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Geoinfographic Trend of Regional Crime in Oke-Ogun Region of Oyo State, Nigeria

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Abstract

The study examined temporal variations in crime in Oke-Ogun region of Oyo State, Nigeria, with a view to understanding the rampant trend of crime in the region. Crime reports were collated from the Nigerian Police records on eighteen typologies of regional crime categorised into crime against person and property from 2005 to 2012. Geo-analytical techniques employed to examine temporal variations in crime were exponential trend smoothing technique with a smoothing constant of 0.3 and the least-squares trend analytical technique. Regression and correlation coefficients represented by "b" and "r" respectively were employed to determine the increase or decline rate of crimes over the period of year under investigation. Analysis showed that out of the eighteen crime types that were analysed, eight were found to exhibit a rising trend with increasing year, and ten exhibited a declining trend. Aggregately, both crime against person and property had downward sloping trend lines. The negative values associated with (b = -35.583, r = -0.39) of crime against person and (b = -93.04, r = -0.62) of property crime confirmed the negative lapse rates and inverse relationships. However, the study concluded that the declining rate of property crime is faster than personal crime hence the latter is more rampant than the former in the region.

Keywords
Crime, temporal variation, property crime, personal crime, Oke-Ogun region

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1. Introduction

Crime is a global cankerworm and one of the most notable threats to development. Crime, as Omisakin (1998) expresses, "is a social menace, an undeniable stigma to national image and a significant source of threat to people's safety and wellbeing". Day in, day out, safe and peaceful existence is worrisomely becoming a fiction of the past in many Nigerian neighbourhoods. Lives are constantly being threatened at residences, on the streets, even at places of worship (Adigun, 2012). Campus, the citadel of learning, is also filled with violence, and the violence echoes the epidemic of assassinations that has threatened the nation psyche with terror. The effects of the criminal operations on the society and its institutions are evident in a new wave of social behaviour featuring isolation, anxiety, individualism, hostility, mistrust, aggressiveness, feelings of hopelessness and helplessness (Madden, 1996). The conceptualization of the region has its origin in the discipline of geography, where it has engaged attention and interest since the nineteen century (Omuta and Onokerhoraye, 1986). The regional concept holds that the surface of the earth can be marked off into spatial units or areal levels of distinctive character, and that the complex patterns and associations of phenomena in particular possess a legible meaning as ensemble which added to the meetings derived from a study. All these parts and processes separately provide additional perspective and outstanding depth of understanding. Okafor (2004) holds that regions are portions of territory each of which is internally homogenous (or largely so) with regard to some attributes. In the context of regional planning, these attributes could be

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unemployment, agricultural output, industrial output, school environment, and infant mortality just to mention a few. Regions are defined on the basis of some significant attributes. Thus, the component parts of a region usually have some similarity in terms of the attributes on the basis of which the region is defined. However, regions are not arbitrarily defined or demarcated areas. Regions are supra urban areas comprising rural and urban environments. Temporal variations in crime are a topical issue in criminological research, and they are among the least understood topics in the field of environmental criminology and criminal justice, especially in the area of generating early warning systems for preparedness against crime. Attempts at understanding various aspects of crime have been carried out in different disciplines. Spatial and/or temporal dimension of crime are also obvious but are often less considered in most of attempts at understanding various aspects of crime by non-geographers / aspatial planners and other non-spatial analysts such as anthropologists, economists, lawyers and psychologists to mention but a few. Crime research efforts of the aforementioned non-spatial crime analysts emphasize on psychological and sociological analysis of causes of particular types of criminal behaviour like juvenile offences, female offences and others. Such attempts are in the works of Odekunle (1982); Obudho and Owuor (1994) and Dambazau (1999). The attempts almost always try to establish a clear link between mental life, modernization, socialisation and increasing level of criminality. In so doing, they frequently focus on how crime is punished, how prisons are managed, and how criminal rehabilitation is handled with little or no reference to temporal dimension to explain how crime vary with time in a particular area. Nevertheless, until recently, the literature on spatial criminology has almost exclusively focused on cities with little efforts on regional problems and the attempts on crime studies include the works of Aust and Simmons (2002); Jones (2003); Mawby (2006); Adeboyejo and Abodunrin (2007); Okoko (2008); Adejumobi, Oni and Ige (2009); Ahmed (2010) and Adigun (2012). Hence, analysis of regional crime occurrence has been relatively neglected and so the literature on regional crime and justice is comparatively sparse. However, those attempts sometimes can conceal patterns of crime variations in some locations and it must be understood here that solutions to crime phenomena in an environment lie in understanding the spatial dichotomy in crime trend and prevention for planning and managing security operations.

Theoretically, it has been argued that there exists a close and positive relationship between crime occurrence and ecological area in any space economy (Sampson, 1995; La Grange 1999). In same way, the extricable relationship between the physical attributes of Oke-Ogun area, and the prevalence of various types of crime incidence cannot be over-emphasized. Oke-Ogun region has geographical peculiarities with possible implication for incidence of crime prevalence and mechanisms by which inhabitants tend to response or cope with it. Oke-Ogun region is a supra urban border environment comprising rural and urban settlements. It is porous and remains an open countryside. The strategic location of Oke-Ogun area as a transit point to the northern and southern Nigeria and Republic of Benin makes it prone to criminality and a choice for the research.

Locational crime studies on Oke-Ogun and some other borderlands in Nigeria are too few. However, the study examined fluctuant, direction and speed patterns of crime in Oke-Ogun region of Oyo State in southwestern Nigeria. It assessed the association between crime frequency and year and also percentage contribution of the time of year to variations in frequencies of crime against person and property in the region. These were with a view to presenting the spatial crime information in a graphical format for understanding the rampant trend of crime in the region.

2. The Study Area

Oke-Ogun region is the north-western area of Oyo State, and is made up of ten local government areas in the northern and north-western parts of Oyo State, Nigeria. Geographically, Oke-Ogun approximately stretches between longitudes 03° 02' and 04° 44' East and latitudes 07° 28' and 08° 38' North of the globe. (Figure 1.1). Oke-Ogun shares boundary with Kwara State in the North, in the South by Ogun State, Ibarapa North and Ibarapa East local government areas; in the East by Atiba and Oyo West local government areas. The people of Oke-Ogun are mostly Yoruba. The regional accent of Oke-Ogun is called "Onko".

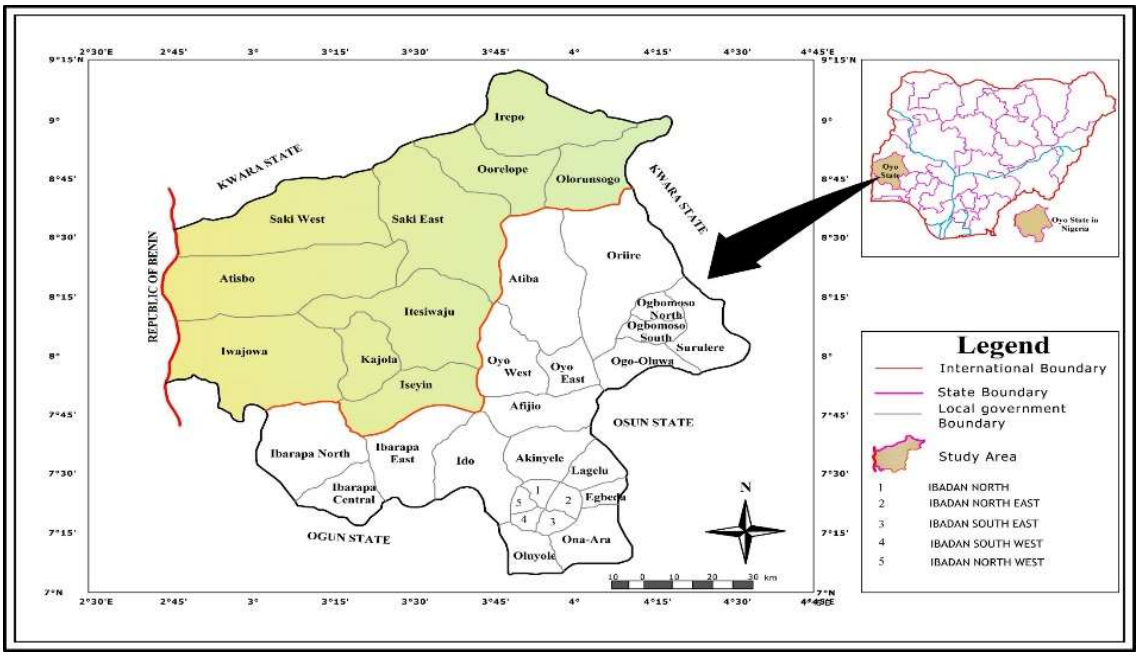

Figure 1: Oke-Ogun Region, Oyo State

3. Research Methodology

Secondary sources of data collection were used for the study. Secondary data included Police records on crime against persons and crime against properties in the study area collected from Oyo State Police Headquarters. Temporal variation in nature of crime in Oke-Ogun region from 2005 to 2012 was examined using the exponential smoothing and least square techniques. The mathematical characteristic of the exponential smoothing trend analysis is given as:

$$T_n = \alpha(\varnothing) + (1-\alpha)(\beta) \quad \text{..... (a)}$$

Where T_n = new trend or predicted trend value; α = a smoothing constant; $\varnothing$ = actual value for current period; β= trend value for last period.

In this technique, the trend value for the first data is the same as the value for the first raw data. For subsequent data, the trend value is calculated using the formula. The commonly used smoothing constant ranges from 0.3 to 0.5, and a smoothing constant of 0.3 was used in this study. The exponential smoothing technique was used to smoothen pattern of crime fluctuation (bring out the rising or falling trend of crime). The Least-Squares technique was used in establishing the nature (fluctuation pattern and rate) of crime. It was used to obtain regression line that would give the clearest picture of the rising or falling pattern of crime, and determine the linear relationship between year and annual crime incidence. The mathematical characteristics of the least-square techniques is given as:

$$y = a + bx \quad \text{..... (b)}$$

Where: y = predicted future crime incidence; a = slope intercept, the value of y when x = 0; b = regression coefficient, constant, representing the amount of change in y that corresponding to a change of one (1) unit in year x = year

For predictive purposes, mathematical models were generated from regression analysis. Regression coefficient (b) and Pearson's product-moment correlation coefficient (r) were employed to determine the strength of the rate of decrease or increase of crime with the efflux of time in the study area. The percentage contribution of x (period of year) to variation in y (level of crime occurrence) is determined using the coefficient of determination (r^2). The r^2 in this case is got by simply squaring "r" value then multiplied by 100. Therefore $r^2 = 100 \times r^2$

4. Results and Discussions

4.1 Temporal Variations in Crime against Property in Oke-Ogun

Data on incidences of crime against property in Oke-Ogun from 2005-2012 were plotted as a time-series data with a view to establishing the trend of occurrence of aggregated crime against property cases over the year under study (Table 1). The exponential smoothing trend line was able to give the picture of the trend as a falling one in Oke-Ogun.

However, the rate of decline was swift. This was attested to by the low and negative values of the regression and correlation co-efficient (r = -0.62), meaning as the year increased the frequency of crime against property decreased in the area and the relationship between level of crime occurrence with the efflux of time was very high and direct. The coefficient of determination (r^2) in this case is 0.3969, implying that 39.69% of variations in the level of property crime was influenced by changes in year, and 60.31% was explained by other factors. The least squares model is given in equation 1.

$y = 1428.8 - 93.036x$ …… (1)

The model implies that a unit increase in year would bring about 93.036 units decrease in the case of crime against property in Oke-Ogun region.

Table 1: Trend Values for Crime against Property

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	1187	1187.00	1335.77
2006	1138	1172.30	1242.74
2007	1147	1164.71	1149.71
2008	1719	1331.00	1056.68
2009	665	1131.20	963.65
2010	902	1062.44	870.62
2011	644	936.91	777.59
2012	679	589.54	684.56

Source: Field Survey, 2014

4.1.1 The Trend of Individual Crime Against property

Armed Robbery

The rate of decrease of armed robbery cases in the number of years as examined by exponential smoothing and the least-square techniques is given in Table (2). However, the relationship between the frequency of armed robbery and increasing years was strong though indirect. The implication is that the trend of armed robbery was decreasing at a very rapid speed (r= -0.73) as the years increased, as shown in equation (2).

$y = 34.429 - 1.5952x$ …… (2)

The model implies that a unit increase in year would bring about 1.5952 units decrease in the case of armed robbery in Oke-Ogun region.

Burglary

Info-graphic trend of burglary cases in Oke-Ogun was upward (Table 3). This is attested to by the low and positive values of the regression and correlation coefficient (r = +0.03). The implication is that the trend of burglary in Oke-Ogun increased at a very slow speed as the years increased and there was a low positive association between crime occurrence and year. The regression model in equation (3) corroborates this.

$y = 253.21 + 1.5357x$ …… (3)

The model implies that a unit increase in year would bring about 1.5357 unit increase in the case of burglary in Oke-Ogun region.

Table 2: Empirical and Predicted Frequencies of the Trend of Armed Robbery

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	39	39.00	32.83
2006	27	35.40	31.24
2007	28	33.18	29.64
2008	27	31.33	28.05
2009	25	29.43	26.45
2010	26	28.40	24.86
2011	20	25.88	23.26
2012	26	25.92	21.67

Source: Field Survey, 2014

Table 3: Trend Values for Burglary

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	174	174.00	254.75
2006	211	185.10	256.28
2007	252	205.17	257.82
2008	585	319.12	259.35
2009	88	249.78	260.89
2010	374	287.05	262.42
2011	123	237.84	263.96
2012	274	245.69	265.39

Source: Field Survey, 2014

Theft and Stealing

The empirical data, when plotted on a coordinate axis, showed a fluctuation of the cases, but the negative values associated with the regression and correlation coefficients respectively (b = -70.12) and (r = -0.79) confirm the negative lapse rate and an inverse relationship. However, the rate of decline (r = -0.79) was high as the year increased.

$y = 677.35 - 70.107x$ ……..... (4)

The model implies that a unit increase in year would bring about 70.107 units decrease in the case of theft and stealing in Oke-Ogun region.

Table 4: Trend Values for Theft and Stealing

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	465	465	607.24
2006	630	514.50	537.14
2007	566	529.95	467.03
2008	567	541.07	396.92
2009	139	420.45	326.82
2010	131	333.62	256.71
2011	265	313.03	186.60
2012	132	258.72	116.49

Source: Field Survey, 2014

House Breaking

Analysis showed a fluctuation of the cases (Table 5). However, the regression technique was far more explicit in depicting the rising trends of house-breaking cases in Oke-Ogun. This increasing trend, though very slow, was confirmed by a weak positive correlation coefficient value (r = +0.22) and the regression coefficient (b = +3.3).

$$y = 157.5 + 3.33x \ldots\ldots\ldots (5)$$

Table 5: Trend Values for House Breaking

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	181	181.00	160.83
2006	122	163.30	164.16
2007	103	145.21	167.49
2008	215	166.15	170.82
2009	116	151.11	174.15
2010	145	149.28	177.48
2011	118	139.89	180.81
2012	140	139.92	184.14

Source: Field Survey, 2014

Store Breaking

The analysis established downward slope of the trend lines (Table 6). The negative values associated with both the regression and correlation coefficient (r = -0.71) was very strong and therefore confirm the negative lapse rate and an inverse relationship, Store Breaking was rapidly declining as the years increased.

$$y = 121.43 - 11.762x \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The model implies that a unit increase in year would bring about 11.762 decrease in the case of store breaking in Oke-Ogun region.

Table 6: Empirical and Predicted Trend of Store Breaking

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	87	87.00	109.67
2006	85	86.40	79.91
2007	85	85.98	86.14
2008	105	91.69	74.38
2009	117	99.28	62.62
2010	46	83.29	50.86
2011	05	59.80	39.10
2012	18	47.26	27.33

Source: Field Survey, 2014

Arson /Malicious Damage

The trend of arson/malicious damage was characterised by crests and troughs and therefore not quite easy to discern. Analysis established downward trend (Table 7). The rate of the decrease of the trend was slow judging by the low values of the regression and the correlation coefficients (r = -0.40). Regression model generated is:

$$y = 19.75 - 0.75x \ldots\ldots\ldots\ldots\ldots (7)$$

The model implies that a unit increase in year would bring about a 0.75 unit decrease in the case of arson/malicious damage in Oke-Ogun region.

Table 7: Trend Values for Arson

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	19	19.00	19.00
2006	12	16.90	18.25
2007	20	17.83	17.50
2008	24	19.68	16.75
2009	17	18.88	16.00
2010	14	17.42	15.25
2011	10	15.19	14.50
2012	15	15.13	13.75

Source: Field Survey, 2014

Forgery

When the information in (Table 8) was plotted graphically the trend of forgery cases in Oke-Ogun area was declining very fast. . This is attested to by the very low and negative values of the regression coefficient (b = -2.34) (equation 8) and the correlation coefficient (r = -0.90). The least-square model is:

$$y = 35.036 - 2.369x \ldots\ldots\ldots\ldots (8)$$

The model implies that a unit increase in year would bring about 2.369 unit decrease in the case of forgery in Oke-Ogun region.

Table 8: Trend Values for Forgery

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	31	31.00	32.67
2006	32	31.30	30.29
2007	29	30.61	27.93
2008	22	28.03	25.56
2009	28	28.02	23.19
2010	18	25.01	20.82
2011	20	23.51	18.45
2012	15	20.96	16.08

Source: Field Survey, 2014

False Pretence and Cheating

Analysis established the frequency of false pretence and cheating as the year increased to have been decreasing in the area. (Table 9). However, the actual rate of decline was found to be strongly rapid as confirmed by the negative values associated with correlation coefficient (r = -0.78) of the crime. The least-square model is:

$$y = 129.18 - 11.512x \ldots\ldots\ldots\ldots\ldots (9)$$

The model implies that a unit increase in year would bring about 11.512 units decrease in the case of false pretence and cheating in Oke-Ogun region.

Table 9: Trend value for false pretence and cheating

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	150	150.00	117.67
2006	105	136.50	106.16
2007	51	110.85	94.64
2008	92	105.19	83.13
2009	54	89.83	71.62
2010	67	82.98	60.11
2011	51	73.39	48.60
2012	49	66.07	37.08

Source: Field Survey, 2014

Unlawful possession of contraband and mood altering substances

The direction of the trend of unlawful possession of contraband and mood altering substance (e.g. counterfeit currency, firearm, ammunition, cannabis, marijuana and stupefying drinks) was not quite clear with the empirical and exponential smoothing values (Table 10). The rising pattern of the trend was vivid with least squares trend line. Judging by the very low coefficients of the regression and correlation (r = + 0.06) the rate of increase can be said to be very torpid and the relationship between level of crime occurrence and year was very low and direct.

$$y = 40.179 + 0.9048x \ldots\ldots\ldots\ldots (10)$$

The model implies that a unit increase in year would bring about 0.9048 unit increase in the case of unlawful possession of contraband and mood altering substance in Oke-Ogun region.

Table 10: Empirical and Predicted Trend Values for the Crime of Unlawful Possession

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	41	41.00	41.08
2006	14	32.90	41.99
2007	13	26.93	42.89
2008	82	43.45	43.79
2009	81	54.72	44.70
2010	81	62.60	45.61
2011	32	53.42	46.51
2012	10	40.39	47.42

Source: Field Survey, 2014

4.2. Trend of Total Crime against Person

The empirical data and exponential smoothing values on crime against person in Oke-Ogun region from 2005-2012 at spatially aggregated level, when put on a graph exhibited remarkable crests and troughs that made a declining trend uneasily discernible (Table 11). However, the least-squares trend line revealed a declining trend. The rate of decrease of the trend is slow judging by the low and negative values of the regression co-efficient (b = 35.58) and confirming by the correlation coefficient (r = -0.39). The coefficient of determination (r^2) in this case is 0.1521. Therefore 15.21% of variations in the level of property crime was influenced by changes in year, and 84.79% was explained by other factors.

$$y = 1286.2 - 35.583x \ldots\ldots (11)$$

The model implies that a unit increase in year would bring about 35.583 units decrease in the case of total crime against person in Oke-Ogun region.

Table 11: Trend Values for Total Crime against Person

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	1129	1129	1251.22
2006	1164	1139.5	1215.67
2007	1236	1168.5	1180.05
2008	1453	1253.82	1144.47
2009	940	1159.67	1108.89
2010	1296	1200.57	1073.30
2011	749	1065.10	1037.72
2012	1046	1059.37	1002.14

Source: Field Survey, 2014

4.2.1 Trend of Individual Crime against Person

Murder

Analysis actually helped to bring out the rapid falling trend of murder. This is attested to by the very low and negative values of the regression coefficient (equation 12) and the correlation coefficient (r = -0.89). These mean that as the years increased, the frequency of murder decreased in the area and there was a high negative association between crime frequency and year. The least squares model is given in equation (12).

$$y = 85.714 - 5.63x \ldots\ldots\ldots\ldots (12)$$

The model implies that a unit increase in year would bring about 5.63 decrease in the case of murder in Oke-Ogun region

Table 12: Trend Values for Murder

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	89	89.00	80.08
2006	71	83.60	74.45
2007	68	78.92	68.82
2008	61	73.54	63.19
2009	50	66.94	57.56
2010	52	63.45	51.93
2011	40	55.72	46.29
2012	52	54.60	40.69

Source: Field Survey, 2014

Suicide

The empirical data and the exponential smoothing values on suicide exhibited remarkable crests and troughs that made trend uneasily discernible (Table

13). However, the slow rising movement of suicide cases was glaring with least square. As years increased, suicide incidents slowly increased in the area as weak and positive values of the regression coefficient (equation 13) and the correlation coefficient (r = +0.35) attested to this.

$$y = 5.164 + 0.119x \ldots\ldots\ldots (13)$$

The model implies that a unit increase in year would bring about 0.119 unit increase in the case of suicide in Oke-Ogun region.

Table 13: Trend Value for Suicide

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	7	7.00	5.58
2006	3	5.80	5.70
2007	9	6.76	5.82
2008	3	5.63	5.94
2009	4	5.14	6.10
2010	10	6.59	6.18
2011	7	6.71	6.30
2012	5	6.19	6.42

Source: Field Survey, 2014

Grievous Harm and Wounding

The empirical data exhibited a remarkable fluctuation. The exponential smoothing and least-squares values revealed a declining trend of grievous harm and wounding (Table 14). The rate of decline is very fast judging by the very low and negative co-efficient of regression and correlation (r = -0. 78). The least-squares model is:

$$y = 250.64 - 20.06x \ldots\ldots\ldots\ldots (14)$$

The model implies that a unit increase in year would bring about 20.06 units decrease in the case of grievous harm and wounding in Oke-Ogun region.

Table 14: Trend Value for Grievous Harm and Wounding

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	233	233.00	230.58
2006	160	211.00	210.52
2007	225	215.27	190.46
2008	220	216.69	170.40
2009	134	191.88	150.34
2010	143	177.22	130.28
2011	49	138.75	110.24
2012	119	132.83	90.16

Source: Field Survey, 2014

Assault

The trend of assault by empirical data and exponential smoothing values was not quite easy to discern (Table 15). The rate of increase of the incidence of assault with unit increase in the number of years is provided in equation (15). The slow upward trend was confirmed by a weak positive correlation coefficient value (r = + 0.09).

$$y = 417.5 + 3.9167x \ldots\ldots (15)$$

The model implies that a unit increase in year would bring about 3.9167 units increase in the case of assault in Oke-Ogun region.

Table 15: Trend value for Assault

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	374	374.00	421.42
2006	411	385.10	425.33
2007	452	405.17	429.25
2008	585	459.12	433.17
2009	288	407.78	437.09
2010	574	457.65	441.00
2011	323	417.26	444.92
2012	474	434.28	448.84

Source: Field Survey, 2014

Rape and Indecent Assault

The direction of the trend of rapes and indecent Assault was unambiguous with the empirical data and exponential smoothing values. The frequency of the crime cases based on the least squares predictions increased with the effluxion of years (Table 16). Also, correlation coefficient for confirmation had a weak positive value (r = + 0.05). The lapse rate of increase is given in the regression model in equation (16).

$$y = 75.143 + 0.6905x \ldots\ldots\ldots\ldots (16)$$

The model implies that a unit increase in year would bring about 0.6905 unit increase in the case of rape and indecent assault in Oke-Ogun region.

Table 16: Trend Value for Rape/Indecent Assault

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	13	13.00	75.83
2006	109	41.80	7.25
2007	87	55.36	77.22
2008	120	74.75	77.91
2009	88	78.73	78.59
2010	79	78.81	79.29
2011	80	79.17	79.98
2012	50	70.42	80.67

Source: Field Survey, 2014

Kidnapping /child stealing

The rate of upward movement of this crime vis-à-vis a unit increase in the number of years was determined using equation (17). The level of association, as measured by the least square and correlation coefficient (r = + 0.04), was very low and therefore,

$$y = 10.43 + 0.0714x \ldots\ldots (17)$$

The model implies that a unit increase in year would bring about 0.0714 unit increase in the case of kidnapping/child stealing in Oke-Ogun region. This is a crime where all the parameters in some earlier years under study showed a rising

Table 17: Trend value for kidnapping/ child stealing

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	07	7.00	10.50
2006	07	7.00	10.57
2007	11	8.20	10.64
2008	18	11.14	10.71
2009	18	13.19	10.79
2010	18	11.64	10.86
2011	10	11.15	10.93
2012	07	9.91	10.99

Source: Field Survey, 2014

Child Abuse

The regression analysis gives the vivid picture of the rising trend of child abuse (Table 18). However, the relationship between the frequency of child abuse cases and the effluxion of years is weak, though direct. The trend of child abuse in Oke-Ogun was therefore increasing at a very slow speed (r = + 0.07). Prediction model is:

$$y = 7.8214 + 0.0952x \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (18)$$

The model implies that a unit increase in year would bring about 0.0952 unit increase in the case of child abuse in Oke-Ogun region.

Table 18: Trend Value for Child Abuse

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	5	5.00	7.92
2006	12	7.10	8.01
2007	4	6.17	8.11
2008	8	6.72	8.20
2009	12	8.30	8.29
2010	12	9.41	8.39
2011	8	8.99	8.49
2012	5	7.79	8.58

Source: Field Survey, 2014

Breach of Peace

Data on breach of peace incidences when plotted as a time series data was therefore not quite easy to discern. The least-squares trend line was able to give the picture of the trend as a declining one (Table 19). The correlation coefficient was negative (r = -0.33). The rate of decrease of the crime cases vis-à-vis the effluxion of years was slow. The lapse rate of decrease is given in the regression model in equation (19).

$$y = 381.361 - 8.1071x \quad \ldots\ldots\ldots\ldots \quad (19)$$

The model implies that a unit increase in year would bring about 8.1071 units decrease in the case of breach of peace in Oke-Ogun region.

Table 19: Trend Values for Breach of Peace

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	343	343.00	373.25
2006	361	348.00	365.15
2007	337	344.98	357.04
2008	422	368.09	348.93
2009	336	358.46	340.83
2010	411	374.22	332.72
2011	227	330.05	324.61
2012	322	327.64	316.50

Source: Field Survey, 2014

Unnatural Offence

Unnatural offence is an official crime against moral (expected behaviour) and social standards. The offence includes stealing a corpse from a grave and sleeping with animals, one's blood relatives among others. The empirical data of unnatural offence when put on graph, showed a remarkable fluctuation of the cases. The clean clue to the declining trend of unnatural offence cases was provided by the exponential smoothing technique. However, the regression technique was far more explicit in depicting its declining trend in Oke-Ogun. This rapid downward trend was confirmed by a strong negative correlation coefficient value (r = - 0.85) the lapse rate of decrease is given in the regression model in (20).

$$y = 48.679 - 6\ .0119x \quad \ldots\ldots\ldots\ldots\ldots \quad (20)$$

The model implies that a unit increase in year would bring about 6.0119 units decrease in the case of unnatural offences in Oke-Ogun region.

Table 20: Empirical and predicted frequencies of the trend of unnatural offence

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	50	50.00	42.67
2006	30	44.00	36.64
2007	43	43.70	30.64
2008	16	35.39	24.63
2009	10	27.77	18.62
2010	7	21.54	12.61
2011	5	16.58	6.59
2012	12	15.2	0.58

Source: Field Survey, 2014

4.3 Total Crime Occurrence in Oke-Ogun

Information on the distribution of cases of all types of crime is given in Table 21. The empirical data exhibited a remarkably zigzag fluctuation. The trend was though not quite difficult to discern. However, when the information in Table 23 was plotted graphically, using the exponential smoothing values and the least-squares values, the declining trend of total crime occurrences in Oke-Ogun area became glaring. However, the rate of decline was averagely

swift. The rate of decline was computed using the least-squares model for obtaining predictions for the trend line, and this is stated in equation (21). The negative values associated with both the regression coefficient (b = -128.6) (and correlation coefficients (r = 0.56) confirm the negative lapse rate and an inverse relationship, all leading to a downward sloping trend line (Figure 4).The meaning of this is that the frequency of total crime occurrences was declining rapidly as the years go by. The coefficient of determination (r^2) in this case is 0.3136. Therefore 31.36% of variations in the level of total crime in Oke-Ogun region was influenced by changes in year, and 68.64% was explained by other factors.

$$y = 2715.5 - 128.62x \quad \ldots\ldots\ldots\ldots\ldots (21)$$

The model implies that a unit increase in year would bring about 128.62 units decrease in total crime occurrence in Oke-Ogun region

Table 21: Trend Values for Total Crime Occurrence in Oke-Ogun

Year	Empirical values	Tn = α (∅) + (1- α) (β)	$y = a + bx$
2005	2316	2316	2586.88
2006	2302	2311.8	2458.26
2007	2383	2333.16	2329.64
2008	3172	2584.81	2201.02
2009	1605	2290.87	2072.4
2010	2198	2363.01	1943.78
2011	1393	2002.01	1815.16
2012	1725	1918.91	1686.54

Source: Field Survey, 2014

5. Summary of Predictions with Planning Implication and Policy-oriented Remarks

Among the nine types of crime against property, only three crime types were increasing, albeit at a slow and dilatory pace which was almost imperceptible (Table 22). Two of the increasing crime types were twin crime. The twin crimes were burglary and house breaking. The term 'burglary' is an illegally forceful entry into building in the night while house breaking is an illegally forceful entry into building during the day. The implication of the rising trend of these twin crimes is that there was a very high level of insecurity against pecuniary and other movable material objects kept at home. For crime against person, five out of nine crime types were increasing (Table 22). In general, the crime occurrence in Oke-Ogun is decreasing at a rapid rate with regression coefficient of b = -128.62. However, it could be predicted from the model generated for crime against property that it would take Oke-Ogun area about (nine) 9 years from year 2012 to mitigate the incidence of crime against property into stymied level using least squares model (y = 1428.8 – 93.036x) as given in equation (1). Concomitantly, it would also take the area about (twenty nine) 29 years from year 2012 to mitigate the incidence of the crime against person into imperceptible level as equation (11) (y = 1286.2 – 35.583x) estimated. It was understood from police officers on the behaviours of criminals in response to a specific set of conditions that some criminals might prefer quiet areas and others might prefer busy areas for their nefarious activities. If we are to transfer the different criminal behaviours on a chart, problem solving for total crime control in a given environment could be impossible due to complications.

All things being equal, if adequate resources could be put at the disposal of effective policing, it would take Oke-Ogun area about 15 years from 2012 to 2027 to stymie crime incidence to imperceptible level as equation 4.21 (y = 2715.5 - 128.62x) estimated. It is therefore concluded that crime against person are more rampant than crime against property based on decreasing rates obtained from time series models estimated in Oke-Ogun to investigate variations in long term crime patterns for property and personal crimes (Table1). Therefore, the results of a time series analysis of the trend of supra-urban (regional) crime at typologically disaggregated levels in Oke-Ogun have some similarities and differences with urban crime study in Akure as carried out by Okoko (2008). Okoko used Police records from 2001 to 2006 to investigate variations in long term urban crime pattern on theft, burglary, house-breaking, store-breaking grievous harm, malicious damage, false pretence and assault. Virtually all these urban crimes but burglary and malicious damage showed a very high rate of increase with the effluxion of years in Akure. Also, the total crime occurrence in Oke-Ogun was at variance with what obtained by Okoko (2008). While total crime in Oke-Ogun showed a fairly fast rate of decline, total crime in Akure exhibited an upward trend with a fairly fast rate of increase. It is evident here that regional environment is distinct from urban environment in ways that affect community policing. According to the literature review of most area studies of crime based on the routine activity theory and basic systemic model of crime, the crime composition of an area would be a result of the area's ability to develop mechanism of formal and informal control. Therefore, high crime

concentration in an area may be directly related to the inability of households to exercise suitable guardianship and the reality of the finiteness and limitations of government resources that could be put at the disposal of effective neighbourhood policing.

For a policy-oriented remark, it is therefore suggested at this point in time that a concertedly intensified effort and determination must be ensured by the law enforcement officers that crimes are stymied. Efforts should be strategically intensified by the law enforcement officers to ensure that criminals are prevented from gaining forceful entry into residential houses during the day after the people have left home for their daily activities especially in the sub-urban areas that are far from town/village centres and security posts. The same effort should equally be made to check burglary at night coupled with the provision of street light by government to illuminate the ghost zones in the night. The rising trend of unlawful possession of contraband, counterfeit currency, firearms and mood altering substance in Oke-Ogun is portentous of palpable insecurity and a high rate insensate porosity of border areas in Oke-Ogun. Pure border law enforcement agents that are highly trained should man border to check trans-border activities, because most of these activities are enormously costly to both the victims and society.

Table 22. Summary of Predictions

S/n	Crime type	Trend	Trend rate
Crime against property			
1	Armed Robbery	Decreasing	Very fast (r = -0.73)
2	Burglary	Increasing	Very slow (r = +0.03)
3	Theft and stealing	Decreasing	Very fast (r = -0.79)
4	House breaking	Increasing	Slow (r = +0.22)
5	Store breaking	Decreasing	Very fast (r = -0.71)
6	Arson	Decreasing	Slow (r = -0.40)
7	Forgery	Decreasing	Very fast (r = -0.90)
8	False pretence & cheat	Decreasing	Very fast (r = -0.78)
9	Unlawful possession	Increasing	Very slow (r = +0.06)
Crime against person			
10	Murder	Decreasing	Very fast (r = -0.89)
11	Suicide	Increasing	Slow (r = +0.35)
12	Grievous harm/ wounding	Decreasing	Very fast (r = -0.78)
13	Assault	Increasing	Very slow (r = +0.09)
14	Rape/ indecent assault	Increasing	Very slow (r = +0.05)
15	Kidnapping/child stealing	Increasing	Very slow (r = +0.04)
16	Child abuse	Increasing	Very slow (r = + 0.07)
17	Breach of peace	Decreasing	Slow (r = - 0.33)
18	Unnatural offence	Decreasing	Very fast (r = - 0.85)
Crime against person		Decreasing	Slow (r = - 0.39)
Crime against property		Decreasing	Fast (r = - 0.63)
Total crime occurrences		Decreasing	Average (r = - 0.56)

Source: Field Survey, 2014

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