



## Prevalence and risk factors associated with benign prostate hyperplasia among patients in Enugu State Nigeria

Nwosu N C<sup>1</sup>, J O Okafor<sup>2</sup>, B C Alio<sup>2</sup>

<sup>1</sup>Department of Human Kinetics and Health Education, Nnamdi Azikiwe University, Awka, Nigeria

<sup>2</sup>Ph.D, Department of Human Kinetics and Health Education, Nnamdi Azikiwe University, Awka, Nigeria

<sup>3</sup> Ph.D, Enugu State University of Science and Technology, Nigeria

### Abstract

Benign Prostate Hyperplasia (BPH) is a condition in men in which the prostate gland is enlarged and not cancerous. This study on the prevalence and risk factors associated with benign prostate hyperplasia among patients in Enugu State Nigeria from 2014 to 2018. A descriptive, retrospective epidemiological survey design was adopted for this study. The study area of this research was Enugu State, in the South-East geopolitical zone of Nigeria. Population of this study comprised the case files or folders of all the male patients aged 45 years and above who attended benign prostatic hyperplasia screening and checkup in all the purposively drawn health facilities in Enugu State between 2014 and 2018 and they are 2883 folders. Patients' case files will represent the actual patients of the study since the study was mainly concerned with the patients' past records. Purposive sampling technique was used to draw four health facilities that were used for the study. The findings include the prevalence of BPH among patients in Enugu State from 2014 to 2018 showed that the highest prevalence (29.6%) was in 2018, while 2017 had the lowest prevalence (11.6%) over the five-year period. The prevalence of BPH among patients in Enugu State from 2014 to 2018 based on age showed that the patients within the age bracket of 70-79 years had the highest prevalence (21.4%) of benign prostate hyperplasia, while the patients aged between 40-49 years had the lowest prevalence (10.5%). It was recommended that the Federal and State government should build additional hospitals and health centers that offer specialized checkup services on benign prostate hyperplasia to males within the ages of 35-40.

**Keywords:** prevalence, risk factor, benign prostate hyperplasia, cancer

### Introduction

Benign Prostate Hyperplasia (BPH) is a condition in men in which the prostate gland is enlarged and not cancerous. BPH is also called Benign Prostate Hypertrophy or Benign Prostatic Obstruction. The prostate goes through two main growth periods as a man ages. The first occurs early in puberty, when the prostate doubles in size. The second phase of growth begins around age 25 and continues during most of a man's life. Benign prostate hyperplasia often occurs with the second growth phase. As the prostate enlarges, the gland presses against and pinches the urethra. The bladder wall becomes thicker. Eventually, the bladder may weaken and lose the ability to empty completely, leaving some urine in the bladder. The narrowing of the urethra and urinary retention – the inability to empty bladder completely – cause many of the problems associated with BPH (Dester, 2014).

According to Urology Care Foundation (2013), BPH is the most common prostate problem for men older than age 50 years. In 2010, over 14 million men in the United States had lower urinary tract symptoms which are caused by benign prostatic hyperplasia. Although benign prostate hyperplasia rarely causes symptoms before age 40, the occurrence and symptoms increase with age. According to Urology Care Foundation (2013), BPH affects about 50 percent of men between the ages of 51 and 60 and up to 90 percent of men older than 80 years. BPH however, is not cancer but must be treated.

Cancer according to Okoye (2016) <sup>[14, 15]</sup> is a term used to describe a group of illness all having certain common

characteristics, in which cells of an organ or tissue in the body becomes abnormal, growing and multiplying out of control. Also, according to Okoye, there are over 200 different types of cancer able to form in any part of the body from head to toe, each with a specific name, treatment and chances of being cured. One of these cancers includes prostate cancer.

Prostate cancer is the most common cancer among Nigerian men and the second most common cause of death from cancer in men worldwide (Ogundele & Ikuerowo, 2015) <sup>[13]</sup>. It is a leading cause of death, disability and suffering to increasingly large number of Nigerian men. Its annual incidence in Nigeria is quoted to be 127/100,000 men and according to Okoye (2016) <sup>[14, 15]</sup> is one of the highest in the world. Increasingly, many Nigerian men are being diagnosed with prostate cancer and often at very advanced (late) stages when unfortunately, little can be done except to palliate (keep the patient as comfortable as possible, whilst waiting for the inevitable death). In fact, many men die of old age, without even knowing they had prostate cancer. Shittu and Ogunbiyi (2003) found that about 80 percent of all men in their eighties had prostate cancer which was unknown to them until when a medical checkup is done. Medical experts say that prostate cancer starts with tiny alterations in the shape and size of the prostate gland cells – prostatic intraepithelial neoplasia (PIN). They say that nearly 50 percent of men over 50 years old have PIN. The cells are still in place, they do not seem to have moved elsewhere but the dangers can be seen under a microscope. Experts describe these prostate gland cell changes as low-

grade or high grade. High grade is abnormal while low grade is more or less normal. Moreover, prostate cancer according to Shittu and Ogunbiyi usually present no symptoms during the early stage, thus the importance of screening when the individual seem completely well and not yet feeling any of the symptoms.

According to Okoye (2016) <sup>[14, 15]</sup>, the signs of prostate cancer include frequent urination at night and day, difficulty in postponing urination, poor urine stream, straining and incomplete emptying. There are also the locally advanced signs which include unilateral leg swelling, penile and scrotal swelling; metastatic symptoms – anemia, weight loss, low back pain, new lumps on the skull, fractures after trivial injury, sudden onset of paralysis of the lower limbs. Some other signs include pain when urinating, blood in the urine, pains in the lower back, hips and thighs, and hot burning feeling in the pelvis. Okoye further stated that most of these signs are symptoms which can also be caused by other conditions such as benign prostate enlargement (BPH). In this study, patients with BPH and prostate cancer will be studied.

Benign Prostate Hyperplasia and prostate cancer prevalence and mortality among Nigerian particularly in Enugu State call for concerted efforts from all and sundry including all areas of research. But the key aspect should be focused on how to prevent and manage the diseases. In Enugu State, it was observed by Okoye (2016) <sup>[14, 15]</sup> that men present late prostate conditions in the tertiary hospitals in the state. Okoye further stated that early diagnosis is a major step in the prevention of prostate cancer. The recommendation for prostate cancer screening by the American Urological Association and the American Cancer Society is for all men aged 50years and above and 40 – 45years for high risked men (National Cancer Institute, cited in Okoye, (2016) <sup>[14, 15]</sup>). Benign Prostate Hyperplasia and prostate cancer are usually attached to certain risk factors that tends to increase its prevalence

A risk factor is anything that increases your chances of getting a disease such as cancer. Risk factors are the prevailing circumstances that can lead or increase the prevalence of Benign Prostate Hyperplasia and prostate cancer. These factors are usually associated with certain types of actions of behavior that triggers or add to the foreseen problems of Benign Prostate Hyperplasia and prostate cancer. Among the risk factors of Benign Prostate Hyperplasia Benign Prostate Hyperplasia and prostate cancer are vasectomy, sexually transmitted infections, inflammation of the prostate, chemical exposures, smoking, obesity, diet, gene changes, and family history (American Cancer Society, 2020) <sup>[3]</sup>

However, there are certain other risk factors or variables that affect the rate at which prostate cancer is prevalence among men. Such variables are age, location (urban and rural) and level of education, among others. Age as a factor plays host to the contraction of the Benign Prostate Hyperplasia and prostate cancer prevalence and mortality among Nigerians. Men who are aged from above 50 years in most instances, tend to have issues or symptoms of the ailment (Okoye, 2016) <sup>[14, 15]</sup>. Men of younger ages below 50years may not have issues or worries about the ailment. Similarly, the location of a male in the urban or rural areas has an effect on the prevalence of Benign Prostate Hyperplasia and prostate on him. Men who reside in urban areas, with presence of junk foods and enriched lifestyles

may have high risk of having the ailment than men who live in the rural setting (Osegbe, 2007) <sup>[17]</sup>. This is because rural lifestyle is cheap and devoid of expensive lifestyles that can increase the rate of the prostate cancer ailment. Furthermore, the level of awareness and education on Benign Prostate Hyperplasia and prostate cancer can reduce the rate at which men suffer complications from this disease as they will be able to check and examine themselves early enough before it gets out of hand (Oladimeji, Bidemi, Olufisayo & Sola, 2010). Education is the key to the acquisition of knowledge that can enhance one's healthy living. When one is not well educated on the dangers of poor diets and healthy lifestyle, they tend to be affected with ailments that would have been controlled if they are educated (Okoye, 2016) <sup>[14, 15]</sup>. According to Osegbe (2007) <sup>[17]</sup> Benign Prostate Hyperplasia and prostate cancer prevalence and mortality seem to be high on among Nigerian males who lack good education and how to prevent it through regular checkup. Adequate education is capable of promoting the awareness on Benign Prostate Hyperplasia and prostate cancer prevalence and mortality among Nigerians. The Nigerian government through its ministry of health both at the federal and state levels has procured drugs, machines and equipment that will facilitate the testing and treatment of the BPH and prostate cancer. In spite of all these efforts, there is still high prevalence of men having the BPH. Rural men in villages do not have access to information on BPH and prostate cancer thereby lacking information on how to curb the ailment at their growing age.

### Purpose of the study

The main purpose of the study was to determine the prevalence and risk factors associated with benign prostate hyperplasia among patients in Enugu State Nigeria from 2014 to 2018. Specifically, the study determined the:

1. prevalence of benign prostate hyperplasia among patients in Enugu State from 2014 to 2018,
2. prevalence of benign prostate hyperplasia among patients in Enugu state based on their ages,
3. prevalence of benign prostate hyperplasia among patients in urban and rural areas of Enugu state.
4. prevalence of benign prostate hyperplasia among patients in Enugu state based on their educational level.

### Research question

The following research questions guided the study;

1. What is the prevalence of BPH among patients in Enugu State from 2014 to 2018?
2. What is the prevalence of BPH among patients in Enugu state based on their ages?
3. What is the prevalence of BPH among patients in urban and rural areas of Enugu State?
4. What is the prevalence of BPH among patients in Enugu state based on their educational level?

### Hypotheses

The following null hypotheses were formulated to guide this work and were tested at 0.05 level of significance.

1. There is no significant difference in the prevalence of BPH among patients in Enugu State from 2014 to 2018.
2. There is no significant difference in the prevalence of BPH among patients in Enugu state based on their ages.

3. There is no significant difference in the prevalence of BPH among patients in Enugu state based on their locations.
4. There is no significant difference in the prevalence of BPH among patients in urban and rural area of Enugu state based on their educational level.

**Method**

A descriptive, retrospective epidemiological survey design was adopted for this study. The study area of this research was Enugu State, in the South-East geopolitical zone of Nigeria. Population of this study comprised the case files or folders of all the male patients aged 45 years and above who attended benign prostatic hyperplasia screening and checkup in all the purposively drawn health facilities in Enugu State

between 2014 and 2018. Patients' case files will represent the actual patients of the study since the study was mainly concerned with the patients' past records. Purposive sampling technique was used to draw four health facilities that were used for the study.

**Data Presentation and Analysis**

Research Questions 1: What is the prevalence of BPH among patients in Enugu State from 2014 to 2018?

**Hypothesis 1**

There will be no significant difference in the prevalence of BPH among patients in Enugu State from 2014 to 2018. The data used in answering research question one and testing hypothesis one is shown in Table 1.

**Table 1:** Prevalence of BPH among patients in Enugu State from 2014 to 2018 (N = 2883)

S/N	Years	f	%
1	2014	486	16.9
2	2015	667	23.1
3	2016	545	18.9
4	2017	333	11.6
5	2018	852	29.6
	Total	2883	100

$\chi^2 = 68.23$ , critical value = 9.49, df = 4,  $p < 0.05$ , significant

Table 1 presents the frequencies and percentages of the subjects that suffered from BPH indicating the prevalence of the health problem from 2014 to 2018. The table shows that greatest percentage (29.6%) of all the subjects put together in 2018 suffered from BPH followed by 2015 (23.1%), 2016 (18.9%), 2014 (16.9%) and 2017 (11.6%) in this their descending order of magnitude.

When the data in table 1 were subjected to  $\chi^2$  analysis to test the hypothesis, the  $\chi^2$  statistics results showed that the  $\chi^2$  calculated = 68.23 were greater than the table value of 9.49 at four degrees of freedom (df) and 0.05 level of significance. Therefore, the null hypothesis was rejected and the conclusion drawn was that the prevalence of BPH

among patients differed significantly based on the different years studied.

**Research questions 2**

What is the prevalence of BPH among patients in Enugu State from 2014 to 2018 based on their ages?

**Hypothesis 2**

There will be no significant difference in the prevalence of BPH among patients in Enugu State from 2014 to 2018 based on their ages. The data used in answering research question two and testing hypothesis two are shown in Table 2.

**Table 2:** Prevalence of BPH among patients in Enugu State from 2014 to 2018 based on age

**Age (years)**

S/N	Years	40-49yrs f	%	50-59yrs f	%	60-69yrs f	%	70-79yrs f	%	80-89yrs f	%	90yrs and above f	%	Total f	%
1	2014	54	1.9	85	2.9	141	4.9	99	3.4	80	2.8	110	3.8	569	19.7
2	2015	72	2.5	100	3.5	90	3.1	110	3.8	115	4.0	105	3.6	592	20.5
3	2016	40	1.4	65	2.3	120	4.2	107	3.7	113	3.9	70	2.4	515	17.9
4	2017	56	1.9	80	2.8	137	4.8	200	6.9	100	3.5	120	4.2	699	24.2
5	2018	80	2.8	95	3.3	85	2.9	100	3.5	60	2.1	94	3.3	514	17.8
	Total	302	10.5	425	14.7	573	19.9	616	21.4	468	16.2	499	17.3	2883	100

$\chi^2_{cal} = 121.03$ , critical value = 31.41, df = 20,  $p < 0.05$ ; significant

Table 2 presents the frequencies and percentages of the subjects that suffered from BPH from 2014 to 2018. The table shows that in 2014, 4.9 percent of the subjects, aged 60-69years suffered from BPH, followed by subjects 90years and above (3.8%) and subjects 70-79years (3.4%). In 2015, subjects 80-89years (4.0%), 70-79years (3.8%) and 90years and above (3.6%) suffered from BPH. In 2016, 4.2 percent, of the subjects, aged 60-69years, 80-89years (3.9%) and 3.7% for subjects 70-79years suffered from BPH. In 2017, 6.9 percent, 4.8 percent, 4.2 percent and 3.5 percent of the subjects suffered from BPH with the age ranges of 70-79years, 60-69years, 90 years and above and 80-89years

respectively. In 2018, subjects 70-79years (3.5%), 50-59years (3.3%) and 90years and above (3.3%) suffered from BPH.

The table also shows that the greatest percentage (24.2%) of all the subjects put together in 2017 suffered from BPH, followed by 2015 (20.5%), 2014(19.7%), 2016 (17.9%) and 2018 (17.8%) in this descending order of magnitude. The table also shows that within the period of the study, highest number of the subjects 70-79years (21.4%) suffered from BPH, followed by 60-69years (19.9%), 90years and above (17.3%), 80-89years (16.2%), 50-59years (14.7%), and 40-49years (10.5%) in this descending order of magnitude.

The chi-square ( $\chi^2$ ) analysis of the data shows that the calculated  $\chi^2$  value of 121.03 was greater than the critical  $\chi^2$  table value of 31.41 at 20 degree of freedom (df) and 0.05 level of significance. There-fore the null hypothesis that there was no significant difference in the prevalence of BPH among patients in Enugu state based on their ages was rejected. This implies that there was a significant difference in the prevalence of BPH among patients in Enugu state based on their ages from 2014 to 2018.

**Research Questions 3**

What is the prevalence of BPH among patients in urban and rural areas of Enugu state?

**Hypothesis 3**

There will be no significant difference in the prevalence of BPH among patients in Enugu state based on their locations. The data used in answering research question three and testing hypothesis three are shown in Table 3.

**Table 3:** Prevalence of BPH among patients in Enugu State from 2014 to 2018 based on location (urban and rural areas)

Location							
S/N	Years	Urban area f	%	Rural areas f	%	Total f	%
	2014	250	8.7	307	10.6	557	19.3
	2015	210	7.0	294	10.2	504	17.5
	2016	280	9.7	284	9.9	564	19.6
	2017	290	10.1	366	12.7	656	22.8
	2018	270	9.4	332	11.5	602	20.9
	Total	1300	45.1	1583	54.9	2883	100

$\chi^2_{cal} = 92.41$ , critical value = 9.49, df = 4,  $p < 0.05$ ; significant

**Table 4:** Prevalence of BPH among patients in Enugu state base on their educational level

Educational Level													
S/N	Years	FSLC f	%	WAEC/NECO f	%	OND/ NCE F	%	BSC/ HND f	%	MSc/ Ph. D f	%	Total f	%
	2014	101	3.5	161	5.6	134	4.6	92	3.2	94	3.3	582	20.2
	2015	190	6.6	121	4.2	78	2.7	130	4.5	52	1.8	571	19.8
	2016	220	7.6	140	4.9	156	5.4	126	4.4	32	1.1	674	23.4
	2017	130	4.5	102	3.5	110	3.8	163	5.7	30	1.0	535	18.5
	2018	160	5.5	135	4.7	95	3.3	105	3.6	26	0.9	521	18.1
	Total	801	27.8	659	22.8	573	19.9	616	21.4	234	8.1	2883	100

$\chi^2_{cal} = 24.62$ , critical value = 26.30, df = 16,  $p > 0.05$ ; Not significant

Table 4 presents the frequencies and percentages of the subjects that suffered from BPH indicating the prevalence of the health problem from 2014 to 2018. The table shows that in 2014, 5.6 percent of the subjects with WAEC/NECO suffered from BPH. In 2015, subjects with FSLC (6.6%), followed by subjects B.Sc./HND (4.5%). In 2016, 7.6percent of the subjects FSLC, OND/NCE (5.4%), and WAEC/NECO (4.9%) suffered from BPH. In 2017, 5.7 percent of the subjects with B.Sc./HND suffered from BPH. In 2018, subjects with FSLC (5.5%) followed by subjects with WAEC/NECO (4.7%) suffered from BPH.

The table shows that greatest percentage (23.4%) of the subjects put together in 2016 suffered from BPH, followed by 2014 (20.2%), 2015 (19.8%), 2017 (18.5%) and 2018 (18.1%). The table also shows that the period of the study, highest percent (27.8%) of subjects with FSLC suffered from BPH, followed by WAEC/NECO (22.8%), B.Sc./HND (21.4%), OND/HND (19.9%) and M.Sc./ Ph.D. (8.1%) in the descending order of magnitude.

The chi-square ( $\chi^2$ ) analysis shows that the calculated  $\chi^2$  value of 24.62 was less than the critical  $\chi^2$  table value of

Table 3 presents the frequencies and percentages of the subjects that suffered from BPH from 2014 to 2018. The table shows that 2017 recorded the highest number of subjects in both urban and rural areas that suffered from BPH with 10.1 percent and 12.7 percent respectively.

The table shows that the greatest percentage (22.8%) of all the subjects put together in 2017 suffered from BPH, followed by 2018 (20.9%), 2016 (19.6%), 2014 (19.3%) and 2015 (17.5%). The table also shows that within the period under study, the highest percent (54.9%) of the subjects in the rural areas suffered from BPH while subjects in the urban areas recorded 45.1 percent.

The chi-square ( $\chi^2$ ) analysis shows that the calculated  $\chi^2$  value of 92.41 was greater than the critical  $\chi^2$  table value of 9.49 at 4 degree of freedom (df) and 0.05 level of significance. Therefore the null hypothesis that there was no significant difference in the prevalence of BPH among patients in Enugu state based on their location was rejected. This implies that there was a significant difference in the prevalence of BPH among patients in Enugu state based on their location from 2014 to 2018.

Research Questions 4: What is the prevalence of BPH among patients in Enugu state based on their educational level?

**Hypothesis 4**

There will be no significant difference in the prevalence of BPH among patients in Enugu state base on their educational level

The data used in answering research question four and testing hypothesis four are shown in Table 4.

26.30 at 16 degree of freedom (df) and 0.05 level of significance. Therefore the null hypothesis that there was no significant difference in the prevalence of BPH among patients in Enugu state based on their educational level was accepted. This implies that there is no significant difference in the prevalence of BPH among patients in Enugu state based on their educational level from 2014 to 2018.

**Discussion of Findings**

**Prevalence of BPH among patients**

The findings of this study on the prevalence of BPH among patients in Enugu State from 2014 to 2018 showed that there was a high prevalence of patients having benign prostatic hyperplasia over the five-year period. There was a significant difference in the prevalence of BPH among patients from 2014 to 2018 ( $P < 0.05$ ). The findings of this results was not unexpected or surprising because men usually indulge in improper drinking and eating habits that could cause the high possibility of them having the benign prostatic hyperplasia. Also, they drink all sorts of alcoholic

drinks and take hard drugs or cigarettes which are all risk factors for this disease. Another factor that could be attributed to the high prevalence of benign prostatic hyperplasia is their careless lifestyle that could predispose them to having sexually transmitted diseases (STDs). Also, if these STDs are not treated properly and cured using effective means, it could lead men to develop the benign prostatic hyperplasia disease. Additionally, young men hardly go for routine medical check-up to determine their level of risk or the possibility of them having this disease.

This finding was in line with the study of Mohammad, Wasileh, and Albikawi (2015) who stated that for a period of 5 years (2010-2015), the rate at which men had benign prostatic hyperplasia was almost the same trend as the prevalence rate was steadily increasing. Using a sample of 150 men, it was found that participation in benign prostatic hyperplasia screening among older men was low and this may be as a result of lack of awareness of the need for the benign prostatic hyperplasia screening.

### **Prevalence of BPH among patients based on their ages**

The findings of this study on the prevalence of BPH among patients in Enugu State from 2014 to 2018 based on age showed that patients within the age bracket of 70-79 years had the highest prevalence of Benign prostate hyperplasia with 21.4 percent while patients aged between 40-49 years had lower prevalence of 10.5 percent. The finding also showed a significant difference in the prevalence of BPH among patients in Enugu state based on their ages from 2014 to 2018 ( $P < 0.05$ ). This finding was not surprising and was also expected because the age of a man can affect his having the benign prostatic hyperplasia. The older a man becomes, the more possibility of him having the benign prostatic hyperplasia. The rate of experiencing benign prostatic hyperplasia was higher with people (men) who were usually above the ages of 60 to 80 years (70 years average) in most cases. Men that are within the ages of 60 to 80 years are usually vulnerable to benign prostatic hyperplasia probably because the benign prostatic hyperplasia comes and grows as one advances in age. In this regard, men who are younger within the ages of 40-50 years may not have symptoms of benign prostatic hyperplasia.

This result is in line with the study of Lee, Chun and Lee (2005) [11] who did a study to identify the prevalence of benign prostatic hyperplasia (BPH) and BPH related symptoms among community-dwelling elderly men in Korea. Lee *et al* found that many elderly and aged men were more vulnerable to benign prostatic hyperplasia. Also, in a multinational, community-based study by Engstrom, Walker-Engstrom, Loof and Leppert (2003) [6] using the IPSS questionnaire, the occurrence rates of BPH among men between the ages of 40 years and 79 years were 14 percent, 18 percent, 24 percent, 38 percent, and 56 percent in France, Scotland, Sweden, the US and Japan, respectively. This implies that the prevalence of benign prostatic hyperplasia increases with age. In agreement with the foregoing, Xia, Xu, Teng, Xu and Tang (2002) stated that BPH typically begins in the fourth decade of life and is attributed to age-related dynamic changes in glandular tissue composition and cell proliferation. In the present meta-analysis, the prevalence of BPH continued to increase with age. With the population aging, the ratio of people greater than 60 years old is continuously increasing, which will cause a continuous increase in the prevalence of BPH (Wang, *et al.*, 2015) [22].

### **Prevalence of BPH among patients in urban and rural areas**

The findings on the prevalence of BPH among patients in Enugu State from 2014 to 2018 based on location showed that male patients within the rural areas had the highest rate of contracting Benign prostate hyperplasia with 54.9 percent, while male patients in urban location had a lower prevalence of 45.1 percent (Table 3). The findings also showed that there was no significant difference in the prevalence of BPH among patients in Enugu state based on their different locations from 2014 to 2018 ( $P < 0.05$ ). This finding was very true and expected because the prevalence of patients having benign prostatic hyperplasia does not necessarily depend on their location or place of residence. Men who live in rural areas as well as those who live in urban areas can develop benign prostatic hyperplasia at any time, and anywhere. It has nothing to do with the location or place of residence of the male patients in the urban or rural areas. Men who live in rural and urban settlements have different lifestyles and partake in certain dietary activities that could predispose them to certain possibilities of experiencing illness and as well as infection. Men in rural or urban location can as well form the habit of not going for regular checkup for benign prostatic hyperplasia, and as such these factors may provide reasons why men develop benign prostatic hyperplasia which has no link with their location or place of residence.

This finding is in line with the study of Wang, *et al.* (2015) [21] who noted that the pooled occurrence rate of BPH was 41.5 percent [95% CI, 34.5–48.4] in urban areas and 38.6 percent [95% CI, 22.7–54.6] in rural areas; and there was no statistically significant difference in the prevalence of BPH among patients in urban and rural areas [OR, 1.51; 95% CI, 0.97–2.36].

### **Prevalence of BPH among patients based on their educational level**

The finding on the prevalence of BPH among patients in Enugu State from 2014 to 2018 based on educational level revealed that the patients with FSLC had the highest prevalence of Benign prostate hyperplasia with 27.8 percent while patients with MSc/PhD had a lower prevalence with 8.1 percent (Table 4). The findings also showed that there was a significant difference in the prevalence of BPH among patients in Enugu state based on their educational levels from 2014 to 2018 ( $P > 0.05$ ). This result was not a surprise as there has been growing evidence that the prevalence of benign prostatic hyperplasia is related to educational level of a person. Although, a person who is educated and one who is not educated both suffer from the benign prostatic hyperplasia, but the educated have some advantage to avoid the rate at which they are exposed to the benign prostatic hyperplasia.

This finding is in line with the study of Kalu, *et al.* (2020) whose study revealed that the higher the educational qualifications of the respondents, the higher their knowledge of prostatic enlargement as a health disorder among males. In their study, all the respondents who had PhD, MSc and BSc knew about prostatic enlargement (Benign Prostatic hyperplasia) and this reduced the prevalence of them developing benign prostatic hyperplasia. The first school leaving certificate (FSLC) holders who were not well educated had poor knowledge of prostatic enlargement as a disorder among men. In support of the foregoing findings, the

work of Robert and Benedict cited in Kalu, *et al.* (2020) supports the opinion that education is a fundamental social determinant of health and can to a large extent determine the prevalence of benign prostatic hyperplasia among men. The lower the educational qualification the lower the knowledge of prostatic enlargement, from the above work of Robert and Benedict (2020), the poorly educated will have poor knowledge of the morbidity of prostatic enlargement as a health disorder among men. The study showed that men who are less educated had poor knowledge of the signs and symptoms of BPH and as such are very vulnerable to benign prostatic hyperplasia. A range of 75.4 percent to 96.7 percent of the respondents, that is a mean population of 85.6 percent did not know the signs and symptoms of BPH due to their poor and low educational level. In agreement with the above finding, Hahn and Truman (2005)<sup>[8]</sup> posited that the imminent lack of knowledge of a disease is a factor that makes them report late for medical advice.

## References

- Akuezilo E, Agu N. American cancer society, (2018), 2002. Extracted from; [https://www.medicinenet.com/prostate\\_problem\\_warning\\_signs/article.htm#what\\_are\\_common\\_prostate](https://www.medicinenet.com/prostate_problem_warning_signs/article.htm#what_are_common_prostate).
- Akuezilo E, Agu N. American Cancer Society: Working Paper, 2016, 54.
- American Cancer Society. Prostate Cancer Causes, Risk Factors, and Prevention, 2020. [cancer.org](http://cancer.org).1.800.227.2345 American Cancer Society extracted from <https://www.cancercenter.com/prostate-cancer/symptoms/>
- Cancer Stat Facts: Prostate Cancer [Internet]. SEER, 2018. Available from: <https://seer.cancer.gov/statfacts/html/prost.html>.
- Deters, LA. Benign prostate hypertrophy, 2014. Emedicine website. <http://emedicine.medscape.com>
- Engstrom G, Walker-Engstrom ML, Loof L, Leppert J. Prevalence of three lower urinary tract symptoms in men-a population-based study. *Fam Pract*,2003;20:7-10.
- Goh HJ, Kim SA, Nam JW, Choi BY, Moon HS. Community-based research on the benign prostatic hyperplasia prevalence rate in Korean rural area. *Korean J Urol*,2015;56:68-75.
- Hahn RA, Truman B. "Education improves Public Health and promotes Health Equity," *Int. Journal of Health Service*,2005;45(4):657-678
- Heber D. "Prostate enlargement: the canary in the coal mine?." *Am J Clin. Nutrition*,2002;75(4):605-6.
- Kalu O, Abubakar U, Luntsi G, Ohagwu CC, Nwodo VK, Anyawu C, *et al.* Knowledge of benign prostatic hyperplasia and ultrasound screening among non-academic males of a university community in Enugu, South- East, Nigeria. *EJMED, European Journal of Medical and Health Sciences*, 2020, 2-3. DOI: <http://dx.doi.org/10.24018/ejmed.2020.2.3.250>
- Lee E, Chun K, Lee Y. Benign Prostatic Hyperplasia in community-dwelling elderly in Korea to identify the prevalence of benign prostatic hyperplasia (BPH) and BPH related symptoms among community-dwelling elderly men in Korea. *Journal of Korean Academy of Nursing*,2005;35(8):1508-1513.
- Lim KB. Epidemiology of clinical benign prostatic hyperplasia. *Asian J Urol*,2017;4(3):148-151.
- Ogundele SO. Iknerowo. A survey of the awareness of prostate cancer and its screening among men attending the outpatient clinics of a tertiary health centre in Lagos, Nigeria. *Nigeria Journal of Prostate Cancer*,2015;(2):115-118.
- Okoye I. Facts on cancer in general/cancers of the breast, 2016. cervix and prostate: 'Bws' initiative [/http:// www.breastmithontspotng.org](http://www.breastmithontspotng.org)
- Okoye I. Prostate cancer, what do we need to know? A Bws Public Health Production. Or facts on cancer in general/cancers of breast, cervix and prostate: A Bws public Health production, 2016, 13.
- Oladimeji O, Bidemi YO, Olufisayo JA, Sola AO. Prostate Cancer Awareness, knowledge and screening practices among older men in Oyo State. *Nigeria International Community Health Education*,2010;30(3):271-286.
- Osegbe DN. Prostate cancer in Nigerians: Facts and non-facts. *Journal of Urology*,2007;157(4):1340-1343.
- Parsons JK. "Benign Prostatic Hyperplasia and Male Lower Urinary Tract Symptoms: Epidemiology and Risk Factors". *Current bladder dysfunction reports*,2010;5(4):212-218. doi:10.1007/s11884-010-0067-2.
- Parsons JK. Lifestyle factors, benign prostatic hyperplasia, and lower urinary tract symptoms. *Curr Opin Urol*,2011;21:1-4.
- Parsons JK, Kashefi C. Physical activity, benign prostatic hyperplasia, and lower urinary tract symptoms. *European Urology*,2008;1(53):1228-1235.
- Wang M, Jicun M, Thomas. "Tissue fibrosis: a principle evidence for the central role of Misrepairs in aging",2015:1505:(01376). Bidcode:2015arXiv150301376C.
- Wang M, Jicun M, Thomas. "Aging as a process of accumulation of Misrepairs",2015:1503(07163). Bidcode:2015arXiv150307163W.
- Wang Jicun, Michelitsch Thomas, Wunderlin Arne, Mahadeva Ravi. "Aging as a consequence of Misrepair-a novel theory of aging,2009:0904:(0575). Bibcode:2009arXiv0904.0575W.
- Wang W, Guo Y, Zhang D, Tian Y, Zhang X. The prevalence of benign prostatic hyperplasia in mainland China: evidence from epidemiological surveys. *Sci. Rep*,2015;5:13546. doi: 10.1038/srep13546.
- Wang Z, *et al.* Trends in prevalence, awareness, treatment and control of hypertension in the middle-aged population of China, 1992-1998. *Hypertens Res*,2004;27:703-9.
- Zhang SX, Balch C, Chain MW, Lai HC, Matai D, Schilder JM, *et al.* Identification and characterization of ovarian cancer-initiating cells from primary human tumors. *Cancer research*,2008;68(11):4322-20.
- Zhang SX, Yu B, Guo SL, Wang YW, Yin CK. "[Comparison of incidence of BPH and related factors between urban and rural inhabitants in district of Wannan]". *Zhonghuananxexue. National Journal of Andrology*,2003;9(1):45-7.