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Compliance of Water Closet Facilities in Mosques with Malaysian Standards, Guideline and Legislation

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Abstract: A mosque often has a main prayer hall and other ancillary spaces. These spaces include water closets that provide general facilities, such as wash-hand basins, ablution areas, shower areas and water cubicles (including those for the disabled). The specifications for the design of these ancillary components are defined in various Malaysian standards and guidelines relevant to water closet design. They are namely, Malaysian Standard MS 2577: 2014 (Architecture and Asset Management of Masjid – Code of Practice), Malaysian Standard MS 2015: Part 1: 2006 (Public Toilet – Part 1: Minimum Design Criteria), Malaysian Standard MS 1184: 2014 (Universal Design and Accessibility in the Built Environment – Code of Practice, Second Revision), JKR 1999 (Guidelines on Buildings Requirements for Disabled Persons) and UBBL: 1984 (Unit Building By-Laws – Part III: Space, Light and Ventilation). Access audit was conducted in this study to investigate the compliance of mosque water closets with these national standards and guidelines and to obtain insights into the actual situation. A five-point rating scale was developed for the access audit (1=not provided; 2=provided but below the recommendation; 3=provided and exactly as the recommendation; 4=provided but above the recommendation; 5=provided but not in the recommendation). The scores of every criterion were computed to determine the compliance percentage. The study was conducted in five mosques to assess the on-site and as-built compliance of their water closets. The results showed that compliance percentages of the studied mosques ranged from only 43% to 64%, which indicated that the provisions of water closet facilities were not fully in compliance with the stipulated national standard, guidelines and legislation due to the lack of awareness and less prioritization on the requirements for water closet facilities.

Keywords: Access audit, rating scale, accessibility, elderly, children

1. Introduction

A sustainable mosque design should demonstrate soundness in terms of design concepts, design requirements, design guidelines, scale and function [1], [2] to provide convenient spaces to all who come to the mosque, including the disabled, elderly and children. Aside from the main prayer hall, ancillary spaces, such as water closets that provide general facilities (e.g. wash-hand basin, ablution area, shower areas and water closet cubicles, including those for

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persons with disabilities), are considered communal areas. Unlike shared water closets in urban slums, Tumwebaze and Mosler [3] stated that the responsibility to clean water closets in mosques is often carried by a designated person, although collective participation was still practiced to ensure hygiene.

Numerous studies focused only on water closet facilities for the disabled [4]-[7]. Facilities for the elderly and children have not been given ample attention. Ramli [7] enumerated the physical features that are important in a mosque water closet, including ramps, water closet facilities for the disabled and hand rails. The appropriate design for water closet bowls and wash-hand basins in public lavatories in Bangkok were studied by Mamee and Sahachaisaeree [4] to determine the effectiveness of these facilities in terms of accessibility and usability. The authors found that the circulation areas and height of wash-hand basins are the factors that determine the appropriate design of public toilets. Dawal et al. [5] investigated the performance of wudu' (ablution area) for the disabled, especially those on wheelchairs, and suggested correct positions within the limitations of the disabled.

However, no study has been conducted on the comfort, safety and accessibility of different users of the general facilities in water closets in mosques, namely wash-hand basins, shower areas and cubicles. Most designers neglect ancillary areas, such as water closet facilities, because they prioritise the aesthetic aspect of building design [8]. Generally, a few guidelines have been set in Malaysian standards, related acts and by-laws for water closet design. Kadir and Jamaludin [9] conducted a study on the applicability of Malaysian standards and universal design to water closet facilities in public buildings. According to Abdul Rahim and Abdul Samad [1], developed countries, such as Korea and Japan, have already achieved considerable progress in providing proper facilities, including the upgrading of water closets. Afacan and Gurel [10] explored the demands, needs and expectations for water closets in Turkey and found that a sustainable design for public toilets must be based on familiarity, legibility, distinctiveness, accessibility, comfort and safety.

This study aims to assess the compliance of water closets in selected mosques by observing the on-site and built-in design of all the facilities in mosque water closets, including facilities for the disabled, elderly and children against the prescribed guidelines. The results of this study could help designers to ensure that the facilities in mosques' water closets are aligned with the prescribed guidelines.

2. Methodology

2.1 Sampling Locations

This research was conducted at five mosques in Seberang Perai Selatan, which is shown in Figure 1. Seberang Perai Selatan is a district in Penang Island that has an area of 243 km^2. It had a population of 165,828 according to the 2010 census [11]. The district is bordered by Junjong River, which separates Central Seberang Perai in the north, Kedah state border in the east, Perak state border in the south and the South Channel that separates Penang Island. Table 1 shows the details of the five mosques selected in Seberang Perai Selatan. These mosques are Masjid Sungai Acheh (MQS01), Masjid Seri Ampangan (MQS02), Masjid Sungai Duri (MQS03), Masjid Sungai Setar Besar (MQS04) and Masjid Nibong Tebal (MQS05).

Fig. 1 - Location of selected mosques in Seberang Perai Selatan, Penang (not drawn to scale)

Table 1 - Details of mosques for water closet assessment

Mosques	Mosques ID	Age of Mosque (Years Old)	Coordinate
Masjid Sungai Acheh	MQS01	4	N5.148779, E100.420434
Masjid Seri Ampangan	MQS02	15	N5.148894, E100.487500
Masjid Sungai Duri	MQS03	36	N5.209307, E100.527626
Masjid Sungai Setar Besar	MQS04	41	N5.146839, E100.450196
Masjid Nibong Tebal	MQS05	50	N5.168175, E100.477498

2.2 Standard and Guidelines for Water Closet Facilities and Design

This work depends merely on the assessment audit of the 'as built' water closets condition at all Mosques based on the compliance levels to related Malaysia's standards, guidelines and legislation. Although, there are methods that could be modified to suits the investigation scenario i.e. Gunawardana and Galadegara [12] for determining sanitation index, this study keeps the focus to local requirements in Malaysia.

Table 2 shows the list of standards, guidelines and legislation for the design of water closet facilities and includes the criteria that should be considered to provide friendly, comfortable and safe water closet facilities to users. Six criteria were selected for assessing water closet facilities and design according to standards, guidelines and legislation [13]-[17]. These criteria were general facilities, wash-hand basin, ablution area, shower, water closet cubicles and water closet for the disabled. Forty elements of water closet facilities were considered to determine their compliance with the standards, guidelines and legislation for water closet facilities and design in mosques.

The first criterion is general facilities (GF). This criterion consists of nine elements, namely water closet separation, water closet entrance/area, signage, water closet unit, floor condition, common facilities, light level, ventilation and parental section. The minimum requirement for water closet separation varies across locations and according to circumstances. However, MS 2577: 2014 [13] suggests that water closets for different genders should be separated and located in two different buildings. The elements for water closet entrance/area, signage, water closet unit, floor condition, common facilities, ventilation and parental section were selected from MS 2015: Part 1: 2006 (Public Toilet – Part 1: Minimum Design Criteria) [14]. The minimum requirements for these elements were obtained from pages 14–16, 22–28, 76 of MS 2015: Part1: 2006 [14]. The light level in this study was that of the light on the top of the wash-hand basin. The minimum light level is 200 lux, which is the minimum work illumination for users.

The second criterion for this study is the wash-hand basin (WHB). According to MS 2015: Part 1: 2006 [14], the locations of wash-hand basin types in the order of preference are as follows: under the counter, semi-recessed/console and hung on the wall with a pedestal shroud. The nine elements of the wash-hand basin considered in this study were the wash-hand basin unit, height of the lower basin, wash-hand basin for children, width of the basin, core end skirting, distance between basins, wash-hand basin traps, height of the top basin and waste plug. Aside from MS 2015: Part 1: 2006 [14], the JKR [16] guideline also states that the height of the top wash-hand basin must be within the range of 700–800 mm.

The third criterion is the ablution area (AB). This criterion is important because it has a strong connection with the main prayer hall, considering that users might use the facilities before entering the main prayer hall [18]. Three elements related to this criterion, namely, distance between water taps, height of the water tap, and water drainage channel, are highlighted in MS 2577: 2014 [13]. The specific distance must be 900 mm, the height must be 1 m and the drop for water drainage channel should be 150 mm with a covered mesh.

The fourth and fifth criteria are shower area and water closet cubicle. A shower should have the following eight elements: shower units, robe hooks, shower area, floor gradient, foldable seat, grab rails, shower head and soap dispenser. Meanwhile, the eleven elements of the water closet cubicle (WCC) should meet the requirements proposed by MS 2015: Part 1: 2006 [14] and UBBL: 1984 [17]. In MS 2015: Part 1: 2006 [14], ten elements of the water closet cubicle are considered, and these are water closet cubicle, door, floor condition, robe hooks, water closet bowl, water tap, tissue roll holder, trap floor, flush tank and sanitary disposal unit. The additional element required in UBBL: 1984 [17] is window for ventilation.

The last criterion is the water closet for the disabled (WCD). The approved requirement in the five standards, guidelines and legislation is to ensure that the disabled have the opportunity to use the facilities [7]. Fifteen elements of water closets for the disabled were considered in this study, and these are water closet separation for the disabled, water tap, signage for the disabled, water closet dimension, water closet bowl, tissue paper dispenser, soap dispenser, towel and dryer, mirror, wash-hand basin, floor surface, door, grab rail, control devices and light level above the wash-hand basin.

Table 2 - Criteria and elements based on standards, guidelines and legislation

No	Criteria	Elements	Standard, Guidelines and Legislation	Pages
1	General facilities	Water closet separation	MS 2577: 2014 (Architecture and Asset Management of Masjid-Code of Practice) [13]	4
		Water closet entrance/area, signage, water closet unit, floor condition, common facilities, ventilation and parental section	MS 2015: Part 1: 2006 (Public Toilet-Part 1: Minimum Design Criteria) [14]	14-16; 22-28; 76
		Light level	MS 1184:2014 (Universal Design and Accessibility in the Built Environment – Code of Practice; Second Revision) [15]	87
2	Wash hand basin	Wash-hand basin unit, height of lower basin, wash-hand basin for children, width of basin, core end skirting, distance between basin, wash-hand basin traps and waste plug	MS 2015: Part 1: 2006 (Public Toilet-Part 1: Minimum Design Criteria) [14]	25;68-70
		Height of top basin	JKR 1999 (Guidelines on Buildings Requirements for Disabled Persons) [16]	183
3	Ablution area	Distance between water tap, height of water tap and water drainage channel	MS 2577: 2014 (Architecture and Asset Management of Masjid-Code of Practice) [13]	20-21
4	Shower	Shower units and robe hooks	MS 2015: Part 1: 2006 (Public Toilet-Part 1: Minimum Design Criteria) [14]	16; 26
		Shower area, gradient of floor, foldable seat, grab rails, shower head and soup dispenser	MS 1184:2014 (Universal Design and Accessibility in the Built Environment – Code of practice; Second revision) [15]	102-106
5	Water closet cubical	Water closet cubical area, door, floor condition, robe hooks, water closet bowl, water tap, tissue roll holder, trap floor, flush tank and sanitary disposal unit	MS 2015: Part 1: 2006 (Public Toilet-Part 1: Minimum Design Criteria) [14]	22-28; 43-55
		Window for ventilation	UBBL: 1984 (Unit Building By-Laws – Part III: Space, Light and Ventilation) [17]	28
6	Water closet for disable	Water closet disable separation	MS 2577: 2014 (Architecture and Asset Management of Masjid-Code of Practice) [13]	4
		Water tap	MS 2015: Part 1: 2006 (Public Toilet-Part 1: Minimum Design Criteria) [14]	48-55
		Water closet dimension, water closet bowl, tissue paper dispenser, soap dispenser, towel and dryer, mirror, wash hand basin, floor surface, door, grab rail, control devices and light level above wash hand basin	MS 1184:2014 (Universal Design and Accessibility in the Built Environment – Code of Practice; Second revision) [15]	38-47; 72-81; 86-102
		Signage for disable	JKR 1999 (Guidelines on Buildings Requirements for Disabled Persons) [16]	181

2.3 Access Audit of Water Closet Compliance

This study conducted an access audit by evaluating 'as built' water closet according to required design and facilities. The access audit covered important criteria in determining the total percentage of compliance of water closet design and facilities. According to Abdul Rahim and Abdul Samad [1], access audit is performed by assessing existing buildings at a given point against the criteria set in Malaysian standards, guidelines and legislation. Access audits can be divided into two categories: audits that assess the presence of facilities for the disabled and audits that assess the accessibility of the building for the disabled [19]. The observation and rating procedures were carried out using a checklist that was developed for assessing every element accordingly. After observation, each element with a certain value was measured using instruments, such as a measuring tape, angle locator and Bosch distance measure. The values were collected and transformed into a specific score in a five-point rating scale, and the percentages of total score were computed to determine the level of compliance.

2.4 Rating Scale for Water Closet Compliance

The rating scale was used as the scoring method. Drawing from the study of Wright and Masters [20], the rating scale method was adopted after outlining the requirements and establishing the rating scores that will represent the qualities of the measured criteria. Table 3 shows the rating scale used in scoring the elements in the water closets. A five-point rating scale was employed to assess the condition of the water closet facilities and the design (1=not provided; 2=provided but below the recommendation; 3=provided and exactly as the recommendation; 4=provided but above the recommendation; 5=provided but not in the recommendation).

Table 3 - Details of rating scale

Scale	Description
1	Not provided
2	Provided but below the recommendation
3	Provided and exactly as the recommendation
4	Provided but above the recommendation
5	Provided but not in the recommendation

2.5 Percentage of Water Closet Compliance

The compliance of each selected water closet was assessed by visualisation and communication with committee members of each mosque. This method allowed for the determination of the quality of the water closet facilities and the transformation of the data collected to obtain the total percentage of water closet compliance. In addition, the percentage of water closet compliance was obtained by scoring (rating scale) the condition of every element of the mosque, including the water closet. The scores of all the elements were computed to obtain the final percentage. Eq. (1) was used to compute the percentage of compliance on the basis of the assessment score (AS) and total score (TS) of each criterion.

$$\text{Percentage Compliance (\%)} = (AS/TS) \times 100 \quad (1)$$

The assessment score was calculated using the sum of the scores of all the elements of a criterion. The total score was the accumulated score of the water closet on the basis of the requirements obtained from the five national standards, guidelines and legislation.

3. Results and Discussion

3.1 Water Closet Rating Score

The rating scores of the elements of general facilities, such as wash-hand basin, ablution area, shower, water closet cubicle and water closet for the disabled, showed that the criteria set by national standards, guidelines and legislation were not completely met.

Table 4 shows the rating scores of the general facilities, which consist of water closet separation, water closet entrance/area, signage, water closet unit, floor condition, common facilities, light level, ventilation and parental section. The desirable total rating score for general facilities was 36. The assessment and percentage rating scores of MQS01, MQS02, MQS03, MQS04 and MQS05 were 26(72%), 24(67%), 20(56%), 20(56%) and 22(61%), respectively. Most of the rating scores obtained by the mosques were 2 (provided but below the recommendation) and 3 (provided and exactly as the recommendation). The highest rating score (4=provided but above the recommendation) of floor condition was obtained by MQS03. The highest rating score of light level were observed in MQS01 and MQS02, whereas the lowest score was given to MQS03. All of the selected mosques did not have a parental section; thus, they

all received a rating score of 1 (not provided) for this element. Meanwhile, the ventilation condition in all of the mosques was as recommended by MS 2015: Part 1: 2006 [14].

Table 4 - Rating scores for general facilities

Mosques ID / Elements	MQS01	MQS02	MQS03	MQS04	MQS05
Water closet separation	3	3	2	2	3
Water closet entrance/area	3	3	2	2	2
Signage	3	3	3	2	3
Water closet unit	3	2	2	3	2
Floor condition	3	3	4	3	3
Common facilities	3	2	2	2	2
Light Level	4	4	1	2	3
Ventilation	3	3	3	3	3
Parental section	1	1	1	1	1
Desirable Total Rating			36		
Assessment Rating Score	26	24	20	20	22
Percentage of Rating Score (%)	72	67	56	56	61

1= Not provided; 2=Provided but below the recommendation; 3=Provided and exactly as the recommendation; 4=Provided but above the recommendation; 5=Provided but not in the recommendation

Table 5 shows the rating scores for wash-hand basins, which include the unit of basin, the heights of the lower and top basins, wash-hand basin for children, width of the basin, core end skirting, distance between basins, wash-hand basin trap and waste plug. The desirable total rating score for the wash-hand basin was 36. The assessment and percentage of rating scores for the wash-hand basins in MQS01, MQS02, MQS03, MQS04 and MQS05 were 29(81%), 24(67%), 25(69%), 18(50%) and 16(44%), respectively. Most of the rating scores obtained were 2 (provided but below the recommendation), 3 (provided and exactly as the recommendation) and 4 (provided but above the recommendation). The observations showed that most of the mosques, except for MQS02, did not provide wash-hand basins for children, indicating that most of the mosques were not concerned about children as users. MQS05 also did not meet the requirements for core end skirting and distance between basins.

Table 5 - Rating scores for wash-hand basin

Mosques ID / Elements	MQS01	MQS02	MQS03	MQS04	MQS05
Wash hand basin unit	4	2	3	2	2
Height lower basin	4	3	4	3	3
Height top basin	4	3	4	2	2
Wash hand basin children	1	3	1	1	1
Width of basin	4	2	2	2	2
Core end skirting	4	4	4	3	1
Distance between basin	3	2	2	1	1
Wash hand basin traps	2	2	2	2	2
Waste plug	3	3	3	2	2
Desirable Total Rating			36		
Assessment Rating Score	29	24	25	18	16
Percentage of Rating Score (%)	81	67	69	50	44

1= Not provided; 2=Provided but below the recommendation; 3=Provided and exactly as the recommendation; 4=Provided but above the recommendation; 5=Provided but not in the recommendation

Table 6 shows the rating scores for water tap and water drainage channel in the ablution area which consist of the distance between water taps, height of water taps and water drainage channel. The desirable total rating score for water

tap and water drainage channel in the ablution area was 12. The assessment and percentage of rating scores for water tap and water drainage channel in the ablution area in MQS01, MQS02, MQS03, MQS04 and MQS05 were 3(25%), 5(42%), 5(42%), 4(33%) and 4(33%), respectively. Most of the rating scores of this criterion were 1 (not provided) and 2 (provided but below the recommendation). From the observations, three (MQS01, MQS04 and MQS05) out of five mosques did not meet the required distance between water taps, and one (MQS01) out of five mosques did not meet the height requirement for the water tap. Meanwhile, the water drainage channel requirement was not satisfied by all of the mosques. The lowest rating score was obtained by MQS01 because all of the elements of the water tap and water drainage channel in the ablution area were not in accordance with the requirement.

Table 7 shows the rating scores of the eight elements of the shower, namely, shower unit, shower area, floor gradient, foldable seat, grab rails, shower head, soap dispenser and robe hooks. The highest assessment rating score of 19 (59%) was obtained by MQS05, whereas the lowest rating score of 8(25%) was obtained by MQS03 and MQS04. Two shower elements, namely, floor gradient and soap dispenser, were given a score of 4. Floor gradient is important in showers to ensure that the water flows when people use the shower, and soap dispensers must be provided and ensure to be refill because people use the shower to clean themselves. The results showed that foldable seats and grab rails inside the shower areas were not provided in all the mosques, although they are included in MS 1184: 2014 [15]. The desirable total rating for shower in all the mosques was 32.

The water closet cubicle was another criterion in this study, and it encompasses eleven elements (i.e. water closet cubicle area, door, floor condition, robe hooks, water closet bowl, water tap, tissue roll holder, trap floor, flush tank, sanitary disposal unit and window for ventilation), as shown in Table 8. The desirable total rating for water closet cubicle was 44. The assessment rating of MQS04 was the highest (29) among the selected mosques with percentage of rating score (66%). In MQS04, only two elements (tissue roll holder and sanitary disposal unit) received a score of 1, and the other elements each received a score of 2 or higher. The lowest assessment rating went to MQS05 which received 22 (57%). The results showed that in all the mosques, water tap scored 4 because it was provided but above the requirement, whereas tissue roll and sanitary disposal unit were not provided in the water closet cubicles of the mosques. The assessment showed that the tissue roll and sanitary disposal unit were usually placed outside the water closet cubicle.

Table 6 - Rating scores for water tap and water drainage channel in the ablution area

Elements \ Mosques ID	MQS01	MQS02	MQS03	MQS04	MQS05
Distance between Water tap	1	2	2	1	1
Height of water tap	1	2	2	2	2
Water drainage channel	1	1	1	1	1
Desirable Total Rating			12		
Assessment Rating Score	3	5	5	4	4
Percentage of Rating Score (%)	25	42	42	33	33

1= Not provided; 2=Provided but below the recommendation; 3=Provided and exactly as the recommendation; 4=Provided but above the recommendation; 5=Provided but not in the recommendation

The scores of the elements of the water closet for the disabled are shown in Table 9. In consideration of the rights of the disabled, mosques should provide water closets for the disabled to have equal access to mosque facilities [7]. According to Abdul Rahim and Abdul Samad [1], adequate facilities should be provided for the disabled to help them join in congregational prayers. MQS01 obtained the highest assessment rating (40) for water closet for the disabled with percentage of rating score (67%), whereas MQS02, MQS03, MQS04 and MQS05 only garnered a score of 15 (25%). These results show that providing water closets to the disabled was not a concern because the scores of all the elements in all the mosques, except MQS01, were 1 (not provided). The desirable total rating for water closet for the disabled in this study was 60.

Table 7 - Rating scores for shower areas

Elements \ Mosques ID	MQS01	MQS02	MQS03	MQS04	MQS05
Shower units	3	3	1	1	3
Shower area	2	2	1	1	2
Floor gradient	3	3	1	1	4
Foldable seat	1	1	1	1	1
Grab rails	1	1	1	1	1
Shower head	3	3	1	1	3
Soup dispenser	1	1	1	1	4
Robe hooks	3	3	1	1	1
Desirable Total Rating			32		
Assessment Rating Score	17	17	8	8	19
Percentage of Rating Score (%)	53	53	25	25	59

1= Not provided; 2=Provided but below the recommendation; 3=Provided and exactly as the recommendation; 4=Provided but above the recommendation; 5=Provided but not in the recommendation

Table 8 - Rating scores for water closet cubicles

Elements \ Mosques ID	MQS01	MQS02	MQS03	MQS04	MQS05
Water closet cubical area	2	2	2	2	2
Door	3	2	2	2	2
Floor condition	3	3	3	3	3
Robe hooks	2	3	4	4	1
Water closet bowl	3	3	3	3	3
Water tap	4	4	4	4	4
Tissue roll holder	1	1	1	1	1
Trap floor	3	3	1	3	2
Flush tank	2	2	2	3	2
Sanitary disposal unit	1	1	1	1	1
Window for ventilation	1	1	2	3	1
Desirable Total Rating			44		
Assessment Rating Score	25	25	25	29	22
Percentage of Rating Score (%)	57	57	57	66	50

1= Not provided; 2=Provided but below the recommendation; 3=Provided and exactly as the recommendation; 4=Provided but above the recommendation; 5=Provided but not in the recommendation

Table 9 - Rating scores for water closet for the disable

Elements \ Mosques ID	MQS01	MQS02	MQS03	MQS04	MQS05
Water closet disable separation	3	1	1	1	1
Signage for disable	1	1	1	1	1
Water closet dimension	2	1	1	1	1
Water closet bowl	3	1	1	1	1
Tissue paper dispenser	1	1	1	1	1
Water tap	4	1	1	1	1
Soap dispenser	3	1	1	1	1
Towel and dryer	3	1	1	1	1
Mirror	2	1	1	1	1
Wash hand basin	2	1	1	1	1
Floor surface	3	1	1	1	1
Door	3	1	1	1	1
Grab rail	3	1	1	1	1
Control devices	3	1	1	1	1
Light Level above wash hand basin	4	1	1	1	1
Desirable Total Rating			60		
Assessment Rating Score	40	15	15	15	15
Percentage of Rating Score (%)	67	25	25	25	25

1= Not provided; 2=Provided but below the recommendation; 3=Provided and exactly as the recommendation; 4=Provided but above the recommendation; 5=Provided but not in the recommendation

3.2 Percentage Compliance of Water Closet Criteria

After finishing the access audit for every criterion, the scores of all the criteria were computed to determine the final percentage of compliance of water closet facilities. According to Mamee and Sahachaisaeree [4], the water closet is a necessary for human amenity, but many water closets are poorly designed and neglect the needs of the disabled. Table 10 shows the desirable total assessment scores with compliance percentages of the selected mosques. These statistics reflect the mosques' effort to eliminate barriers to their users.

The results showed that the assessment scores of MQS01, MQS02, MQS03, MQS04 and MQS05 were 140, 110, 98, 94 and 98, respectively. The percentage of compliance of every mosque was calculated using their respective assessment score. The computed compliance percentages of the selected mosques ranged from 43%–64%. The water closet facilities with the highest compliance percentage were in MQS01 (64%), which was only constructed in 2013 (4 years old). MQS02 obtained 50% compliance, and it was constructed in 2003 (15 years old). Both MQS03 and MQS05 achieved 45% compliance. MQS03 was constructed in 1982 (36 years old) whereas MQS05 was built about 50 years ago. The lowest percentage of compliance was obtained by MQS04, which was built in 1978 (41 years old).

These results also agree with the statement of Ramli [7], who asserted that the right of persons with disabilities are being ignored because mosque management lack awareness on this issue. Measures should be implemented to ensure that persons with disabilities are given equal access to the physical environment, transportation, information, communication, technologies, facilities and services either in urban or rural areas [21].

Table 10 - Total assessment scores with compliance percentages of all the criteria of water closet facilities

Mosque ID	Scores of Water Closet Facilities and Design						Assessment Score	Total Desirable Score	Percentage (%)
	GF	WHB	AB	SHW	WCC	WCD			
MQS01	26	29	3	17	25	40	140	220	64
MQS02	24	24	5	17	25	15	110	220	50
MQS03	20	25	5	8	25	15	98	220	45
MQS04	20	18	4	8	29	15	94	220	43
MQS05	22	16	4	19	22	15	98	220	45

Indicator: GF (General Facilities); WHB (Wash Hand Basin); AB (Ablution Area); WCC (Water Closet Cubical); WCD (Water Closet for Disable)

4. Conclusion

An access audit was conducted to determine the compliance of water closets in mosques with the guidelines provided in the Malaysian Standard MS 2577: 2014 (Architecture and Asset Management of Masjid – Code of Practice), Malaysian Standard MS 2015: Part 1: 2006 (Public Toilet – Part 1: Minimum Design Criteria), Malaysian Standard MS 1184: 2014 (Universal Design and Accessibility in the Built Environment – Code of Practice; Second Revision), JKR 1999 (Guidelines on Buildings Requirements for Disabled Persons) and UBBL: 1984 (Unit Building By-Laws – Part III: Space, Light and Ventilation). In this study, the six facilities of the water closet, which are ancillary areas, were selected for assessment. The total assessment scores of MQS01, MQS02, MQS03, MQS04 and MQS05 were 140, 110, 98, 94 and 98, respectively. The compliance percentages of MQS01, MQS02, MQS03, MQS04 and MQS05 were 64%, 50%, 45%, 43% and 45%, respectively. These results indicate that the provisions of water closet facilities in the studied mosques did not fulfill the national standards, guidelines and legislation. This may be due to the lack of awareness on the requirements for water closet facilities and less attention has been given to it, as designers mostly focus more on the aesthetic feature of the most visible and attractive parts of mosques. Albeit, the newest among five mosques and recorded the highest assessment score, MQS01, still have to improve to conform to those criteria.

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