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Morbidity of Prostate Enlargement Among Adult Males Aged Thirty (30) Years and Above in Abia State, Nigeria

[1] Ezeibe EC, [2] Nwoke BEB, [3] Obasi KO, [4] Ozims SJ, [5] Eberendu I

[1, 4, 5] Department of Public Health, Imo State University, Owerri, Nigeria

[2] Department of Animal and Environmental Biology, Imo State University, Owerri, Nigeria

[3] Department of Environmental Management and Toxicology, Michael Okpara University of Agriculture, Umudike, Umuahia, Nigeria

Corresponding Author: **Ezeibe EC**

Abstract

The classical description of a healthy human male prostate portrays it as slightly larger than a walnut. The enlarged prostate which is also called Benign prostatic hyperplasia (BPH) is rather a potential problem to male's health, it therefore becomes necessary to assess the morbidity of prostate enlargement among adult males aged thirty (30) years and above in Abia State. This work is a population based cross-sectional descriptive study among adult males of 30 years and above in Abia State Nigeria. It was designed to apply quantitative approaches through structured questionnaires to collect data. The instrument (questionnaire) was validated using face validity and content validity. The questionnaire was carefully prepared and was approved by the study supervisor. Also, inputs were obtained from two experts in prostate medicine. The distribution of the study participants for the severity of symptoms of prostate enlargement was based on **a**ssessment through International Prostate Symptom Score (IPSS) and the digital rectal examination (DRE). At IPSS, a total of 353 (80.2%) were classified as no symptoms, 71 (16.1%) as mild symptom (0-7), 12 (2.7%) as moderate symptom (8-19) and almost one percent (0.9%) as severe symptom. It is therefore recommended that a screening programme for early detection of prostate enlargement in various work places should be undertaken periodically as there is a lot of potential benefit when illnesses are detected early and managed appropriately. Equally, there is need for raising the community's awareness about prostate enlargement and it's complications.

Keywords: Hyperplasia, Benign, Prostatic, Rectal, Validity, Questionnaire

Introduction

Background of the Study

The prostate is an exocrine gland that produces a portion of the seminal fluid critical for male reproduction. Prostatitis is a debilitating urologic disease characterized by inflammation of the prostate gland. The disease is quite rampant among adult males to the extent that up to 50% of all adult males were estimated to suffer from the symptoms of the disease at some time in their lives (Bushman, 2009) [3]. Prostatitis is usually regarded as an age-related disease for the older men but this time around, it has been shown that the disease is also common among the middle-aged adults less than 50 years of age (Nickel, Downey, Hunter & Clark, 2001) [7].

It is the role of the prostate muscles to eject or push sperm during ejaculation in males as well as and/ to push urine during urination in males, yet it can give rise to health issues such as compression of the urethra, dysuria, nocturia, incontinence, and incomplete urination when it grows larger in the number of prostate cells (Oesterling, 1995) [9]. The enlarged prostate which is also called Benign Prostatic Hyperplasia (BPH) is rather a problem to male's health.

Clearly the classical description of a healthy human male prostate portrays it as slightly larger than a walnut. The mean weight of the normal prostate in adult males is about 11 grams, usually ranging between 7 and 16 gms. A study conducted by American Urological Association (2008) stated that prostate volume among patients with negative biopsy is related significantly with weight and height (Body mass index), so it is necessary to control weight. The prostate surrounds the urethra just below the urinary bladder and can be felt during a rectal exam (Harper, 2017) [5].

Benign Prostatic Hyperplasia (BPH) or enlarged prostate gland is probably a normal part of the aging process in men. It is a progressive disease of the lower urinary tracts and if it is not detected at the onset for prompt medical intervention. Acute

Urinary Retention (AUR)- an incomplete voiding of urine from the urinary bladder can cause bacteria stasis in the bladder residue, which increases the risk of urinary tract infections (UTI). Acute and chronic urine retention is also progressive and can lead to bladder distention as well as urinary bladder hypotonia. There have been frequent hernia and surgery among older men aged 60 years and above and these have been attributed to prolonged and repeated straining caused by bladder outlet obstruction resulting from enlarged prostate or benign prostatic hyperplasia BPH (Barry, 2001) [2]. "Benign" means the enlargement of the prostate gland is not caused by cancer or infection. "hyperplasia" means enlargement. Many research studies are conducted on this Benign Prostatic Hyperplasia (BPH) because of its high incidence and prevalence, it therefore becomes necessary to assess the morbidity of prostate enlargement among adult males aged 30 years and above in Abia State.

Materials and Methods

This was a population based cross-sectional descriptive study among adult males of 30 years and above in Abia State Nigeria. It was designed to apply quantitative approaches through structured questionnaires to collect data.

Area of Study

This study was conducted in Abia State, South Eastern Nigeria which is geographically located at 5.25N. 7.30E, covering an area of 6,320 km^2 (2,440 sq mi). Abia State was created from Imo State on 27th August 1991 and has Seventeen Local Government Areas. As at the 2016 census, the population of Abia State was put at 3,727,300. Its capital city is Umuahia and the major commercial city is Aba.

Abia State has three senatorial zones with 17 Local Government Area (LGAs). The senatorial zones are Abia central, Abia North and Abia South. Seven of the LGAs are in Abia South, namely Aba North, Aba South, Obingwa, Osisioma, Ugwunagbo, Ukwa East, Ukwa West. Five of the LGAs are in Abia North, namely: Arochukwu, Bende, Isukwuato, Ohafia and Umu-Nneochi. Five of the LGAs are also in Abia Central, namely: Ikwuano, Isiala Ngwa North, Isiala Ngwa South, Umuahia North and Umuahia South.

Sample size

The study sample was established using Taro Yammane formula, which stated that the sample size ($n) = \frac{N}{1+N(e^2)}$, where N is the study population and *e* is the marginal error. Considering the study population, a 5% marginal error was assumed in this study, which suggested a sample size of 400. An additional 10% was included to account for attrition, leading to a sample size of 440, used in this study.

Validity of the Instrument

The instrument (questionnaire) was validated using face validity and content validity. The questionnaire was carefully prepared by the researcher and was approved by the study supervisor. Also, inputs were obtained from two experts in prostate medicine. The importance of all these was to ensure that the instrument measured what it was supposed to measure.

Reliability of the Instrument

The questionnaire was tested for reliability of which 25 adults of age 30years and above were selected in neighboring communities that were not included in the study and the result was scaled and tested using *Crombach alpha* test, which yielded a reliability coefficient of 0.72.

Administration of Instrument

Data collection took place in the selected communities. The researcher administered the questionnaire in person to the respondents at the selected communities. Trained research assistants were also used. Oral informed consent was sought for and obtained before they were allowed to participate in the study. The questionnaire was written in English Language but was translated to some of them that were not literate. Each participant was interviewed for presence of lower urinary tract symptoms (LUTS), followed by assessment for severity of symptoms using International prostate symptom score (IPSS).

Results

Demographics Characteristics of the Study Participants

A total of 440 subjects were used in the study which comprised of 160 (36.4%) from Abia South, 150 (34.1%) from Abia Central and 130 (29.5%) from Abia North. The demographic characteristics of the participants are represented with Table 1. The average age of the participants is 63 (standard deviation = 17.8). Among the overall study participants, the 61-70 years old has the largest number of participants with 122 (27,7%) followed by the 51 -60 years old with 117 (26.6%). The age group with the overall lowest number of participants is the 30 -40 years with 53 (12%) participants.

The number of participants in the age group 51-60 is slightly higher than the age group 61 -70 in Abia South and Abia central which is unlike the case in Abia North where the reverse is the case. The largest number of participants which falls in the 51- 60 years old were 43 (29.9%) in at Abia South, 43 (28.7%), while the largest number of participants in Abia North (for the age group 61 -70 years) is 42 (32.3%). The 30 – 40 years also had the lowest frequency of the participants in all the three zones with 20 (12.5%) in Abia South, 16 (10.7%) in Abia Central and 17 (13.1%) in Abia North.

Clear majority of the participants are married (Overall = 351: 79.8%; Abia South = 128: 80%; Abia Central = 117: 78%; Abia North = 106: 81.5%), while a few of them were either separated or divorced (Overall = 12: 2.7%; Abia South = 4: 2.5%; Abia Central = 4: 2.7%; Abia North = 4: 3.1%), Majority also had up to secondary education level in each of the zones (Overall = 329: 74.8%; Abia South = 119: 74.4%; Abia Central = 114: 76%; Abia North = 96: 73.8%), while next to that is the tertiary education level among them at a distant second (Overall = 4: 16.87%; Abia South = 27: 16.9%; Abia Central = 24: 16%; Abia North = 23: 17.7%),

The occupation of the participants was such that 116 (26.4%) in the overall are involved in trading or business activities (Abia South = 49: 30.6%; Abia Central = 36: 24%; Abia North = 31: 23.8%). Up to 99 (22.5%) in the overall were public or civil servants (Abia South = 32: 20.6%; Abia Central = 24: 16%; Abia North = 28: 21.5%); while 39 (8.9) were retirees (Abia South = 10: 6.3%; Abia Central = 18: 12%; Abia North = 11: 8.5%).

Table 1: Distribution for Demographics Characteristics of the Study Participants

	Abia South		Abia Central		Abia North		Overall	
Demographics	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Age in years (Mean ± std dev)= 63 ± 17.8)								
30- 40	20	12.5	16	10.7	17	13.1	53	12.0
41 – 50	29	18.1	28	18.7	20	15.4	77	17.5
51- 60	43	26.9	43	28.7	31	23.8	117	26.6
61 – 70	38	23.8	42	28.0	42	32.3	122	27.7
71+	30	18.8	21	14.0	20	15.4	71	16.1
Total	160	100.0	150	100.0	130	100.0	440	100.0
Marital status								
Single	12	7.5	10	6.7	7	5.4	29	6.6
Married	128	80.0	117	78.0	106	81.5	351	79.8
Widowed	16	10.0	19	12.7	13	10.0	48	10.9
Separated/Divorced	4	2.5	4	2.7	4	3.1	12	2.7
Total	160	100.0	150	100.0	130	100.0	440	100.0
Education								
Primary	11	6.9	9	6.0	7	5.4	27	6.1
Secondary	119	74.4	114	76.0	96	73.8	329	74.8
Tertiary	27	16.9	24	16.0	23	17.7	74	16.8
non formal	3	1.9	3	2.0	4	3.1	10	2.3
Total	160	100.0	150	100.0	130	100.0	440	100.0
Occupation								
Farming	32	20.0	22	14.7	28	21.5	82	18.6
Trading/ business	49	30.6	36	24.0	31	23.8	116	26.4
Artisans	33	20.6	24	16.0	28	21.5	85	19.3
Public/ Civil servants	32	20.0	44	29.3	23	17.7	99	22.5
Retirees	10	6.3	18	12.0	11	8.5	39	8.9
Others	4	2.5	6	4.0	9	6.9	19	4.3
Total	160	100.0	150	100.0	130	100.0	440	100.0

Severity of symptoms of Prostate Enlargement (PE) by IPSS, DRE and PSA

Table 2 contains the distribution of the study participants for the severity of symptoms of prostate enlargement based on **a**ssessment through International Prostate Symptom Score (IPSS) and the digital rectal examination (DRE).

At IPSS, a total of 353 (80.2%) were classified as no symptoms, 71 (16.1%) as mild symptom (0-7), 12 (2.7%) as moderate symptom (8-19) and almost one percent4 (0.9%) as severe symptom (20-35). Similar results were obtained across the three zones of Abia state studied. However, none of the participants were classified under severe symptom at Abia North while 2 (1.3%) each recorded severe symptoms in Abia South and Abia Central. The proportion for mild symptom was slightly higher in Abia central (16.7%), which also recorded the lowest proportion of moderate symptom (2%).

At DRE assessment in combination with PSA gives no symptom (0–1.49 ng ml^{-1}) of 347 (78.9%) in all, while total for mild (1.50–9.99 ng ml^{-1}), moderate (10.00–20.00 ng ml^{-1}) and severe (> 20 ng ml^{-1}) were in 70 (15.9%), 18 (4.1%) and 6 (1.1%) respectively. Only one person (0.8%) was classified as severe in Abia North compared to 2 (1.3%) each in Abia South and Abia Central. Also, the proportion for moderate class was lowest in Abia North (5: 3.8%), while the proportion for mild class was lowest in Abia South (23:14.4%).

Table 2: Distribution for Severity of symptoms by IPSS and DRE

	Abia South		Abia Central		Abia North		Total	
	N	**%**	**n**	**%**	**n**	**%**	**n**	**%**
IPSS								
No symptom	121	80.0	110	80.0	98	80.8	353	80.2
Mild (0 -7)	32	15.6	35	16.7	28	16.2	71	16.1
Moderate (8 -19)	5	3.1	3	2.0	4	3.1	12	2.7
Severe (20 – 35)	2	1.3	2	1.3	0	0.0	4	0.9
Total	160	100	150	100	130	100	440	100
DRE/PSA								
Normal (0–1.49 ng ml^{-1})	128	80	116	77.3	103	79.2	347	78.9
Mild (1.50–9.99 ng ml^{-1})	23	14.4	26	17.3	21	16.2	70	15.9
Moderate (10.00–20.00 ng ml^{-1})	7	4.4	6	4.0	5	3.8	18	4.1
Severe (> 20 ng ml^{-1})	2	1.3	2	1.3	1	0.8	6	1.1
Total	160	100	150	100	130	100	440	100

Abnormal: PSA ≥ 1.50 ng ml^{-1}, Normal: PSA < 1.50 ng ml^{-1}

Overall Prevalence of prostate enlargement in Abia State

In table 3, a total of 97 out of 440 (21.1%) studied across the three zones of Abia State have abnormal prostate specific antigen (PSA ≥ 1.50 ng ml^{-1}), while the remaining 347 (78.9%) had normal PSA (PSA < 1.50 ng ml^{-1}) (Fig 1). Hence the prevalence of prostate enlargement in Abia State, was found to be 21.1% in the present study based on the proportion with PSA ≥ 1.50 ng ml.

Table 3: Classifications for Normal and abnormal PSA among the studied Population

PSA	Frequency	Percent (%)
Normal: PSA < 1.50 ng ml^{-1}	347	78.9
Abnormal: PSA ≥ 1.50 ng ml^{-1},	93	21.1
Total	440	100

Prevalence of prostate enlargement on each zone in Abia State

At Abia South, a total of 129 (80%) have PSA less than 1.50 ng ml^{-1} while 32 (20) have PSA of at least 1.50 ng ml^{-1}. At Abia Central, 116 (77.3%) have PSA less than 1.50 ng ml^{-1} while 34 (22.7) have PSA of at least 1.50 ng ml^{-1}. Those with PSA less than 1.50 ng ml^{-1} and not less than 1.50 ng ml^{-1} in Abia North zone were 103 (79.7%) and 27 (20.8%) respectively. Clearly Fig 2 showed that the prevalence of prostate enlargement among the studied group was found to be 20% in Abia South, 22.8% in Abia Central and 20.8% in Abia North. PE was slightly higher in Abia central than compared to the two other zones.

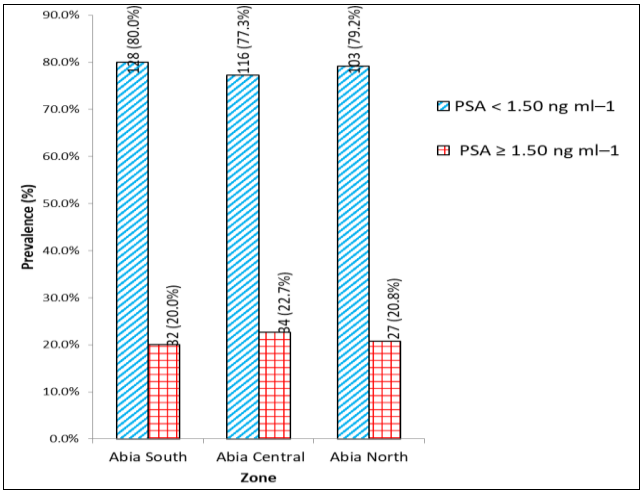

Fig 1: Relationship between Demographic Factors and Prostate Enlargement among the Studied Population

In the overall data, demographic factors significant with PE in this study include age ($p < 0.0001$, $\chi^2 = 53.795$) and occupation ($p = 0.001$, $\chi^2 = 20.681$). Education ($p = 0.050$, $\chi^2 = 7.843$) and marital status ($p = 0.241$, $\chi^2 = 4.199$) were not found significant. For age, the of PE was largest (45.2%) among the oldest age group (above 70 years) and lowest among the youngest age group (30 – 40 years old). Age was also significant in each of the three zones (Abia South: $p < 0.0001$, $\chi^2 = 22.183$; Abia Central: $p = 0.003$, $\chi^2 = 15.730$; Abia North: $p = 0.002$, $\chi^2 = 17.471$) and in all, showed a progressive rising trend with PE (see Fig 2).

Though marital status was not found significant, PE was more on the married men (23.1%) compared to all other group, and was lowest among singles (10.3%). No particular pattern could be observed between education and PE. For instance, PE occurrence was relatively close among the participants with primary education (11.1%) tertiary education (12.2%) and no formal education (10.0%), but went high among the secondary school level subjects (24.3%).

Occupation was found significant associated with PE in the overall group ($p = 0.001$, $\chi^2 = 20.68$). The retirees were the most affected (33.3%) followed by the artisans (29.4%). The least affected were the public/ civil servants (11.1%). Occupation was not found significant in Abia South and Abia North zones but remained significant in Abia central ($p = 0.035$, $\chi^2 = 12.011$). Similar to the overall group, the retiree were the most affected group in Abia central (38.9%), followed by the artisans (33.3%), while the public / civil servants were the least affected (9.1%).

Table 4: Demographic Characteristics and Prostate Enlargement among the Study Group

Demographics	Abia South		Abia Central		Abia North		Overall	
	PSA≥ 1.50 (%)	PSA< 1.50 (%)	PSA≥ 1.50 (%)	PSA< 1.50 (%)	PSA≥ 1.50 (%)	PSA< 1.50 (%)	PSA≥ 1.50 (%)	PSA< 1.50 (%)
	n = 32	n=128	n= 34	n=116	n=27	n=103	n=93	n=347
Age in years)								
30- 40	0 (0.0)	20 (100)	1 (6.3)	15 (93.8)	1 (5.9)	16 (94.10	2 (3.8)	51 (96.2)
41 – 50	2 (6.9)	27 (93.1)	3 (11.1)	24 (85.7)	2 (10.0)	18 (90.0)	7 (9.2)	69 (90.8)
51- 60	6 (14.3)	36 (83.7)	7 (16.3)	36 (83.7)	4 (13.3)	26 (86.7)	17 (14.8)	98 (85.2)
61 – 70	10 (26.3)	28 (73.7)	12 (28.6)	30 (71.4)	9 (21.4)	33 (78.6)	31 (25.4)	91 (74.6)
71+	14 (45.2)	17 (56.7)	11 (50.0)	11 (52.4)	11 (52.4)	10 (47.6)	36 (48.6)	38 (51.4)
Statistical Test	$p < 0.0001$, $\chi^2 = 22.183$		$p = 0.003$, $\chi^2 = 15.730$		$p = 0.002$, $\chi^2 = 17.471$		$p < 0.0001$, $\chi^2 = 53.795$	
Marital status								
Single	1 (8.3)	11 (91.7)	1 (10.0)	9 (90.0)	1 (14.3)	6 (85.7)	3 (10.3)	26 (98.7)
Married	29 (22.7)	99 (77.3)	29 (24.8)	88 (75.2)	22 (22.9)	83 (78.3)	81 (23.1)	270 (76.9)
Widowed	2 (12.5)	14 (87.5)	3 (15.8)	16 (84.2)	3 (13.0)	11 (84.6)	7 (14.6)	41 (85.4)
Separated/ Divorced	0 (0.0)	4 (100)	1 (25.0)	3 (75.0)	1 (25.0)	3 (75.0)	2 (16.7)	10 (83.3)
Total	32 (20.0)	128 (80.0)	34 (22.7)	116 (77.3)	27 (20.8)	103 (79.2)	93 (21.1)	347 (78.9)
Statistical Test	$p = 0.369$, $\chi^2 = 3.148$		$p = 0.628$, $\chi^2 = 1.740$		$p = 0.917$, $\chi^2 = 0.507$		$p = 0.241$, $\chi^2 = 4.199$	
Education								
Primary	1 (9.1)	10 (90.9)	1 (11.1)	8 (88.9)	1 (14.3)	6 (85.7)	3 (11.1)	24 (88.9)
Secondary	28 (23.5)	91 (76.5)	30 (26.3)	84 (73.7)	22 (22.9)	74 (77.1)	80 (24.3)	249 (75.7)
Tertiary	3 (11.1)	24 (88.9)	3 (12.5)	21 (87.5)	3 (13.0)	20 (87.0)	9 (12.2)	65 (87.8)
Non formal	0 (0.0)	3 (100)	0 (0.0)	3 (100)	1 (25.0)	3 (75.0)	1 (10.0)	9 (90.0)
Statistical Test	$p = 0.281$, $\chi^2 = 3.828$		$p = 0.279$, $\chi^2 = 3.846$		$p = 0.723$, $\chi^2 = 1.326$		$p = 0.050$, $\chi^2 = 7.843$	
Occupation								
Farming	5 (15.6)	27 (84.4)	4 (18.2)	18 (81.8)	4 (14.3)	24 (85.7)	13 (15.9)	69 (84.1)
Trading/ Business	10 (20.4)	39 (79.6)	6 (16.7)	30 (83.3)	4 (12.9)	27 (87.1)	20 (17.2)	96 (82.8)
Artisans	9 (27.3)	24 (72.7)	8 (33.3)	16 (66.7)	8 (28.6)	20 (71.4)	25 (29.4)	60 (70.6)
Public/Civil servants	3 (9.4)	29 (90.6)	4 (9.1)	40 (90.9)	4 (17.4)	19 (82.6)	11 (11.1)	88 (88.9)
Retirees	3 (30.0)	7 (70.0)	7 (38.9)	11 (61.1)	3 (27.3)	8 (72.7)	13 (33.3)	26 (66.7)
Others	0 (0.0)	4 (100)	0 (0.0)	6 (100)	0 (0.0)	9 (100)	0 (0.0)	19 (100)
Statistical Test	$p = 0.362$, $\chi^2 = 5.467$		$p = 0.035$, $\chi^2 = 12.011$		$p = 0.345$, $\chi^2 = 5.616$		$p = 0.001$, $\chi^2 = 20.681$	

† : likelihood ratio Chi square used; PSA measured in ng ml^{-1}; Abnormal : PSA ≥ 1.50 ng ml^{-1}, Normal: PSA < 1.50 ng ml^{-1}

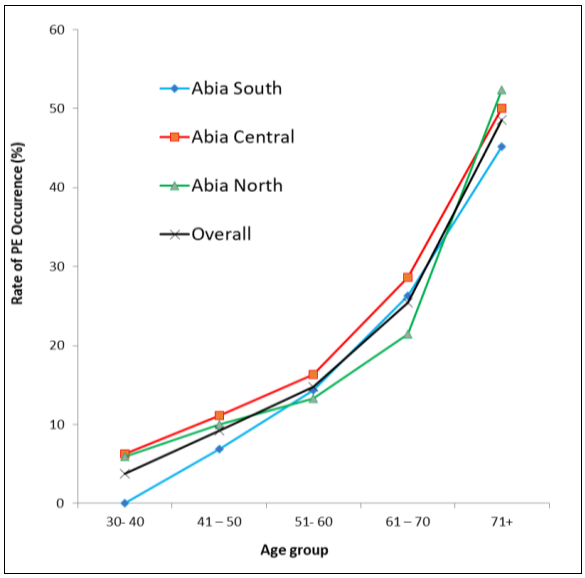

Fig 2: Trend Relationship between Age and Prostate Enlargement among different zones in Abia State Nigeria

Discussion

Prostate enlargement commonly occurs in men as they grow older and has been posing health morbidity challenge in men as they are aging. In the present study, the overall prevalence of prostate enlargement in Abia State, was found to be 21.1% through DRE (19.8% if based on IPSS).

This prevalence rate is lower than prevalence of 68.3% in a rural south western Nigerian study (Ojewola *et al.*, 2017) [8], and 85.23% found in Ghana (Aboah *et al.*, 2016) [1]. Probable reason for differences in the two results compared to this study could be as a result of differences in study population. While most reported study was on adults of over 40 years, the present study was based on men of up to 30 years to enable it assess the prevailing rate in the 30-40. Obviously both studies contained more aging population than the present study. It has been reported that 50% of the male population develop pathological BPH at age 51–60 years (Lu & Chen, 2014) [6]. Besides, the Ghanaian study is a hospital-based study which in most times is likely to be higher due to the fact that most people that do go to hospital for screening may be experiencing some elements of symptoms of the disease.

Age was found as a significant factor of PE in this study and this was not a surprise as age has been reported as the greatest risk factor of developing BPH (Urologix, 2019) [11]. The age-specific prevalence rates showed a progressive increase in PE from 3% among the 30 -40 years old to 48% among the 70 years and above. It however agrees with some other studies in term of trend for rising prevalence with age which is an associating risk factor of PE (Parson *et al.*, 2016; Aboah *et al.*, 2016 [1]; Ojewola *et al.*, 2017) [10, 1, 8]. Hence the finding in the present study is in line with other finding on the influence of age with PE.

No evidence of association was established between the prevalence of PE and other socio-demographic factor studied apart from occupation. The retirees were the most affected showing highest prevalence, followed by the artisans. The higher rate among the retirees was not a surprise as most retirees are advanced in age. On the other hand, it is not quite clear why artisans recorded higher rate of PE. More studies can be gotten from (Dozie *et al.*, 2022) [4]. While the study did not examine further on the particular jobs duty among the artisans, it is possible that some of them can be exposed to occupational risk capable of causing abnormality in prostate volume. In Fritschi *et al.*, 2007, though there exist lack of significant relationship between occupation and BHP, occupation leading to exposure to toxic metals was associated with a 39% increased risk of developing BPH (OR 1.39, 95% CI 1.10 to 1.84).

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