



**FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA**



**SCHOOL OF ENVIRONMENTAL TECHNOLOGY
INTERNATIONAL CONFERENCE (SETIC 2016)**

SETIC 2016 *Conference Proceedings*

EDITORS:

**Yekeen A. SANUSI
Olatunde F. ADEDAYO
Richard A. JIMOH
Luqman O. OYEWOB**

THEME:

**SUSTAINABLE BUILT ENVIRONMENT
AND CLIMATE CHANGE:
THE CHALLENGE OF POST 2015
DEVELOPMENT AGENDA**

DATE:
**TUE. 10TH - THUR. 12TH
MAY, 2016**

VENUE:
**SCHOOL OF ENVIRONMENTAL
TECHNOLOGY COMPLEX**

TIME:
**9:00AM - 5:00PM
DAILY**

CHIEF HOST:
PROF M. A. AKANJI
VICE CHANCELLOR, FEDERAL UNIVERSITY
OF TECHNOLOGY, MINNA

HOST:
PROF Y. A. SANUSI
DEAN, SCHOOL OF ENVIRONMENTAL TECHNOLOGY,
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SUPPORTED BY



**School of Environmental Technology
International Conference
(SETIC) 2016**

10-12 May 2016

**Federal University of Technology Minna,
Niger State, Nigeria**

Conference Proceedings

Editors

**Yekeen A. SANUSI,
Olatunde F. ADEDAYO,
Richard A. JIMOH,
Luqman O. OYEWOLI,**

Conference Proceedings of the School of Environmental Technology International
Conference (SETIC) 2016

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10th – 12th May 2016
School of Environmental Technology,
Federal University of Technology, Minna, Niger State, Nigeria.

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FOREWORD

The organising committee of the 1st School of Environmental Technology International Conference is pleased to welcome you to Federal University of Technology Minna, Niger State Nigeria.

The conference provides an international forum for researchers and professionals in the built and allied professions to address fundamental problems, challenges and prospects that affect the Built Environment as it relates to Climate Change and Sustainable Development. The conference is a platform where recognised best practices, theories and concepts are shared and discussed amongst academics, practitioners and researchers. The papers and scope are quite broad but have been organised around the sub-themes listed below:

- Infrastructure Development and Financing
- Sustainable Practice Theories
- Urban Resilience and Energy Conservation
- Waste Management and Sanitation
- Health and Safety Issues
- Climate Change and Threat to Sustainability of the Built Environment
- Climate Change Induced Disaster
- Designing the Human Settlement for Climate Change
- Conceptual Issues on Climate Change and Sustainable Development
- Sustainable Materials
- Cross Cutting Issues

The peer review process saw us making use of 48 senior academics and specialist as reviewers drawn from institutions in Nigeria and England. There were some papers were outside the theme of the conference but we had to create a cross cutting issues to accommodate such papers this is in spirit that every knowledge is important.

We hope you enjoy your time at our conference, and that you have the opportunities to exchange ideas and share knowledge, as well as participate in productive discussions with the like-minded researchers and practitioners in the built environment and academia.

Professor Yekeen Adeeyo Sanusi
Conference Chair
School of Environmental Technology International (SETIC) 2016
Federal University of Technology Minna, Niger State Nigeria.
May 2016

ACKNOWLEDGEMENTS

The success of the 1st School of Environmental Technology International Conference holding at the Main Campus of the Federal University of Technology Minna, Nigeria is predicated on the support and goodwill from Vice-Chancellor of Federal University of Technology and many other highly motivated people.

I sincerely wish to appreciate you for attending this maiden event and to warmly welcome you to the city of Minna the capital of the *POWER STATE*. It is a great honour to have you in the beautiful campus of Federal University of Technology Minna, Nigeria, **THE MOST PEACEFUL UNIVERSITY IN NIGERIA**. I am aware of the great sacrifices made by many of you to be present in this occasion and I will definitely not overlook the long distances some of you have had to cover to get to this conference venue. We genuinely appreciate all your efforts. It is our singular hope and desire that the conference meets your expectations and gives you unquantifiable experience and tremendous developmental networking opportunities for a life fulfilling career.

We are grateful for the presence of the Vice Chancellor of the Federal University of Technology Minna – Professor Musbau Adewumi Akanji whose leadership and distinguished academic career has served as inspiration and encouragement to many young academics. His desire to see the University compete at International level has led to the upsurge in the organisation of International conferences, Public lectures and Seminars on regular basis within and outside the university. We are happy to have you as the Chief host to declare the conference open and deliver the welcome address.

We are grateful to the Dean of School of Environmental Technology, Federal University of Technology Professor Yekeen Adeeyo Sanusi for providing the robust platform, academic support and leadership for the organisation of the conference. You threw the challenge and provided the required resources and strategies for achieving its success, it is a great honour of having the opportunity to learn at your feet. We are happy to have you as the host and keynote speaker at the conference. I wish to thank also all the special guests particularly leaders of the Industry, Built Environment and Academia.

SETIC is beginning at the foundation this year and for this I wish to thank all those who have supported us through various forms of participation. Specifically I wish to thank the delegates and the partners for contributing significantly to the conferences. I wish to thank Prof. Oluwole O. Morenikeji (DVC Academic), Prof. Stella N. Zubairu and Prof. A. M. Jinadu who genuinely and consistently monitored the progress of the conference preparations. It is my desire that SETIC becomes a constant feature in the calendar of the university and global conference listings.

Delegates to SETIC 2016 are from 39 different academic and research institutions that are spread across six different countries. This offers participants a wonderful opportunity for exchange of cultural, social and academic ideas during the conference periods. It is also an opportunity to create awareness about programmes and events at the participants' individual institutions. I encourage you all to make good use of the networking opportunities that are available.

We received a total of 226 abstract, based on a quick review we were able to accept 175 of them and the authors were communicated on what they needed to focus on while developing the full papers. A total of (129) full papers were received and reviewed, the reviewers report for the authors to make corrections and submit revised papers. It was after the process that we were able to accept 112 papers for presentation at the conference, I therefore congratulate all the authors whose papers made it to the conference. We acknowledge the amount of hard work you had all put in producing these papers. It is my sincere believe that the presentation of the different ideas in your paper would go a long way in improving the knowledge of the participants and also generate meaningful discussions at the tea beaks, lunch and beyond.

I wish to express my utmost gratitude to each reviewer for a wonderful job done and for tolerating our deadlines and Oliver Twist syndrome. It is your dedication and expertise that has ensured that the conference is a success.

Special thanks to all our keynote speakers, Prof. Oluwole O. Morenikeji (Deputy Vice-Chancellor Academics, Federal University of Technology Minna), Prof. Hussein Makun (Director, Directorate of Research Innovation and Development, Federal University of Technology Minna), Prof. Musa Aibinu (Director, Centre for Distance Learning), Prof. Mustapha Zubairu (Director, Centre for Human Settlement and Urban Development), Dr. Appolonia A. Okhimamhe (Director, WASCAL) and Prof. Yekeen Sanusi, (Dean School of Environmental Technology, Federal University of Technology Minna).

It is important to appreciate the roles and efforts of the following people for their selfless and very significant contributions made towards the successful organization of the conference: Adedokun John, Idowu Oqua, Akhabue Oriwoh and Ailoyafen Dorcas (for being available to run around at very short notice), Arc. Oyetola Stephen and Tpl Samuel Medayese (for typesetting the papers for the conference proceedings).

I have come to realise that it is not easy to organize conference without dedicated individuals offering to serve. My heartfelt gratitude goes to Dr. R.A. Jimoh, Dr. L.O. Oyewobi, Dr. Taibat Lawanson, Dr. P. Ayuba, Dr. J.J. Dukiya, Dr. A.I. Anunobi, Dr. N.I. Popoola and Dr. O.A. Kemiki for their unflinching support all through the process.

It is our sincere hope that this conference will serve as a forum for the advancement of research in the urban sphere towards achieving a sustainable environment. It is our sincere believe that academics and professionals in practices will continually participate in this forum.

Once again I wish to thank you all for creating time out of your busy schedule to attend this conference. Please do enjoy your stay at Federal University of Technology Minna, and the city as a whole. Ensure that you make use of the different fora created throughout the conference to build new relationships for the future and strengthen existing relationships. I look forward to seeing you all in future.

Olatunde Folaranmi ADEDAYO
Chairman SETIC 2016 Organising Committee
May 2016

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DECLARATION

PEER REVIEW AND SCIENTIFIC PUBLISHING POLICY STATEMENT

10th May 2016

TO WHOM IT MAY CONCERN

I wish to state that all the papers published in SETIC 2016 Conference Proceedings have passed through the peer review process which involved an initial review of abstracts, blind review of full papers by minimum of two referees, forwarding of reviewers' comments to authors, submission of revised papers by authors and subsequent evaluation of submitted papers by the Scientific Committee to determine content quality.

It is the policy of the School of Environmental Technology International Conference (SETIC) that for papers to be accepted for inclusion in the conference proceedings it must have undergone the blind review process and passed the academic integrity test. All papers are only published based on the recommendation of the reviewers and the Scientific Committee of SETIC

Names and individual affiliation of members of Review and Scientific Committee for SETIC Conference 2016 are published in the SETIC 2016 Conference Proceedings and made available on www.futminna.edu.ng

Olatunde Folaranmi ADEDAYO
Chairman SETIC 2016
Federal University of Technology, Minna, Nigeria

Papers in the SETIC 2016 Conference Proceedings are published on www.futminna.edu.ng.

REVIEW PANEL

We wish to express our deepest and sincere gratitude to the following people in no particular order who provided comprehensive scientific reviews and made commendable suggestions towards improving the over 200 abstracts and 100 full papers submitted to SETIC 2016. They provided constructive comments to authors regarding their papers, it is necessary to state that there was no reported case of conflict of interest by any of the reviewers or the authors.

Dr. J.J. Dukiya, Department of Transport Technology, Federal University of Technology, Minna

Dr. Naomi I. Popoola, Department of Estate Management, Federal University of Technology, Minna

Dr. Anthony I. Anunobi, Department of Architecture, Federal University of Technology, Minna

Dr. Philip Ayuba, Department of Architecture, Federal University of Technology, Minna

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Dr. Yakubu Mohammed, Department of Quantity Surveying, Federal University of Technology, Minna

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Dr. Rotimi University of West England, UK

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Dr. Bashir Nuhu, Department of Estate Management, Federal University of Technology, Minna

Dr. Olatunde F. Adedayo, Department of Architecture, Federal University of Technology, Minna

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Dr. Rotimi University of West England, UK

Dr. Olatunde F. Adedayo, Department of Architecture, Federal University of Technology, Minna

PROFILE OF KEYNOTE SPEAKERS

SETIC 2016 organisers wishes to thank our keynote speakers for accepting to create time to share from their rich wealth of knowledge and interact with delegates and participants on varied issues being examined at this year's conference. A brief profile of each keynote speaker is provided here, this would allow for future interaction and networking with them.

Prof. Hussaini Anthony MAKUN

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Hussaini Anthony Makun is currently working as Professor of Biochemistry in the Department of Biochemistry, Federal University of Technology, Minna where he has been since 1992. He completed his PhD in 2007 in Biochemistry (Toxicology) from same University. The researcher was a National Research Foundation Postdoctoral Fellow (PDF) with Food Environment and Health Research Group of the University of Johannesburg (UJ) between 2008 and 2010. He is teaching basic and advanced courses in biochemistry, and toxicology related courses at both undergraduate and postgraduate levels.



He has supervised and graduated over seventy B-Tech and ten M-Tech students and two PhDs. He is currently the Lead Researcher of the Food and Toxicology Research Group (FTRG) of the University which has 2 Senior Researchers, 3 M.Tech and 4 PhD students. FTRG conducts researches on environmental health monitoring and mycotoxins at national and international levels. The researches focus on detection and health impacts of mycotoxins and establishing novel integrated intervention strategies approach against mycotoxins. The intervention strategies include exploration of natural preservatives from African traditional medicinal plants with fungicidal effects for production of fungicides for storage of crops. Other approaches at animal farms include formulation of nanoparticle based multi-mycotoxin feed binder against exposure to common, toxic mycotoxins. The research group is also involved in studies to produce simple medicinal supplements encapsulated in

nanoparticles with protective effects against diseases induced by mycotoxins from African traditional medicinal plants; such supplements will alleviate the adverse health impact of mycotoxins in animals and human beings. The research group is also interested in toxicological studies of medicinal plants used in the folkloric treatment and drug toxicology. Following the trend of drugs abuse in Nigeria, the research group is embarking on research titled “Elucidation of the chemical composition and biomonitoring of substances of abuse in the Northern region of Nigeria”. The focus of this research is to establish the current state of art of drugs of abuse in the Northern region of Nigeria; to elucidate the chemical composition and active ingredient of new psychoactive substances (NPS); to modify validated analytical methods for the detection of new psychoactive substances in blood, urine and hair.

In last 5 years, 6 research projects were granted with funding from NRF, South Africa and TETFUND, Nigeria. He is a member of Mycotoxicology Society of Nigeria (Vice President (North), Experts on Mycotoxins in Food, Food Hygiene, Food Import/Export Inspections and Certification System of the National Agency for Food and Drug Administration and Control (NAFDAC) of Nigeria, National Codex Committee of Nigeria, African Union Expert Committee on Contaminants in Food (2011 to date) and Joint FAO/WHO Expert Committee on Contaminants in Food (JECFA) (2012-2016). He coordinated the writing of the “discussion paper on fungi and mycotoxins in Sorghum” which was adopted as a document of the Joint FAO/WHO Experts Committee on Food Additives (JECFA) in 2012 and participated in the writing of “Proposed draft annex for “prevention and reduction of aflatoxins and ochratoxin A in sorghum” in the existing code of practice for the prevention and reduction of mycotoxin contamination in cereals (CAC/RCP 51-2003)”.

Prof Makun has 57 publications, mostly on mycotoxins in peer review journals, technical papers and books and is currently the Director of Research, Innovation and Development, Federal University of Technology, Minna.

Dr. Appollonia A. OKHIMAMHE

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Dr A. A. Okhimamhe is the Director of the Masters Research Programme on Climate Change and Adapted Land Use (MRP CC & ALU) of the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL), a German sponsored graduate research programme with its Headquarters in Accra, Ghana.



In collaboration with colleagues, 20 West African students from Nigeria, Ghana, Benin, Togo, The Gambia, Cote D'Ivoire, Mali, Niger and Burkina Faso graduated with Master of Technology (M.Tech) in Climate Change and Adapted Land Use from the University. Another Batch of 10 students are expected to commence their programme in mid 2016. Aside from her academic qualifications, her participation in various training activities organized by the United Nations in Regional Centre for Mapping of Resources for Development in Nairobi, Kenya (1992); University of Stockholm, Sweden (1994); Harare, Zimbabwe (1995); and European Space Research Institute in Frascati, Italy (1997, 1998) had prepared her professionally for her career. Additionally, in 2000, she secured a 6 months fellowship-traineeship for a colleague in the Department and herself at the European Space Research Institute in Frascati, Italy. Dr Okhimamhe is an alumni of the International Visitor Leadership Programme (IVLP), U.S. Department of State's Bureau of Educational and Cultural Affairs' (ECA) premier professional exchange program. Currently, she is an Associate Professor of Geography with a research focus on application of remote sensing and GIS in geographical sciences including climate change.

Dr Okhimamhe has served her country as a Technical Delegate at the UNFCCC COP in Cancun, Mexico (2010), Durban, South Africa (2011), Doha, Qatar (2012) and Warsaw, Poland (2013). She has supervised more than 30 postgraduate students and has several publications and is still publishing. In collaboration with her students in the last 3 years, she has focused on urban climate change studies using geospatial techniques.

Prof. Abiodun Musa AIBINU
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Abiodun Musa AIBINU (PhD), is a highly motivated career driven achiever with over Eighteen (18) years working experience in the field of: Mechatronics Engineering; Telecommunication Engineering; Spectrum Management; Industrial Automation; Teaching; Research and Project Development.



He received: National Diploma award from The Polytechnic, Ibadan, Nigeria; B.Sc degree from Obafemi Awolowo University (OAU), Ile-Ife, Nigeria; M.sc degree from Blekinge Institute of Technology (BTH), Sweden and Doctoral degree award from International Islamic University Malaysia, (IIUM), Malaysia. He has been actively involved in teaching and research activities at various universities since the completion of his post-graduate studies. However, prior to that he has worked with: MTN Communication (Nigeria) Limited; GS Telecom (Nigeria) Limited; DCC Satellite and Networks Limited; Oganla Consulting and Investment (OCI) limited; Communications Associates (COMSAC) (Nigeria) Limited just to mention but a few.

Engr. Aibinu has participated and won several awards at various international and national exhibitions and was nominated for 2012 promising researcher award and best teacher award at IIUM Malaysia. He has also won several research grant awards in and outside Nigeria and has authored/co-authored several publications in both local and international journals and conferences.

He is presently, the Head of Department, Mechatronics Engineering Department, Federal University of Technology, Minna and the Director, Center for Open Distance and e-Learning (CODEL), Federal University of Technology, Minna.

Prof. MORENIKEJI, Olakanmi Oluwole

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Morenikeji, Olakanmi Oluwole joined the services of the Federal University of Technology, Minna in 1990 as an Assistant Lecturer and rose to become a Professor of Urban and Regional Planning in 2006. He obtained his B. Sc in Geography and Regional Planning from the University of Calabar in 1983 and M. Sc Urban and Regional Planning from the University of Benin in 1998. He enrolled for his Ph.D in Transport Planning in 1992 at FUT Minna and won a Nigerian-Italian Ph.D scholarship which enabled him to do part of his Ph.D work at the University of Trieste, Italy. He bagged his Ph.D in 1998 and utilized his post-doctoral Commonwealth Fellowship at the Instrumented City, Institute for Transport Studies, University of Leeds, UK (2004/2005).



Morenikeji served as the Head of Department of Urban and Regional Planning from 1995 – 2002 and later, Director of the Centre for Human Settlements and Urban Development established in collaboration with the UN-Habitat in FUT, Minna. He was also the Dean of the School of Environmental Technology from 2008-2012. He has also participated in a number of internationally funded research projects and published several papers in learned journals. His areas of interest include transportation planning, human development studies, spatial analysis and Research Methods.

He is currently participating in a collaborative research between The Construction and Property Research Centre, University of the West of England (CPRC-UWE), Bristol, UK and the Federal University of Technology (FUT), Minna being funded by DFID. He has been appointed by the West African Science Centre on Climate Change and Adapted Land Use (WASCAL) as a visiting Lecturer at the Joint Facility for Language and Common Courses (JFLCC) 2016 which is a collaborative programmes for Masters (MRP) and Doctoral Research Programme (GRP) students from 10 participating Universities.

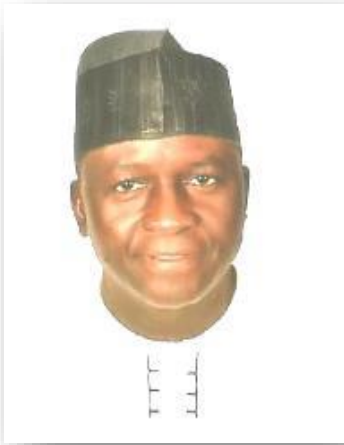
He is currently the Deputy Vice-Chancellor (Academics) Federal University of Technology, Minna, Niger State, Nigeria.

Prof. Mustapha ZUBAIRU

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Mustapha Zubairu is currently a Professor in the department of Urban and Regional Planning and the Director Centre for Human settlement and urban development (CHSUD) in the Federal University of Technology, Minna. He received his B.Sc. and M.Sc. degrees in architecture from the Ahmadu Bello University Zaria, Nigeria, in 1975 and 1977 respectively. He also holds M.Sc. and Ph.D. degrees in urban and regional planning from the University of Strathclyde, Glasgow, Scotland 1983 and 1990. He is a Member of the Royal Planning Institute, Member, Nigerian Institute of Architects, Fellow, Nigerian Institute of Town Planners and a Member, Nigerian Institute of Management.



Prof. M. Zubairu was amongst others, a principal architect in the Ministry of Works and Housing, Minna, Niger State from 1979-1981, a Chief Architect/Planner in the Niger state housing corporation between 1983 – 1984 after which he became the general manager Niger State Housing Corporation, Minna between 1984 and 1992. He eventually became the General Manager, Urban Development Bank of Nigeria PLC, in charge of the Lagos Regional Office from 1992 to 1999 where he was trained by World Bank on Project development and appraisal.

In 1999 he was appointed the position of Managing Director/Chief Executive, Federal Housing Authority, Abuja where he stayed until 2001. Through a large portion of his tenure (1995 till date) to be exact, he established and was also involved in private practice as principal partner in an architecture and urban planning consultancy firm. In 2003, he was appointed as director, Centre for Human Settlements and Urban Development in the Federal University of Technology, Minna and has retained this position till date. Since his appointment he has been servicing the department of urban and regional planning and architecture as mentor, supervisor and all round resource person.

His area of specialization includes; Housing, Urban design, Urban Management and Slum upgrading.

Professor Yekeen A. SANUSI
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Yekeen A. Sanusi is a Professor of Urban and Regional Planning at the Federal University of Technology, Minna. His lecturing experiences span over 20 years and has lectured at both undergraduate and postgraduate classes. His academic works cover issues on urban environmental quality, urban dynamics, urban governance and green economy (poverty, service delivery and deprivations, water and sanitation, energy and climate change).



He also has studies and reports sponsored by international bodies and Research Board of the Federal University of Technology, Minna. His teaching areas cover planning theory, development control and settlement of disputes, urban governance, project planning and evaluation, energy planning, environmental impact assessment and tourism planning. He has successfully supervised many postgraduate theses (PhD, Master and Postgraduate Diploma). On administrative front,

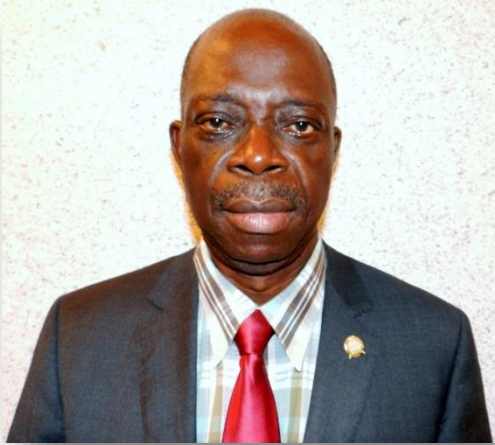
He was Deputy Dean, School of Environmental Technology of the Federal University of Technology, Minna between 2006 and 2008 and the Head of Department, Urban and Regional Planning between 2008 and 2012. Since 2012, he has been the Dean of the School of Environmental Technology. He is a Registered Town Planner (RTP) and a member of Nigerian Institute of Town Planners (NITP).

He is a member of many international research networks. Among these are Environment, Health and Development Network and Renewable Energy Policy Network for the 21st Century.

PROF Johnson Bade FALADE

Executive Director of the Foundation for Development and Environmental Initiatives (FDI)

He is currently the Managing Director/Chief Executive Officer of Gotosearch.Com Ltd and Executive Director of the Foundation for Development and Environmental Initiatives (FDI) from July 20012-date. He is currently a Senior Programme Advisor for the Urbanisation Research Nigeria Project.



Prior to this appointment, Prof Falade was the first Country Director of UN-HABITAT Programme Support office for Nigeria (2003-2012); UNDP (Programme Analyst in the Governance Team (2000-3), UNDP Zonal Officer for the North-West Zone of Nigeria (1998-2000); Programme Officer for Economic Management Team (1994-98); Programme Officer for Water and Sanitation (1992-94).

He was appointed Pupil Town Planner, County Planning Department, County Durham, Durham, UK (1977-78) and Air Mapping Assistant with the Photogrammetry Department, Ministry of Lands and Housing, Ibadan, Nigeria (1968-1970).

Professor Falade has a vast teaching and research experience. He was appointed Assistant lecturer (1982-83), Lecturer 1 (1985-87), Senior Lecturer (1987-91) with the Faculty of Environmental Design and Management for the Obafemi Awolow University Ile-Ife. He was a Visiting Professor, Department of Geography and Regional Planning, Adekunle Ajasin University, Akungba, Akoko, Ondo State (2005-7); He was Visiting Associate Professor, Department of Urban and Regional Planning University of Lagos, Lagos (1998-90); Visiting Lecturer Department of Geography and Regional Planning Lagos State University, Ojoo (1998).

Professor Falade is member of several Professional Bodies: namely Nigerian Institute of Town Planners (1984-till now), Fellow of the Institute (1999-till date); Town Planners Registration Council (1986-till date); Nigerian Construction Industry Academy (1986-to-date); Nigerian Institute of Management (NIM) and International Union on Parks and Recreational (2004-to-date).

Professor Falade has been awarded many national and international awards. He has several publications to his credit in the areas of urban planning, landscape design and conservation and urbanization and urban governance.

ASSESSMENT OF THE EFFECT OF COMMUNAL CONFLICTS ON RESIDENTIAL SEGREGATION IN KADUNA METROPOLIS, KADUNA STATE, NIGERIA

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This research focuses on the assessment of the effect of communal conflict on residential segregation in Kaduna metropolis, Kaduna State Nigeria. It assesses the socio-spatial and economic characteristics of the residents and their pattern of intra-city movement. The study also assessed the role of physical planning agencies responsible for physical development in the study area. To obtain field data required, 390 (2.5%) households out of 15,378 existing in the study area were selected using stratified simple random sampling technique. Four settlements; one in each of the four local government areas that made up the metropolis out of the 33 settlements were selected using a simple random technique they are: Narayi-bayan dutse in Chikun, Unguwan Muazu in Kaduna south, Rafin guza in Kaduna north, and Hayin naiya in Igabi Local Government Area. The research showed that there was a significant movement of residents who changed location within the metropolis due to communal conflict; this resulted in ethnic and religious segregation, such that Kaduna north, accommodates about 75% Hausas and other tribes whom are 90% Muslims and Kaduna south accommodates people from southern Kaduna origin, Igbo, Yoruba and other tribes; 73.02%, 7.14%, 1.11% and 8.13% respectively, constituting 91.05% Christians. Unguwan Muazu exhibits an element of coexistence among the various ethnic groups; Hausas, southern Kaduna, Yoruba, Igbo and other tribes: 48.83%, 12.68%, 32.39%, 4.2% and 1.88% respectively. The study shows that people can still coexist, given the right atmosphere and through concerted planning efforts and enlightenment. The study, therefore, recommends a framework for planning and controlling the physical development in Kaduna metropolis and the inclusion of residents in planning decision making for sustainable development.

KEYWORDS: Communal Conflict, Economic Characteristics, Intra-City Movement, Residential Segregation and Socio-spatial.

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INTRODUCTION

Developing countries the world over are diverse in nature in terms of religious, ethnic, political affiliation and economic endowment. These diverse affiliations and endowments are expected to be tools for the development of these countries instead they have become agents of discontent, disharmony and hatred. Urban areas of these developing countries are supposed to be the nucleus for development activities where ideas and innovations are formed and diffused to other sub-communities they are supporting rather, the development of the centers have taken a downturn because the urban areas have become canter where discontent and disharmony among communities of these centers and governments are being exhibited because desired services that are required for sustainable development cannot be provided. As a result of this, in Africa, over 201 state conflicts have occurred in various urban areas between 1989 and 2009. Countries where these conflicts occur include; Sudan, Rwanda, Somalia, Ethiopia, Hema and Lendu in the Democratic Republic of Congo and Nigeria among others.

Nigeria has experienced numerous communal conflicts arising from electoral, religious, political ethno-religious land and economic crises since 1999. Elaigwu (2011) stated that more than 600 communal conflicts with triggers related to the issues above have occurred in Nigeria. Swanstrom and Weissman (2005) said conflict is present when two or more parties perceive that their interests are incompatible, express hostile attitudes, or take pursue their interests through actions that damage the other parties. These parties may be individuals, small or large groups, and countries.

Conflict is an intrinsic and inevitable aspect of social change, Swanstrom and Weissman (2005); it is an expression of the heterogeneity of interests, values and beliefs that arise as new formations generated by social change come up against inherited constraints. But the way we deal with conflict is a matter of habit and choice. It is possible to change habitual responses and exercise intelligent choices. Communal conflict was considered by Oyewole (2010) as a conflict that occurs between two or more communities. It is described as a conflict involving two or more communities engaging themselves in disagreement or an act of violence over issues such as claims for land ownership, religious and political difference leading to loss of lives and destruction of properties. Communal violence (sometimes inter-communal violence) is a situation where violence is perpetuated across ethnic lines, and victims are chosen based upon ethnic group membership. Dzurgba (2006) was of the opinion that communistic violence is that which occurs between two or more communities over territorial land. To Ekpeyong (2011), conflict simply means “that I want something and you also want the same, but we both cannot have it all. According to Fernandez in Ekpeyong (2011) conflict can be viewed as a difference in perspectives: what one sees, think, feel, and believe may be different from what another sees, think, feel, and believe. From the above assertion, it therefore means that conflict is a part of all human interactions, and it can have a positive influence. Hence, we can say conflict is inevitable as it is present in daily, public and private life.

Violent conflict usually erupts in places where the government is an instrument of group domination and where the channel for articulating demands is closed. This type of ethnic conflict is very complex and very notorious to manage. It entails clash of cultures, as well as of interests in all ramifications, and always expressed in a cruel manner. This form of conflict ranges from riot to secession to civil wars. The hard view of ethnic conflicts sees ethnic groups as, inscriptive group, firmly bounded entities based on a strong sense of commonality, producing considerable loyalty, persisting over time, providing large effective reward to group members, inclined to ethnocentrism and to hostility and to a desire to dominate outsiders, liable conflict behavior based on passion, and endangering great willingness on the part of group members to sacrifice for collective welfare (Oyewole, 2010).

Conflicts can become violent when parties go beyond seeking to attain their goals peacefully, and try to dominate or destroy the opposing parties' ability to pursue their own interests. Conflicts become manifest when these unacknowledged contrary interests become conscious and voiced (Swanstrom and Weissman, 2005). Conflict itself is not always negative. Indeed, conflict is one of the most powerful positive factors in a society. Writing about the positive impacts of ethnic conflicts, Nnoli (1993) argued that since the political demands of many ethnic movements concern liberties and justice, conflict arising there from "contributes to democratic practice by its emphasis on equity and justice in social-political relations ". This shows that ethno-religious conflict in plural societies can neither be wished away nor eradicated and, at the same time, cannot be left alone because they are capable of destroying states.

Most of the violent conflicts that have rocked Nigeria over the years and intensified in recent times are part of the consequences of a failed development process. If Nigeria had realized the potential of its huge human and material resources, much of the discontent that has resulted in violent conflicts would have been avoided. The following factors have been identified by Nehi (2013) as the root cause of social conflicts in Nigeria:

Communities and ethnic groups within and across the boundaries of states and local government council areas lay claim to land as original owners (settlers) or „aboriginals“ and on this basis, those regarded as intruders are fought against. It is nothing new that farmers and pastoralists, fishermen and pond owners, foresters and timber loggers clash throughout Nigeria often over disputed use and exploitation of land and water resources. Commenting on the above resource based conflicts, Otite (1999) writes: And since the 1960s, and particularly since the 1990s, communities in Nigeria's deltaic areas have clashed with one another over claims in territories in which oil exploration companies operate and for which royalty and amenities and development projects are expected.

Power is also a main source of conflict in societies since it has the ability to achieve something successfully. It is also the ability to cause things to happen rapidly. It is the capacity to reward complaints, persuade recalcitrant, coerce intransigent and punish offenders. Thus, power gives the ability to control the behaviour of others, even against their

will such as deviants, sociopath, delinquents, dissenters and rebels. By using power one can also control resources, political processes, social institutions, cultural institutions and development. Thus, power decides and chooses those who will gain and those who will lose in any given situation. Power is always in limited supply. Hence, the gains for one individual or group are often associated with the losses for the other individual or group. This is why power has become a major source of conflicts not only in Africa, but also in many other nations (Dzurgba, 2006).

The aim of this research therefore, is to assess the effects of communal conflicts on residential segregation in Kaduna metropolitan area with a view to evolving appropriate solution to identified problems. The objectives of the research are:

1. Assess the socio-spatial and economic characteristics of residents.
2. Assess the pattern of intra – city movement of the residents

The Study Area

Kaduna is the capital of Kaduna State in northwestern Nigeria; Kaduna was founded by the British in 1913 and became the capital of Nigeria's former Northern Region in 1917. Kaduna retained this status until 1967. It is located at latitude 10°23'N and 10° 43'N and longitude 7°17'E and 7° 37'E, see (Figure 1). It is a trade centre and a major transportation hub for the surrounding agricultural areas with its rail and road junctions.

The symbol of Kaduna is the crocodile, called *Kada* in the native [Hausa](#) language. Ethnic groups include Hausa and Kurama in the north and northeast, Kamuku, Gwari and Kadara in the west, Jaba, Kaje, Kataf, Marwa are some of the ethnic groups found in the southern part of the state. The Hausas and Fulanis in the north practice Islam while the majority of the southern people are Christians, there are also Gbagyi, Ibo and Yoruba ethnic groups (Nigeria Galleria, 2004).

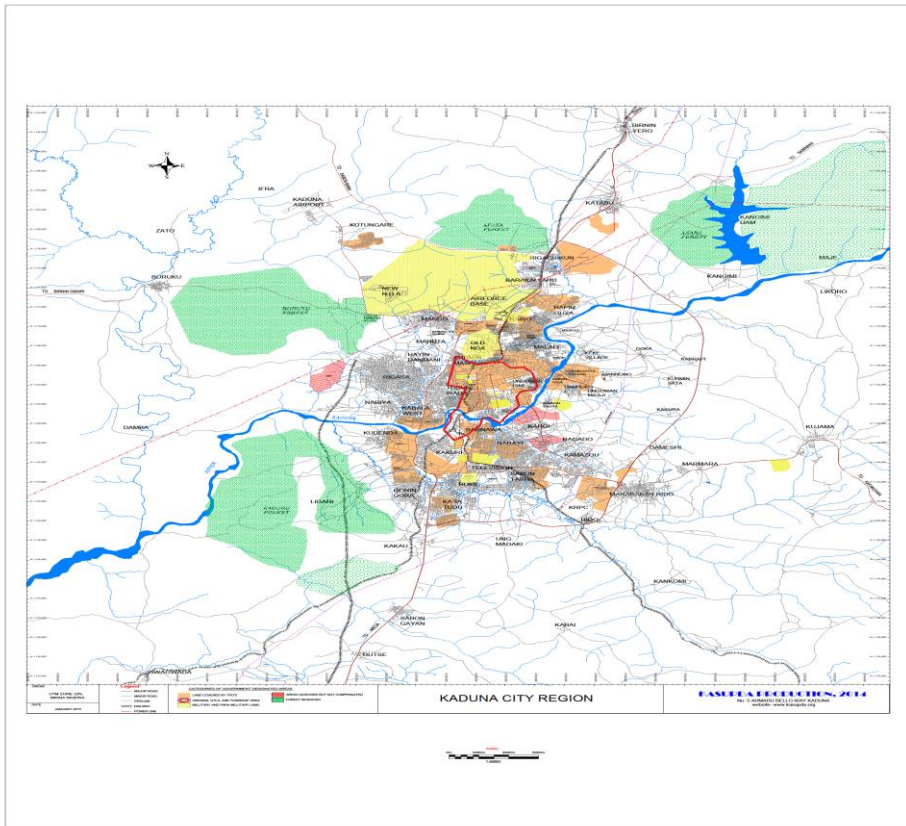


Figure 1: Location of the Study Area
 Source: Kaduna Master Plan – Max Lock (2010)

MATERIALS AND METHODS

Population Sampling and Data Collection Technique

The study focused on the persons in the affected areas of the conflicts within Kaduna metropolitan areas. It covers the heads of households in the sampled settlements and the physical planning agencies (Kaduna State Urban Development Authority and Ministry of Lands Surveys and Country Planning).

Sample Frame

The sample frame for this study consists of the list of all the districts in the Kaduna metropolis after the year 2000 conflict. This can be seen in Table 1.

Sample Size

The sample size for the study was 12% of the 33 settlements being four settlements; one each from four of the local government areas that make up the metropolis as follows: Kaduna north – Rafin guza; Kaduna south – Anguwan mu’azu; Chikun – Narayi – Bayan dutse and Igabi – Hayin Naiya. The sample size of 390 (2.5%) of the households was taken using an

average household size of 8 persons. The Yamane's formula was used to determine the sample size for the survey:

Yamane's Formula:

$$n = \frac{N}{1 + (Ne^2)}$$

Where:-

n = Sample Size,

N = Population

e = Level of Significance (0.05)

The population of the selected settlements is as follows:

Narayi/Bayan Duste, 42,089; Hayin Na'iyia, 4,306; Rafin Guza, 9,584; Ung. Mu'azu/Kabala West, 67,048.

The total number of persons in the sampled settlements is 123,027.

Therefore, $123,027/8 = 15,378$ Households.

Using an average household of 8 persons per household, the sample size derived is 390 used for the survey using Yamani's formula.

Table 1 shows the distribution of the sample population, according to households.

Table 1: Population and Household Distribution of the Sampled Settlements

A LGA	B Districts	C 2012 Pop.	D Average h/hold Size	E Sample Frame	F Sample Size	G %
Chikun	Narayi/Bayan Duste	42,089	8	5,261	133	34.21
Igabi	Hayin Na'iyia	4,306	8	538	14	3.5
K/North	Rafin Guza	9,584	8	1,198	30	7.79
K/South	Ung. Mu'azu/Kabala West	67,048	8	8,381	213	54.50
Total		123,027		15,378	390	100

Source: Author, 2012

Sampling Technique

The stratified random sampling technique was used for the study. First, the total number of households was stratified according districts in the local government areas (Table 1). Simple random sampling was used to select the sample from the stratified districts by writing the names of districts on paper and then shuffling to pick the sample without replacement, until the required sample was picked. The sample is then shared proportionally among the selected

districts as presented in Table 2.

Table 2: Distribution of Samples in the Study Areas

LGA	Districts	Population	No. of Households	No. of Sampled Household	Percentage (%)	Ratio
Chikun	Narayi/Bayan Duste	42,089	5,261	133	34.21	1:40
Igabi	Hayin Na'iyā	4,306	538	14	3.50	1:38
K/North	Rafin Guza	9,584	1,198	30	7.79	1:40
K/South	Ung. Muazu	67,048	8,381	213	54.50	1:39
	Total	123,027	15,378	390	100	

Source: Author, 2012

Data Collection Procedure

Secondary data were sourced from Institutions and Governmental Organizations relevant to the study. These include publications such as the Master Plan for Kaduna, reports, land use maps, and population data on Kaduna for the period under review which was obtained from the National Population Commission. The land use maps, and topographical maps, were obtained from the Ministry of Lands and Surveys and the Federal Surveys Kaduna.

The survey instrument for data collection used is the questionnaire with structured questions directed to the heads of households to gather socioeconomic characteristics of the residents. Physical planning agencies comprising of Kaduna State Urban Planning and Development Authority, Ministry of Land, Survey and Country Planning were interviewed. Data processing used involves the use of descriptive statistics to summarize the data collected from the first hand survey and subsequently inferential statistics. Statistical Packages for Social Sciences (SPSS) such as percentages are used for the analysis. The information collected during the field work and interview formed the data for the statistical analysis.

RESULTS AND DISCUSSION

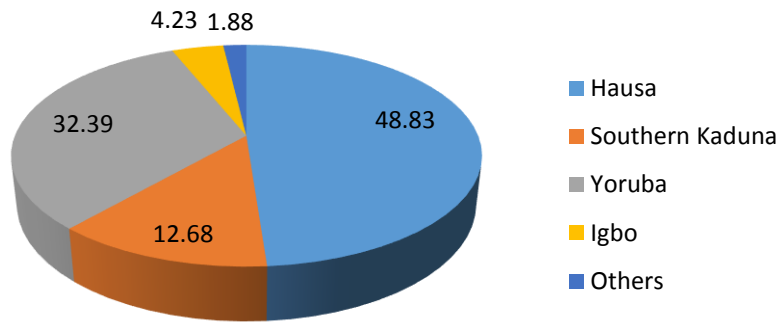


Figure 2: Ethnic Background of Residents in Narayi/Bayan Duste
Source: Field survey 2012

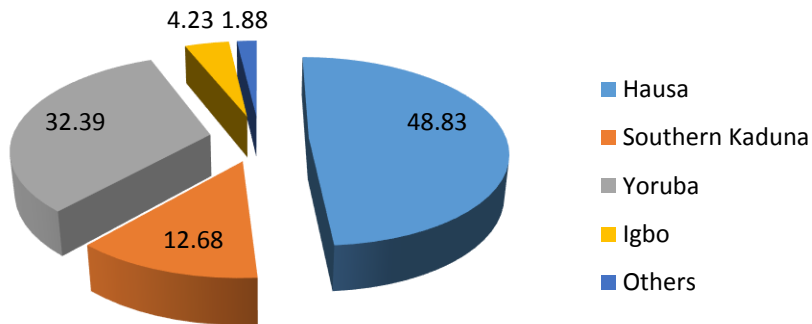


Figure 3: Ethnic Background of Residents in Unguwan Muazu
Source: Field survey 2012

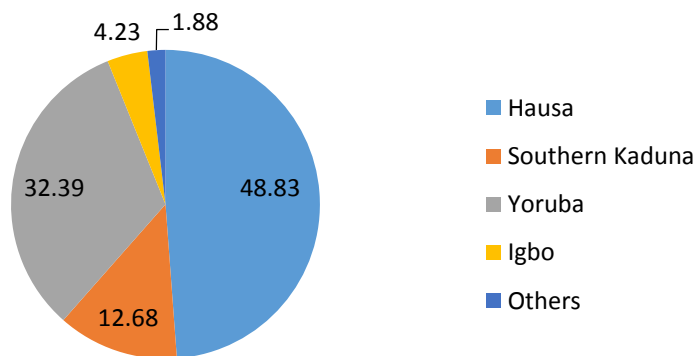


Figure 4: Ethnic Background of Residents in Rafin Guza
Source: Field survey 2012

From the results in figures 2 to 4 it can be deduced that there are more southern Kaduna tribes in Narayi/Bayan Duste with 73.02% while the Hausa's dominate Hayin Na'iyā, Rafin Guza and Ung. Mu'azu/Kabala West with 76.20%, 73.30% and 48.83% respectively. This implies that there is ethnic stratification within Kaduna metropolitan areas, with the Hausas residing in the Northern part and southern Kaduna tribes in the Southern part of the Metropolis, suggesting segregation along ethnic groupings.

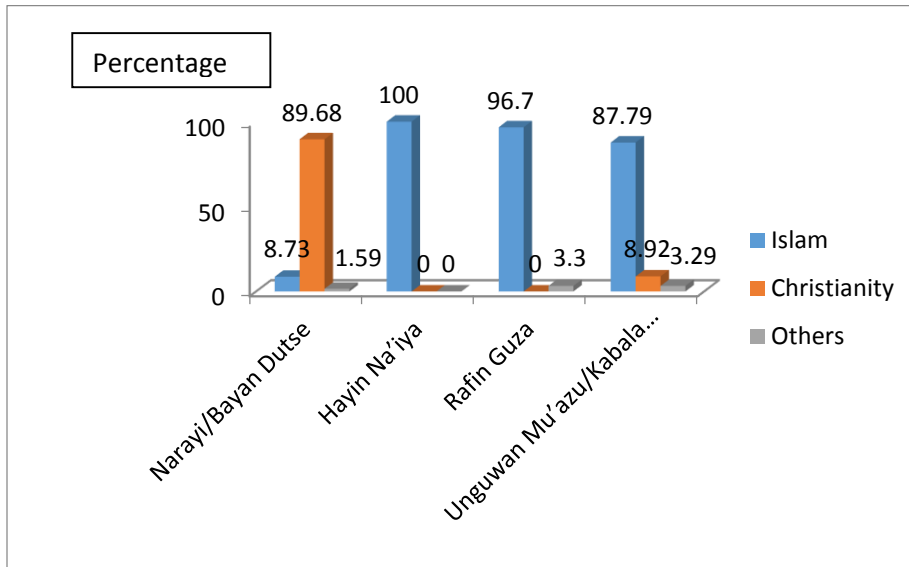


Figure 5: Religious Background
Source: Field survey 2012/10

Presentation in Figure 6 shows that there are more Christians with 89.68% in Narayi/Bayan Duste than the remaining settlements with Muslims having an average size of 8%. This implies that there is religious segregation in Kaduna metropolis which contradicts the Nigerian constitution that encourages coexisting irrespective of religious background. The research also shows that the respondent's choice of residence before and after the conflicts in Narayi/Bayan Duste and Unguwan Mu'azu has changed from being cheaper with 43.65% and 42.72% to more secured with 78.57% and 69.48%, respectively; while in the case of Hayin Na'iyā and Rafin Guza, it has changed from owned residence with 52.20% and 33.40% to more secure with 38.00% and 53.30% respectively. This implies that security of life and properties are the major determinant in the choice of residence in these study areas.

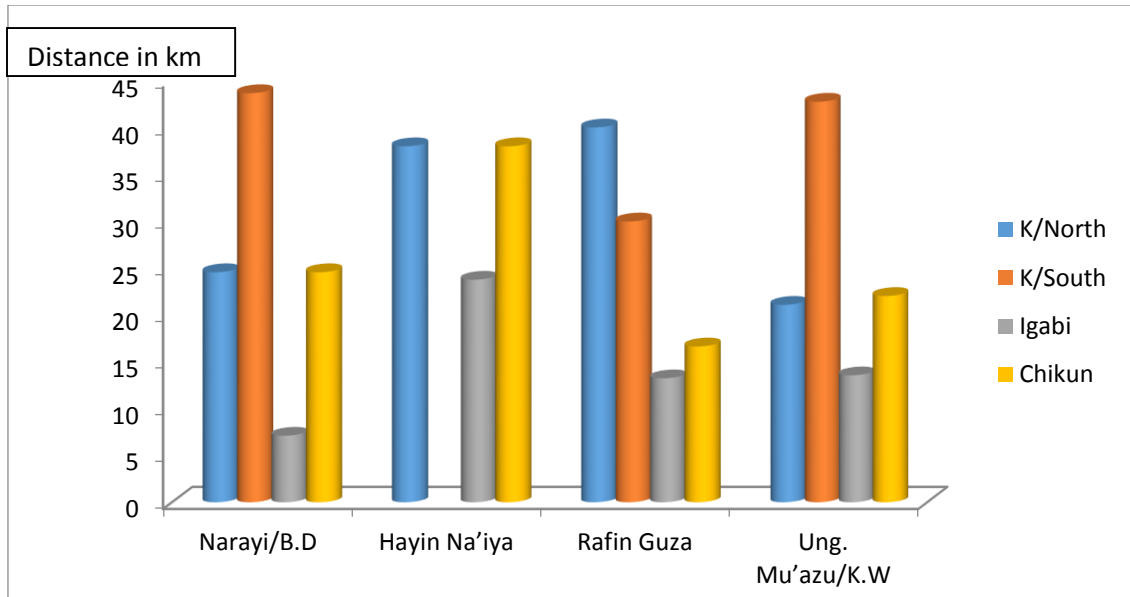


Figure 6: Places of Work Before the year 2000 Conflict
Source: Field survey 2012

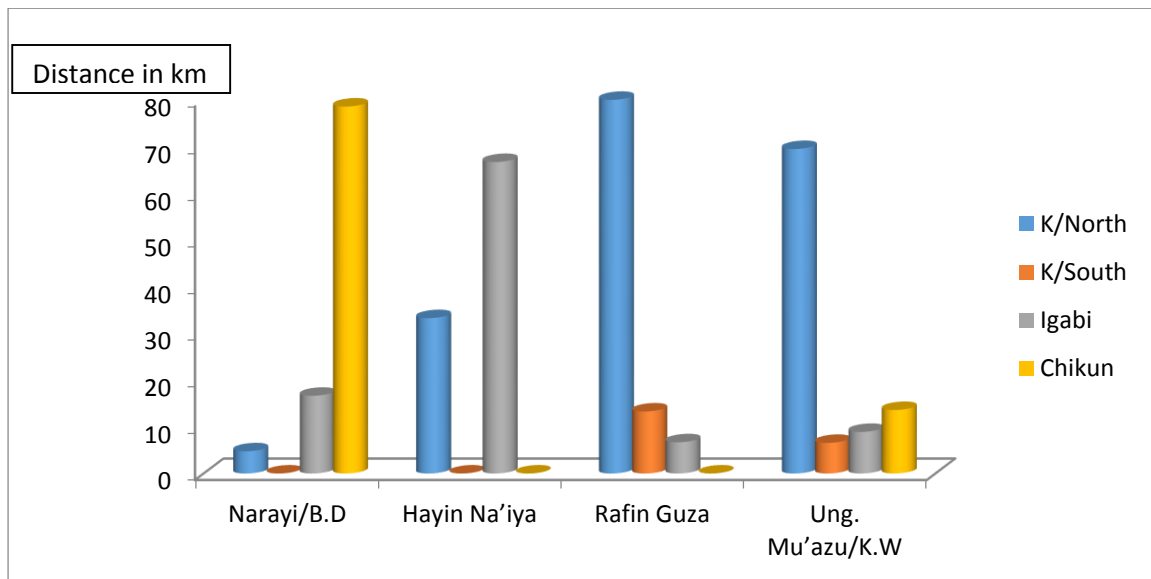


Figure 7: Places of Work After the year 2000 Conflict
Source: Field survey 2012

Results in Figures 6 and 7 reveal the relationship to place of work before and after the year 2000 conflict. Residents in Narayi/Bayan Duste work in Kaduna south (43.65%) before the year 2000. This later changes to Chikun (78.57%) after the year 2000; on the other hand, shifted from Chikun (38.00%) before the year 2000 to Igabi (66.70%) after the year 2000. Rafin Guza maintained the status quo with 40.00% (before) and 80.00% (after) being the highest while in Ung. Mu'azu/Kabala West, there is a change in relationship from Kaduna

south (42.72%) to Kaduna north (69.48%) being the highest. This shows that there is a shift in place of work of respondents to places nearer to their areas of residence.

Table 3: Reasons for the choice of Place of work before and after the 2000

Source: Field survey 2012

Reasons	Narayi/B.D				Hayin Na'iyā				Rafin Guza				Ung. Mu'azu/K.W			
	Before		After		Before		After		Before		After		Before		After	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
More Secured	9	7.14	37	29.37	21	100	7	33.30	12	40.00	10	33.30	77	36.15	67	31.46
As a Result of Conflict	1	0.79	62	49.21	-	-	14	66.70	9	30.00	18	60.00	6	2.82	132	61.97
Job Transfer	65	51.59	21	16.67	-	-	-	-	4	13.30	-	-	14	6.57	3	1.41
Better Income	41	32.54	6	4.76	-	-	-	-	5	16.70	2	6.70	102	47.89	8	3.76
Others	10	7.94	-	-	-	-	-	-	-	-	-	-	14	6.57	3	1.41
Total	126	100	126	100	21	100	21	100	30	100	30	100	213	100	213	100

Survey findings in Table 3 revealed that the choice for the place of work in Narayi/Bayan Duste has shifted from job transfer (51.59%) before the year 2000 to 'as a result of conflict' (49.21%) after the year 2000. On the other hand, it has shifted from 'more secured' (100%) to 'as a result of conflict' (66.70%) in Hayin Na'iyā; while in Rafin Guza, it has shifted from 'more secured' (40.00%) before the year 2000 to 'as a result of conflict' (60.00%) after the year 2000. Ung. Mu'azu also experience a change from 'better income' (47.89%) before to 'as a result of conflict' (61.97%) after the year 2000. This implies that the conflict had affected the choice for the place of work in the sampled study area, because people feel more secured working close to where they reside.

Physical Planning Agencies

The agencies responsible for physical planning and control of physical development in Kaduna metropolis are; Ministry of Lands, Surveys and Country Planning and Kaduna State Urban Development and Planning Authority (KASUPDA) respectively. The Ministry of Lands, Surveys and Country Planning is the agency that initiates and prepare physical planning schemes in the State while KASUPDA is responsible for implementation, monitoring and control of physical development.

The result of the research indicates that the initiating Ministry has not prepared any physical planning scheme to cater for the population that changed location even when the demand became high, indicating inadequacy of fund as reason for non-initiation of plans. In the areas

of plan preparation, implementation, control and monitoring the agencies had minimal influence after the crisis of the year 2000, as such individuals prepared layouts and sell plots to developers, and permissions were granted to the developers by the planning agencies who develop without due consideration to required standards and planning regulation. This action resulted in the unplanned nature of the sampled settlements.

Conclusion and Recommendation

The occurrence and recurrence of the conflict brought about a movement of people from various parts of the metropolis to areas where they feel secure. There is ethnic and religious stratification within Kaduna metropolitan areas with the Hausas, whom are mostly Muslims dominating the Northern part and southern Kaduna tribes, mostly Christians occupying the Southern part of the Metropolis.

Based on the field data analysis, the following recommendations are therefore, made:

- Planning decisions and politics should encourage coexistence of segregation through assurance of equity and fairness in the provision of facilities and services.
- Comprehensive land use planning and policies should be encouraged through prompt preparation of plans and monitoring so that development can be guided without being left at the discretion of individual developers.
- Religious and opinion leaders should be made to participate in decision making on planning issues, this will assist in creating awareness about physical development control and protection of the environment.
- There is a need for the formalization and integration of private layout so that this will enable enforcement of development control policies and create awareness of the activities of the planning agencies.
- The policy instruments and tools to tackle the issue of urban spatial segregation must be multi-dimensional. This should include; Massive provision of serviced land at affordable prices and at appropriate locations and upgrading of informal settlements.
- Frameworks in the form of an action plan should be prepared to guide and control the development of the settlements in the metropolis.

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