize a wide range of older people and to study their living needs and daily activity habits in order to more accurately define the dimensions of the older person's experience in the bathroom space.

This study used a combination of questionnaires and in-depth interviews to do a summary and analysis of the questionnaire results and interview results. The questionnaire was divided into three parts: personal information, life needs, and traditional art and culture of Shandong by classifying and summarizing different types of elderly people to gain a comprehensive understanding. The content of the questionnaire is as follows:

Preliminary collation and generalization of the large amount of data and information were obtained from the survey to identify patterns, concentration and dispersion of such information. This is mainly done with the help of statistical quantities expressed in various data, such as means, percentages, and so on. In this analysis, frequency statistics were mainly used to conduct descriptive analysis of the 13 items of the "Questionnaire on Nursing Homes in Dezhou City, Shandong Province". In particular, the frequency statistics were conducted after multiple responses were made for the multiple-choice question of item 8.

Table 1 Gender

options (as in computer software settings)	Total number of persons	Per cent
Male	45	56.25 per cent
Women	35	43.75 per cent
(Grand) Total	80	100.00 per cent

As can be seen from Table 1, the total number of people in the survey was 80, of which 45 were men (56.25 per cent) and 35 were women (43.75 per cent), which was a more even ratio between men and women.

Table 2 Age

Options (as in computer software settings)	Total number of persons	Per cent
60-70	51	63.75 per cent
70-80	26	32.50%
80 or more	3	3.75 per cent
(Grand) Total	80	100.00 per cent

From Table 2, we can understand that a total of 80 people participated in this survey. The number of people aged 60-70 years old 51 accounted for the total number of people 63.75 per cent; the number of people aged 70-80 years old 26 accounted for total number of people 32.50 per cent; the number of people aged 80 years old and above 3 accounted for total number of people 3 per cent. It can be seen that most of the questionnaire for the 60-70 years of age of this body accounted for more than 60 per cent.

Table 3 Salaries

Options (as in computer software settings)	Total number of persons	Per cent
Less than 1000 RMB	11	13.75 per cent
1000~2500	11	13.75 per cent
2500~4000	47	58.75 per cent
Over 4000 RMB	11	13.75 per cent
(Grand) Total	80	100.00 per cent

11 accounted for 13.75% of the number of people surveyed. The number of people with RMB 2,500~4,000 was 47, accounting for 58.75% of the number of people surveyed, and the number of people with more than RMB 4,000 was 11, accounting for 13.75% of the number of people surveyed. The results of the survey showed that the majority of the population of the nursing home has a salary of RMB 2,500~4,000, which is more than half of the total.

Table 4 Occupation

Options (as in computer software settings)	Total number of persons	Per cent
Military personnel	10	12.50%
General staff	15	18.80 per cent
Office	50	62.50%
The rest	5	6.30 per cent
(Grand) Total	80	100.00 per cent

Table 4 shows that, in terms of occupation, 10 or 12.50 per cent are military personnel, 15 or 18.80 per cent are general employees, 50 or 62.50 per cent are employed in institutions, and 5 or 6.30 per cent are others, which means that most of the surveyed population, including the yanks, are employed in institutions.

Table 5 Level of education received.

Options (as in computer software settings)	Total number of persons	Per cent
Below secondary	42	52.50 per cent
High school/junior high School	21	26.25 per cent
Universities	10	12.50%
Postgraduates	5	6.25 per cent
Master's degree or above	2	2.50 per cent
(Grand) Total	80	100.00 per cent

In terms of educational attainment, Table 5 shows that 42 or 52.50 per cent are below secondary school, 21 or 26.25 per cent are high school/junior high school, 10 or 12.50 per cent are university students, 5 or 6.25 per cent are postgraduate students, and 2 or 2.50 per cent are masters or above students. 5 (6.25 per cent) and 2 (2.50 per cent) for those had a master's degree or higher, which means that more than half of the students have less than a secondary school education.

Table 6 What kind of bathrooms older people need.

Options (as in computer software settings)	Total number of persons	Per cent
Modernity	26	32.50%
Traditional cultural identity	33	41.25 per cent
Neat and tidy	21	26.25 per cent
(Grand) Total	80	100.00 per cent

In particular, a survey was conducted on what kind of bathrooms this group needs, and the results showed that the number of people choosing the modern option was 26 with a ratio of 32.50 per cent, the number of people choosing the option of traditional cultural features was 33 with a ratio of 41.25 per cent, and the number of people choosing the option of cleanliness and tidiness was 21 with a ratio of 26.25 per

cent, which showed that the bathrooms with traditional cultural features are more popular with the elderly.

Table 7 What type of fancy bathrooms you have used.

Options (as in computer software settings)	Total number of persons	Per cent
Swimming pool bathtubs	20	25.00 per cent
Shower bathtub	60	75.00 per cent
(Grand) Total	80	100.00 per cent

The results of the survey on what type of senior bathrooms were used were 20 or 25.00 per cent for the swimming pool tub option and 60 or 75.00 per cent for the shower tub option, which shows that, for most of the nursing home audience, there are more people choosing the shower bathtub.

Table 8 What equipment would you like to have in the bathroom.

Options (as in computer software settings)	Total number of persons	Per cent
Water heaters	6	2.96 per cent
Bathtub heaters	8	3.94 per cent
Lighting	28	13.79 per cent
Shower	29	14.29 per cent
Sinks	26	12.81 per cent
Mirrors	27	13.30 per cent

Table 8 (Continued)

Options (as in computer software settings)	Total number of persons	Per cent
Towel rack	8	3.94 per cent
Toilet seat	12	5.91 per cent
washbasin	25	12.32 per cent
Ventilation fan	23	11.33 per cent
Bathtubs	11	5.42 per cent
(Grand) Total	203	100.00 per cent

For the question of what equipment is in the bathroom, the cumulative number of times each option was selected was 203, of which, the number of times each option was selected. The proportions are as follows: Water heater option was selected 6 times, accounting for 2.96 per cent; the bathtub heater option was selected 8 times, accounting for 3.94 per cent; the lighting fixture option was selected 28 times, accounting for 13.79 per cent; the shower option was selected 29 times, accounting for 14.29 per cent; sink option selected 26 times or 12.81 per cent; mirror option selected 27 times or 13.30 per cent; towel rack option was selected 8 times or 3.94 per cent; toilet seat option was selected 12 times or 5.91 per cent; washbasin option was selected 25 times or 12.32 per cent; ventilating fan option was selected 23 times or 11.33 per cent; bathtub option was selected 11 times or 5.42 per cent. As can be seen from the fact, the common bathroom fixtures are lighting fixtures, shower, sink, mirror, and washbasin.

Table 9 Which form of lighting do you think is more appropriate.

Options (as in computer software settings)	Total number of persons	Per cent
LED lighting	29	36.25 per cent
Warm yellow lighting	37	46.25 per cent
Whiteout	14	17.50 per cent
(Grand) Total	80	100.00 per cent

So, which form of lighting is more appropriate and popular? From Table 9, we can know that the number of supporters of LED lighting is 29, accounting for 36.25 per cent, the number of supporters of warm yellow lighting is 37, accounting for 46.25 per cent, and the number of supporters of white lighting is 14, accounting for 17.50 per cent, which concludes that the majority of the people think that warm yellow lighting is more appropriate.

Table 10 How do you usually go to the toilet.

Options (as in computer software settings)	Total number of persons	Per cent
Walks without external assistance	46	57.50 per cent
Walking with crutches or rails or other aids	19	23.75 per cent
Need help in a wheelchair	15	18.75 per cent
(Grand) Total	80	100.00 per cent

For question 10, "How do you usually go to the bathroom?" 46 (57.50 per cent), 19 (23.75 per cent), and 15 (18.75 per cent) of the respondents chose to walk without external assistance, while 19 (23.75 per cent) chose to walk with crutches, rails or other aids, and 15 (18.75 per cent) chose to walk in a wheelchair, which indicates that walking without external assistance is the reality for the majority of the population in nursing homes.

Table 11 What do you think the representative of Shandong art is.

Options (as in computer software settings)	Total number of persons	Per cent
Zibo Big Fish Plate - Fish Scale	21	26.25 per cent
Traditional Residential Buildings in Shandong	14	17.50 per cent
Brocade	45	56.25 per cent
(Grand) Total	80	100.00 per cent

For the elderly in nursing homes, looking at the issue of the representative of Shandong art, there are different choices for different people. Zibo big fish plate, Shandong traditional residential architecture and the percentage of the option of the Lu Jin were 26.25%, 17.50% and 56.25%, which shows that for most of the elderly, more support for the Lu Jin is the representative of the art of Shandong Province.

#### 4.1.1 Basic information about the respondents Analyzed

After detailed analysis of the 80 valid questionnaires and data integration with factors, such as gender, age and education level, the questionnaires were comprehensively analyzed as follows.

Table 12 Analysis of gender preferences for bathrooms among older adults.

Preferences	Information analysis
Bathroom Preferences	Women prefer tidy bathrooms as compared to men.
Device Preferences	While both genders tend to favor basic bathroom fittings such as showers, washbasins, toilets and water heaters, women may be more concerned with additional fittings such as bathtubs or ventilation fans.
Lighting Preferences	Most women prefer warm yellow light to men.



Table 13 Analysis of bathroom preferences of older people of different age groups.

(A person's)	Information analysis
Age	
60-70	Seniors in this age group prefer modern and clean bathrooms. They use shower tubs more often, and most have independent use of the bathroom.
70-80	People in this age group are more likely to need canes or other aids to get into the bathroom, and they may prefer warm yellow lighting when choosing their lighting.
80+	Although the sample size is small, older adults in this age group are more likely to need complete care, and their bathroom needs may be different from those of the previous two age groups, requiring further study.

Table 14 Generic analysis of older people's preferences.

Other requirements	Information analysis
Bathroom Accessories	The fact that most older people's bathrooms are equipped with basic fittings shows a general trend towards a clear need for basic bathroom fittings.
Lighting Options	LED lighting and warm yellow lighting were popular amongst all respondents, which indicated a general demand.
Artistic integration	The majority of respondents favored the incorporation of Chinese art into fine bathroom design, which may be a generally accepted design trend.

By integrating gender, age, and generalized data, researchers can gain a more comprehensive understanding of what older people want from their bathroom space, which will help to more accurately provide design recommendations that meet the needs of older people.

By analyzing the urgency with which older people demand bathroom space, it is possible to see the importance they place on various needs. This provides designers with valuable information on how to optimize bathroom design to meet the actual needs of older people. By gaining a deeper understanding of these needs, designers can better position their design strategies to create bathroom environments that are both practical and aesthetically pleasing. Therefore, the design strategies in this paper should focus on the following points:

**Enhanced functionality:** Considering the basic living needs of the elderly, the design of the bathroom should be simple and practical, aiming to avoid unnecessary decorations and complicated operations and ensure that all basic functions can be easily realized.

**Enhanced safety:** Considering that older adults may have mobility and balance issues, designs should include non-slip flooring, strong handles, and other safety features to ensure their safety when using the bathroom.

**Optimizing layout:** To ensure that older people can move around the bathroom with ease, the layout should be simple and intuitive, with items and facilities placed for easy access, aiming to avoid unnecessary crowding and clutter.

**Considering future changes:** The needs and abilities of the elderly may change as they age. In Shandong Province, older people prefer traditional art and culture. Designing a bathroom that combines functionality with traditional art based on older people's preferences is what older people want, and what the times demand.

Taking these analyses together, researchers can be convinced that bathrooms designed for older people should focus not only on functionality and safety, but also on aesthetics and comfort. To this end, the design should adapt the bathroom to ensure that it fully meets all the needs of older adults. As a result, researchers believe

that creating a bathroom space that is both safe and comfortable for older adults will allow them to enjoy every moment of their daily lives.

#### **4.1.2 Bathroom requirements of elderly people of different genders**

In design, one needs to give special consideration to these gender differences. For example, to meet women's higher needs for safety and comfort, one can enhance anti-slip designs in bathrooms, focus on material choices, and provide more personalized services. By understanding and analyzing the situation, one can better define the design direction of this paper to ensure that it meets the basic needs of older people while providing a more gender-specific and humane design.

#### **4.1.3 Analyzing the demand for bathrooms by different age groups of the elderly**

As they age, seniors become less fit, which leads to a reduced need for bathroom space. Some seniors may face mobility and balance issues, thus making safety in the bathroom an added concern. For such seniors, accidents such as slips and falls can become a hidden danger in their daily lives, hence the urgent need for bathrooms with safety features.

It is worth noting that the aesthetics of the elderly may change. As they grow older, some seniors may feel psychologically isolated and therefore have an increased need for color. Warm and pastel colors can bring comfort and psychological solace to the elderly in terms of their visual senses. Therefore, when designing a bathroom space for the elderly, it is important to consider their aesthetic preferences and create an atmosphere that makes them feel warm and happy.

In the questionnaire survey, the researchers interviewed 80 elderly people of different ages. 32.5 per cent of the elderly preferred modern bathroom decorative styles, while 41.25 per cent preferred bathrooms with traditional cultural features, and bathrooms using traditional cultural elements were more acceptable to the elderly. In addition, bathroom design is flexible and adaptable to meet the needs of different age groups, aiming to ensure that their changing needs and aesthetic preferences are met.

It is important to consider the differences in safety and mobility needs of older people with different levels of self-care ability, and to provide them with a more caring and appropriate bathroom space. To further validate the above argument, the researchers conducted a survey on the bathroom space needs of elderly people with different levels of self-care ability. The results of the survey showed that 23.75 per cent of the elderly needed partial care and 18.75 per cent needed complete care. This shows that most of the elderly people are living well. However, in the bathroom or to the elderly data further proves that for the elderly people with different self-care ability, the focus of the bathroom design should be different. For older people with higher self-care abilities, one can incorporate more aesthetically pleasing and comfortable elements into the design, such as the red walls chosen for this paper, which not only creates a serene environment for them, but also provides a cultural connection. At the same time, to meet the needs of the elderly who are less able to take care of themselves, people can also specially design automatic dryers and devices that automatically adjust the height of the shower to ensure their autonomy and safety in the bathing process. Combined with the data analysis, the design strategy becomes clearer: For the elderly with poor self-care ability, functionality and safety should be the top design priority, while for the elderly with better self-care ability, the aesthetics and comfort of the space should not be neglected.

In short, by analyzing the data of elderly people with different self-care abilities, the design is more detailed and targeted, aiming to provide every elderly person with a safe and comfortable bathroom experience.

#### **4.1.4 Analysis of Shandong Art**

Shandong traditional art is the soul of a nation and the crystallization of human wisdom only in the pace of the times, and it continues to adhere to the inheritance of national art and culture, so that the traditional culture and modern life can be integrated to trigger resonance. Drawing on the wisdom and nutrition of Shandong traditional culture, we will continue to show the unique charm of traditional culture in the inheritance and development and display the beauty of Shandong traditional culture in an all-round and diversified form.

### (1) Analysis of Traditional Elements

After analyzing the data, the researchers found that 26.25 per cent of the elderly liked the architectural of Zibo big fish plate, 17.5 per cent liked the Traditional residential architecture of Shandong, and 56.25 per cent liked Shandong's intangible cultural heritage, the Lu brocade.

Elderly people in the home have rich experience and strong interest in culture and art. In the process of chatting with the elderly people, we learnt that many of them would use the old rough cloth of Lu Jin to make bed sheets and pillowcases, so it seems that Lu Jin has already been integrated into the daily life of the elderly people.

### (2) Color analysis

37.5% of the elderly favorite color is red. The study found that the elderly can avoid falling by making good use of red, because the elderly are more sensitive to bright colors such as red. When designing the bathroom, they may want to use more bright colors to reduce the risk of falling and improve the safety of the bathroom. In Shandong art, more like to use bright colors, Shandong likes to use complementary or contrasting colors to highlight the pattern. Dai Zhijuan (2023) Lunan folk color print fabric design mentioned in the extraction and application of factors, such as yellow and purple, red and green complementary colors, as well as red, blue and other contrasting colors of color collocation can stimulate people's emotions and inner feelings, and give people a strong emotional point of color. The application of color in design and different colors have different feelings towards people. After research, I will analyze that the different colors bring different feelings to people.

Warm colors can give people a warm and comfortable feeling, so that the elderly can feel the warmth and care of home.

The researcher believes that the symbolism and strong color scheme of auspicious motifs is an important carrier of Qilu traditional culture. It is like the character of Shandong people who are bold and straightforward without losing the delicate humor. This is the color that belongs to the folk, and this is the expression that belongs to Shandong.

#### 4.1.5 Summary

The in-depth analyses in this chapter yielded several key insights and conclusions that not only provide a deep understanding of the needs of older adults for bathroom spaces, but also point to key elements for future design directions. Firstly, this paper finds that older people's needs for bathroom spaces go far beyond basic functionality. They are more focused on safety, comfort, and ease of use. A finding emphasizes the importance of considering these factors when designing bathrooms. In particular, safety features such as non-slip flooring, strong handles, and simple and intuitive layouts are particularly important for older people. Secondly, the results of the questionnaire showed that Shandong art elements are highly attractive to the elderly. They believe that integrating Shandong art styles into bathroom design not only stimulates an emotional connection to the culture, but also enhances the comfort and aesthetics of the living environment. This points to a design concept that combines functionality with regional cultural characteristics. Further, factors such as gender, age and educational background have significant impacts on the needs of the elderly. For example, women prefer tidy bathrooms, while older people may need more aids and soft lighting. These nuances need to be properly considered and reflected in the design. It is also clear from the questionnaire survey that the aesthetic requirements of older people for their bathrooms should not be overlooked as well. They like bright colors and traditional artistic elements, which should be reflected in the design. For example, complementary or contrasting colors should be used to create a lively environment, while symbolic traditional motifs should be incorporated to enhance the emotional connection of the culture.

In summary, to meet the needs of older people, bathroom design should consider not only functionality, safety and convenience, but also aesthetic and cultural factors. This comprehensive design approach can create a bathroom space that is both safe and comfortable for the elderly, which allows them to enjoy the richness of culture and the beauty of art in their daily lives.

#### 4.2 Analysis of information from in-depth interviews

The interviewee is a young designer Dong Yu (Figure 14). He is a designer with a wide range of influences and outstanding achievements in the field of interior design. His career began 20 years ago and since then he has devoted his passion and expertise to interior design.



Figure 11 Interior Designer Dong Yu

Source: <https://www.biud.com.cn/news-view-id-757251.html>

He received his art education at the Lu Xun Academy of Fine Arts in Shenyang, where he laid a solid foundation on the path of art and design. After graduation, he chose to continue his studies at the Canondo Institute in France, specializing in interior architecture. There, he had the opportunity to study and work with some of the world's best designers and architects, and his design concepts and skills were deepened and enhanced. After completing his studies at Ecole Canondo, he travelled to the United States to work for B. Altman & Co. where he gained experience from front line practice in the industry and added practicality and foresight to his design philosophy. He also serves as an invited lecturer for the Architectural Design programme at the Shandong Academy of Fine Arts, where he passes on his design philosophy and experience to a new generation of designers. Throughout his career, Dong Yu has won numerous



awards for his design work. He has a unique design style and specializes in blending traditional and modern elements to create designs that are both artistic and practical.

He won the Circle Finalist Award of the China Interior Design Competition in 2006, and the Asia Pacific Interior Design Award for the Shogun Stone Hot Spring Hotel design (Figure 11) in 2014. In addition to this, he has also made a name for himself in several fields, including the 2015 National Residential Decoration and Renovation Industry Outstanding Design Award (Fig. 12), the 2nd China Nest Award Excellence Award in the Interior Design category in 2016, and the 2017 Kohler Cup China Interior Decoration Design Excellence Award.



Figure 12 Design Drawings

Source: <https://www.danzhoufdc.com/iy/118162/>

His papers and research have also been widely recognized in the industry. He has published several papers on the theory and practice of interior design, which provided valuable references for research and practice in the industry.

In short, Dong Yu has made significant achievements in the field of interior design through his expertise, artistic talent, and love of design. His works, papers, and



contributions to the field of design are a testament to his personal growth and professional success.



Figure 13 Design Drawings

Source: <https://www.danzhoufdc.com/iy/118162/>

Dong Yu is a renowned designer in the interior design industry and is widely recognized for his deep knowledge in the field of senior bathroom design. In the interview, he talks about his career, the design needs of senior bathrooms, and how to integrate Shandong art into senior bathroom design from a personal perspective. In the interview, Dong stated, *"I am 34 years old and have been working in interior design for nearly 20 years since I graduated from university."* He further explained, *"For the design of senior bathrooms, the first thing to consider is safety and practicality. Most of the current senior bathrooms are characterized by high functionality, simplicity and practicality, but sometimes comfort and artistry may be neglected."* He believes that *"To improve the design of senior bathrooms, the first thing to do is to fully meet the living needs of the elderly. In addition, designers should focus on choosing colors and patterns that are friendly to the elderly and consider how to use space, materials and technology to create a more comfortable environment."*

When asked about the use of Shandong art in bathroom design, Dong excitedly shared that "Shandong art has its own unique charm and style, and it represents a perfect blend of tradition and modernity. When designing bathrooms for the elderly, I would consider using some of the classic colors and patterns from Shandong art, such as sky blue, deep green or golden yellow, which are not only beautiful but also bring a sense of tranquility and comfort to the elderly." When asked about his attitude towards Shandong art, this is how he replied: "Shandong traditional art has styles due to the different cultural traditions, lifestyles and aesthetic habits of different countries and ethnic groups, and its formation often relies on long-established historical precipitation and conceptual refinement, and from this point of view, it is relatively stable. Of course, with the development of the times, changes in content are only manifested in the external form, and its essence is still relatively stable." As for the design needs of the elderly, he said that "Designers should pay careful attention to the needs of consumers, and the elderly need special care and note that appropriate advice can be given to the elderly, but it is still important to respect their choices and take care of their emotions while making the design the best it can be." (Figure 18)



Figure 14 Design of Dongwoo Superior Bathroom

Source: By Dong Yu

Through the interview with Dong Yu, people have a deeper understanding of his design concept and practical experience. His answers provide many new ideas and inspirations for bathroom design, as well as the possibility of a perfect combination of traditional art and modern design. Designers should also design for the benefit of the elderly and make design human-centered, which is a social responsibility that designers should undertake. In the future, designers should continue to improve their humanistic qualities, learn more about traditional Chinese culture, and analyze the environmental characteristics of the design object in a targeted manner, to design works that meet specific requirements. In addition to the basic design ability, the development potential of designers depends largely on the improvement of humanistic qualities, and the comprehensive cultivation of all kinds of humanistic knowledge can make designers go farther.

#### 4.3 Summary and analysis of interview and questionnaire results

Based on the content of the interview with Dong and the questionnaire previously conducted, the researcher compared the results of the two:

Table 15 Summary of Interview and Questionnaire Results

Collection methods	Different answers
Age and practical experience:	
Hunt for and collect	Dong says he is 44 years old and has been involved in interior design for nearly 20 years. As a graduate of a school, he likes to continue to enhance his own learning, and Dong said he also loves Chinese art and wants to continue to promote traditional Chinese art and culture.
questionnaire	Most of the elderly people are between 60 and 70 years old, and they grew up in an era when traditional Chinese art was distinctive, and the elderly witnessed the development of traditional Chinese art, which transcends time and space and is rich in timeless glamour.

Table 15 (Continued)

Collection methods	Different answers
Key features of senior bathrooms:	
Hunt for and collect	Dong emphasized that senior bathrooms are characterized by functionality and simplicity.
Questionnaire	In the questionnaire survey 32.5 per cent of the elderly chose modern style, 41.25 per cent favored traditional cultural features and about 26.25 per cent were clean and tidy. The elderly who love traditional Chinese culture are the most
Design improvements in senior bathrooms:	
Hunt for and collect	Dong believes that the focus should be on choosing age-friendly colors and patterns and considering how space, materials and technology can be used to create a more comfortable environment, put the feelings of older people first and try to meet their needs.
Questionnaire	In terms of the type of shower used, 75% of seniors chose a shower tub. Lighting fixtures, showers, sinks, mirrors and washbasins, the 5 most chosen items in the bathroom, are prioritized in the design of senior citizen bathrooms. More than half of the elderly can take care of themselves completely, 23.75% need partial care, and 18.75% need complete care. This shows that the majority of seniors are doing well, but the need for safety in the bathroom space is still a top priority.

Table 15 (Continued)

Collection methods	Different answers
Shandong art in bathroom design:	
Hunt for and collect	Mr. Dong highlighted the use of some of the classic colors and patterns of Shandong art in the design of senior bathrooms.
Questionnaire	Within Shandong traditional arts, 56.25% of the elderly like "Lu Jin", and in the color classification, the largest number of elderly like orange, accounting for 37.5%.

Focusing on the comparative results, Mr. Dong's views and the questionnaire survey show a high degree of convergence in some key areas, especially on the perception of the characteristics of the elderly washroom, the optimisation of its design and the use of Shandong's art. This undoubtedly confirms Mr. Dong's deep understanding and professional insight into interior design and bathroom space. In this study, a specific questionnaire was developed to obtain data. The questionnaire was carefully designed by the researcher to find out the needs and preferences of the elderly for bathroom design. The questionnaire covered three main elements: personal information, lifestyle needs, and traditional art in Shandong Province. Personal information included gender, age, economic status, occupation, and education level; and lifestyle needs explored the elderly choice of bathroom category, required equipment, and key reference factors. According to the survey responses, aesthetics and safety were seen as the primary considerations in the design of bathrooms for the elderly. Therefore, we suggested focusing on this during the design process, while incorporating Shandong art into the bathroom design to give it a sense of homeliness and care.

**Survey Reveals:** Survey participants were generally concerned about bathroom design style and safety. This finding prompts us to pay attention to the safety demands and mobility convenience of the elderly when planning bathrooms. In addition, the

results of the survey also showed that Shandong art elements have a deep appeal to the elderly population. According to the feedback from the elderly participants, bathroom designs that incorporate Shandong art styles can strengthen their cultural identity and enhance the comfort and aesthetic taste of their living environment.

#### 4.4 Field trips

The researcher went on a site visit to the senior bathroom and chose to take a scene to photograph the nursing bathroom, which is 7 square meters in size, and the actual situation is shown in the figure below.



Figure 15 senior bathrooms in Dezhou, Shandong Province Written by

Source: By Researcher

Table 16 Record of field visits

Research time:	2023.4.28
Bathroom area:	6 square meters
Separation of wet and dry condition of ventilation	No No ventilation equipment, poor state of ventilation
Whether the washroom has a light window	Yes
Height of washbasin	800mm
Availability of safety grab bars around the shower area	No
Whether the shower area has a non-slip finish	No

Table 16 (Continued)

Research time:	2023.4.28
Height of shower head in shower area	1900mm
Whether the bathroom has mirrors	Yes
Is the shower area damp-proofed	No
Whether the bathroom has Shandong art design style	No

Produced by the author

#### 4.4.1 Design faults

##### Problems with senior bathrooms

Through the data from the research, the author found the following problems within the bathrooms of senior citizen residences:

##### Spatial scale

Unsafe incidents caused by external environmental factors are more common in the bathroom of residential homes for the elderly, and the actual environmental conditions are indeed not optimistic. From the point of view of spatial scale, the bathroom has a large space, and the facilities are too dispersed, so that the elderly need to move during the process of grasping and leaning, and this is prone to cause accidents of straining and falling.

##### Layout

Nursing homes have not made the division of wet and dry areas, and the elderly are prone to slipping and falling when they finish bathing.

##### Ventilation and lighting

(1) The light in the bathroom is not adjustable. At night when the elderly go from a darker space to a brighter space, their vision cannot adapt quickly to the strong light, and they can easily fail to see the facilities around them, which may cause falls, scratches and collisions.



(2) There is no ventilation system installed in the bathrooms, and the elderly may suffer from physical discomfort caused by the high temperature in the bathrooms during summer bathing.

#### Anti-slip and anti-damping measures

Anti-slip devices in the shower area are not provided by the nursing home, and drainage and moisture control measures in the bathrooms are not yet satisfactory. Floors do not meet efficient drainage capacity and water absorption.

#### Safety handrails

(1) The shower area is the most prominent is the lack of safety handrails. Most of the elderly have said that it is easy to trigger the phenomenon of slippery feet. If there is no auxiliary safety handrails, in the standing position when the shower, the height of the shower head is inappropriate to increase the burden of bathing.

(2) The height of the washbasin is not suitable, as there is no safety handrail. The operation of standing and bending for a long time causes damage to the lower limbs and waist of the elderly, and the pressure on the waist and lower limbs is too great, which may trigger fainting.

### 4.5 Design Steps and Conclusion

According to the previous questionnaire survey, interviews, analysis of Shandong art and field visits, the designer gradually improved the design ideas and used 3Dmax to draw the design drawings.

#### 4.5.1 Bathroom floor plan

According to the measurement, bathroom size is  $6 \text{ m}^2$ . On the basis of this area, the bathroom was remodeled.  $2 * 3$  area based on the wet and dry separation was done.



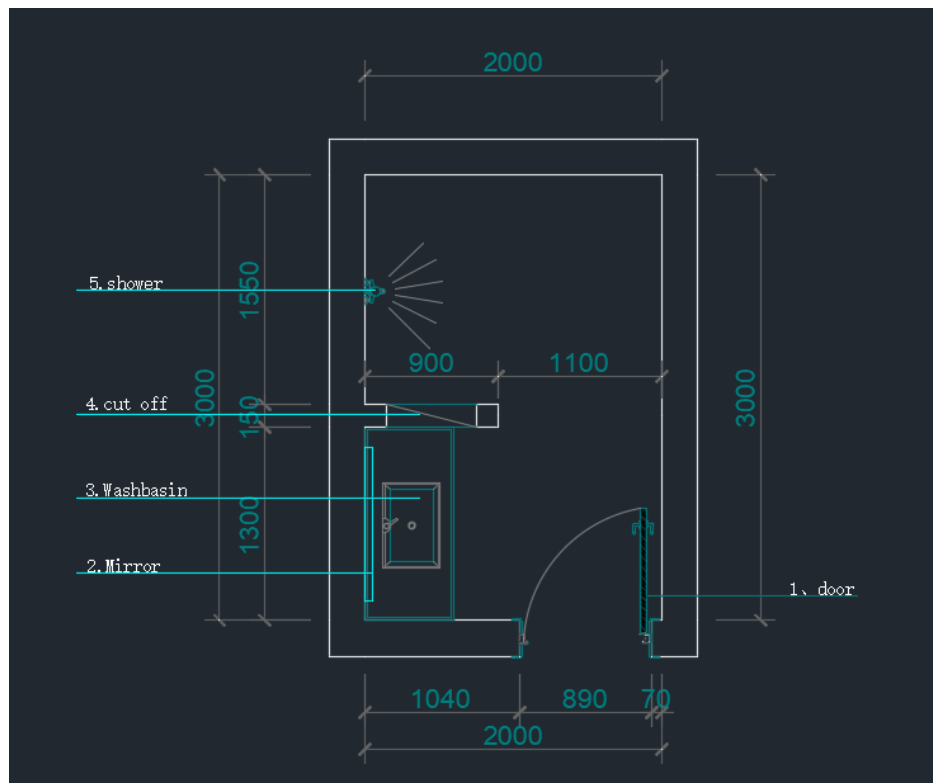


Figure 16 Bathroom Plan

Source: By Researcher

#### 4.5.1.1 Preparation for modelling

3ds Max is a much better choice with its intuitive interface and many powerful features. Before starting the modelling process, the design concept and needs of the pensioner's bathroom need to be clarified. In preparation, relevant reference materials need to be collected and modelling standards and specifications need to be developed.

#### 4.5.1.2 Basic modelling

Based on the image below, you can see the basic structure of the walls, floor and ceiling of the retirement bathroom created using the 3Dmax tool. First, a rectangle was created as the basic shape of the walls, then the rectangle was subdivided and adjusted using the Edit Polygon function to get smooth walls. For the floor, a flat surface was created and appropriate subdivisions were added. For the

ceiling, the Chamfer Profile feature was used to create detail and thickness. A suitable model was created. The model for later rendering was prepared.

#### **4.5.1.3 Materials and mapping**

Materials and textures were set for components, such as walls, floors and ceilings to add visual realism. You can find the material editor and choose the right material for each surface, choose masonry material for walls, add marble texture to floors and white paint for ceilings. More details and textures were added to the materials by mapping them to make the bathroom scene more realistic. A flooring material was chosen with good slip resistance, such as stone or non-slip tiles, and you need to make sure that the floor is dry and free of water damage.

#### **4.5.1.4 Lighting and rendering**

Lighting and rendering were set up to give the bathroom more dimension and realism. In this scenario, different types of lights can be used to simulate natural and artificial light. A directional light was added as the main light source and exclude function was used to exclude the bathroom fixtures so that they only illuminate the walls and floor. These lights were used to simulate lighting effects in a variety of situations. For rendering, the V-Ray renderer was selected and the parameters were adjusted to get a high-quality image. It was to ensure that the lighting in the bathroom is bright enough so that the older person can clearly see their surroundings.

#### **4.5.1.5 Design patterns**

The design obtained was inspired by the fish scale pattern on the body of the teapot, and the color used is red, which is preferred by the elderly. In Shandong culture, the fish scale pattern symbolizes happiness and good luck, as well as peace. Fish represents a sign of wealth and good fortune, so the fish pattern was applied to the design of the retirement bathroom to bring happiness and blessings to the elderly.

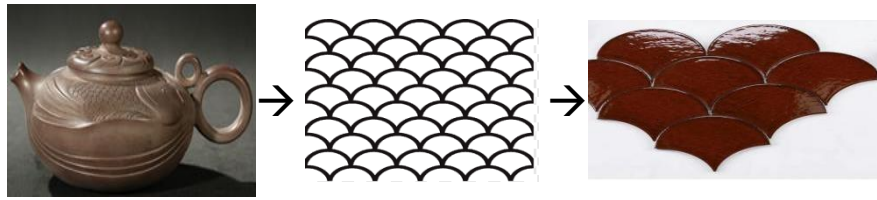


Figure 17 Origin of the motifs

Source: By Researcher

Shandong traditional residential buildings is the living environment of the elderly when they are young and unique style, and it is a beautiful landscape of traditional culture in Shandong Province. The wall has distinctive characteristics of the times, the stone barricade formed by the design of the wall used in the bathroom, the elderly will have a familiar feeling, as if the time back to the time when they were young, so that a sense of affinity.

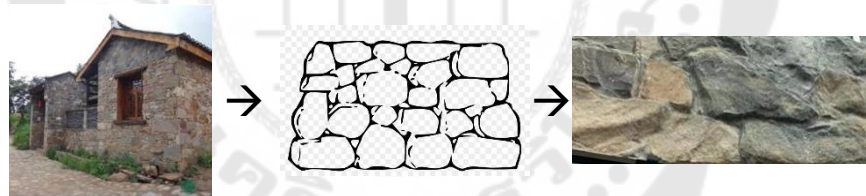


Figure 18 Origin of the motifs

Source: By Researcher

Shandong traditional residential buildings

The design of the beams inside the traditional Shandong residential buildings is in the form of wooden strips, which is inspired using wooden strips in the roof decoration, aiming to highlight the traditional Shandong architectural style.

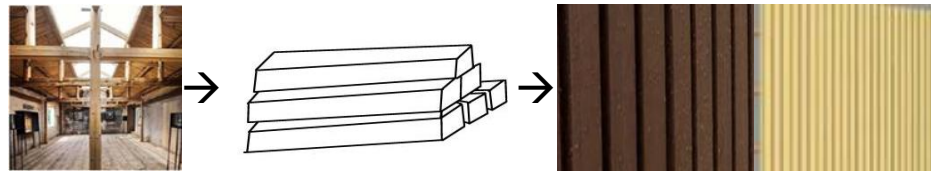


Figure 19 Origin of the motifs

Source: By Researcher

Lujin is the favorite traditional art of Shandong province for the elderly, and objects with Lujin patterns are often found in the homes of the elderly. The different patterns of brocade, representing a different meaning, as shown in the figure below, brocade pattern of the color is the elderly like red, yellow, orange, and purple design. Pattern is based on the original pattern of brocade to improve, so that it has a more decorative style, and it was drawn into a figure placed on the wall of the bathroom and played a very good decorative effect.

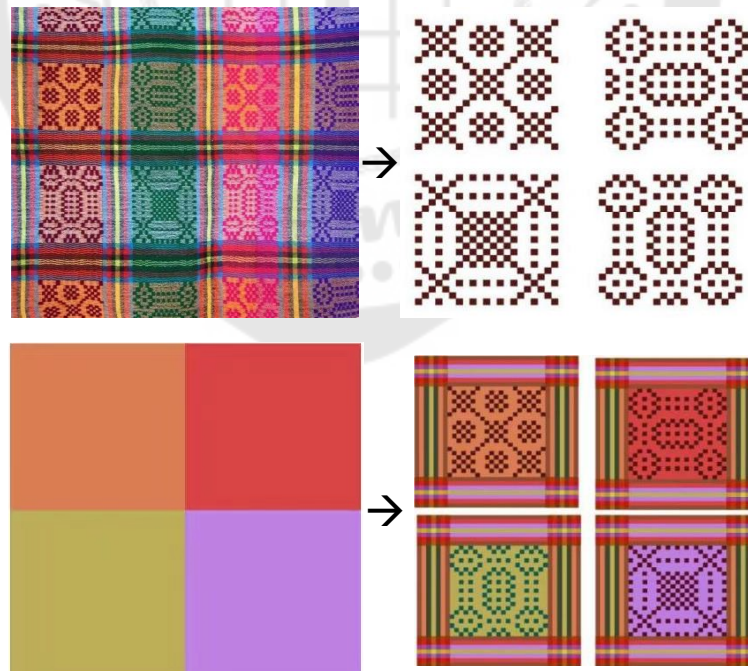


Figure 20 Origin of the motifs

Source: By Researcher

#### 4.5.1.6 Selection of raw materials

The choice of finishing materials is critical for senior bathrooms as they need to meet specific safety and durability requirements. The choice of WPC panels (wood plastic composite), as the main material, was based on the following considerations. The first was water resistance. WPC panels have excellent water resistance and are suitable for bathroom environments where there is regular contact with water. The material is resistant to humidity changes and water erosion, thus maintaining structural stability and reducing the need for maintenance. Secondly, in terms of environmental considerations, as WPC panels are made from recycled materials, this choice is also in line with the principles of sustainability. The use of this environmentally friendly material not only enhances the quality of the bathroom, but also demonstrates a commitment to environmental protection. Third, it is aesthetics and practicality. WPC panels have the appearance of natural wood but are not made of wood. In addition, it can be customized with colors and textures to suit different décor styles, aiming to meet diverse aesthetic needs.



Figure 21 Floor Material

Source: By Researcher

The color of the wall is designed according to the color of the traditional residential buildings in Shandong. Culture stone wall tiles are three-dimensional, and indoor use does not change color and deformation, and moisture-proof and impervious to water, and it can better protect the wall.



Figure 22 Shower wall material

Source: By Researcher

The bathroom's roof is made of longwall panels. Plastic wood longwall panels provide waterproof decorative features due to their simple and atmospheric linear arrangement style, weather resistance and zero maintenance.



Figure 23 Roof Material

Source: By Researcher

#### 4.5.1.7 Rendering and outputting results

According to the elderly like the Shandong art style, through the design into the bathroom, decorative style from the previous simple perfect into a bathroom with Chinese style, bathroom design, the fish scale pattern as a wet and dry area walls, Shandong traditional residents of the building of the stone wall placed in the shower room. You can play a moisture-proof effect, and the ground used wpc panels plays a



role in non-slip and moisture-proof role. Finally, the results are rendered and exported to visualize the retirement bathroom. In 3Dmax, the rendering result can be exported as an image file using the "Render to Texture" function.



Figure 24 Bathroom design concept

Source: By Researcher

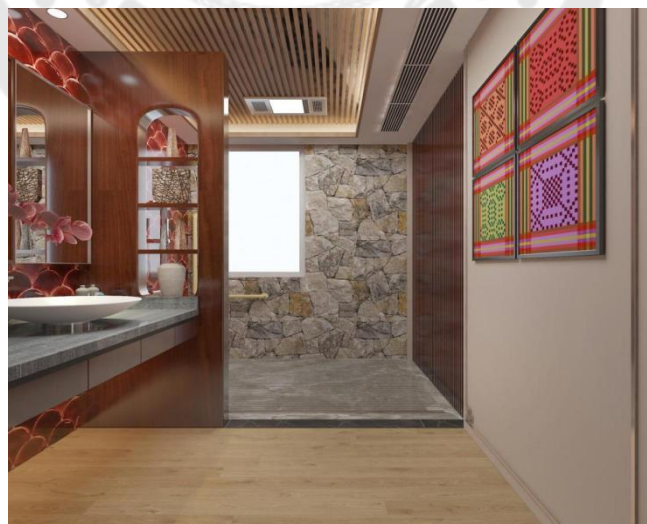


Figure 25 Bathroom design concept

Source: By Researcher

#### 4.5.2 Summary

Through the above steps, the 3Dmax drawing of the senior citizen bathroom was completed. In this process, the needs and usage habits of the elderly were fully considered, and a realistic scene of the retirement bathroom was successfully created through the fine processing of basic modelling, design patterns, lighting, and rendering. Finally, through the resultant rendering and output, I present the drawing results in high-quality image files for promotion and use. In conclusion, the senior bathroom should start from the actual needs of the elderly through the introduction of Shandong art and the improvement of the bathroom environment to provide a more comfortable, convenient and safe bathing experience for the elderly.

This chapter mainly combines the results of previous questionnaire surveys, in-depth interviews, and fieldwork. On this basis, design principles, such as safety, practicality and aesthetics, are summarized to create a personalized experience. The design strategy can be applied to various forms of senior bathroom space to improve the demand for proportional scales of bathroom space for the elderly with different self-care abilities. The design strategy can be applied to various forms of senior bathroom space to improve the demand for bathroom space proportion and scale of the elderly with different self-care ability. As shown in the figure above, this paper aims to provide some basis for the design of bathroom space in future nursing homes.

#### 4.6 height ratio of older people and costs

4.6.1 Dimensioning that takes into account the physical characteristics of older people.

Table 17

Form	Sizes	Instructions
Average height of older men	163.8 cm	Older people are generally shorter than younger people due to reduced bone density



Table 19 (Continued)

Form	Sizes	Instructions
Average height of older women	151.2 cm	Older people are generally shorter than younger people due to reduced bone density
Shower area standing applicable size	36 in. x 36 in.	Approx. 91.4cm x 91.4cm
Suitable size for wheelchair in shower area	30 in. x 60 in.	Approx. 76.2 cm x 152.4 cm
Basin height	32 to 34 inches	Approx. 75 cm to 85 cm
Basin depth	6 inches.	Shallower basins reduce the need to bend over and increase comfort
Mirrors	Up to 25cm	For ease of use in both sitting and standing positions

From the perspective of height and ease of use, the height of all facilities should be adjusted to the average height and physical dexterity of older persons. For example, the height of washbasins and mirrors should be set at wheelchair-accessible heights for easy standing or sitting. In terms of spatial accessibility considerations, there should be sufficient movement space in the bathroom, especially to accommodate older people who use wheelchairs or walking aids. This includes generous access, appropriate doorway widths and bathroom design. The average height of an elderly male is about 163.8cm, while that of a female is about 151.2cm. So, for this size, the basic size of the shower area is more appropriate at an area of 91.4cm\*91.4cm. Considering that an elderly person may need to use a wheelchair, the applicable size for a wheelchair at the shower area is at an area of 96.2cm\*152.4cm, with the height of the washbasin ranging from 75cm to 85cm. In order to enhance the comfort of the elderly, the depth of the washbasin is about 15.2cm.

#### 4.6.2 Budgeting for the cost of a pensioner's bathroom

The "14th Five-Year Plan for the Elderly Service System in Shandong Province" was issued by the General Office of the People's Government of Shandong Province on 29 July 2021, and it was designed to implement the national strategy of actively responding to the ageing of the population and to better meet the diversified and multi-level demand for elderly care services of the ever-growing masses of the people. The plan specifies a series of initiatives aimed at establishing a sound network of county, township (street) and village (community) elderly care facilities that cover both urban and rural areas in a balanced and functional manner, with a view to providing more comprehensive and convenient services. The plan emphasizes the need to build elderly service facilities in urban and rural areas as well as in remote areas. By setting up services at all levels, the needs of the elderly in different areas can be better met, thus resulting in wider service coverage. At the same time, the plan focuses on balanced distribution to ensure that older persons in all regions can enjoy fair and high-quality elderly care services. The plan mentions the importance of building a multi-level long-term care protection system. Such a protection system will provide more comprehensive and sustainable support for the elderly and ensure their quality of life in their twilight years. In addition, the plan focuses on accelerating the construction of a long-term care insurance system to provide more comprehensive and sustainable medical and nursing care for the elderly. Through social assistance and social welfare, the plan endeavors to provide more detailed support to groups with special difficulties, thus ensuring that the warmth of social care reaches every elderly person in need. Overall, the "14th Five-Year Plan for the Elderly Service System in Shandong Province" issued by the General Office of the Shandong Provincial People's Government provides a systematic solution to the challenges posed by an aging population, and provides more reliable and comprehensive support for the elderly in their old age through the establishment of a sound service network and a multi-level protection system.

And based on the instructions of the paper, Shandong Nursing Home has also increased its investment in senior care services. This paper in a single design senior bathroom budget table is as follows, and this budget is also in the Shandong nursing home programme budget.

Table 18

Offerings	Prices
Shower equipment	2000 RMB
Washbasin	2000 RMB
Ventilation equipment	1000 RMB
Floor and wall tiles	4000 RMB
Mirrors	500 RMB

By the production cost for a single bathroom is  $P$  shower fittings +  $P$  washbasin +  $P$  ventilation fittings +  $P$  floor and wall tiles +  $P$  mirrors = R9500.

#### 4.6.3 Summary

Taking these factors into account, it is possible to create a bathroom environment for nursing homes that is both safe and comfortable. The use of durable, waterproof, and aesthetically pleasing materials, such as WPC panels, combined with a size design that meets the physical characteristics of the elderly, will greatly improve the quality of life and safety of the elderly in using the bathroom, while taking into account the cost of the design, which can better serve as a reference for the nursing home.

#### 4.7 Summary

In exploring the design of bathrooms for older people, this chapter begins by emphasizing the multidimensional nature of design needs, where functionality and safety are fundamental, while aesthetics and comfort are key in enhancing the quality of life for older people. Compared with younger older adults who tend to seek independence and privacy, older adults are more concerned with safety and ease of

use. In addition, as they age, older people's aesthetic preferences change, and the need for color increases accordingly, especially warm and eye-catching colors, such as orange, which enhances not only the aesthetics of the bathroom, but also its safety. The integration of Shandong art brings cultural depth and aesthetic value to bathroom design. Through in-depth analyses of traditional Shandong art elements, such as Lu Jin, the study found that older people have a high preference for designs with local characteristics. The use of these traditional elements not only meets the cultural needs of the elderly, but also enhances their sense of identity with their living environment. In-depth interviews provide insights from professional designers. Dong Yu is a senior interior designer, and his viewpoints largely coincide with the results of the questionnaire survey. The researcher conducted a site visit to the nursing homes in Dezhou City, Shandong Province, to understand the current situation of the nursing homes and summaries the existing shortcomings to make reference to them in the later design.

In summary, this chapter has meticulously explored the multifaceted needs of bathroom design for older people through questionnaires, expert interviews, artistic analyses, and fieldwork. The core of the design is to create a bathroom space that is both safe and comfortable, and full of cultural characteristics. Using advanced technologies such as 3Dmax, these concepts were successfully translated into concrete design solutions, thus resulting in the realization of an senior bathroom design to bring convenience and pleasure to the daily lives of the elderly.

## CHAPTER 5

### CONCLUSION DISCUSSION AND SUGGESTION

#### 5.1 Conclusion

This research in the questionnaire section of this paper explores the specific needs and preferences of older people in relation to the design of retirement bathrooms. The results of the questionnaire indicate that older people place particular importance on the aesthetics and safety of the bathroom, which form the cornerstone of the design. Many older people are interested in designs that incorporate local cultural elements, such as the Shandong intangible cultural heritage element of brocade. In addition, the design needs to take into account older people with different levels of self-care ability. For those with greater self-care ability, elements of aesthetics and comfort can be added, while those with less self-care ability need to focus more on practicality and safety. The questionnaire results also highlighted the importance of color and pattern choices to enhance safety and create a pleasurable experience. In addition, considerations of environmental friendliness and sustainability, as well as the integration of theory and practice, are also key considerations in design. Finally, continuous evaluation and improvement are critical to understanding the complex needs of older adults and enhancing design quality. These findings not only demonstrate the comprehensive needs of older people for bathroom design, but also highlight the importance of incorporating traditional cultural elements and environmentally friendly design.

This paper also brings together the views of the results questionnaire section and recommendations from experts in the field of interior design, particularly for senior bathroom design, through an in-depth interview methodology. The experts emphasized the importance of safety and practicality in senior bathroom design, pointing out that most designs are functional, simple and practical, but may sometimes neglect the emotional and artistic needs of the elderly. In particular, the insights of senior designer Dong Yu provided an important reference value for this study. He emphasized that on the basis of satisfying aesthetics and safety, the cultural value and aesthetic experience

of senior bathrooms can be enhanced by integrating Shandong artistic elements. This not only reflects the respect and inheritance of traditional culture, but also enhances the bathroom experience of the elderly. Dong Yu advocates a design philosophy that emphasizes the perfect combination of traditional art and modern design, and a human-centered design philosophy that stresses the importance of humane design, especially with regard to the needs and preferences of the elderly.

The researcher also explored the application and significance of Shandong art in senior bathroom design, emphasizing the importance of integrating traditional cultural elements into senior bathroom design and its positive impact on the elderly. Shandong art, as part of China's rich culture, plays an important role in senior bathroom design because of its unique aesthetic and cultural values. This art form is not only the soul of a nation and the crystallization of human wisdom, but also has a significant impact on senior bathroom design. The use of colors in Shandong art, such as the matching of complementary and contrasting colors, not only enriches the visual effect of the bathroom, but also stimulates the emotions and inner feelings of the elderly. Therefore, the application of Shandong art in senior bathroom design not only reflects the respect and inheritance of traditional culture, but also significantly improves the bathroom experience of the elderly. By combining traditional art elements with modern design concepts, it is possible to create a senior bathroom that meets the practical needs of the elderly and is also full of cultural heritage and aesthetic value.

## **5.2 Discussion**

### **5.2.1 Design of bathrooms for the elderly**

In designing bathrooms for older people, this thesis draws on several literature studies and combines different national and international perspectives. Based on Sedikides et al.'s (2004) research, the emotional component of nostalgia is explored in details, and this sense of nostalgia can help older adults find a psychological comfort and sense of belonging in the face of uncertainty and loneliness in their lives. The studies reflect a deep understanding of and respect for the emotions of older people, and in this thesis these insights are applied to the design of bathrooms for older people,

with a particular emphasis on artistic design that incorporates elements of Shandong's traditional culture, in order to create bathroom environments that are both safe and comfortable, and that meet the emotional feel like home and affective needs of older people.

In designing the bathroom for the elderly, this paper pays special attention to some key design elements and determines the selection of these elements based on literature, survey results and expert interviews. For color selection, this paper chose red as the light color, in the interviews experts such as Dong Yu's opinions and the questionnaire survey results indicated that older people's preference for bright colors such as red also enhances the safety of the bathroom due to its high sensitivity, which was verified by the questionnaire survey in which it was found that 37.5% of the older people preferred the color red. Secondly, the use of a biased Chinese retro design in this design is similar to Ru's (2020) study on the optimal design of accessibility-based bathrooms in the context of ageing, which concluded that warm-colored bathrooms can improve the resistance and immunity of older people, as well as accelerating blood circulation, and that the colors red, yellow, and orange are very suitable for frail and sickly older people. The overall design principles are based on a comprehensive understanding of the needs of the elderly. This includes every aspect of the design from the choice of primary colors to the aesthetics. Every design choice was made with the needs of seniors in mind, aiming to create a bathroom space that is both functional and aesthetically pleasing.

Deardorff and Birdsong (2005) suggests that artistic elements in bathroom design can take many forms, such as paintings, photographs and sculptures. The researcher used the elements of brocade in the bathroom design and applied them to the decorative paintings. The bathroom is full of vintage feelings, classic elements and nostalgic colors, which make the bathroom full of history and culture and art.



### 5.2.2 Shandong Arts

This thesis specifically considers the combination of Shandong art and Chinese art when exploring the design of senior bathrooms. Liu's (2023) study points out that Shandong art and culture is an important cultural component of China's eastern coast, with deep historical origins and unique regional characteristics. The diversity of Shandong art ranges from traditional painting and sculpture to folk art such as paper-cutting and shadow puppetry, demonstrating rich cultural connotations and aesthetic styles. Shi's (2023) study further deepens the understanding of Shandong's art history, emphasising that Shandong, as an important birthplace of Chinese history and culture, has nurtured unique and far-reaching art styles and forms. These art forms not only reflect the history and culture of the Shandong region, but also the evolution of ancient Chinese society and the transmission of national spirit.

In this study, Shandong art elements such as Lu brocade, Zibo big dish fish and Shandong traditional residential architecture are applied to the design of senior bathrooms, aiming to show the historical development and national characteristics of Chinese art. Shandong art has formed unique national characteristics and traditional spirit during the five-thousand-year historical development of Chinese art, with unlimited vitality and creativity, which provides rich inspiration and materials for the design of senior bathrooms. The design of the senior bathroom in this thesis not only reflects the respect and inheritance of traditional culture, but also enriches the aesthetic value and cultural connotation of the bathroom by integrating the elements of Shandong art and Chinese art. This design concept, which integrates tradition and modernity, region and nation, provides a powerful guide for creating a comfortable, safe and culturally rich bathroom environment suitable for the elderly.

### 5.2.3 Bathrooms for the elderly

This thesis gives importance to the risk of falls for the elderly in bathrooms. The researchers designed the bathrooms with non-slip flooring and safety handrails that can be effective in reducing slipping of elderly people. In relation to the research of Cho and Lee (2017) and Afifi et al. (2015) focus on reducing the risk of falls for the elderly in bathrooms.



In addition, the researcher gives importance of the physical and mental characteristics and needs of the elderly. There is related research in the country of Zheng's (2015) study provides an in-depth analysis of the use behavior of public bathroom spaces in elderly care facilities and proposes design recommendations to improve public bathroom spaces and cultural context of older people. In this thesis, with a particular emphasis on an artistic design that incorporates traditional cultural elements to create a bathroom environment that is both safe and comfortable. It is related to my research.

In this article, the cost of the senior bathroom is 9,600 RMB, the funding is the need for government help to complete, the Civil Affairs Department of Shandong Province issued "Shandong Province: Focus on the cracking of the problem to create a model for improving the quality of nursing home services," inside the proposed investment of 1 billion in the renovation of nursing home facilities, firmly believe that in the government's policy support, Shandong Province, Shandong Province, can create a leading nursing home for the elderly to create a better valuable way of life, truly realise the dignity of old age. The value of life style, the real realisation of old age with dignity.

### 5.3 Suggestion

This research paper, the researcher found that there were suggestions from the research as follows:

(1) This research focuses on the analysis of Shandong art style. In the future, Academics or those interested in research on such issues able to design the senior bathrooms according to other local art styles and under the need of the elderly in other areas.

(2) The concept of Nostalgia or bringing the concept of happiness to feeling like home. Such ideas can be used to design rooms or other places for the elderly.

(3) In the business aspect of the Nursing home of the government sector such process and design can be applied to develop areas for the elderly in nursing home.

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