



Validation of smart phone Apps as Environmental Noise Monitoring tool & its Application in Abuja city noise mapping.



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Introduction



- Noise is a global occupational and environmental health hazard.
- NIHL; aggravates Cardiovascular Diseases; Insomnia , psycho-social disturbances.
- Hence the need for communal environmental noise monitoring.



- However the tools(sound meter, dosimeter etc.) are not easily affordable especially in developing world.
- Need arises for affordable, available ,convenient & reliable means .

Objective

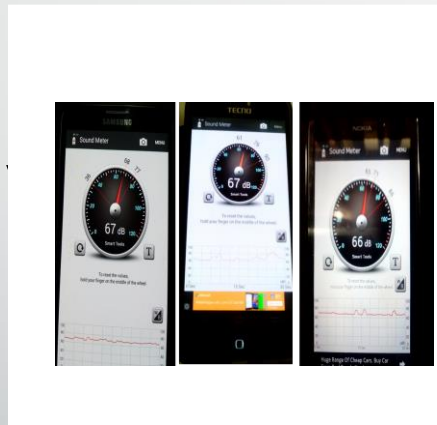


- To assess the validity of mobile phone Apps as noise monitoring tool .
- Measure the equivalent noise level(L_{eq}) in Abuja municipality with this simple method.

Methods(1)



Vs



- Comparative analysis of a cross sectional study (January 2014 - February 2015).
- Environmental noise levels (day & night hours in real time) were measured simultaneously with Extech 407730 Digital Soundmeter, Serial no:2310135, calibration no:91037 and three smartphones (Samsung Galaxy note3; Nokia S and Techno Phantom Z) running on Android "Apps" Androidboy1.
- Statistical calculations were done with Pearson correlation, T-test and Consistency within American National Standards Institute(ANSI) acceptable standard errors.

Method(2)

- The validated phone App(Android boy1) was used to map the noise levels within the Abuja municipality (residential, business and market areas) via the Abuja Geographic Information System.



Its no pandemonium.

Busy African city!



Rush hour in Vancouver!



Results (Validation outcome)

Simultaneous day readings of SLM and smartphone App

Simultaneous night readings of SLM and Smartphone App

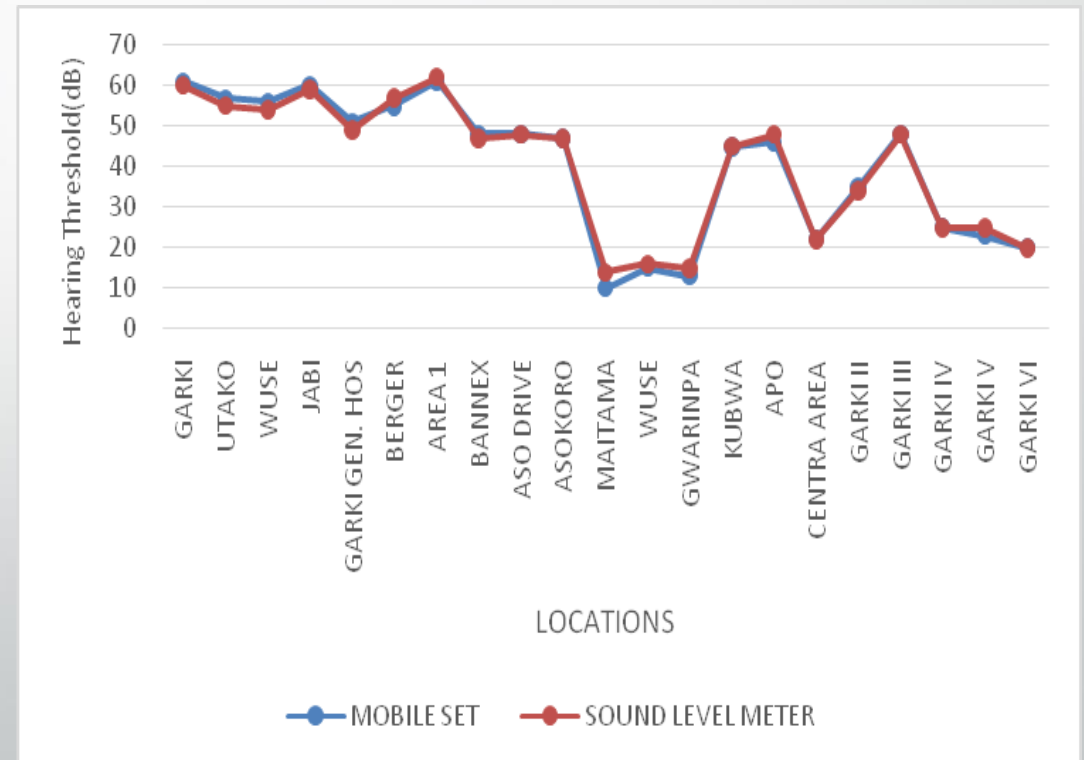
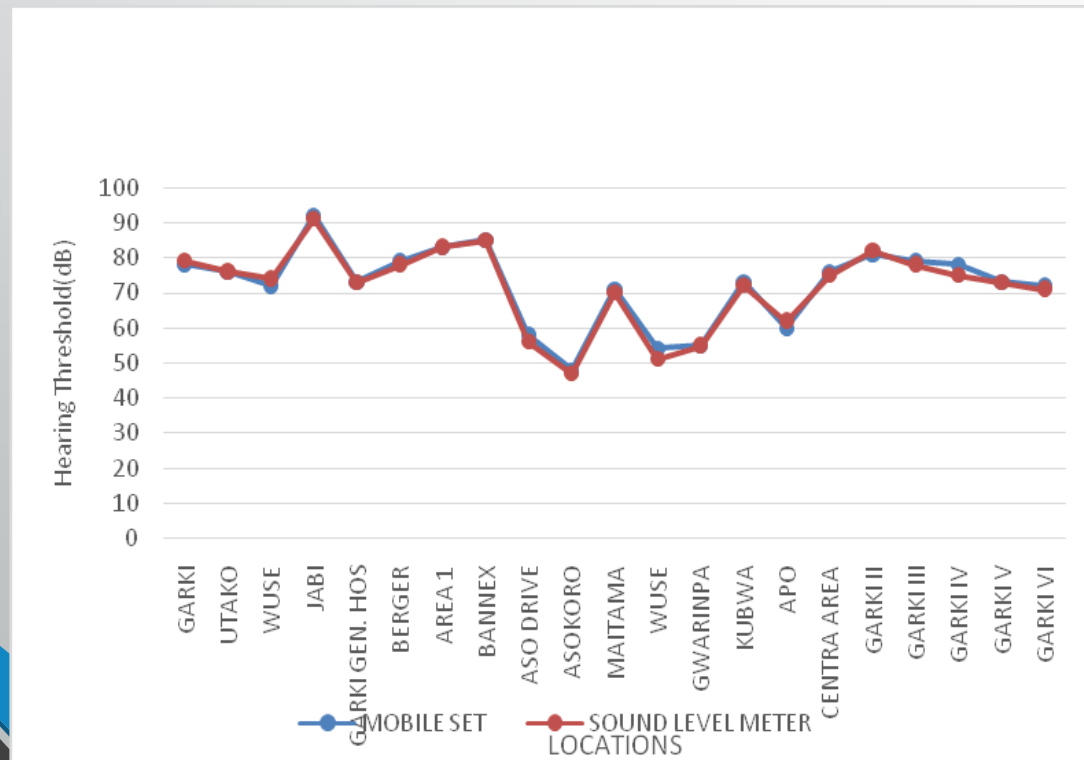


TABLE II: Paired Sample Statistics of Day and Night Mobile phone and Sound Level Meter(SLM) simultaneous readings”

Within :
 Type 2 noise device
 ANSI Acceptable
 error
 ±2dB


	Mean	N	Std. Deviation	Std. Error Mean	t-test	p-value
DAY MOBILE	72.1905	21	11.19205	2.44230	1.644	0.116
DAY SLM	71.7143	21	11.45924	2.50061		
Night Mobile	40.2857	21	17.30648	3.77658	0.556	0.584
Night SLM	40.4762	21	16.48217	3.59670		

RESULTS(Abuja City Mapping)

LOCATION(MARKETS/PARKS)	DAY TIME (dB)	NIGHT (dB)
GARKI	78	-
UTAKO	76	-
WUSE	72	-
JABI	92	-

RESULTS Contds

LOCATION(HOT SPOT/BUSINESS AREAS)	DAY TIME (dB)	NIGHT (dB)
GARKI GEN HOSPITAL	73	51
BERGER JUNCTION	79	55
AREA I ROUND ABOUT	83	61
BANNEX PLAZA	85	48



LOCATION(RESIDENTIAL)	DAY TIME(dB)	NIGHT(dB)
ASO DRIVE	58	48
ASOKORO	48	47
MAITAMA	71	10
WUSE	54	15
GWARINPA	55	13
KUBWA	73	45
APO	60	46
CENTRAL AREA	76	22
GARKI(ARS II-VI)	81,79,78,73,72	35,48,25,23,20
BERGER AREA	68	55

Discussions /Conclusion



- The choice of the 3 brands of phones for the study was purely on availability and popularity within Nigeria.
- Apart from the App, microphone and condenser system quality of the phone are vital for sensitivity.
 - ✓ ***Microelectromechanical system microphone (30-120dB).***
 - ✓ ***Ceramic Condenser*** present in type-2 noise meters;

Discussions /Conclusions



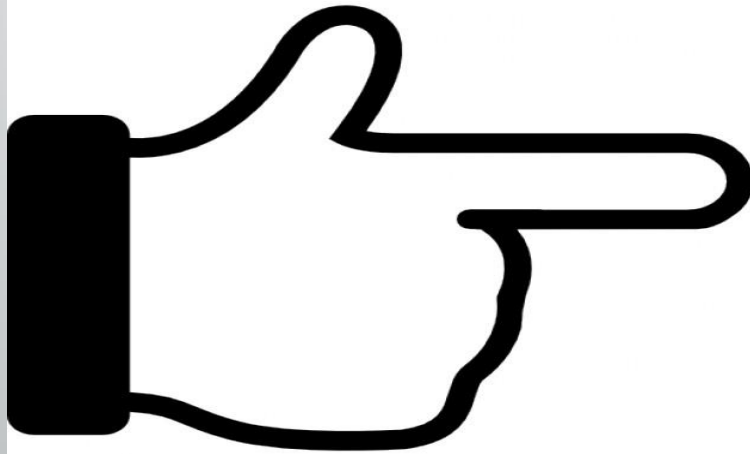
- Average values of noise for daytime in Abuja is still very high, compared to WHO standard of 55dB.
- Probably associated with Migrations, insecurity & industrialization.
- Average noise level at night of 34dB compare to WHO of 45dB is still satisfactory.

FINALLY



- The use of mobile (smart) phones “apps” for sound level measurement is a huge potential for environmental noise monitoring.
- The *androidboy1* “app” performance in this study showed a good correlation and comparative high sensitivity to the Standard Sound Level Meter (type 2 SLM device).

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