Spatial Analysis of Distribution and Socio-economic Impacts of Immigration: Case Study of Nairobi, Kenya

Article · November 2015

2 authors, including:

John Kiema
Regional Centre for Mapping of Resources f…
57 PUBLICATIONS **124** CITATIONS

SEE PROFILE

Sci-Afric Journal of Scientific Issues, Research and Essays Vol. 3(11), Pp. 819-829, November, 2015.
(ISSN 2311-6188)
http://www.sci-africpublishers.org

Research Article

Spatial Analysis of Distribution and Socio-economic Impacts of Immigration: Case Study of Nairobi, Kenya

Ogola DPO***** and **Kiema** John Kyalo B**.**

Department of Geospatial and Space Technology of the University of Nairobi, P.O. BOX 30197-00100 Nairobi, Kenya.

*Corresponding Author's e-mail: dpetergeda@yahoo.com

Accepted November 4th, 2015

ABSTRACT

Increasing globalization trends have made migration a key element in national and international deliberations worldwide. Mapping of immigrant issues has therefore gained prominence in many parts of the world. In Kenya the management of foreigners or aliens is one of the core functions of the Department of Immigration Services with the mandate of enhancing security and socio-economic development through policy and management strategies targeting immigrant populations. However, due to inadequate use of available technology a number of potential datasets still remain largely unexploited including data on visas and work permits, border-post data and passenger surveys at international airports and seaports. This study proposes a spatial approach to enable tracking, analyses, visualization and management of alien activities. This entailed the geo-coding of immigrant residential addresses and linking this with their respective attributes to enable input, storage, manipulation and analysis using appropriate spreadsheet and GIS software. The results were visualized using various maps, charts, figures and tables. The study demonstrated that migration and development are closely related and create impact in various perspectives and proportions. Furthermore, geospatial technology has great potential for organizing, manipulating and analyzing migration data and information and can enable the department to use a variety of maps and documents to interpret and better understand immigrant activities, including major patterns of migration; settlement patterns and changing environmental preferences.

Key words: Spatial analysis, GIS, Foreign Nationals, Geo-coding, Immigration.

INTRODUCTION

There are several challenges in gaining a better understanding of international migration patterns and impacts with one of the major ones being deficiency of data. This constrains meaningful and detailed analysis and interpretation for sound information and appropriate decisions to be made. According to Kenya Population Situation Analysis report NCPD (2013), it emerged that even though periodic censuses have generated immigration data, and lately emigration data, a number of potential datasets remain unexploited. Further, according to Ronningen (2004), there is usually a great deal of interest in a particular country, the numbers of foreigners who reside there from other countries, where they live, what they do and what sort of services they need or offer.

Migratory population movements are very important objects of interest for demographers. It is in fact a key variable used for the description and prediction of demographic structures, together with the natural movement of the population such as births and deaths. These demographic indicators can be easily applied to monitor the development of economic activities in terms of their establishment, location, and distribution. Zimmermann (2005) in the study of European migration concluded that it is mainly the distributional effects of migration that drive public attitudes towards immigration and the related policy discourse. This introduces

the spatial context of various immigration variables, their relationships, effects and consequences to the source and destination countries Dustmann, et al., (2005).

Despite considerable interest in the relationship between migration and development, there have been relatively few attempts to map the various development impacts that migration can have on a country. This study presents a framework for mapping these impacts by focusing particularly on immigration and its variables. Drawing on two closely related definitions of development; the capabilities approach and the sustainable livelihoods approach, the study avers that migration can shape social and economic development in eight dimensions including: economic impacts, educational impacts, health impacts, gender impacts, wider social impacts, governance impacts, environmental sustainability and disaster relief as defined by Chappell and Sriskandarajah (2007).

Against the above background, this study sought to assess the status and develop a geo-database of the distribution of immigrant activities in Nairobi County for better understanding of the spatial immigration patterns and impacts. The main focus was to document and visualize the geographical distribution of socio-economic activities in relation to immigration processes and variables. The main objective of the study was to assess the socio-economic implications of immigration in Nairobi County using geo-spatial techniques. The specific objectives were to map the trend and settlement pattern of foreigners within Nairobi City, to create a spatial entity profile of various immigration variables and to evaluate socio economic activities which attract immigrants to Nairobi.

MATERIALS AND METHODS

Study area

The study was carried out in Nairobi County which is one of the 47 Counties of Kenya. It contains Nairobi city, which is also Kenya's capital and largest city covering an area of 696 km2 (269 sq mi). The County was founded in 2013 on the same boundaries as Nairobi Province, after Kenya's 8 provinces were subdivided into 47 counties with a population of 3,138,295 (KNBS, 2009). The county has been further subdivided into 17 constituencies (see Figure 1).

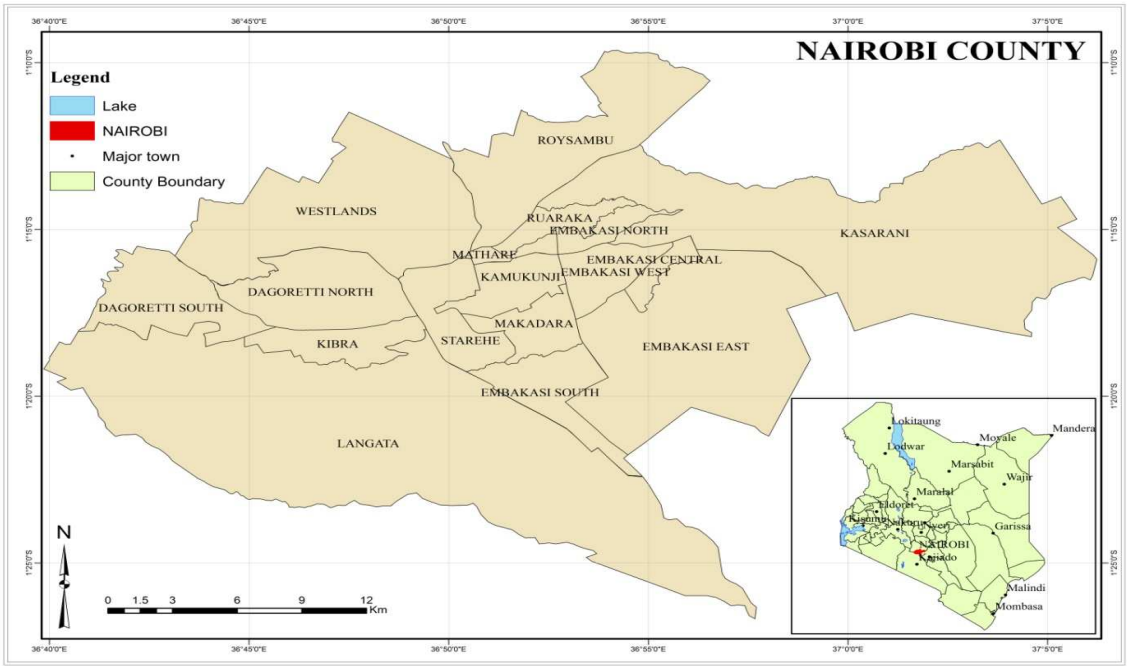

Figure 1: Location of the study area

METHODOLOGY

Data Sources

The goal of this research was to analyze socio-economic influences of immigrant populations in Nairobi City County by their activities within the areas. The results of the analysis are intended to help service providers, government authorities and policy formulators better assess immigrant activities and settlement patterns, therefore to help them better prepare and plan for the

services and formulate appropriate policies involving immigrants and tap the potential. It also gave an overview of the characteristics of the immigrant stock in the county and by extension country, thereby offering a framework for mitigating the undesirable effects of immigration. The end results may also be helpful for governmental budgeting and resource distribution. To complete this research, data gathering was undertaken. Both primary and secondary datasets were employed. Primary data were collected using questionnaires and interview schedules and field survey for GIS analysis and also quantitatively and qualitatively using simple descriptive statistics and presented in form of maps, tables and charts. Secondary data collected comprised of recorded and archived information. Policies and Laws on Immigration were also examined. This information was obtained from internet, books, journals, reports, previous projects, Government publications, registration records and existing spatial information like geospatial images of study area, maps and immigration trends of foreigners in Nairobi County. Aspects of the data obtained from the secondary sources touched on legal framework, social-economic, cultural and environmental status of the study area.The main sources of data were the Statistical reports, Foreigner registration records, and base-maps of the study area and field Survey data. Data from these sources were used to create maps and perform analysis of the immigrant populations. The sampling frame for the study comprised of all Foreigners registered in 2014 and who reside in the study area. Stratified random sampling technique was used to achieve a representative sample of 500 registered immigrants in the study area in order capture different characteristics of the immigrant population.

Methodology Workflow

Major processes used in this study included data collection, conversion, joining, calculating, layer creation, analyzing, and graphing data as illustrated in Figure 2

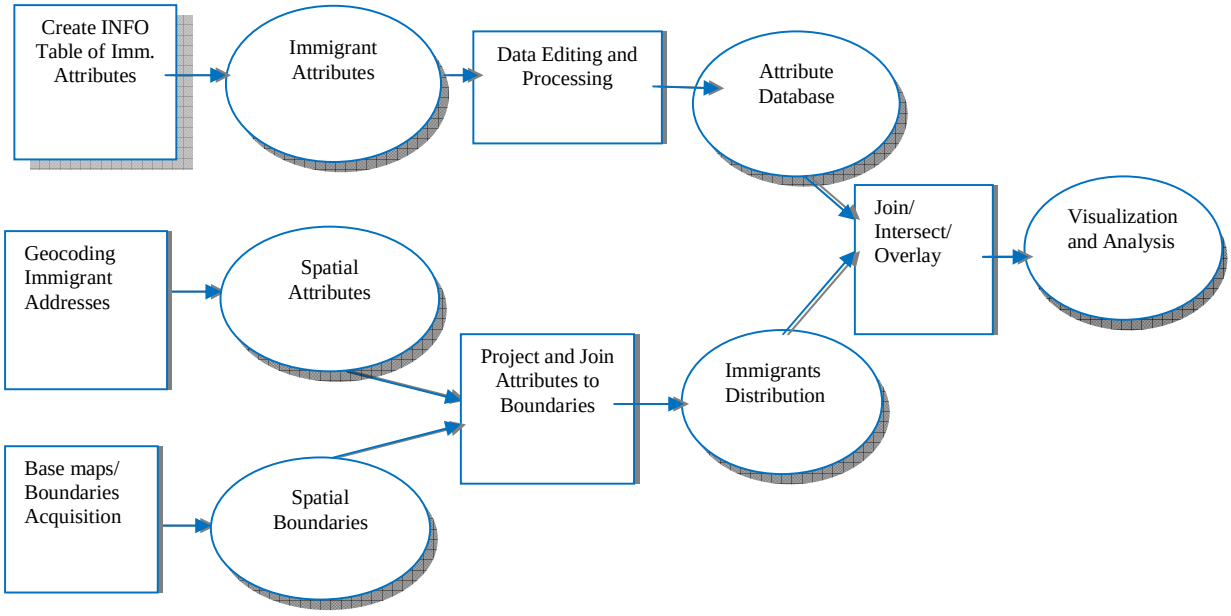

Figure 2: Methodological flowchart

DATA ANALYSIS

The statistical data obtained from the Kenya National Bureau of Statistics and other agencies such as Department of Immigration Services and through field Survey were manipulated to make attributes consistent. Maps and data were obtained from the relevant authorities to acquire estimates of the county's overall and immigrant populations. GIS datasets of required variables were obtained and/or created. These comprise of shapefiles and database files. These shapefiles contained data representing (a) study areas (basemaps), (b) Constituency boundary polygons, and (c) immigrant count data. The polygon layers were used to estimate, locate, and analyze where immigrants reside.

ArcGIS's Geoprocessing and Spatial Analyst tools were used to convert, import, merge, and clip these data. Database files were joined across section IDs. Eventually all data layers were examined to make sure they were consistent and contain: A cross Section ID field to facilitate joining different features and tables, Area of study – basemaps and Demographic data attributes of immigrants. This information was generated in form of percentages and averages which are presented using maps, tables, graphs, and charts, upon which discussions, conclusions and recommendations are based on.

Data Editing and Processing

The activities in this stage included the editing and processing of both spatial and attribute data that was collected, and involved the following activities: First, the personal information of the actual immigrants was disguised so as not to infringe on their privacy. This was achieved by using fictitious names and identification numbers instead of the real ones to mask their identity. The location information that was expressed in different forms such as LR Number Road/Street, Estate, Block/House name and Number was not consistent for presentation and therefore required to be standardised. Unnecessary fields in the immigrants attribute data were removed in clean up and preparation for GIS operations. Only the fields relevant for the study were retained. New data fields were created such as clusters of skill or education levels and sectors of the different professions. The other inconsistent attributes were also sorted and organized in themes in order to align them to the project objectives resulting in an excel datasheet that is compliant to the project.

Geocoding of Addresses

The Google Earth Pro provides a huge accessible archive of imagery which was useful for geocoding of the residential addresses. Scenes of the study area were selected based on the criteria of cloud free atmospheric conditions and temporal restrictions of the reference year (see Figure 3)

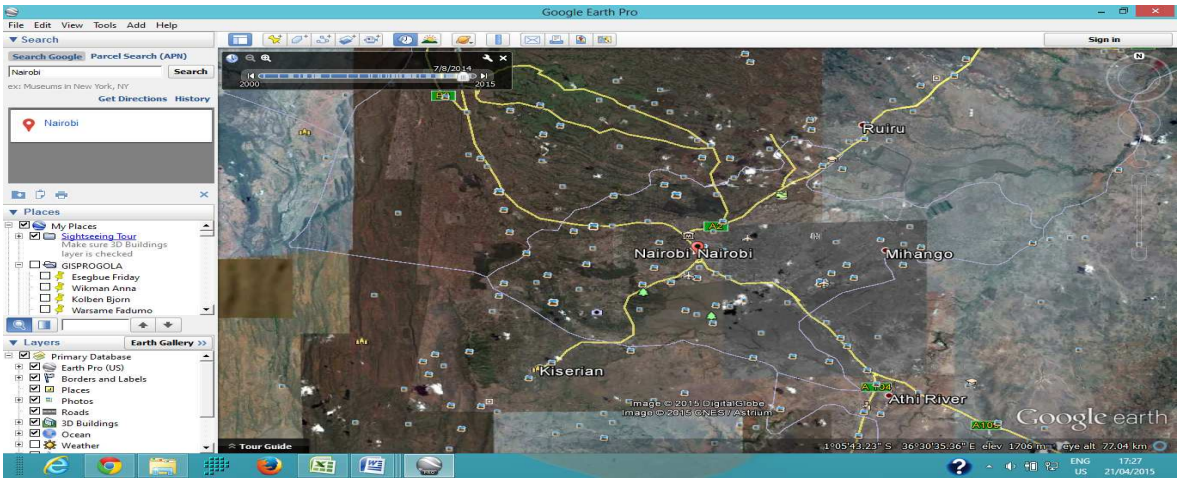

Figure 3: Satellite image of the study area on Google Earth.

Using the respective reference residential addresses obtained from the dataset, each address was geocoded on the Google Earth image using the address search function to obtain the spatial coordinates of the sample variables. This was done with precision where the address given existed or otherwise by approximation using nearest known features and stored in a single folder as shown in Figure 3.

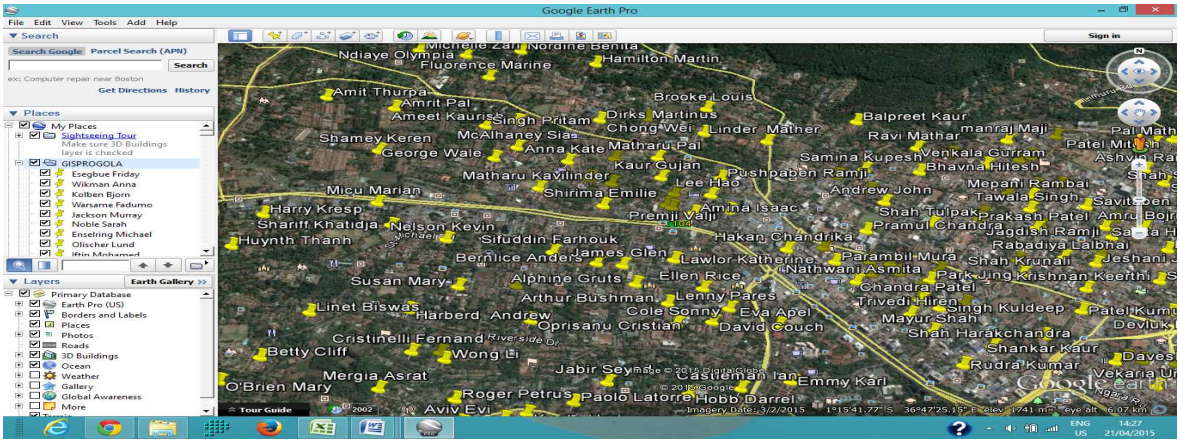

Figure 3: Geocoding of physical addresses using pacemarks

Once all the addresses were geocoded, the folder containing the spatial references representing individual addresses was exported and stored in KML/KMZ format to be imported into GIS software for manipulation

Immigrant GIS Database Development

ArcGIS 10.2 software was used to perform the GIS processes. Using conversion tools in ArcToolbox the KML file was converted to ArcGIS layer which can be manipulated in the software environment. The layer was then added to the GIS project for further processing. The placemarks shapefile created allowed the access and manipulation of the attribute table. Further, the attribute table generated contained the spatial signature and identity of every immigrant mapped (see Figure 4) and would then allow for linking and performing join operation with the corresponding excel datasheet table for the other attributes of immigrants.

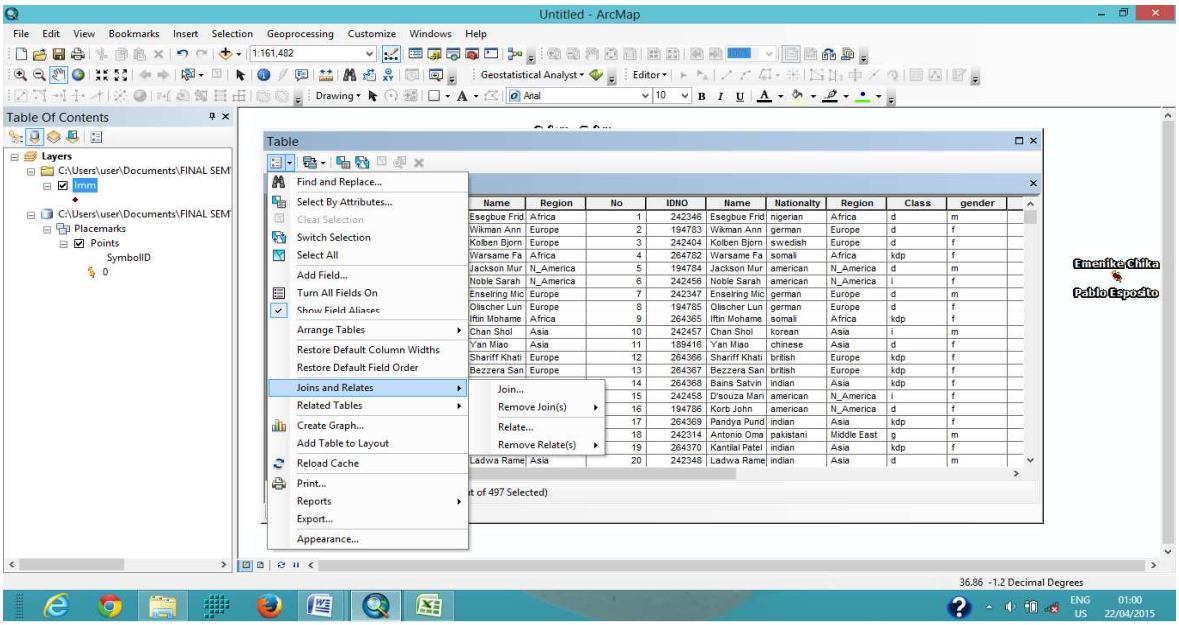

Figure 4: Attribute table of immigrant profiles

The attribute table constitutes the geodatabase from which the GIS operations were performed. The name column was common and consistent in both tables and was therefore used to facilitate the join table operation.

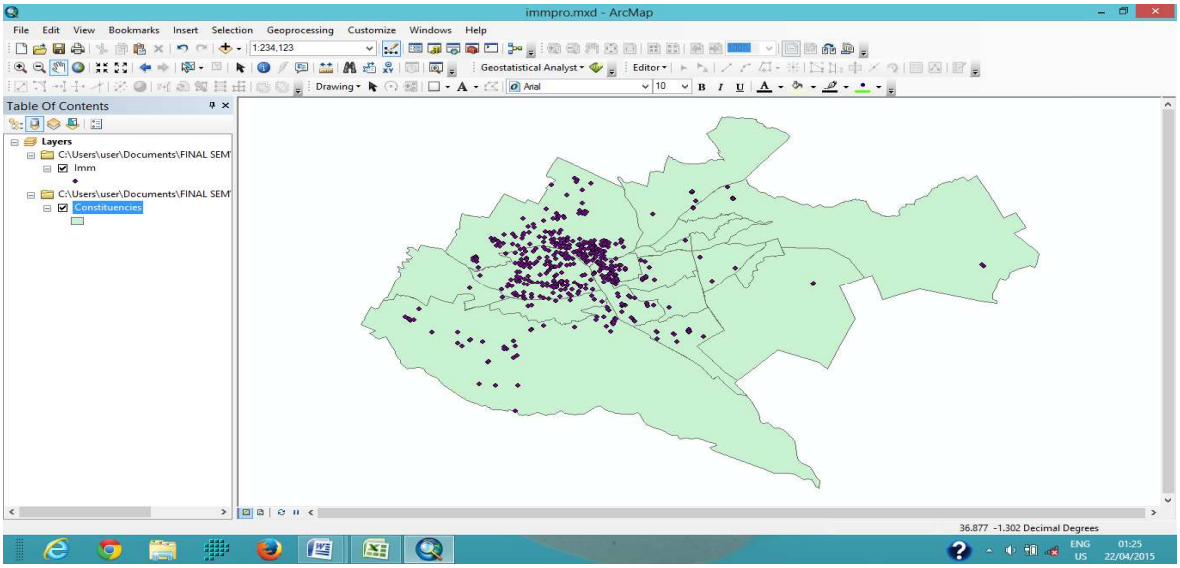

Figure 5: An overlay operation of immigrants and constituency shapefiles

The shapefile for immigrants was then created and overlaid with the county shapefile which has constituency boundaries as shown in Figure 5. Several other shapefiles were created according to the various attributes that are aligned to the objectives for the analysis of the socio economic variables of the immigrants. This involved sorting the attribute table columns in order to identify the nationalities, regions of origin, immigrant categories, gender, skills, sector and age of immigrants for every constituency of the study area and creating respective shapefiles for GIS analysis. The operation allowed selection and data overlay, visualization of the maps by using the various techniques and visual variables such as shape, size and colour to show distribution by numbers and categories over different constituencies. These GIS operations further enabled the performance of statistical analysis of the various datasets created as indicators of demographic and socio economic variations of immigration over the study area.

Figure 6 shows the representation of the distribution and settlement pattern of foreign nationals as classified according to their regional clusters over the constituency spaces of the county. The separation of the foreigners according to their regions of origin and the shapefiles created was done in order to provide general overview of their common characteristics, since the more spatially related the regions are, the more probable is the similarity in their attributes. The shape files which were created facilitated the linking of this category of foreign nationals with their corresponding attributes from the excel tables and this was replicated for all the identified themes of the study according to the study objectives.

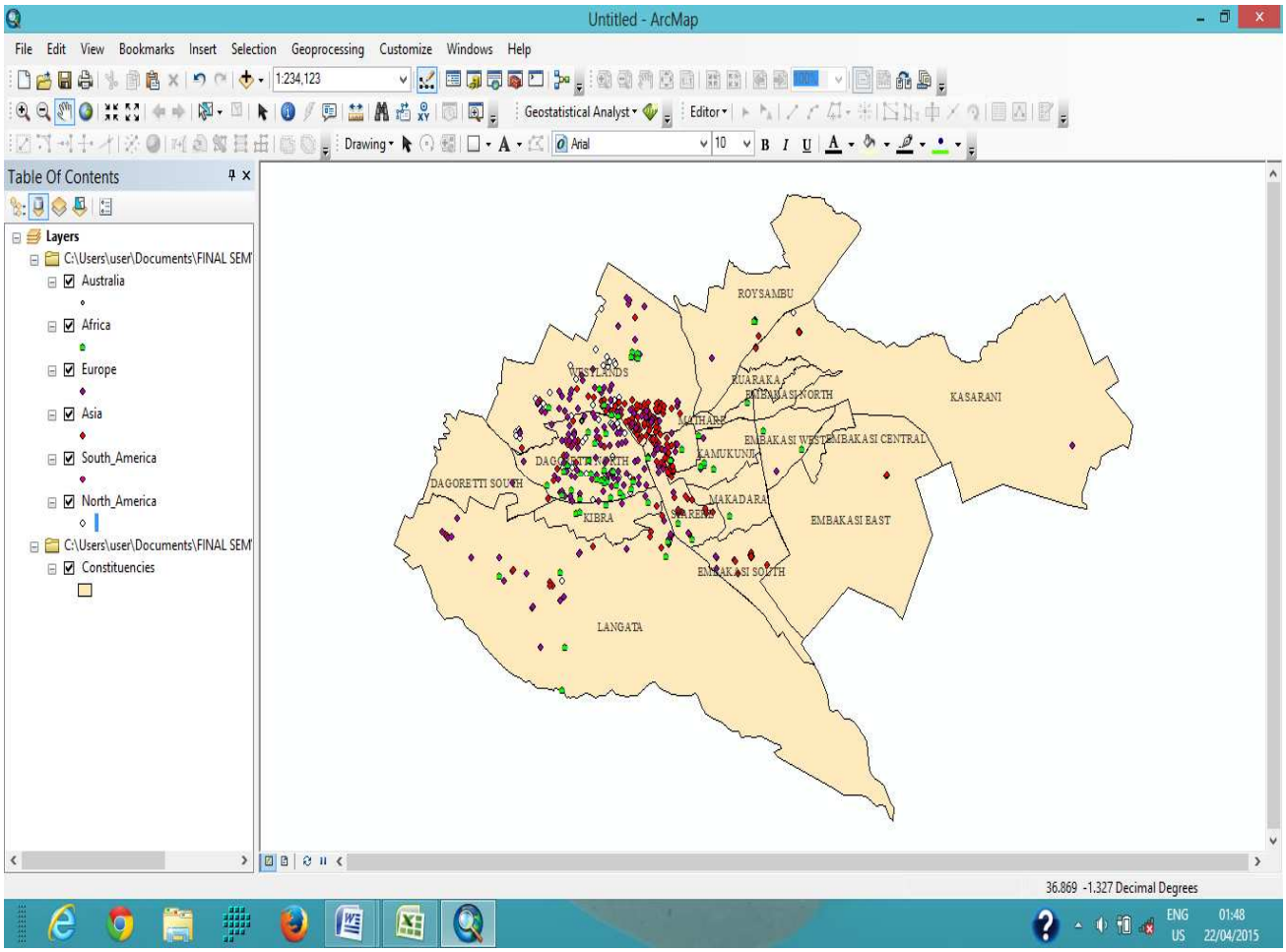

Figure 6: Regional shapefiles overlay with the constituencies to show pattern and distribution

RESULTS AND DISCUSSION

Data Visualization and Analysis: The results of this study was represented using various maps, charts and graphs which were used to visualize and analyze the findings of the project according to various socio economic themes.

Spatial Profile of Immigrants: The spatial and attribute data of the immigrants were successfully aligned and organized into a geo-database after clean up for subsequent geo-processes. The geo-codes representing the respective physical addresses were created and stored. These can be accessed in the attribute table of immigrants as shown in Table 1.

Table

Imm

FID	Shape *	OID_	Name	Region	No	IDNO	Name	Nationalty	Region	Class	gender	Age	Profession	Skills Level	Sector	Registratio
0	Point ZM	0	Esegbue Frid	Africa	1	242346	Esegbue Frid	nigerian	Africa	d	m	47	Banker	Degree	Financial	2014
1	Point ZM	0	Wikman Ann	Europe	2	194783	Wikman Ann	german	Europe	d	f	55	Teacher	Degree	Education	2014
2	Point ZM	0	Kolben Bjorn	Europe	3	242404	Kolben Bjorn	swedish	Europe	d	f	44	Social worke	Degree	Information/A	2014
3	Point ZM	0	Warsame Fa	Africa	4	264782	Warsame Fa	somali	Africa	kdp	f	23	Housewife	Less than Se	Domestic	2014
4	Point ZM	0	Jackson Mur	N_America	5	194784	Jackson Mur	american	N_America	d	m	45	Teacher	Degree	Education	2014
5	Point ZM	0	Noble Sarah	N_America	6	242456	Noble Sarah	american	N_America	i	f	53	Missionary	Degree	Religious	2014
6	Point ZM	0	Enselring Mic	Europe	7	242347	Enselring Mic	german	Europe	d	m	45	Finance Dire	Degree	Financial	2014
7	Point ZM	0	Olischer Lun	Europe	8	194785	Olischer Lun	german	Europe	d	f	43	Teacher	Degree	Education	2014
8	Point ZM	0	Iftin Mohame	Africa	9	264365	Iftin Mohame	somali	Africa	kdp	f	44	Housewife	Less than Se	Domestic	2014
9	Point ZM	0	Chan Shol	Asia	10	242457	Chan Shol	korean	Asia	i	m	60	Missionary	Degree	Religious	2014
10	Point ZM	0	Yan Miao	Asia	11	189416	Yan Miao	chinese	Asia	d	f	54	Engineer	Degree	Construction	2014
11	Point ZM	0	Shariff Khati	Europe	12	264366	Shariff Khati	british	Europe	kdp	f	35	Housewife	Degree	Domestic	2014
12	Point ZM	0	Bezzera San	Europe	13	264367	Bezzera San	british	Europe	kdp	f	50	Housewife	Secondary E	Domestic	2014
13	Point ZM	0	Bains Satvin	Asia	14	264368	Bains Satvin	indian	Asia	kdp	f	56	Housewife	Less than Se	Domestic	2014
14	Point ZM	0	D'souza Mari	N_America	15	242458	D'souza Mari	american	N_America	i	f	56	Missionary	Secondary E	Religious	2014
15	Point ZM	0	Korb John	N_America	16	194786	Korb John	american	N_America	d	f	56	Teacher	Degree	Education	2014
16	Point ZM	0	Pandya Pund	Asia	17	264369	Pandya Pund	indian	Asia	kdp	f	44	Housewife	Less than Se	Domestic	2014
17	Point ZM	0	Antonio Oma	Middle East	18	242314	Antonio Oma	pakistani	Middle East	g	m	56	Business	Secondary E	Commercial	2014
18	Point ZM	0	Kantilal Patel	Asia	19	264370	Kantilal Patel	indian	Asia	kdp	f	43	Housewife	Less than Se	Domestic	2014
19	Point ZM	0	Ladwa Rame	Asia	20	242348	Ladwa Rame	indian	Asia	d	m	56	Financial Con	Degree	Financial	2014
20	Point ZM	0	Shah Krunali	Asia	21	264371	Shah Krunali	indian	Asia	kdp	f	53	Housewife	Less than Se	Domestic	2014
21	Point ZM	0	Jeshani Jaso	Asia	22	264372	Jeshani Jaso	indian	Asia	kdp	f	45	Housewife	Less than Se	Domestic	2014
22	Point ZM	0	Krishnan Ke	Asia	23	264373	Krishnan Ke	indian	Asia	kdp	f	76	Housewife	Less than Se	Domestic	2014
23	Point ZM	0	Tandel Pravi	Asia	24	264374	Tandel Pravi	indian	Asia	kdp	f	56	Housewife	Secondary E	Domestic	2014
24	Point ZM	0	Ruda Jashua	Asia	25	264375	Ruda Jashua	indian	Asia	kdp	f	34	Housewife	Secondary E	Domestic	2014
25	Point ZM	0	Patel Hansa	Europe	26	247561	Patel Hansa	british	Europe	g	f	54	Business	Degree	Commercial	2014
26	Point ZM	0	Mukherjee Ar	Asia	27	264376	Mukherjee Ar	indian	Asia	kdp	f	54	Housewife	Less than Se	Domestic	2014
27	Point ZM	0	Rabadiya Lal	Asia	28	264065	Rabadiya Lal	indian	Asia	d	f	45	General Man	Degree	Commercial	2014
28	Point ZM	0	Kabaria Sha	Europe	29	264377	Kabaria Sha	british	Europe	kdp	f	67	Housewife	Secondary E	Domestic	2014
29	Point ZM	0	Jose Atul	Asia	30	264378	Jose Atul	indian	Asia	kdp	f	45	Housewife	Secondary E	Domestic	2014
30	Point ZM	0	Gosai Nilesh	Asia	31	264379	Gosai Nilesh	indian	Asia	kdp	f	33	Housewife	Secondary E	Domestic	2014
31	Point ZM	0	Singh Shaile	Asia	32	242393	Singh Shaile	indian	Asia	d	m	46	Operations M	Degree	Industry	2014
32	Point ZM	0	Sarachandra	Asia	33	264380	Sarachandra	indian	Asia	kdp	m	76	Dependant	Less than Se	Other	2014
33	Point ZM	0	Shah Shushit	Asia	34	264381	Shah Shushit	indian	Asia	kdp	f	65	Housewife	Less than Se	Domestic	2014
34	Point ZM	0	Patel Foranb	Asia	35	264382	Patel Foranb	indian	Asia	kdp	f	45	Housewife	Secondary E	Domestic	2014
35	Point ZM	0	Mepani Ramb	Asia	36	242349	Mepani Ramb	indian	Asia	d	f	45	Accountant	Degree	Financial	2014
36	Point ZM	0	Malkit singh	Asia	37	242350	Malkit singh	indian	Asia	d	m	47	Accountant	Degree	Financial	2014
37	Point ZM	0	Patel Ronakk	Europe	38	220069	Patel Ronakk	british	Europe	g	m	58	Business	Secondary E	Commercial	2014
38	Point ZM	0	Savitaben Hir	Asia	39	257344	Savitaben Hir	indian	Asia	kdp	f	38	Housewife	Secondary E	Domestic	2014

1 (0 out of 497 Selected)

Imm

Table 1: Extract from database with spatial and attribute profiles of immigrants

Spatial Settlement Pattern of Immigrants

One of the final results of this study was the trend and pattern maps of immigrant settlements in Nairobi. This was based on the physical addresses which were identified and geocoded to provide the spatial attributes for the study. The resultant map is an overlay of the County constituency boundaries map, with that of roads and immigrant physical addresses is shown in Figure 7

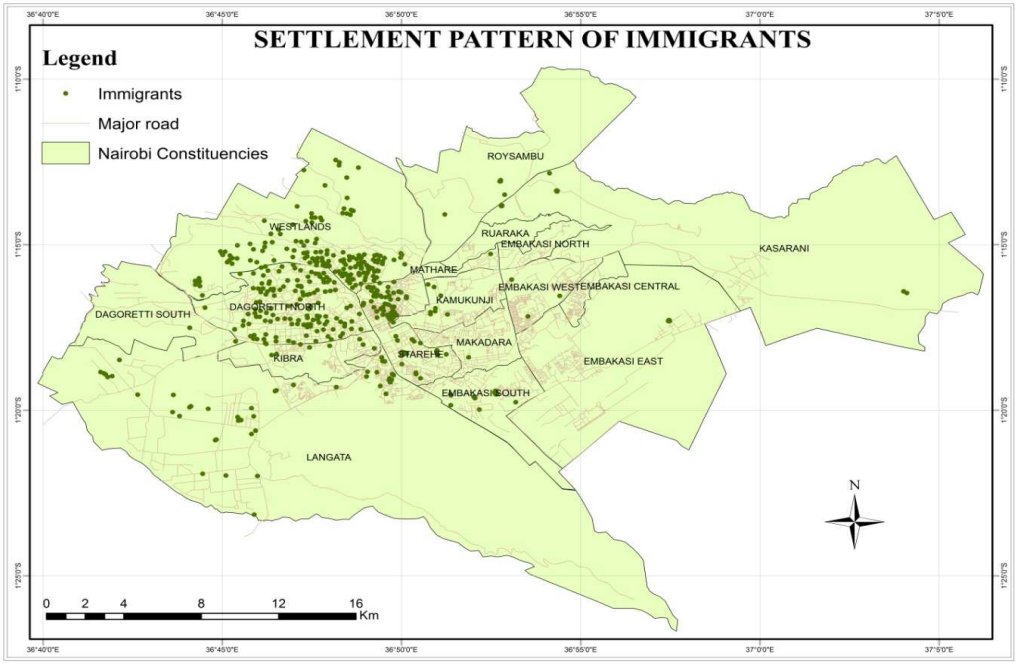

Figure 7: Settlement Pattern of Foreign Nationals

Interpretation of the above map reveals several characteristics that are important in understanding the outcome as follows: Immigrants settlements tend to concentrate more on certain areas than others; the overlay with the roads layer enhances the

location addresses in terms of the roads and streets where immigrants are located and Some constituencies host more immigrants than others.

Distribution of Immigrants in Nairobi County per Constituency

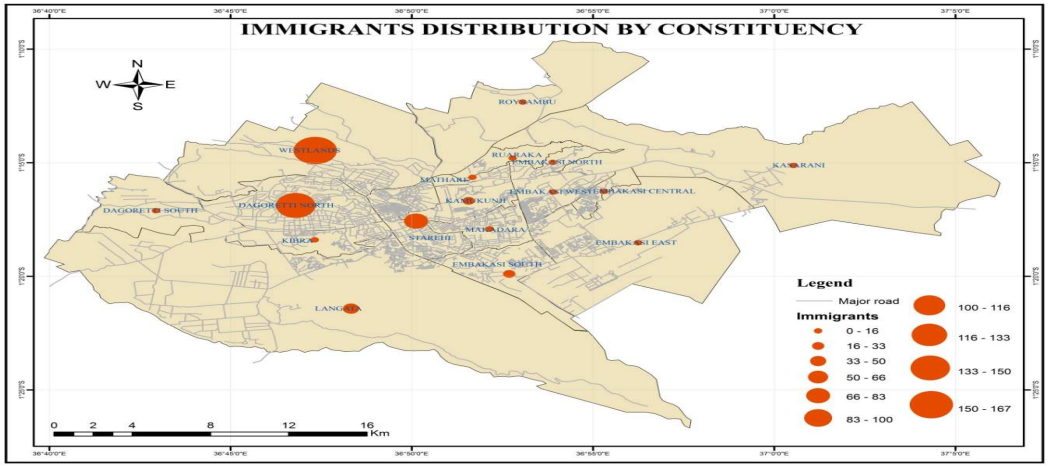

Figure 8: Distribution of Immigrants by Constituency

The resultant dot figure 8 shows immigrant distribution by size across the county so as to assess the areas preferred by most immigrants and possibly determine the reasons for this trend of settlement. The following observations can be inferred from the map:

- There are more immigrants in Westlands, Dagoretti North and Starehe constituencies than the other constituencies in the study area
- Immigrant settlements are found mainly in areas covered with good road network. This is indicative of good infrastructure and high level of development
- There are fewer immigrants in far flung areas of the county; and
- There were no immigrants reported to settle in Mathare, Ruaraka and Embakasi Central constituencies.

Distribution of Immigrants Origin by Continent

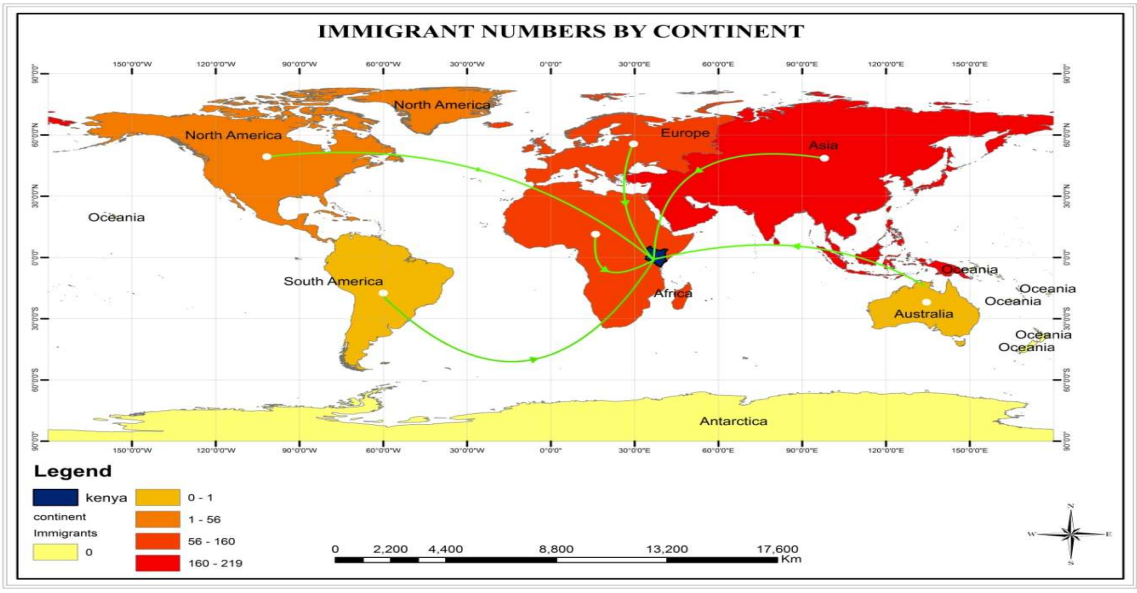

Figure 9: Proportion of Immigrants by Continent of Origin

Figure 9 shows the proportion of immigrants by continent of origin, while Figure 10 presents the actual proportion figures from the study of the various immigrant blocks

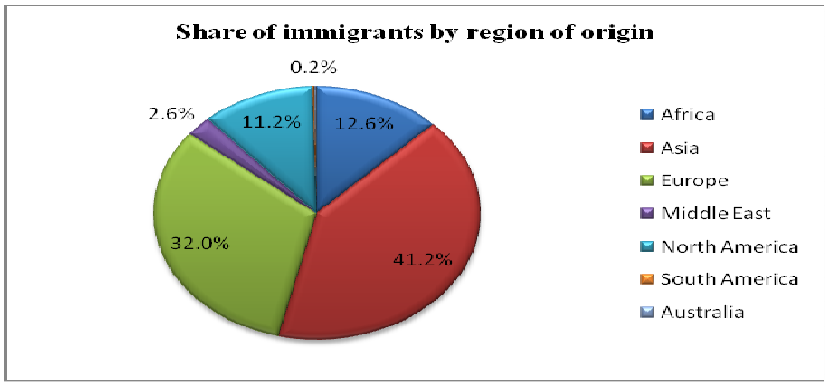

Figure 10: Share of Immigrant numbers by region of Origin.

According to these findings, the following observations were made: A large majority of immigrants in Nairobi originate from the Asia at 41.2%; Europe also contributes greatly to the number or registered and resident immigrants at 32%; The least sources of documented immigrants in Nairobi are Australia and South America at 0.2% each; and African immigrants constituted 12.6% of all foreign nationals recorded.

The findings were also analyzed according to main countries of origin of immigrants. The main purpose of this was to further understand the actual sources of immigrants in Nairobi in order to appreciate the dynamics and variables at play.

Age Composition of Immigrants

Figure 11 illustrates the age composition and gender composition of immigrants in the study area.

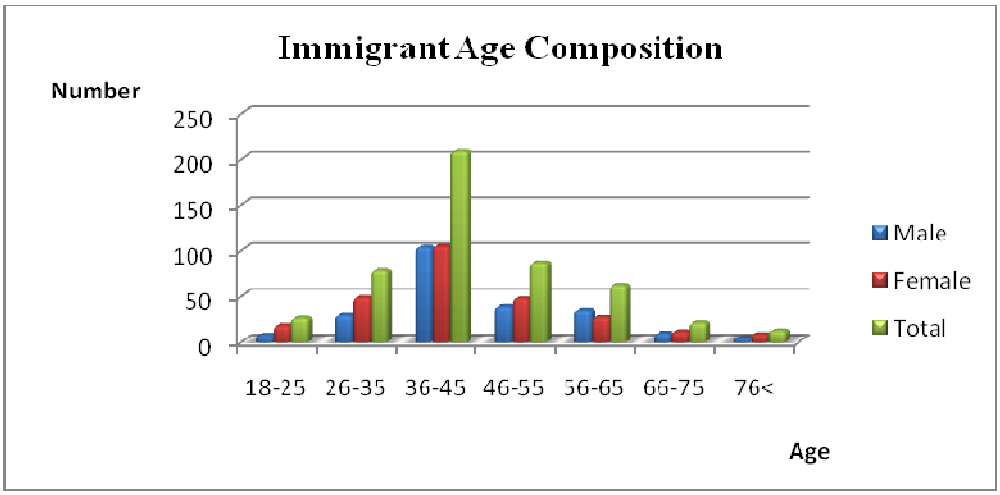

Figure 11: Age Composition and Gender of Immigrant Stock

The following results were observed from the study of the immigrants' age composition

- Majority of Foreign Nationals registered and resident in Nairobi are in the middle age brackets
- The largest number of the immigrants falls in the 35-45 years age bracket
- There were more female immigrants in every age bracket apart from 56-65 years bracket where there were more male immigrants than females
- The least number of immigrants were those above 76 years of age; and
- The number of Foreign Nationals in Nairobi increase gradually from 18 years peaks between 36-45 years and then declines towards the older immigrants.

Foreign Nationals classification by Sector

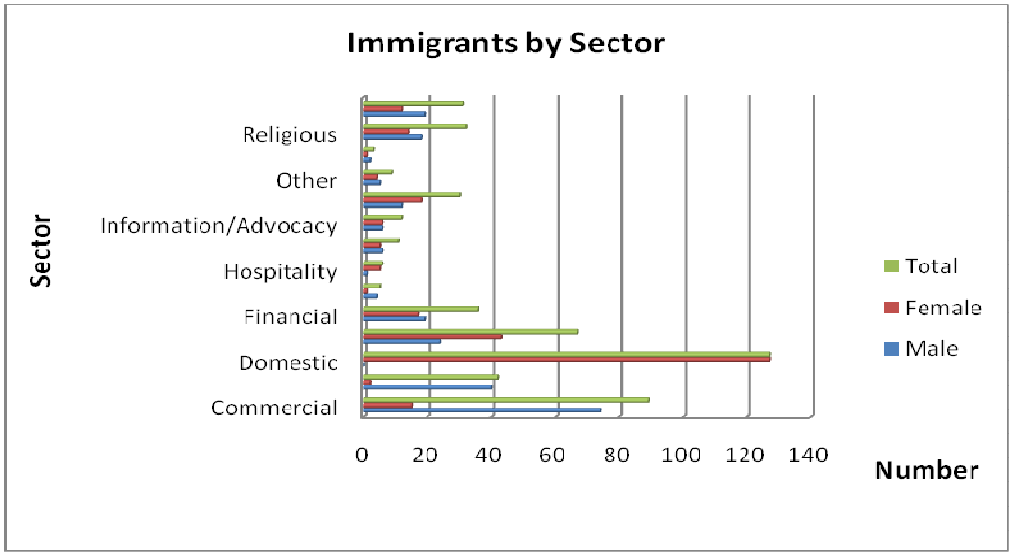

Figure 12: Immigrant Distribution by Socio-economic Sector

As indicators of the socio economic characteristics of the immigrant population in the county, the registered foreign nationals were clustered into various categories according to their occupations. The result of this analysis shown in Figure 3.3 generated interesting outcomes as follows:

- A large proportion of the foreign nationals in this study who were mostly women were dependants and were hence classified under domestic category
- There were a significant number of foreign nationals who were engaged in the commercial sector, either as investors or employees
- The technology sector also registered a sizable portion of the foreign nationals who were resident in the study area
- There were very few retirees compared to other sectors of immigrant activities observed in the study
- There were significantly many male foreign nationals in the construction sector. Many of these were of Chinese origin
- Religion also took a key position in the activities that the foreign nationals were engaged in. Many of these were missionaries, priests and religious sisters
- Education sector attracted students and teachers from across the immigrant groups, with majority of them being female.

DISCUSSION OF THE RESULTS

In line with the main objective of this study that was to assess the socioeconomic impacts of immigration in Nairobi, it emerged that immigration had profound characteristics and consequences in the study area. The presentation and visualization of the results of the study established a clear pattern of settlement of foreign nationals through various maps that were able to overlay and display general and differentiated immigrant settlements to the constituency boundaries. This showed that certain immigrant groups often cluster around certain preferred areas. Indians for instance, who formed the bulk of foreign nationals registered in the study were found clustered in limited areas such as Westlands and Starehe constituencies.

According to the immigrant distribution map, the study was able to reveal that certain areas are preferred for settlement by foreigners than others. In the findings, the use of dot map to show distribution and size of immigrants' settlements indicated that the registered and resident immigrants preferred to stay in relatively affluent areas of the county. These areas are characterized by up market, high cost residences. This reflected the economic status of these foreign nationals that appears to be relatively high compared to majority of the local residents, majority of who dwell in the densely populated areas of the county. The stronger economic power of the foreign nationals is of both micro and macroeconomic benefit to the county since they have superior spending habits.

Economic Impacts

The presence, characteristics and distribution of the foreign nationals in Nairobi as the study found out also presented the economic consequences of international migration. These can be viewed as direct, indirect or overall economic impacts. Some of the indicators of direct economic impacts of the presence of foreign nationals in the study area included:

- Generation of Government Revenue: This aspect accrued from the direct payment for services rendered such as fees charged for permits and passes as well as for registration
- Revenue is also generated from the direct taxes charged on the businesses owned by the foreign nationals
- Employment Creation: The 13.4% foreigners who hold class G work permits have invested substantively within the county. These companies employ locals in their operations who earn wages as well as other associated utilities and supplies. This generates a number of employment opportunities that result in direct economic benefits as migration stimulates local employment and businesses
- Technological contribution: From the findings of the study, about 7% of foreigners are involved in the technology sector. These migrants can bring broader economic benefits, including higher rates of innovation
- Financial contribution: Foreigners were also found to be key players in the financial sector. Close to 7% of the immigrants are directly engaged in the financial sector.

Some indirect economic effects that were identified in the study included infrastructure developments and linkages. The outcome indicated there are several foreign nationals who were involved in the construction sector of the economy. This accounted for 9% of the total immigrants of this study showing the great potential and impact that immigration is contributing to Nairobi County. The leading areas under this category were roads and house constructions with Chinese immigrants being the main players. This was revealed by their spatial settlement patterns which showed that most of them clustered around project locations.

Foreign nationals were also found to enhance economic linkages through international networking. The interaction at personal or business levels between foreigners and the locals creates an important synergy for benchmarking and networking. This was because some of the immigrants are well equipped with appropriate skills and knowledge involving international best practices. The study showed that many of the immigrants, particularly male had high skills level at 73.91%. Again some of the immigrants run local subsidiary companies of some international ones thus providing avenue for cooperation and incorporation.

On the overall economic impact, foreigners had the effect of aggregate benefit through expanding level and composition of consumer demand. This was due to need for exotic goods as well as locally available goods and services that are close to their homes and work-places.

Social Impacts

On the social front, the differentiation of foreigner activities into various activities and sectors provided significant indicators of the impacts. It emerged that most females were dependants who were either married to other foreigners or to locals. The field survey that was conducted further revealed that of the 47% female holders of the Kenya Dependants Pass (KDP) only 22% were married to Kenyans. This was indicative of social interaction and transmission of culture and social norms from across the world. This has a positive social impact if the influences are acceptable within the local setting, but can also be detrimental in cases where undesirable tendencies occur that erode the norms and value systems of the host society. Majority of the female dependants however were found to be of Indian origin with close and selective settlement pattern. This observation was consistent with the traditional view of this group as a closed community with limited cross cultural interaction.

CONCLUSIONS AND RECOMMENDATIONS

The evaluation of status and effects of international migration then provides important insights to help in development of policies and programs that address the emergent challenges, while reinforcing the benefits accruing from migration, and their viability. It also helps in keeping track of the indicators during the implementation of various immigration policies and finally measuring the output and its sustainability. One of the important areas that emerged from the study was labour–based migration.

The results of this study explored the nature and extent as well as the characteristics of immigrant populations. This presents a means for a more comprehensive and coherent strategy in migration management when adopted and implemented. The geographic location data collected and used in this study can be modeled and utilized to develop a system for migration management by creating a web based interactive interface for maintaining and tracking immigrant activities.

Data for this study covered only one reference year of registration. This can be replicated for several years so as to study the spatio-temporal dynamics of this research area. This would allow for visualization and comparison of information for different periods for trend and change analysis for a more in-depth understanding of migration dynamics. The study and analysis illustrated that there is no limit to the kind of information that can be analyzed using GIS technology. With this wealth of capabilities and possibilities, it is clear that the Department of Immigration services will greatly benefit in the adoption and implementation of a Geospatial Technology policy in delivering on its core mandate of enhancing socio-economic development of Kenya. This will be achieved for instance through Integrated Secure Border Management System that embraces geospatial technology.

References

Chappell, L., & Sriskandarajah, D. (2007). Mapping the Development Impacts of Migration. Development on the Move

Crampton, Jeremy W. (2004). GIS and Geographic Governance: Reconstructing the Choropleth Map. Cartographica 39(1).

Dustmann, C., F. Fabbai and I. Preston (2005). 'The Impact of Immigration on the UK Labour market'. The Economic Journal, 115: F324-F341.
Kenya National Bureau of Statistics (KBNS) (2009). Kenya Population and Housing Census, Ministry of Planning, National Development and Vision 2030.
National Council for Population and Development (NCPD) (2013). Ministry of Devolution and Planning. Kenya Population Situation Analysis
Ronningen, B. J. (2004). Estimates of Selected Immigrant Populations in Minnesota: Population Notes. Minnesota: Minnesota State Demographic Center
Zimmermann, K. F. (2005). European Migration: What Do We Know? Oxford/New York: Oxford University Press