



American Journal of Multidisciplinary Research and Innovation (AJMRI)

ISSN: 2158-8155 (Online), 2832-4854 (Print)

VOLUME 3 ISSUE 6 (2024)



PUBLISHED BY: E-PALLI PUBLISHERS, DELAWARE, USA

Qiblah Angle and Direction of Some Mosques in Zuru Metropolis

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Article Information

Received: June 14, 2024

Accepted: July 17, 2024

Published: November 13, 2024

Keywords

*Angle, Direction, Islamic App,
Masjid/Mosque, Qiblah*

ABSTRACT

A total of 50 mosques (masjids) were randomly sampled in Zuru metropolis, the headquarters of Zuru local government area in Kebbi state, Nigeria, and their qiblah angles taken with modern (scientific) tools notably 3 Islamic apps and one compass, to ascertain the precision of their focus towards makkah. The 3-way analysis revealed the best case scenario of 36%, 6% and 0% of the mosques focused on makkah. It also invariably means 64%, 94% and 100% of the mosques tested were not in the direction towards makkah, by the different approaches used. These results confirm the earlier belief that most of the mosques were not properly focused on the qiblah angle of makkah from Zuru, established at 68.5° in the east-northeast direction from the north. A 'safe' range of 67.5 - 79° from north was however found with the tools used. This justifies the use of modern scientific equipments to verify and guide the angular direction of our prayer grounds, as against the hitherto arbitrary dependence of using the sunrise angle as the guide. There's need for the appropriate authorities to rectify these anomalies, both in row angles already in place, as well as in future construction of mosques, ensuring that they are focused correctly with the prime qiblah angle established, without which prayers conducted will be put in jeopardy.

INTRODUCTION

The direction faced by Muslims during prayers is the qiblah. It was prescribed to our Prophet Muhammad (SAW) by Allah, when the Prophet was directed to turn from facing Al-aqsa masjid in Baitul Muqaddas present day Palestine, to face ka'aba in makkah (Al-Baqara 2, 1980, vs. 144, 149, and 150). This ka'aba which is located in present day Saudi Arabia is at a distance of 3,846.4 (three thousand eight hundred and forty six) km and 4m from Zuru. Due to its coincidental direction in the east where the sun rises for those of us located to its west, arbitrary placement of masjid qiblah is done towards the east, with the sunrise serving as the key index of qiblah location. This is wrong. All places on the planet Earth are located by lines of latitude and longitude (Martin, 2009), which transverse the globe horizontally and vertically, respectively. Zuru is globally located at latitude 11°25' (eleven degrees twenty five minutes) north and longitude 5°13' (five degrees thirteen minutes) east, at an elevation of 400m above sea level. Makkah on the other hand is located on latitude 22°25' north and longitude 39°48' east (Microsoft Encarta, 2009). The ka'aba is at a fixed angle from Zuru, so also its direction. Contrary to that, the sunrise angle and direction change with seasons, as the earth revolves around the sun. Thus the summer angle differs from the winter (Al-Rahman 55, 1980, vs. 17), and where these are used for qiblah location, it results in wrong placement. Available information reveals the direction of ka'aba from Zuru to be east-northeast, and not just east as generally acclaimed. Similarly, the angle towards this ka'aba from Zuru is not 90 degrees from north, but much narrower than that. Scientific tools have

established this angle to be between 68 and 68.7 degrees from north. These tools have yet been put to use to ascertain the correctness of the qiblah of our masjids. Majority of the masjids/mosques in Zuru are not properly facing the direction of ka'aba, as their angles reveal the obvious. It is a known fact that praying away from qiblah direction is void, and must be avoided or corrected. This direction is best achieved today by knowing the qiblah angle, using such tools as compass, or modern Islamic apps. Fortunately, we are privileged with the technology but seldom used, to verify and justify many facts, such as these angles and directions hitherto established arbitrarily. It is in the light of this that my study, was set out to assess the current situation of qiblah location of some masjids in Zuru towards ka'aba using scientific tools, with a view to establishing their precision or otherwise, and drawing the attention of appropriate authorities to rectify anomalies, and for future developments thereafter. The major limitation encountered was the scanty literature available.

LITERATURE REVIEW

Correct qiblah direction from the prime angle is very vital for prayer grounds, and burial grounds/cemetery in Islam, not arbitrary angles. This work could be one of the pioneering efforts to modernize our erstwhile old standards, in the conduct of religious affairs in Zuru, and perhaps similar other places. One of the most useful records found was the qiblah world map of accurate times, a tool used in the study. It showed the region of northwestern Nigeria where Zuru is located, to fall within 70° east of the angle band, as its qiblah angle of makkah

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(Figure 1). This angle covers such a wide area from latitude 9-15° north and from longitude 0-30° east. As such, the qiblah range between 70-79° within this region fall in this category. On a location specific evaluation with Zuru, it showed the qiblah angle to be 68.7° from north with this same tool, giving a difference of 1.3°, which could of course be from the visual assessment of the map resulting in this difference. In both cases however, the direction is east-northeast. Other tools explored were the Muslim guide and ARz Islamic vibes. The angles they provided were 68° and 68.67° respectively. A further critical evaluation of the north – east sector (a 90° band) where the qiblah direction occurs, is divided into 4 (four)

subsectors, with the prime angle of each subsector constituting the previous plus 22.5° thus, starting from N (north) at 0°, NNE (north- northeast) is 22.5°, NE (north east) is 45°, ENE (east- northeast) is 67.5°, and E (east) is 90° of the compass. The south- east sector is similarly divided as such, into 4 subsectors. Thus ESE (east-southeast) is 112.5°, SE (southeast) is 135°, SSE (south-southeast) is 157.5°, and S (south) 180°. It can be concluded here that the theoretical angle for east-northeast direction starts from 67.5° and ends at 79°, thus its range is 67.5 -79° from north. This may not be visually established from this qiblah world map, but only with a compass on site, to provide the angle in degrees.

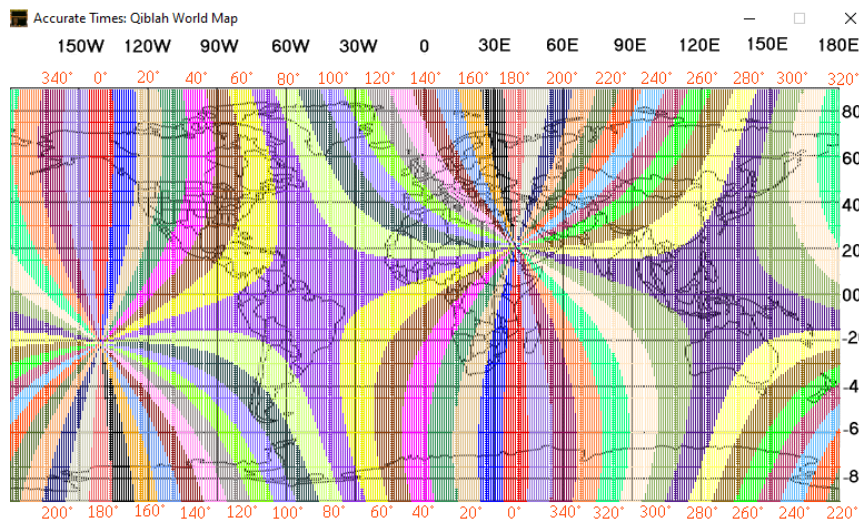


Figure 1: Qiblah world map, Adopted from accurate times

MATERIALS AND METHODS

Study Site

The site of the study was the metropolis of Zuru. This is the local government headquarters.

Tools and Applications Used

A total of 4 software applications (scientific tools) available online were used in this study. These were:

- Accurate times 5.3.9 of ICOP (Islamic Crescents' Observation Project)
- Muslim Guide
- ARz Islamic vibes (App)
- Compass

Methodology and Data Collection

The first tool accurate times, was downloaded from their website to a computer (Laptop) and configured with the latitude, longitude and height above sea level for Zuru. It was then activated and automatically provided the needed information, which is the qiblah angle for Zuru, in addition to other items from the 14 application options in it. The second and third tools (Muslim guide and ARz Islamic Vibes), were equally obtained online from Google play store, saved in a 4G (fourth generation) Huawei nova

3i android phone and automatically activated, which located Zuru using its GPS (ground position satellite). They both confirmed the earlier coordinates imputed into the accurate times app as correct. The fourth tool the compass, which came in the Huawei handset, was activated and it automatically provided the angle in degrees from north, as well as the direction, latitude and longitude (same as earlier given by other apps). Any other compass can however be used provided it is GPS sensitive. A total of 50 (fifty) masjids/mosques (sample size) were randomly taken from different parts of Zuru metropolis, including some juma'at (Friday) prayer grounds. Each was evaluated with the second to fourth app from the Huawei phone, taking qiblah readings with the phone placed flat on the first row behind the Imam directed horizontally. Where the Muslim Guide and ARz Apps indicated disparity with the angle faced by the Imam, the Compass was then used to determine the qiblah angle in use.

Data Analysis

The data collected were then subjected to descriptive analysis using the Microsoft office tool, excel. The entire study was undertaken from February 24th to March 15th, 2023, a total of 3 weeks.

RESULTS AND DISCUSSION

The results present a 3-case scenario, as depicted in figures 2, 3, 4 and summarized in 5. The qiblah values of the 3 tools used for Zuru indicate the prime angle to be between 68 – 68.7° from the north as shown in table 1. This further revealed 8% of the mosques were below 68° the lower limit, with the mosques shown in table 2. The least angle was the central mosque, under by 11° (degrees) at 57°, followed by masjidul tarbiya in GRA with 58°, under by 10°. Those within the tools range of 68-68.7° accounted for only 6%, and shown in table 3. However, majority of the mosques or 86% were above 68.7° qiblah angle, the upper limit of the range, and presented in table 4. The most deviated of these, was late Mallam Sule Bida mosque in ZC at 123°, over by 55°, followed by Mallam Umar’s mosque in shadawanka. It was over by 53° at 121° from the north. These two were completely not in the qiblah angle of makkah but beyond, in the east- southeast direction to the southeast (112.5 - 135°) from the north. The least deviated was the GRA eid prayer ground at 69°, over by just 0.3° compared to the upper limit of the range (68.7°). Figure 2 is a pie-chart summarizing the results obtained from this study. It can be concluded that 94% (86+8%) of the mosques evaluated were actually off the qiblah angle from both the lower and upper limits of the tools used, as shown in figure 2. Only 6% of the mosques were actually within the tools prime qiblah angle.

Further analysis of table 1 from a statistical viewpoint provides the mean (68.5°) for the second case scenario, indicating not a single mosque from the 50 evaluated, was within the acceptable prime angle range computed (68.5-68.7°) from the north as shown in figure 3, which is a grave cause for concern. This is because the mean (average) qiblah angle computed (68.5°), and the difference between it and one of the tools used (Muslim guide) value of 68° (lower limit) had a difference of 0.5, which is higher than the standard deviation (SD) value of the mean (0.4), thus making a significant difference. As such, any value below 68.5° is significantly below the computed qiblah angle, thereby invalidating the three earlier values of 68°, which accounted for the 6% in figure 2. The first two other tools from table 1 had values within the computed range and didn’t differ significantly from the mean SD, with their differences being lower (0.2 and 0.17 respectively) than 0.4 (mean SD). Figure 3 thus indicates that 14% of the mosques were below the computed mean of 68.5°, and their list is shown in table 5, while 86% were above 68.7° (table 4), thus further confirming that none of the 50 mosques (0) is on prime qiblah angle, which was earlier presented in figure 3.

A third scenario at evaluating the qiblah angles used the world qiblah map of accurate times. Zuru appeared to fall in the 70° angle band. Only 36% of the mosques were

within this angle, while 64% (16 below and 48 above) were off this angle (figure 4). The list of those mosques constituting the 36% is on table 6. On the whole, these three scenarios reflect a poor outcome of the focus of these mosques towards the prime qiblah angle of makkah from Zuru. The best score of 36% was obtained using the 70° angle band from the world qiblah map of accurate times on visual observation, which is itself not error free yet a poor score, followed by 6% from the raw qiblah values when the three tools were used, and finally 0% when the mean (average) value of the three tools was used, which is most scientific on the prime qiblah angle focused towards makkah. On the other hand, the mosques off focus amounted to 64%, 94% and 100% (0) respectively, as shown in figure 5.

What is certainly true is the fact that using these modern tools appropriately will provide the best result, and that involves knowing the local coordinates of the location in question and reading the angle from that perspective. The verses from Al-Baqara (2 vs. 144, 149 and 150) in the holy Qur’an (1980), stated facing the direction of the holy mosque in makkah, and the only way that direction can be established from a far, is not by arbitrary focus, but only using modern tools to establish the perfect angle. The north – east sector which harbours the direction from Zuru, confirmed the prime angle in this study to be 68.5°, when the mean of the three tools was used, and not 68°.

Table 1: Qiblah angle of Zuru given by the tools used

Software (Tool)	Angle (degrees from north)	Difference with mean
1. Accurate Times 5.3.9	68.7	0.2
2. ARz Islamic Vibes	68.67	0.17
3. Muslim Guide	68	0.5
Mean 68.5 (SD = 0.4)		
SD = Standard Deviation		

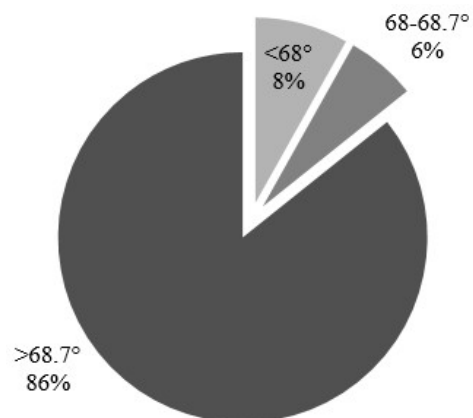


Figure 2: Summary of masjid qiblah angles from the three tools in the study

Table 2: List of masjids below 68 degrees (<68°) Qiblah angle

No.	Name	Angle (Degrees from north)	Difference from 68°
1	Masjiddul Tarbiya GRA	58	-10
2	Mutawalle residential masjid ZC	66	-2
3	Police station roundabout masjid	62	-6
4	Zuru central masjid	57	-11

Table 3: List of mosques within the tools range (68 - 68.7°).

No.	Name	Angle
1	Federal University of Agriculture, Zuru	68
2	Senator Bala's residencial mosque, zango	68
3	Zanga Sahaba Juma'at mosque, zanga	68

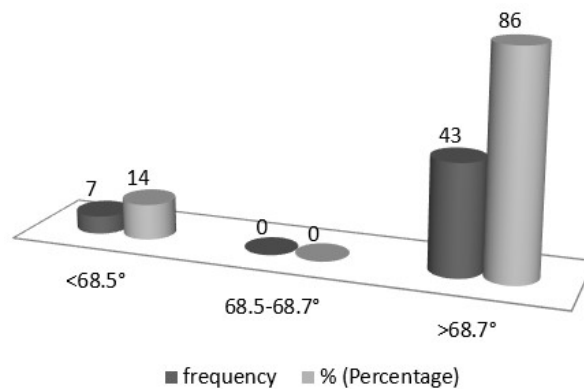


Figure 3: Summary of masjid qiblah angles computed from the mean of table 1

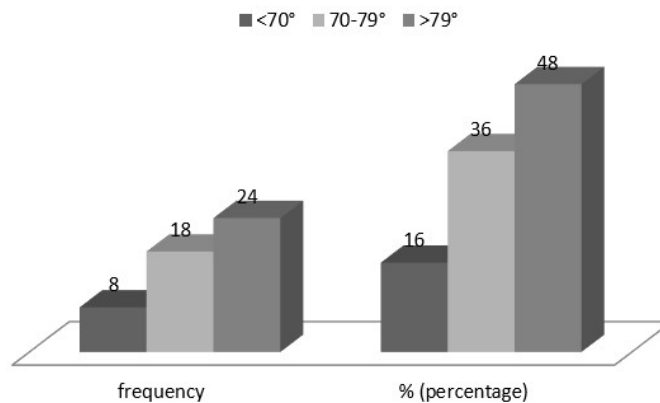


Figure 4: Qiblah angles for Zuru mosques using world map of accurate times

Table 4: List of mosques above 68.7° angle.

No.	Name of mosque	Location	Qiblah angle from north (°)	Difference with 68 and 68.7° respectively
1	223 military barrack mosque	223 military barrack, Zuru	76	8; 7.3
2	Aliyu Maiwa Res. Masjid	Tafidas Res. ZF	77	9; 8.3
3	Chiromas Res.	Fada	77	9; 8.3
4	Eid Prayer Ground (Izala)	Opt Govt Sc. College	73	5; 4.3
5	Eid Prayer ground GRA	GRA	69	1; 0.3
6	Emir Sani Sami Rd. Masjid	Along Emir S.S. Road	75	7; 6.3

7	Emir Sani Sami Res Masjid	Residence GRA	85	17; 16.3
8	Emirs Palace Masjid	Palace ZF	77	9; 8.3
9	Federal Low-cost Masjid	Fed Low-cost	102	33; 33.3
10	First Izala I Masjid	Mangwarori	85	17; 16.3
11	FirstBank Zuru Branch	Ahmadu Bello Way	78	10; 9.3
12	Gen Magoro/Galadima's Mas.	Res. of Gen. Magoro	71	3; 2.3
13	General Hospital (MBGH)	MBGH	90	22; 21.3
14	Juma'at Masjid New Mkt (Izala 2)	New Market	82	14; 13.3
15	Juma'at Masjid Tarbiyat Sch	Ribah Road, Zuru.	84	16;15.3
16	Late Bala Gwauna Res. Masjid	Res. Along Ahmadu B.Way, zango	71	3; 2.3
17	Late Danladi Oho's Res. Masjid	Beside Res., Adjacent Fed Low-cost	86	18; 17.3
18	Late Sule Bawa Rd, Masjid ZC	ZC	75	7; 6.3
19	Late Sule Bida Res.	ZC	123	55; 54.3
20	Layilayi Masjid	Layilayi Supermarket Zur	106	37; 37.3
21	Local Govt Sect. Masjid	L. G. Secretariat HQTS	76	8; 7.3
22	Mai Mauludi Masjid Bypass Rd.	Bypass Islamiya Masjid	82	14; 13.3
23	Mal Umar Res, Masjid	Shadawanka Juma'at Masjid	121	53; 52.3
24	Mal. Lawali Dattijo's Res.1 Masjid	Zanga	84	16; 15.3
25	Mamman Nabalki's Masjid	Res. Zanga	107	39; 38.3
26	Masallacin Saye	ZC/Ahmadu Bello Way	79	11; 10.3
27	NATO New Motor Park msq.	Inside NATO New M.Park	79	11; 10.3
28	New Juma'at Masjid Opt FUAZ	Opt FUAZ	75	7; 6.3
29	Old Market Masjid	Ahmadu Bello Way	85	17; 16.3
30	Old Motorpark (NURTW) Masjid	Old Motor Park, NURTW	81	13; 12.3
31	Old Motorpark (Yoruba) Masjid	Old Motorpark, KD loading section	110	42; 41.3
32	Old Post Office	Jarqasa	100	32; 31.3
33	Police Station masjid	DPO's Office, GRA	75	7; 6.3
34	Prison Service Office Masjid	Prison Service	72	4; 3.3
35	Government Rest House	G. R. A.	86	18; 17.3
36	Sabon Kasuwa Masjid (Izala)	Inside Sabon Kasuwa (Kesto)	83	15; 14.3
37	Sabon Kasuwa Masjid (Other)	Inside Sabon Kasuwa, beside well	76	8; 7.3
38	Sabongarin Dabai Juma'at Masjid	Sabongarin Dabai	88	20; 19.3
39	Sarkin Dabai Palace Masjid	Dabai Palace	82	14; 13.3
40	Sarkin Rafin Zuru Palace Masjid	Rafin Zuru Palace	90	22; 21.3
41	Sarkin Rikoto Res, Masjid	Sarkin Rikoto Residence	84	16; 15.3
42	State Low-cost Masjid	State Low-cost, behind MBGH	113	45; 44.3
43	ZC Juma'at Masjid	ZC	78	10; 9.3

Table 5: List of mosques below computed mean (68.5°) of the tools used

No.	Name	Angle (Degrees)	Difference from 68.5°
1	Masjiddul Tarbiya, GRA.	58	-10.5
2	Federal University of Agric. Zuru	68	0.5
3	Mutawalle residential masjid ZC	66	-2.5
4	Police station roundabout masjid	62	-6.5
5	Senator Bala N. res. Mosque.	68	0.5
6	Zanga Sahaba Juma'at mosque	68	0.5
7	Zuru central masjid	57	-11.5

Table 6: List of mosques within the 70° band for Zuru with the world qiblah map of accurate times

No.	Name of mosque	Location	Angle (degrees)
1	223 Mil Barracks Masjid	223 Mil. Barrack Zuru.	76
2	Aliyu Maiwa Res. Masjid	Tafidas Res. ZF	77
3	Chiroma Res.	Fada	77
4	Eid Prayer Ground (Izala)	Opt Govt Sc. College	73
5	Emir Sani Sami Rd. Masjid	Along Emir S.S. Road	75
6	Emirs Palace Masjid	Palace ZF	77
7	FirstBank Zuru Branch	Ahmadu Bello Way	78
8	Gen Magoro/Galadima's Mas.	Res. of Gen. Magoro	71
9	Late Bala Gwauna Res. Masjid	Res. Along Ahmadu B.W., zango	71
10	Late Sule Bawa Rd, Masjid ZC	ZC	75
11	Local Govt Scrt Masjid	L. G. Secretariat HQTS	76
12	Masallacin Saye	ZC/Ahmadu Bello Way	79
13	NATO New Motor Park	Inside NATO New M. Park	79
14	New Juma'at Masjid Opt FUAZ	Opt. FUAZ	75
15	Police Station (DPO'S) Office Mas.	DPO's Office	75
16	Prison Service Office Masjid	Prison Service	72
17	Sabon Kasuwa Masjid (Other)	Inside Sabon Kasuwa, beside well	76
18	ZC Juma'at Masjid	ZC	78

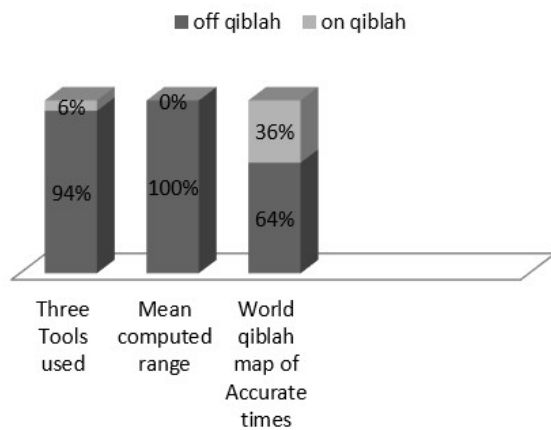


Figure 5: Comparison of qiblah results from a 3-way analysis on 50 mosques

CONCLUSION

In this study, 50 masjids/mosques were randomly sampled in Zuru metropolis, and their qiblah angles taken with modern (scientific) tools, notably 3 Islamic apps and one compass, to ascertain the precision of their focus towards makkah. It was disappointing to observe from the 3-way analysis that, the best case scenario resulted in only 36% of the mosques being within the qiblah angle of makkah. This was followed by 6%, and finally 0%, where none of the 50 mosques was within the prime angle of makkah. This prime angle (68.5° from the north) was the computed mean of the three tools used. What this means in this 21st century is, majority of the mosques in Zuru where muslims pray are not focused in accordance with the injunctions of

God (Allah), as ordained in the holy Quran cited earlier. Without the use of such modern tools, it wouldn't have been possible to establish these huge flaws perpetrated by our erstwhile approach of arbitrary focusing, using the sunrise direction as the qiblah guide, instead of employing the use of modern tools like the compass and modern Islamic apps during the construction process, to focus appropriately towards makkah, the city where the holy mosque is located. It was also established from the tools used, that a range (67.5 -79° from the north) provided the 'safety limit' within the direction in the east – northeast subsector of focus. Thus any mosque within this range could be considered in a 'safe' direction and within qiblah focus. It becomes necessary here to recommend that, the appropriate authorities in Zuru advice that prayer rows in mosques not within the established qiblah angle from this study re-orient them to align with it. Authorities must insist on new masjids under construction, to strictly adhere to the qiblah angle established. Further studies should be continued with modern tools, in harmony with Quranic verses and the traditions of the Prophet (SAW), to re-affirm these findings and fine-tune the outcome for best guidance of the Muslim umma in prayers. Allah guide us aright, amen.

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