

IJSGS


 ISSN: 2488-9229  
 FEDERAL UNIVERSITY  
 GUSAU-NIGERIA

**INTERNATIONAL JOURNAL OF SCIENCE FOR GLOBAL SUSTAINABILITY**  
**Infrastructure and Spatial Concentration of Cattle in Wudil Market,**  
**Kano State, Nigeria**

**Bello Gambo**

Department of Geography, Bayero University, Kano

Corresponding Author's Email & Phone No.: bgambo.geo@buk.edu.ng,

Received on: August, 2020

Revised and Accepted on: September, 2020

Published on: October, 2020

**ABSTRACT**

This study aims at examining infrastructure and spatial concentration of cattle in Wudil market, Kano State. Data collection was done using focus group discussion with nine market participants that included market leaders and some elderly traders. The discussion centered on number of cattle, market sectors and market infrastructure. There was also field observation and records of coordinates and physical organization of the market. The coordinates were used to determine the size and produce the map of the market using ARCGIS software. Location quotient, Gini coefficient and Lorenz curve were used to analyze spatial concentration of cattle in the market with the aid of Microsoft Excel 2007. The findings showed that the facilities in the market are for storage, water supply, public convenience, health, parking/loading, administration and praying (mosques). Absolute spatial concentration (number of cattle) fluctuates seasonally. The peak period which has the highest number (about 5000) is in the dry season. Also, relative spatial concentration fluctuates between high in the peak period, low in the lean period and medium in the moderate period. However, the market has generally low cattle concentration. The study concluded that the low concentration indicates efficiency and relative importance of the market to the area. However, the inadequacy and non-functionality of some infrastructure serve as limitation to the efficiency especially in the wet season. It is recommended that there is the need to provide of adequate and functional infrastructure, especially for drainage.

**Keywords:** cattle, spatial concentration, infrastructure, market and efficiency

**1.0 INTRODUCTION**

Across the world, livestock is one of the fastest-growing sectors in agriculture, which has opportunities for potential contribution to economic growth (Robinson & Pozzi, 2011). In Tropical Africa, greater economic and social significance is attached to cattle than other types of livestock (Udo, 1987). Population growth, accelerated urbanization, growing incomes and consequent increase in purchasing power of the people in sub-Saharan Africa, notably West Africa, have resulted in the increase of the demand for animal products that was estimated at the rate of 4% (Valerio *et al.*, 2020). The most affected are coastal countries like Benin, Côte d'Ivoire, Ghana, Nigeria and Togo (Kamuanga *et al.*, 2008).

In addition, cattle and beef trade has been an important aspect of the economy in Nigeria from which millions of people drive their livelihood. Raising the income and improving nutritional status

of households require enhancement of production and marketing of cattle and its products. To increase accessibility to and affordability of cattle meat, there is the need to sustain commercialization of cattle production. This can be facilitated if there is a full understanding of the operation of cattle markets (Mafimisebi *et al.*, 2013). The major challenges facing cattle markets in Nigeria relate to infrastructure and spatial concentration (Hoffmann and Melly, 2015).

Moreover, Vega *et al.* (2015) observed that market was a spatial reality characterized by two factors influencing the demand: the distribution system and the geographic component of the market. However, most previous researches have concentrated on the former. This includes market institutions (Adamu, 2005), economics of livestock production and trade (Mafimisebi *et al.*, 2013), cattle transport (Coste, 2014), and cross boundary exchange (Madaka, 2015) among others. The geographic, or specifically spatial,

component can provide decision makers with objective insight concerning the nature of their customer base and the dynamics of their marketplace.

Indeed, Wudil District has been an area of large scale economic activities such as agriculture, craft industries and trade (Zubairu, 2015). The Cattle market (Kara), which began about 1915 as a small venture located on a cross-road where Fulani cattle-owners brought some animals to meet their regular buyers during the off season, has been recognized as the largest cattle market in Kano State. The market has been one of the main distributive centers for cattle since the beginning of the trade (Okediji, 1973). The aim of the study is to examine infrastructure and spatial concentration of cattle in Wudil market, Kano State. This will be achieved through the following objectives: to describe the space and available infrastructure of the cattle market and to examine the spatial concentration of cattle in the market.

On one hand, infrastructure is the basic structures and facilities required for societal or organizational operation (Hornby, 1995). It also refers to large capital good that is characterized by long duration, technical indivisibility and a high capital-output ratio and has its origin in investment expenditure (Torrise, 2009). An infrastructure encompasses public or quasi-public goods meant to ensure the supply of basic power, water, sewerage, and communications services across geographical territories using systems of standardized services (Constantinides, 2012). Infrastructure can be categorized into three: institutional, personal and material (Buhr, 2014).

On the other hand, spatial concentration is the analysis of the location in the space of some defined well sectors like industrial activities and market operations. It is the geographical distribution of a particular sector within a territory (Ceapraz, 2008). Level of spatial concentration can be analyzed by considering distribution of phenomena across spatial units. Spatial concentration is many times determined

by comparing the geographic pattern of employment or plants for one sector with the pattern of an aggregate. Spatial concentration was described as a very important concept as it relates to geographical space (Egeraat and Curran, 2013).

In fact, the need to understand the spatial component of cattle market prompted this study, particularly on Wudil cattle market, one of the largest in Nigeria. Two research questions arose out of this: (i) What is the nature of the space and infrastructure in the market? (ii) What is the level of spatial concentration of cattle in the market?

## 2.0 MATERIALS AND METHODS

### 2.1 The Study Area

#### 2.1.1 Location

Wudil Town is the administrative headquarters of Wudil Local Government Area. It is located southeast of Kano City, on latitude 11° 48'N and longitude 8°55'E (Figure 1). The market is located within the town, near motorable roads (Figure 2). It serves the area, the surrounding local community and beyond. The area of Wudil cattle market (*Kara*) is about 35, 050.11 m<sup>2</sup>.

#### 2.1.2 Economic Activities

Wudil has been an area of large scale economic activities such as agricultural production, craft industrial production and trade (Zubairu, 2015). In particular, marketing of agricultural products is as old the culture and traditions of the people (Yakasai, 2011).

#### 2.1.3 The Market

Wudil cattle market is one of the largest of its kinds in the world. It is the largest in Nigeria and probably the largest in West Africa. Activities in the market usually commence on Wednesday through Thursday to Friday (market day). Activities continue not for transaction but for loading of cattle to different destinations after Friday through Saturday to the early hours of Sunday (Giginyu, 2011).

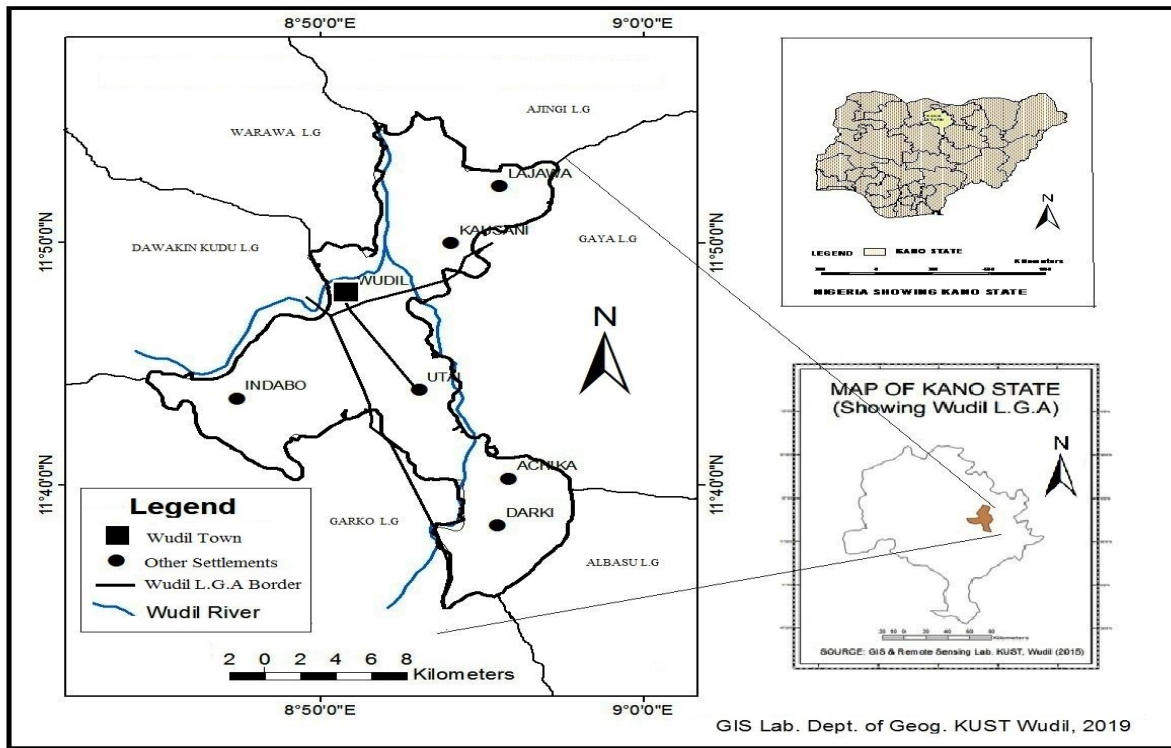


Figure 1: Wudil Town in Wudil Local Government Area, Kano State, Nigeria

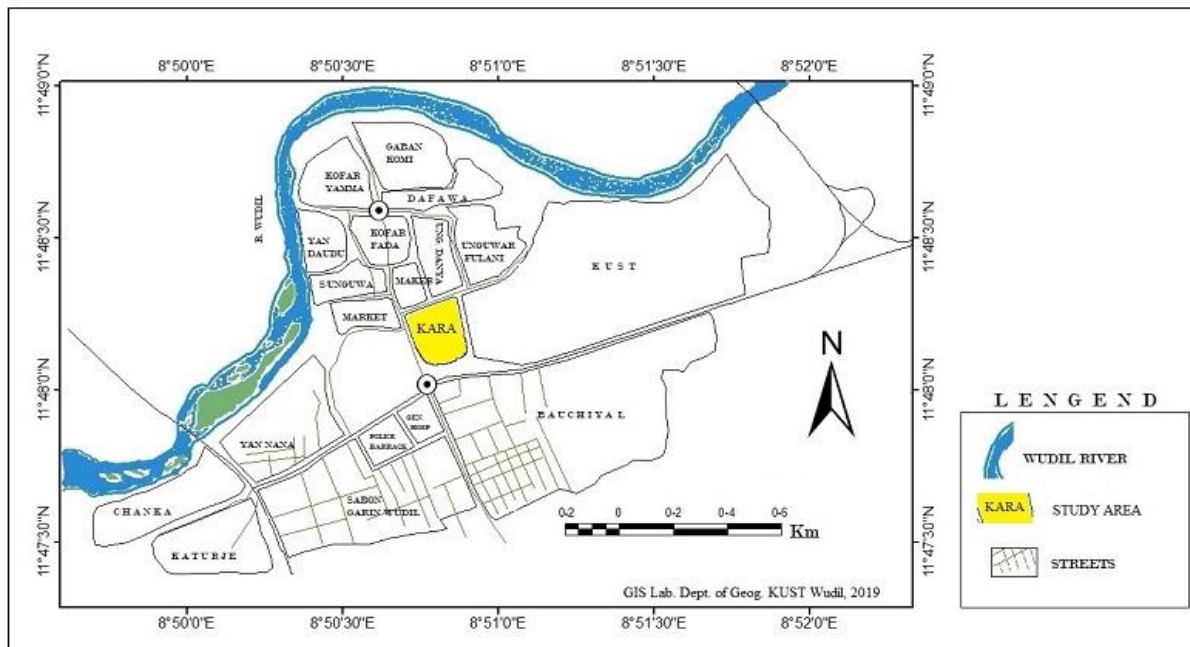


Figure 2: A Map showing Cattle (*Karu*) Market in Wudil Town (Source: Google Earth, 2019)

## 2.2 Materials

The materials that were used to collect the data included GPS, camera and field note book. The geographical coordinates of the market were derived with aid of GPS. Mobile phone (TECNO LA 6) based camera was used to take the pictures of market and loading spaces. Outcomes of field observations and focus group discussion (FGD) were recorded in field note book.

## 2.3 Methods

### 2.3.1 Data Collection

The data collected included coordinates, infrastructure and seasonal fluctuation of number of cattle traded in the market. Collection of the data was based on the following:

(i) Focus group discussion was held with market participants. The discussion centered on seasonal fluctuation in number of cattle, market sectors or spaces used for different categories of cattle, and market infrastructure.

(ii) Field observation and records of physical organization of the market. In particular, the variables observed included types of livestock, structures and facilities of the market, livestock storage, and livestock displayed for sale. The procedure for the observation included seeking of owners' permission, record of observation and photographing.

(iii) The participants of the FGD were nine in number. They included the market leaders (market's head and union leaders) and some elderly traders. The optimal number of the participants for an FGD should be 8-10 (Secor, 2010).

### 2.3.2 Data Analysis

The coordinates collected were used to determine the size and produce the map of the cattle market, containing structures and facilities, using ARCGIS software. Location quotient, Gini coefficient and Lorenz curve were used to analyze spatial concentration of cattle in the market with the aid of Microsoft Excel 2007. Location quotient, which was first introduced by Florence in 1929, was determined using the formula as follows:

$$LQ = \frac{a_x/c}{b_x/d} \quad (1)$$

where

$LQ$  = Location Quotient

$a_x$  = Employment in a particular activity  $x$  in a given area

$c$  = Total employment in the area

$b_x$  = National employment in activity  $x$

$d$  = Total national employment

For data in percentages, the equation becomes:

$$LQ = \frac{x}{y} \quad (2)$$

where

$x$  = percentage of activity  $x$  in an area

$y$  = percentage of activity  $y$  in an area

High degree of concentration of phenomena or a particular activity in area is indicated by high values of the Location Quotient that is greater than 1. A low value that is of less than 1 indicates that the area's share of the activity or phenomena is less than as is generally found among the areas. If the value of Location Quotient is equal to 1, it is an indication that the distribution is the same as the general average (Robinson, 1998).

The Gini coefficient, which was first introduced by Corrado Gini in 1912, was obtained using the formula:

$$G = \frac{1}{2}(x - y) \quad (3)$$

Where ;

$G$  = Gini Coefficient

$x$  = Percentage values of one attribute

$y$  = Percentage values of another attribute

Gini coefficient ranges from 0 to 100, which is an expression of the extent of spatial concentration or dissimilarity. At 0, there is unconcentration or perfect equality in the size and distribution of phenomena. Low concentration or high similarity is shown by Gini values between 0 and 33%. There is medium concentration or dissimilarity between 34% and 50%. There is high concentration at above 50%, and the concentration becomes maximum or perfect at 100% (Robinson, 1998; Ajala and Adesehinwa, 2008).

For Lorenz curve, a diagonal line or line of equality represents perfectly even distribution. It was initially

developed by Max Lorenz in 1905. A curved line represents the degree of concentration of cattle in the market. The greater the inequality (high concentration) of the distribution, the wider will be the curvature of the line and vice versa (Robinson, 1998).

#### 4.0 RESULTS AND DISCUSSION

##### 4.1 Infrastructure in Wudil Cattle Market

The space of Wudil cattle market (*Kara*) has three major sections. In the northeast, there is *Yan tike*, a

small section where small ruminants - ram, sheep and goat - are sold (Figure 3). The number of these animals, and thus the volume of trade, is low as it has been overshadowed by cattle trade. In the southeast, there is the section where young cattle are sold. The rest, a larger space, is for older cattle. The market's area has built fence, with two entrances. The major entrance is in the south, which is for movement in and out of cattle. The second entrance is in the north, and is for movement in and out of small ruminants (Figure 3).

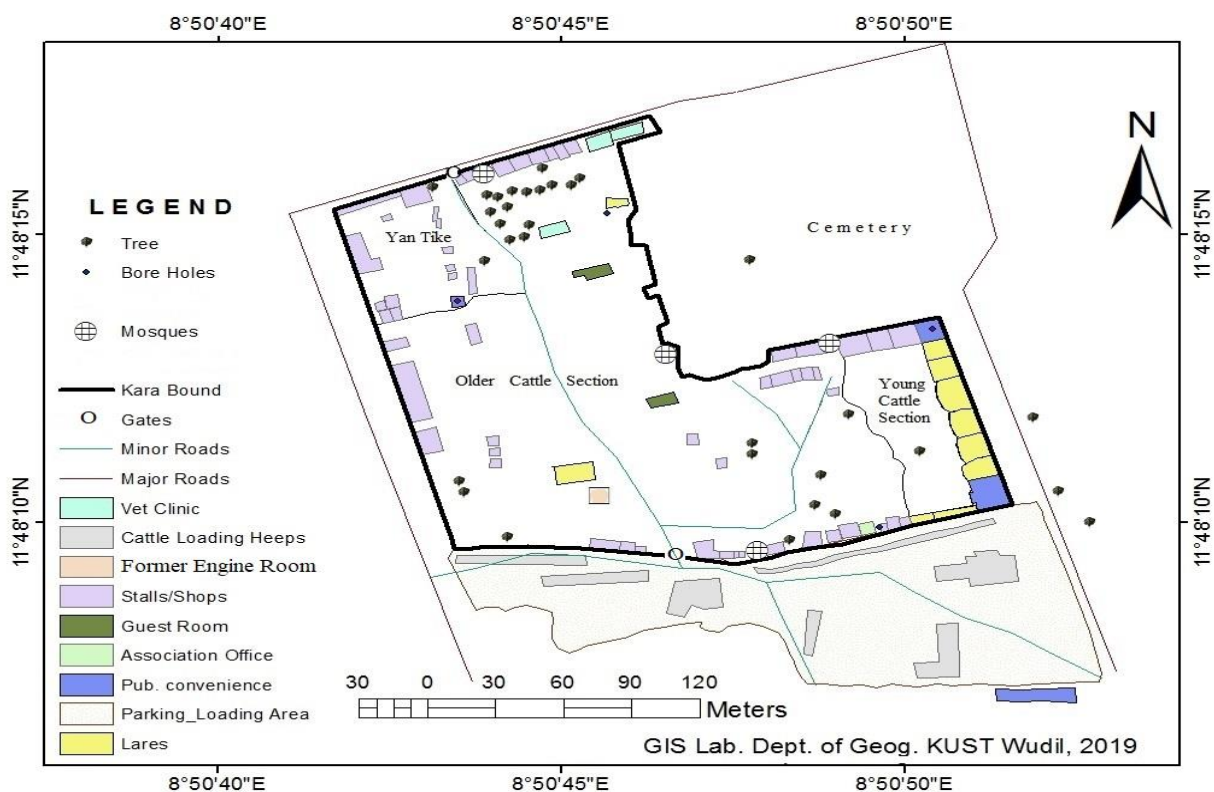


Figure 3: Space and Facilities in Wudil Cattle (*Kara*) Market  
(Source: Google Earth and Field Survey, 2019)

The facilities in the market are for storage, water supply, public convenience, health, parking/loading, administration and praying (mosques) (Figure 3). Cattle brought prior to market day and those to stay after the market day are stored in a fenced enclosure, known as *Lare*. Borehole is used to supply water in the market. There are two boreholes within the market area out of which one is functional, with one collection point. This is supplemented with supply by water vendors. There are four buildings for public

convenience out of which one is located around the parking/loading area. Health facilities in the market include two functional veterinary clinics, and many shops and stalls for sale of animal medicine.

The parking/loading area is located in the south, immediately outside the market. Earth heap is used to aid on-loading and off-loading of cattle. There are sixteen heaps; one was provided by the state government, which has iron enclosure for controlling

flow of cattle into or out of the vehicle (Plate 1). The rest of the heaps were provided by the market leadership. These have only earth heap with no any enclosure as protective device (Plate 2).

There are stalls in the market for food processing and sale, and sale of animal feeds, rope, sticks for controlling cattle, etc. Some of these commercial activities are conducted under the shed of trees, especially in the northernmost area, between *Yan tike*

and the cemetery. In this part, cattle are not stationed. The market head (*Sarkin Kasuwa*), titled *Sarkin Zango*, uses one of the stalls for his personal use, as one of the traders, and for the leadership operation. The Kara Multipurpose Cattle Traders Association has an office for the control of supply, loading and sales, and issues related to vigilante and secret security. There are two guest rooms for rest by traders from far distance. There are minor roads in form of footpaths that link the two gates of the market and other strategic points.



Plate 1: Enclosed Loading Heap (on Sunday)



Plate 2: Opened Loading Heap (on Sunday)

## 4.2 Spatial Concentration of Cattle

### 4.2.1 Absolute concentration

Table 1: Seasonal Fluctuation in Number of Cattle

Period	Number			Total
	Big	Medium	Small	
Peak Period (November- April)	1000	3000	1000	5000
Moderate Period (May-June)	700	2500	600	3800
Lean (Low) Period (July-October)	100	2000	400	2500

(Source: Field Survey, 2018)

The absolute spatial concentration is provided in Table 1. Number of cattle fluctuates between three seasons. There is the peak period (Dry season), from

November to April, which records the highest number of cattle (about 5000), including big, small and medium sizes. The moderate period is the early

part of wet season when about 3800 cattle are traded in the market. The lean period is in the wet season in which about 2500 cattle are traded. This is despite the Sallah festivities. There is less number because the market gets flooded so that entry, loading and movement with cattle tend to be difficult (Plates 3 and 4). The major cause of the flood is poor drainage. Also, people collect large amount of animal dung for

use in the farm. This helps to deepen the surface of the market, and water accumulates in the wet season. The large number of cattle traded is an indication that the size of the market is large. Babatola (2004) observed that large market places would be associated with high volume of attendance because it could provide the required threshold for a variety of goods and services.



Plate 3: Inside Wudil Cattle Market (WEST)



Plate 4: Inside Wudil Cattle Market (East)

#### 4.2.2 Relative Concentration

The level of spatial concentration of cattle (density) in the market is here expressed in terms of number of cattle in relation to the market's (*Kara*) area. Table 2 contains Location Quotient, Gini Coefficient, and cumulative percentages of number of cattle and area of the market. The peak period has high concentration because it has location quotient above 1. There is lower concentration in the low period because of location quotient below 1. In the moderate period, the location quotient is 1, which indicates that the concentration is neither high nor low. A general picture given by the Gini Coefficient figure (11) is low concentration (density). In the analysis of concentration of suppliers of agricultural products in Dawanau, Yan Kaba and Yan Lemo markets of Kano Metropolis, Gambo (2017) showed that, based on location quotient, there was high concentration in Dawanau market (above 1), medium concentration in

Yan Kaba market (with a value of almost 1) and low concentration in Yan Lemo market (below 1). The Gini Coefficient indicated that the markets had very low concentration because of low values of 05 (0.05).

**Table 2: Location Quotients, Gini Coefficients and Cumulative Percentages of Seasonal Cattle Density**

Period	No. of Cattle (x)	Area of Kara (m <sup>2</sup> ) (y)	Cattle % (x)	Area % (y)	Location quotient (x/y)	Gini C. ½ (x-y)	Cummulative % of x	Cummulative % of y
Peak Period	5000	35,050.11	44.2	33.3	1.3	10.9	44.2	33.3
Moderate Period	3800	35,050.11	33.6	33.3	1.0	00.3	78.0	66.6
Low Period	2500	35,050.11	22.1	33.3	0.7	11.2	100	100
Total	11,300	105,150.33	100	100		11		

(Source: Field Survey, 2019)



**Plate 4: Wudil Cattle Market Session (Friday)**

The Lorenz Curve (Figure 4) gives a narrow space between the curve and equality line, which signifies low concentration. The highest ratio (1.3:1) between the cumulative percentages of cattle number and the market area is in the peak period (dry season). The lowest concentration is in the lean period (wet season), having a ratio of 1:1. On distribution among marketers of maize grain in Southwestern Nigeria, Akanni (2012) found a narrow gap between the Lorenz Curve and the equality line, which indicated equality or low concentration. Many reasons could explain the general low concentration of cattle in

Wudil market: one, the yearly flood all over the market is enough to cause low concentration of cattle. Two, not all the market's space is covered with the animals. About half of the space contains smaller ruminants (Yan tike) section, buildings, stalls, trees, and participants that storm the market's session (Plate 5).

### 4.3 Economic Implications of the Results

The economic implications of the results include the following: One, the division of the market into sections with different infrastructure can attract and accommodate more traders so that there will be no monopoly. Two, the large number and low concentration especially in the dry period suggest different variety or species of cattle in the market so

that particular species do not dominate. Also, there will be more revenue to the government and income to the traders because large number of buyers will be attracted. Three, the poor drainage in the market especially in the wet season will reduce the attraction of both traders and buyers to the market. This will mean less revenue to the government.

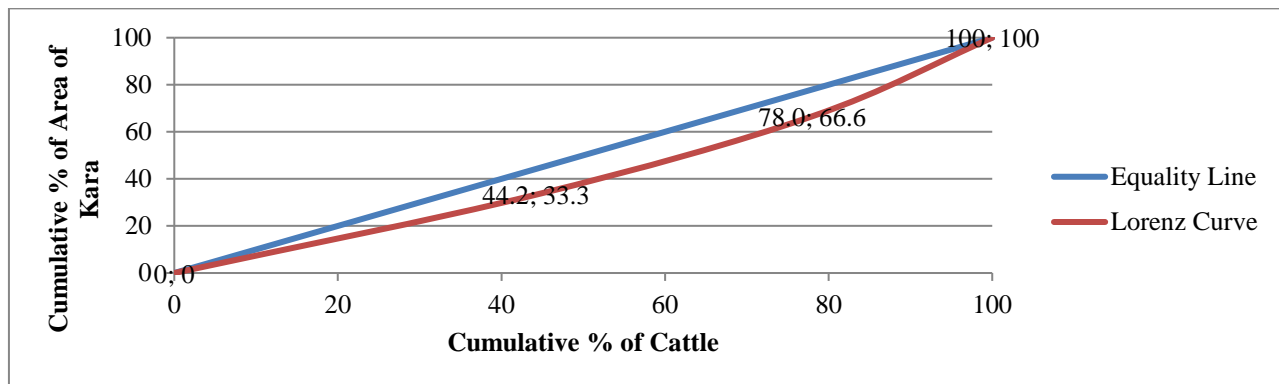


Figure 4: Lorenz Curve for Concentration of Cattle in Wudil Market  
(Source: Field Survey, 2019)

### 5.0 CONCLUSION AND RECOMMENDATION S

Based on the results, four major conclusions can be drawn. First, the division of the market into different sections, with their respective infrastructure, is an indication of good market organization. Secondly, the inadequacy and non-functionality of some of the infrastructure like borehole and enclosed loading device could serve as hindrance to cattle trade in the market. Thirdly, the relative spatial concentration has shown that the market is efficient because of low concentration. This means that the market space is able to contain the large number of cattle traded. This is indicative of the importance of the market to the area. Lastly, high concentration in the wet season is an indication of relative inefficiency. This is the result of yearly flood in the market. Based on the conclusions, the study provides the following recommendations. First, adequate and functional infrastructure should be provided. This will attract

more cattle into the market. Secondly, the efficiency of the market can be enhanced by providing more space. This can be done by concentrating sales of other commodities outside the market. Lastly, to improve drainage people that collect animal dung for use in the farm should be made to replace it with lateritic soil.

### REFERENCES

- Ajala, M.K. & Adeshinwa, A.O.K. (2008). Analysis of pig marketing in Zango Kataf local government area of Kaduna State, Nigeria. *Tropicultura*, 26(4), 229-239.
- Akanni, K.A. (2012). Economics of Marketing of Food Grains in South Western Nigeria. *Economía Mexicana Nueva Epoca*, 21(2), 373-390.
- Babatola, J.O. (2004). Export promotion of horticultural crops. *Nigerian Journal of Horticultural Science*, 9, 70-77.
- Buhr, W. (2014). What is infrastructure? Discussion Paper No. 107-03.
- Ceapraz, I.L. (2008). The concepts of specialisation and spatial concentration and the process of economic integration: theoretical relevance and statistical measures, the case of Romania's regions.

- The Journal of the Romanian Regional Science Association, 2(1), 68-93.
- Coste, A. (2014). Domestic obstacles to trade and transport in Nigeria and their impact on competitiveness. *Africa Trade Policy*, No. 42, October.
- Egeraat, C.V. & Curran, D. (2013). Spatial Concentration in the Irish Pharmaceutical Industry: The Role of Spatial Planning and Agglomeration Economies. *Tijdschrift voor Economische en Sociale Geografie*, 104(3): 338-358.
- Giginyu, I.M. (2011). In the Heart of Nigeria's Biggest Cattle Market. *Daily Trust*, 24.
- Hoffmann, L.K. & Melly, P. (2015). Nigeria's booming borders: the drivers and consequences of unrecorded trade. Chatham House, London: The Royal Institute of International Affairs.
- Hornby, A. S. (1995). *Oxford advanced learners' dictionary*. Great Britain: Oxford University.
- Kamuanga, M.J.B., Somda, J., Sanon, Y. & Kagoné, H. (2008). Livestock and regional market in the sahel and West Africa: Potentials and challenges. *Sahel and West Africa Club/OECD 4 boulevard des Iles 92130 Issy-les-Moulineaux, Paris Cedex 16, France: SWAC-OECD/ECOWAS*.
- Mafimisebi, T. E., Bobola, O.M. & Mafimisebi, O.E. (2013). Fundamentals of cattle marketing in southwest, Nigeria: analyzing market intermediaries, price formation and yield performance. Invited Paper Presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, Hammamet, Tunisia.
- Okediji, F.A.B. (1973). *The cattle industry in Northern Nigeria, 1900- 1939*. Indiana: Prepared by the African Studies Program Indiana University Bloomington. Press, Oxford.
- Robinson, G.M. (1998). *Methods and techniques in human geography*. United Kingdom: Wiley.
- Robinson, T. & Pozzi, F. (2011). *Mapping supply and demand for animal-source foods to 2030*. Rome: FAO Animal Production and Health Working Paper, No. 2.
- Secor, A.J. (2010). Social surveys, interviews, and focus groups. In B. Gomez & J.P. Jones III (Eds.), *Research methods in geography: A critical introduction*. United Kingdom: Blackwell Publishing Ltd.
- Torrisi, G. (2009). Public infrastructure: Definition, classification and measurement issues. <https://www.researchgate.net/publication/23935428>.
- Udo, R.K. (1987): *The human geography of tropical Africa*. Ibadan: Heinemann Educational Books (Nigeria) Ltd.
- Valerio, V.C., Walther, O.J., Eilittä, M., Cissé, B., Munepeerakul, R. and Kiker, G.A. (2020): Network analysis of regional livestock trade in West Africa. *PLoS ONE*, 15(5): 1-20.
- Vega, R.S., Acuna, J.L.G., & Diaz, M.R. (2015). Spatial analysis of consumer behavior in a food products market. *Theoretical and Empirical Researches in Urban Management*, 10(1), 25-42.
- Yakasai, M.T. (2011). Marketing of agricultural products in Wudil. In M. Muhammad and B. Ritter (Eds.), *Wudil cottage industries* (pp. 82-87). Wudil: Kano University of Science and Technology.
- Zubairu, N.I. (2015). *A Study of the colonial economy of Wudil district, Kano province, 1907-1960*. Unpublished M.A. Thesis, Department of History, A.B.U., Zaria.