



## The Internet Journal of Allied Health Sciences and Practice

<http://ijahsp.nova.edu>

A Peer Reviewed Publication of the College of Allied Health & Nursing at Nova Southeastern University

*Dedicated to allied health professional practice and education*

**<http://ijahsp.nova.edu> Vol. 7 No. 3 ISSN 1540-580X**

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# Prevalence and Pattern of Symptomatic Knee Osteoarthritis in Nigeria: A Community-Based Study

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**CITATION:** Akinpelu, AO., Alonge, TO., Adekanla, BA., Odole, AC. Prevalence and Pattern of Symptomatic Knee Osteoarthritis in Nigeria: A Community-Based Study. *The Internet Journal of Allied Health Sciences and Practice*. July 2009, Volume 7 Number 3.

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### ABSTRACT

Purpose: Osteoarthritis (OA) is a leading cause of disability, affecting 60-70% of people aged  $\geq 60$  years. Community-based prevalence estimates of OA in Nigeria are not readily available for referencing. This study investigated the prevalence and pattern of knee OA in Igbo-Ora, a rural community in Southwestern Nigeria. Methods: A total of 1044 adults (487 males, 557 females) aged  $\geq 40$  years in Igbo-Ora were recruited into this door-to-door survey through multi-stage cluster sampling. Knee OA was diagnosed using the American College of Rheumatology (ACR) clinical criteria. Knee OA severity was assessed using the Lequesne Algofunctional Index and interference with role performance was rated by participants who met the ACR criteria. Plain radiographs of a multiphase sample of 15 participants with Knee OA were taken. Data was analysed using percentages and Chi square. Results: Two hundred and five (119 females, 86 males) out of the 1044 participants fulfilled the ACR criteria, giving a point prevalence of symptomatic knee OA of 19.6%. The prevalence of knee OA was 21.4% among the females and 17.5% among the males, giving a female bias in the ratio of 1.2:1. Prevalence increased and was significantly associated ( $P < 0.001$ ) with age. Most participants (98.5%) had moderate-extremely severe disease and knee OA interfered with role performance in 90.2% of participants. All radiographs showed signs consistent with OA. Conclusion: One out of every five adults aged  $\geq 40$  years in this Nigerian rural community has symptomatic knee OA, with a female preponderance in the ratio of 1.2:1.

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### INTRODUCTION

Osteoarthritis (OA) is a chronic degenerative joint disease and a leading cause of disability, affecting 60-70% of the population older than 60 years. The worldwide prevalence estimate for symptomatic OA is 9.6% among men and 18% among women<sup>1</sup>. Although OA occurs all over the world, the pattern and prevalence of the disease varies among populations.<sup>1</sup>

Many hospital-based studies<sup>2,3</sup> have provided evidence that OA is common in Nigeria. These studies reported a preponderance of OA in women; the knee being the most commonly affected joint, with very low involvement of the joints of the hand. However, community-based prevalence estimates and pattern of OA in Nigeria are not readily available for referencing. According to Dawson *et al*<sup>4</sup> hospital-based data cannot be extrapolated to the community because many people with OA do not seek medical care because of their belief that OA is an inevitable condition of old age for which little can be done. In addition, the onset of pain

in OA may be very gradual and its presence may not automatically result in a medical consultation and such individuals may not be included in hospital-based prevalence estimates. Therefore, community-based data on prevalence and pattern of OA in Nigeria are preferred as these will unveil the true burden of the disease. This study was carried out to determine the prevalence and pattern of symptomatic knee OA in Igbo-Ora, a rural community in southwestern Nigeria.

## METHODS

The joint University of Ibadan/University College Hospital Institutional Review Committee approved this cross sectional survey. It was carried out in Igbo Ora, a town in the Ibarapa district of Oyo state, whose indigenous language is Yoruba (one of the three main languages in Nigeria). Based on the 1991 Nigerian Population Commission's census figures with demographic details (the most recent census results in Nigeria as at the time of this study), the population of Igbo-Ora was 46,472 with adults aged 40 years and above constituting 42% of the population. Results of previous studies and activities documented in Igbo Ora have served as models within and outside Nigeria for innovations in gathering vital data, designing medical education, organizing medical research and controlling tropical diseases.<sup>5</sup> Prior to the study, the sample size was estimated to be 1030, using the standard equation by the world Health Organization<sup>6</sup> and prevalence rate reported of a rural South African community by Solomon *et al.*<sup>7</sup>

A multi-stage cluster sampling technique was used to recruit participants into the study and the six Nigerian Population Commission's enumeration blocks in Igbo-Ora formed the 6 clusters. Four of the blocks were selected using a simple random sampling technique. The number of people to be interviewed in each block was determined by a probability proportional to size method, using the number of households in each block according to the 1991 Census results for Igbo-Ora. In identifying a starting point, a prominent landmark (market place, church, mosque or bus station) close to the centre of the block, was selected. The direction to take from the starting point was determined using simple random technique and each consecutive house from the starting point was visited till the sample size for that block was attained. In each house all adults who were aged 40 years and above and who gave consent were interviewed. Those aged below 40 years were excluded from the study because OA has been shown to be relatively uncommon below the age of 40 years.<sup>3</sup> The study was also delimited to knee OA because the knee has been reported to be the most commonly affected among Nigerians.<sup>2,3</sup> A community health worker (an indigene of Igbo-Ora) served as a research assistant. She was helpful in identifying the landmarks demarcating the six blocks and in our initial social interaction with the residents of the town. The door-to-door survey was carried out over a period of two months.

Body weight and height of participants were measured with portable weighing scale (Seca 762, Vogel and Halke, Germany) and height with a plastic height metre (Invicta Plastic Limited, England) respectively. They were asked if they had knee pain and for how many days of the past week they experienced the pain. Participants who reported having knee pain of a score of at least 2 out of 10, which had persisted for most days of the previous month, were then physically examined, using the clinical criteria of the American College of Rheumatology (ACR) for the diagnosis of knee OA.<sup>8</sup> The physical examination included assessment of bony enlargement, joint crepitus (patellofemoral or tibiofemoral), joint line tenderness, effusion, superficial point tenderness, local warmth and patellofemoral joint compression.<sup>8</sup> Participants who fulfilled the ACR clinical criteria for knee OA were interviewed to collect information on clinical history of knee OA, using a pre-tested questionnaire. They then completed the Lequesne Algofunctional Index of Knee OA, which was also administered through an interview. For participants with bilateral knee OA, they were asked to base their response on the more severely affected knee, i.e. the index knee.<sup>9</sup> Participants were also asked to describe the extent to which knee osteoarthritis interfered with their role performance on a four point rating scale.

Using a systematic random sampling technique, a multiphase sample of 15 individuals was selected from the participants who met the ACR clinical criteria for knee OA for radiological examination. Nineteen plain radiographs, each comprising of antero-posterior and lateral views, of the knees of the 15 individuals were taken (4 of them had bilateral knee OA). The radiographs were graded using the radiographic atlas of the knee OA by Spector *et al.*<sup>10</sup> Data were summarized using mean, standard deviation and estimated prevalence of knee OA was calculated as percentage of the total number of adults surveyed.

## RESULTS

A total of 1044 residents of Igbo-Ora, aged 40 years and above were surveyed. Five hundred and fifty three (53%) respondents were females and 491 (47%) were males. Their mean age was  $54 \pm 11.7$  years and the range was 40-95 years. Participants were mostly traders (29.8%), artisans (24.2%) and farmers (21.7%). The majority of them (65%) had no formal education and only 8.2% had tertiary education (Table 1). The mean weight and height of the participants were  $63.6 \pm 10.1$ kg and  $1.6 \pm 0.1$ m respectively and their mean Body Mass Index (BMI) was  $23.8 \pm 4.2$  kg/m<sup>2</sup>.

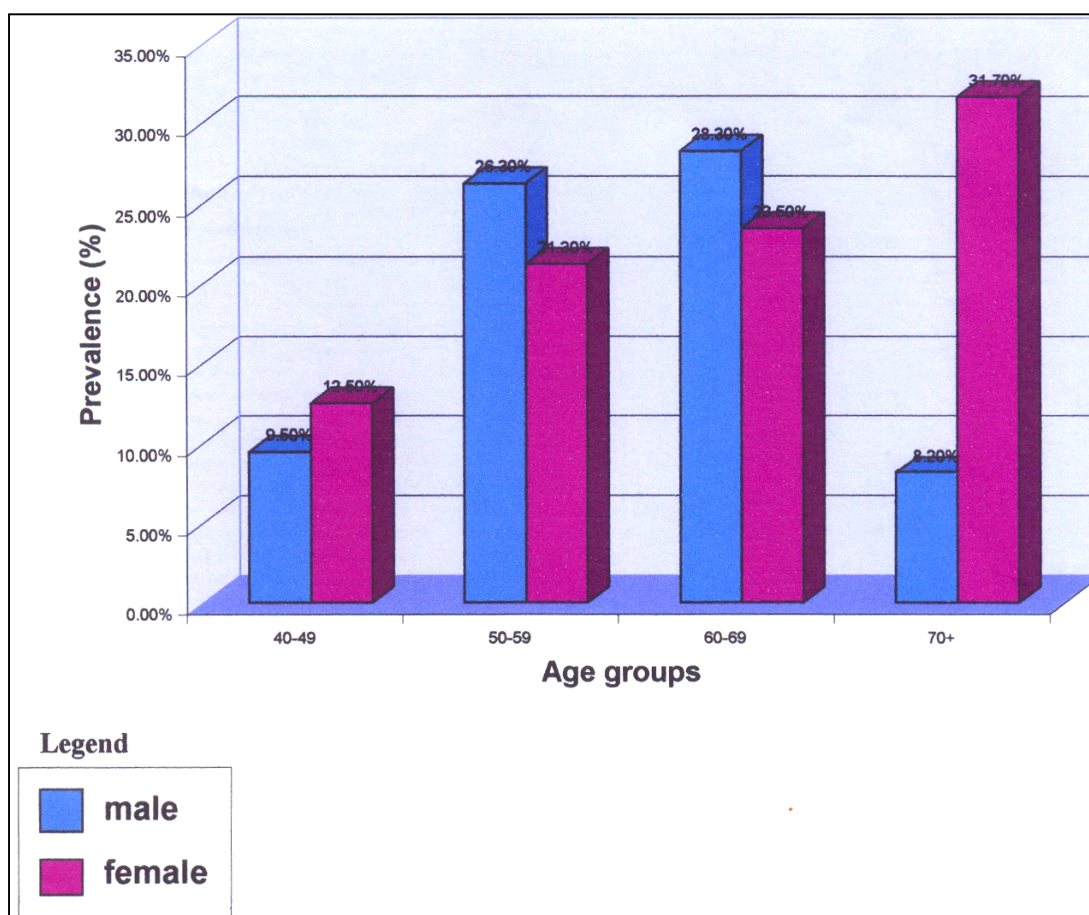
**Table 1: Prevalence of Knee Osteoarthritis by Socio-Demographic Categories**

Socio-Demographic Variable	No of Individuals Surveyed	No of Individuals With knee OA	Prevalence of Knee OA (within category) (%)
Gender			
Male	487	86	17.5
Female	557	119	21.4
Occupation			
Teaching	52	5	9.6
Artisans	252	43	17.1
Retirees	19	16	84.2
Civil servants	80	23	28.8
Housewives	22	15	68.2
Unemployed	73	1	1.4
Farmers	234	52	22.2
Traders	312	50	16.3
Level of education			
No formal Education	679	42	6.2
Primary	169	32	18.9
Secondary	110	21	19.1
Tertiary	86	10	11.6

Two hundred and five (19.6%) (86 males, 119 females) of the 1044 sampled residents of Igbo-Ora fulfilled the American College of Rheumatology's (ACR) clinical criteria for knee OA. The estimated point prevalence of symptomatic knee OA in Igbo-Ora was therefore 19.6% (table 2). The prevalence increased and was significantly associated ( $P < 0.001$ ) with age ( $X^2 = 73.954$  at  $df = 3$ ). It increased considerably from 11% in age group 40-49 years to 23.3% in age group 50-59 years and peaked at 60-69 years (Table 2). The prevalence was 21.4% for females and 17.5% for males (Table 1), giving a female bias in the ratio of 1.2:1. It was higher in females than males in age groups 40-49 and 70+ years, and it was higher in males than females in age groups 50-59 and 60-69 years (fig 1).

**Table 2: Prevalence of Knee Osteoarthritis in Different Age Groups**

Age group	Total no of participants	Participants with knee OA	Prevalence of knee OA
40-49	346	38	11.0%
50-59	301	70	23.3%
60-69	235	60	25.5%
70+	162	37	22.8%
Total	1044	205	19.6%

**Figure 1: Prevalence of Knee OA in males and females of different age groups**

The occupational category with the highest prevalence of symptomatic knee OA was the farmers (25.4%) and this was closely followed by the traders (24.4%) and the artisans (21.0%) (Table 1). Table 3 indicates that in age groups 40-49 and 50-59 years, knee OA prevalence was highest among civil servants, followed by artisans and farmers. Apart from occupations with small sample sizes, the prevalence was highest among farmers in age group 60-69 years and among traders in age group 70+ years.

**Table 3: Prevalence of Knee OA by Gender and Occupational Categories in Different Age Groups**

	40-49 years		50-59 years		60-69 years		70+ years	
	Number Surveyed	% with knee OA	Number Surveyed	% with knee OA	Number Surveyed	% with knee OA	Number Surveyed	% with knee OA
Gender								
Male	190	9.5	137	26.5	99	28.3	61	8.2
Female	156	12.5	164	21.3	136	23.5	101	32.7
Occupation								
Teacher	36	2.8	13	23.1	2	50.0	1	100.0
Artisan	156	14.1	65	24.6	22	18.2	-	-
Farmer	39	12.8	68	26.5	72	31.9	55	10.9
Trader	66	6.1	101	14.9	86	3.9	100	23.7
Civil servant	40	15.0	38	42.1	1	100.0	1	0.0
Retiree	-	-	2	100.0	14	21.4	-	-
Homemaker	-	-	-	-	4	75.0	14	14.3
Unemployed	-	-	-	-	-	-	21	4.8

The majority (63.9%) of the individuals with knee OA have had symptoms for over 3 years, 24.4% have had it for between 1 and 3 years, and only 11.7% had it less than a year. Eighty six (42%) individuals with knee OA had bilateral knee affectation, 83 (40.3%) had right knee affectation and the remaining 36 (17.5%) had the left knee affected. The majority (83.9%) of those with knee OA reported that they have never had any previous history of injury, surgery or infection of the knee joint. Sixty three (30.7%) reported having family members with similar problem, 73 (35.6%) reported having no family members with knee OA and 69 (33.7%) gave no information about this.

Table 4 shows the frequency distribution of the Lequesne Algofunctional Index categories of reported knee OA severity. The majority (98.5%) of the participants with knee OA reported having moderate to extremely severe disease, with more participants (35.1%) in the extremely severe category than in other categories. Only 1.5% had minor disease. The extent to which knee OA interfered with their role performance was described by the majority of participants as "a little" in 43.4%, "quite much" in 36.1% and "very much" in 10.7% of the participants. A few participants (9.8%) claimed knee OA did not interfere at all with their role performance (Table 4).

**Table 4: Frequency Distribution of Knee OA Severity Categories and Extent of Interference with Role Performance**

Attribute	Frequency	% of total (n=205)
Lequesne Algofunctional Index Severity		
Minor	3	1.5
Moderate	51	24.9
Severe	43	21.0
Very severe	36	17.6
Extremely severe	72	35.1
Extent of Interference with Role Performance		
Not at all	20	9.8
A little	89	43.4
Quite much	74	36.1
Very much	22	10.7

The radiographs of the knees of the participants randomly sampled of those clinically diagnosed as having knee OA showed radiographic changes consistent with the disease. Radiographic changes in the tibiofemoral compartment occurred in all the radiographs and were graded moderate in 68.4% of cases. Changes in the patellofemoral compartment were evident in 16 out of the 19 radiographs and they were graded mild or moderate in 63.1% of cases (Table 5).

**Table 5: Radiographic Grading of Knee OA Severity**

Grade	Radiographic score	Frequency	% of total (n=19)
Tibiofemoral Compartment			
None	0	0	0
Mild	1-2	4	21.1
Moderate	3-5	13	68.4
Severe	6-8	2	10.5
Patellofemoral Compartment			
None	0	3	15.8
Mild	1-2	5	26.3
Moderate	3-4	7	36.8
Severe	5-6	4	21.1

## DISCUSSION

In English medical literature, this is the first community-based study on symptomatic knee osteoarthritis (OA) in Nigeria. Most participants (76.4%) in this study were traders, farmers and artisans, and the majority (65%) had no formal education. This implies a high level of illiteracy among adults aged 40 years and above in this rural Nigerian community. All the radiographs from the random sample of participants with knee OA had radiographic changes consistent with knee OA in the tibio-femoral compartment and/or patello-femoral compartment. This finding lends credence to the use of the American College of Rheumatology clinical criteria for the diagnosis of knee OA.<sup>8</sup>

Our results show that 19.6% of participants in this study had symptomatic knee osteoarthritis (OA) and since the sample is representative of adults aged 40 years and above in Igbo-Ora, a rural community in Nigeria, the estimated prevalence of symptomatic knee OA among adults who are 40 years and older in this rural community is therefore 19.6%. In effect, one fifth of adults aged 40 years and above in this rural Nigerian community has symptoms of knee OA. The estimates for males (17.5%) and females (21.4%) in this study are lower than those (20% in males and 38% in females) reported in a South African Black community.<sup>7</sup> However, it is difficult to compare the prevalence estimate in this study with those reported by many previous studies because of methodological differences. Only a few previous community-based studies on prevalence of symptomatic knee OA used the American College of Rheumatology's criteria to diagnose knee OA.<sup>11,12</sup> The age-specific estimated prevalence rate of symptomatic knee OA obtained in this study for those who are 70 years and above (22.5%) is higher than 18% reported by Van Schaardenburg *et al*<sup>11</sup> for older adults age 85 years and above living in Leiden, Netherlands. The age-specific estimated prevalence rate of symptomatic knee OA (25.5%) for those who were age 60-69 years in the present study is however lower than that (29.8%) reported by Mannoni *et al*<sup>12</sup> for adults aged 65 years and above in a rural Italian community. The finding that knee OA prevalence increases with age and that the peak age of prevalence is 60-69 years supports the fact that OA is a common health problem in the elderly.<sup>1-3</sup> The higher prevalence of symptomatic knee OA among farmers (25.4%), traders (24.4%) and artisans (21.0%) probably has to do with their job activities (table 2). Twisting, turning, persistent awkward postures, heavy lifting, frequent bending, walking long distances over uneven ground and work requiring a lot of force at an early age are occupational risk factors for knee OA.<sup>13</sup>

The results of this study indicate a female bias in the prevalence of symptomatic knee OA. Studies from other parts of the world also support the female preponderance of knee OA occurrence.<sup>2,14</sup> However, the ratio (1.2:1) reported in the present study is much lower than the ratios reported in previous hospital-based studies from Nigeria and Ivory Coast.<sup>2,3,15</sup> The reason for this difference could be attributed to probable gender difference in the health seeking behaviour of people with knee OA, with more women seeking health care than men.

Most participants (98.5%) with knee OA in this study reported having moderate to extremely severe disease. Majority (90.2%) also reported that knee OA interfered with their role performance. These findings imply that knee OA, although not a life threatening disease, has much impact on physical function and role performance.

## CONCLUSION

Knee OA is a common health problem in Igbo-Ora, a rural Nigerian community, affecting one fifth of adults aged 40 years and above, with a female preponderance in the ratio of 1.2:1. Knee OA prevalence in this rural community increases with age and the age of peak prevalence is 60-69 years. Our findings suggest that the burden of knee OA in this Nigerian rural community is high and future studies will address the impact of this disease among urban dwellers in Nigeria.

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