

Urinary tract Infections, Pelvic Inflammatory Disease, Hepatitis B and Diabetes Mellitus among women of the reproductive ages in a developing nation

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ABSTRACT

With the high prevalence of cervical cancer, sexually transmitted infections, in particular HIV/AIDs, in developing countries, there is a need to examine pelvic inflammatory diseases or urinary tract infections, Hepatitis B, diabetes mellitus and factors which explain pelvic inflammatory diseases or urinary tract infections. No single study has emerged in the developing world, which has explored all these issues.

The present study sought to elucidate information on pelvic inflammatory diseases or urinary tract infections among Jamaican women in reproductive ages, as well as Hepatitis B, diabetes mellitus, and factors which accounted for pelvic inflammatory diseases or urinary tract infections.

Stratified random sampling was used to design the sample, and a three-stage sampling design was used.

The current study used secondary survey data. An administered questionnaire was completed by a random sample of 7,168 females.

The Statistical Packages for the Social Sciences (SPSS) for

Windows, Version 16.0 (SPSS Inc; Chicago, IL, USA) was used to analyse the data. Multiple logistic regressions were used to model the factors which explained pelvic inflammatory diseases or urinary tract infections.

Twelve percentages of study respondents indicated that they have had pelvic inflammatory diseases or urinary tract infections. Nine variables emerged as statistically associated with urinary tract infections or pelvic inflammatory diseases: forced to have sexual intercourse (Odds ratio, OR, = 22.73, 95% CI = 2.86 – 180.56), education (OR = 1.97, 95% CI = 1.19 – 3.25), Pap smear examination (OR = 9.38, 95% CI = 1.05 – 84.21), partner main source of financial support (OR = 0.10, 95% CI = 0.02 – 0.58), Hepatitis B (OR = 7.31, 95% CI = 0.92 – 54.92), number of miscarriages (OR = 1.25, 95% CI = 1.02 – 1.48), number of abortions (OR = 2.01, 95% CI = 1.49 – 2.73), and social hierarchy.

Sexual activity, inconsistent condom usage, and pelvic inflammatory diseases or urinary tract infections are a part of the reality among females of the reproductive age, and within the context of low Pap smear or pelvic examination, public health practitioners need to implement programmes to address these concerns.

Key Word: Pelvic inflammatory disease (PID), Urinary tract infection, Hepatitis B, Women of the reproductive ages, Diabetes mellitus, Jamaica

INTRODUCTION

Premarital sexual encounters, early sexual debut, and inconsistent condom usage are some of the reasons among others for the incidence of sexually transmitted infections (STIs), HIV/AIDs, teenage and unwanted pregnancies, premature mortality and high school-drop outs in the world, particularly in the developing world [1-14].

The developing nations continue to experience higher incidences of HIV/AIDs, and cervical cancers than those in the developed world [1], [2], [14-16], and this has been made worse as a result of income inequalities among and within the nations. Sub-Saharan Africa and the Caribbean [1],[2] continue to grapple with a high prevalence of HIV/AIDs, STIs, inconsistent condom usage, and lowered age at the first sexual initiation, poverty, income-inequalities, health disparities, premarital sexual encounters and cancers [17], [20-23].

In Antigua and Barbuda, Haiti, Guyana, Trinidad and Tobago and the Dominican Republic, one in six women between the ages of 15 and 24 was found to become sexually active before the age of 15 years [20], [21], and this was typically about the same in the sub-Saharan African nations [22].

Another study found that 2 in every 5 Jamaican women had been pregnant at least once, that 4 in every 5 adolescent women preg-

nancies were unplanned and that 74% of the females aged 15-17 years old were sexually active as compared to 47% of the males of the same age [23].

Previous studies have examined intrauterine contraceptive devices and/or pelvic inflammatory diseases in the developing and the developed nations [24-27].

In spite of early sexual initiation, inconsistent condom usage, premarital sexual activities, teenage pregnancies, and a high rate of HIV/AIDs in the developing societies not a single study has examined pelvic inflammatory disease, urinary tract infection, Hepatitis B, Diabetes mellitus, and the characteristics of urinary tract infections and/or pelvic inflammatory diseases.

In Jamaica, statistics showed that 84% of the women in the reproductive ages of 15-49 years had been pregnant [10]; 80% of the Jamaicans (ages 15-74 years) have had sexual intercourse in the last 30 days, 76.4% reported to have at least one sexual partner, 94.7% have had sexual intercourse, 48.4% reported having sexual intercourse at least once per week, 14.5% have had STIs, and 88.9% of the Jamaican women (ages 15-74 years old) had been pregnant [28]. According to the WHO [16], cervical cancer is the second most prevalent type of cancer among women, and it

is among the 10th leading cause of mortality in Jamaican women [9].

Furthermore, the WHO opined that among four-fifths of the women who were newly diagnosed with cervical cancers in the developing countries, most were diagnosed when the disease was in its advanced stage, and that 90% of the women in those nations had never been screened for cervical cancers [16].

Jamaica is a developing country and Wilks et al. [28], by using a sample of 2828 Jamaican women of the ages 15-74 years, found that 34.3% of the women had never had a Pap smear, and this was as high as 71.3% among those who were aged 15-24 years. These were within the context of 42.4% of the Jamaican women aged 15-24 years, who reported having had sexual intercourse at least once per week and 72.4% of those aged 25-34 years who reported having done the same. Thus, the high irresponsiveness of women in performing pelvic examination and/or Pap smear, with the realities of the afore-mentioned, denotes that pelvic inflammatory diseases and/or urinary tract infections are highly unreported and undetected and that they will account for the premature mortality which is caused due to cervical cancers. The WHO stated that "In reality, low and middle income countries are at the centre of both old and new public health challenges"[29], and that, "In Jamaica, 59% of the people with chronic diseases experienced financial difficulties because of their illness..."[29].

Clearly, there are sexual autonomies, inconsistent condom usage, premarital sexual initiation, health disparities, early sexual debut, high STIs and HIV/AIDS prevalence and incidence, and unwillingness of women to do pelvic examination and/or Pap smear. This means that pelvic inflammatory diseases and/or urinary tract infections will be able to remain undetected, and that they would be a public health concern. Statistics revealed that cervical cancers were among the 10 leading causes of mortality in Jamaica and that they were one of the leading cancers among women in the developing countries. Pelvic inflammatory diseases and/or urinary tract infections can be a result of sexually transmitted infections or a result of the introduction of bacteria into the uterus from the vagina or from outside contamination [30].

These are the risk factors which can account for morbidities and premature mortalities among women and within a nation. [2] However, we have failed, in a single study, to explore pelvic inflammatory diseases, urinary tract infections, Hepatitis B, diabetes mellitus, pelvic examinations and Pap smears. These are the rationales which justify the current study. The present study seeks to elucidate information on the prevalence of pelvic inflammatory diseases and/or urinary tract infections among Jamaican women in the reproductive ages (15-49 years), as well as Hepatitis B, diabetes mellitus, and the associations between particular demographic characteristics and pelvic inflammatory disease as well as factors that influence pelvic inflammatory disease and/or urinary tract infections.

METHODS

Since 1997, the National Family Planning Board (NFPB) has been collecting information on women (ages 15-49 years) in Jamaica regarding contraception usage and/or reproductive health. In 2002, the Reproductive Health Survey (RHS) collected data on women who were aged 15-49 years and men who were aged 15-24 years. The current study extracted the sample of only women (ages 15-49 years), given the nature of the research. The sample was 7,168 women, representing a response rate of 91.8% [31].

Stratified random sampling was used to design the sampling frame from which the sample was drawn. By using the 2001 Census sector (or sampling frame), a three-stage sampling design was used. Stage 1 was the use of a selection frame of 659 enumeration areas [or enumeration districts (EDs)]. This was calculated, based on the probability proportion to size. Jamaica is classified into four health regions. Region 1 consists of Kingston, St. Andrew, St. Thomas

and St. Catherine; Region 2 comprises Portland, St. Mary and St. Ann; Region 3 is made up of Trelawny, St. James, Hanover and Westmoreland, with Region 4 being St. Elizabeth, Manchester and Clarendon. The 2001 Census showed that region 1 comprised 46.5% of Jamaica, as compared to Region 2, 14.1%; Region 3, 17.6% and Region 4, 21.8% [32].

Stage 2 saw the clustering of households into primary sampling units (PSUs), with each PSU constituting an ED, which in turn consisted 80 households. The previous sampling frame was in need of updating, and so this was carried out between January 2002 and May 2002. The new sampling frame formed the basis upon which the sampling size was computed for the interviewers to use. Stage 3 was the final selection of one eligible female. This was done by the interviewer on visiting the household.

The Statistical Institute of Jamaica (STATIN) provided the interviewers and supervisors who were trained by the McFarlane Consultancy to carry out the survey. The interviewers administered a 35-page questionnaire. The data collection began on Saturday, October 26, 2002 and was completed on May 9, 2003. The data was weighted in order to represent the population of women who were aged 15 to 49 years in the nation [32].

Statistical methods

We used the Statistical Packages for the Social Sciences (SPSS) for Windows, Version 16.0 (SPSS Inc; Chicago, IL, USA). The frequencies and the means were computed on the basis of sociodemographical characteristics, health conditions, pregnancy, Pap smears, gynaecological examinations and the reasons for choices. We also performed χ^2 tests to compare associations, particularly, sociodemographical variables, contraception, pregnancy, and gynaecological examination. The Student's t-test was used to examine the statistical difference between those who were forced into a sexual encounter and the age at first sexual initiation. Stepwise multiple logistic regressions were used to analyze the factors that explained the gynaecological examinations which were undergone in the last 12-month period, and the Pap smear tests which were done during the same period. Where collinearity existed ($r > 0.7$), the variables were entered independently into the model to determine those that should be retained during the final model construction. To derive the accurate tests of statistical significance, we used the SUDDAN statistical software (Research Triangle Institute, Research Triangle Park, NC), and this was adjusted for the survey's complex sampling design.

Measurement

Age was the number of years a person was alive up to his/her last birthday (in years). The contraceptive method came from the question "Are you and your partner currently using a method of contraception? ...", and if the answer was yes, the question was asked, "Which method of contraception do you use?" The age at which the contraception was begun, was assessed by asking, "How old were you when you first used contraception? The area of residence was measured by asking, "In which area do you reside?" The options were rural, semi-urban and urban. The current sexual status was measured by asking, "Have you had sexual intercourse in the last 30 days?" Education was measured from the question "How many years did you attend school?" Marital status was measured from the following question "Are you legally married now?", "Are you living with a common-law partner now? (that is, are you living as man and wife now with a partner to whom you are not legally married?)", "Do you have a visiting partner, that is, a more or less steady partner with whom you have sexual relations?", and "Are you currently single?" The age at first sexual intercourse was measured from "At what age did you have your first intercourse?" Pelvic examination was assessed by asking, "Have you ever had a gynaecological [or pelvic] examination?" Pregnancy was assessed by asking, "Are you pregnant now?" Religiosity was evaluated from the question, "With what frequency do you attend religious services?" The options ranged from at least once per week to only

on special occasions (such as weddings, funerals, christenings et cetera). Dummy religiosity denoted 1 = at least once per week and 0 = otherwise. The subjective social class was measured from "In which class do you belong?" The options were lower, middle or upper social hierarchy. Hepatitis B is an infectious illness which is caused by the hepatitis B virus (HBV). HBV affects the livers of the hominoidae species, which include humans, and result in an inflammation called hepatitis.

Analytic Model

By using logistic regression, this study sought to examine the factors which were associated with a self-reported past incidence of urinary tract infections or pelvic inflammatory diseases. Empirical evidence showed that different social factors influence incidence of urinary tract infection or pelvic inflammatory disease, which justifies the use of multivariate analysis. Thus, this study used Grossman's model [33] which established the use of econometric analysis to determine the use of multiple factors for health demand. Grossman's model has been modified and used by many scholars to examine health, health outcome and other health-related issues. The current research will use the theoretical framework of Grossman's econometric analysis to examine the factors which are associated with urinary tract infections and/or pelvic inflammatory diseases of women who are aged 15-49 years in Jamaica. The variables which are used in this econometric model are based on the literature as well as on the dataset. We will test the hypothesis that the urinary tract infections or pelvic inflammatory diseases among women who are aged 15-49 years are determined by particular sociodemographical variables (Equation [1]).

$PID_i = f(DM_i, A_i, ED_i, U_i, SSI, ARI, P_i, F_i, GNI, AS_i, S_i, Ni, Ri, Ki, Mi, Wi, Ti, Xi, Li, Qi, AB_i, \epsilon_i)$ Eqn [1], where PID_i represents self-reported having had urinary tract infection or pelvic inflammatory disease, DM_i denotes self-reported diabetes mellitus of woman i , A_i is age of woman i , ED_i represents educational level of woman i , U_i means employment status of woman i , SSI is social class of woman i , ARI indicates area of residence of woman i , P_i denotes current pregnancy status of woman i , F_i is forced to have sex (woman i), AS_i is age of first sexual intercourse of woman i , S_i represents having had a papanicolaou smears (Pap Smear) in the last 12 months (woman i), N_i is number of sexual partners of woman i , R_i denotes religiosity of woman i , K_i woman is currently in a sexual union i , M_i denotes shared sanitary convenience with another household for woman i , W_i represents self-report having Hepatitis B for woman i , T_i denotes age at which contraceptive use for woman began i , X_i indicates self-reported having done a pelvic examination, L_i represents partner being the main financial source, Q_i denotes the number of miscarriages, AB_i indicates the number of abortions, and the parameter ϵ_i is the model's error term.

By using the data to test the hypothesis (Equation [1]), from the logistic regression analyses, we can write an equation [2] to represent the function that explains the method of self-reported females having had urinary tract infections or pelvic inflammatory diseases of women who were aged 15-49 years in Jamaica.

$$PID_i = f(ED_i, SSI, F_i, S_i, W_i, L_i, Q_i, AB_i, \epsilon_i) \text{ Eqn [2]}$$

RESULT

[Table/Fig 1] shows the demographical characteristics of the sample.

Characteristic	n	%
Pelvic inflammatory disease		
Yes	125	1.7
No	7004	97.7
Don't know	8	0.1
Refused to answer	31	0.4
Urinary tract infection		
Yes	800	11.1
No	6334	88.4

Don't know	14	0.2
Refused to answer	20	0.3
Marital status		
Legally married	1542	21.5
Common-law	1733	24.2
Visiting	1959	27.3
Not currently in union	1934	27.0
Currently pregnant		
Yes	288	4.4
No	6219	94.6
Ever been pregnant		
Yes	5301	84.3
No	985	15.7
Forced to have sex		
Yes	747	11.6
No	5707	88.4
Currently having sex (in the last 30 days)		
Yes	4289	59.8
No	2879	40.2
Currently using a method of contraception		
Yes	4027	63.8
No	2282	36.2
Employment status		
Unemployed	4143	57.8
Employed	3025	42.2
Area of residence		
Urban	1144	16.0
Semi-urban	2079	29.0
Rural	3945	55.0
Socioeconomic class		
Lower	1705	23.8
Middle	3079	43.0
Upper	2384	33.2
Age at menarche median (range)	13.0 years (8-)	
Years of schooling mean (SD)	13.0 years (3.0 years)	
Age mean (SD)	31.3 years (9.3 years)	
Age of first sexual intercourse median (range)	17.0 (15,49), mean =15.2 yrs (SD =5.8)	

[Table/Fig 1]: Sociodemographic Characteristic of Sample, n = 7,168

One in every 1000 females of the reproductive ages (15-49 years) reported having Hepatitis B and 4 in every 100 had diabetes mellitus. Forty-four percent of the study respondents reported that they always used a condom with their steady partners, 48% mentioned that they used it most times, 6.2% said that they seldom used it and 0.2% indicated that they had never used it. Seventy-four percent of the sample indicated that they have never had a non-steady partner and 13% indicated that they always used a condom with this partner as compared to 7% who reported that they used it most times, 0.2% who said that they seldom used it and 6% who indicated that they never used it. Almost 5% of the sample indicated that they have had still births, 16.2% had miscarriages and 2.2% stated that they have had abortions.

The mean age of menarche was 13.5 years (SD = 4.4 years), with the mean age of first sexual relations being 15.0 years (5.8 years). The mean age at which the sample began using a contraceptive method was 19.8 years (SD = 4.3 years).

Twelve percent of the study respondents indicated that they have had pelvic inflammatory diseases or urinary tract infections, and 0.6% said that they had both.

When the respondents were asked the question "In the past 12 months, have you had a vaginal discharge that was not menstrual?", 15.5% of the sample indicated yes. When they were asked

“Along with the discharge, did you have any...?” itching (yes, 8.9%), painful urination (yes, 17.0%), painful intercourse (yes, 18.4%), and lower abdominal pain (yes, 36.4%). The previously mentioned question was followed by “Did you have any treatment for this (ese) condition(s)? 76.0% indicated yes. [Table/Fig 2]

Characteristic	Age group							P
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
	yrs	yrs	yrs	yrs	yrs	yrs	yrs	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Pap smear								$\chi^2 = 199.9, P < 0.001$
Yes	49 (5.0)	167 (17.8)	287 (24.4)	335 (25.6)	284 (24.5)	224 (22.4)	150 (15.0)	
No	940 (95.0)	770 (82.2)	889 (75.6)	976 (74.4)	876 (75.5)	697 (75.7)	524 (77.7)	
Pelvic examination								$\chi^2 = 62.3, P < 0.001$
Yes	63 (55.3)	156 (55.7)	240 (48.9)	277 (41.3)	240 (38.6)	176 (34.5)	135 (34.9)	
No	51 (44.7)	124 (44.3)	251 (51.1)	393 (58.7)	382 (61.4)	334 (65.5)	252 (65.1)	
Hepatitis B								$\chi^2 = 11.7, P = 0.863$
Yes	1 (0.1)	1 (0.1)	2 (0.2)	1 (0.1)	1 (0.1)	0 (0.0)	0 (0.0)	
No	982 (99.3)	929 (99.2)	1170 (99.5)	1306 (99.5)	1154 (99.4)	670 (99.4)	670 (99.4)	
Don't know	2 (0.2)	2 (0.2)	0 (0.0)	2 (0.2)	2 (0.2)	0 (0.0)	0 (0.0)	
Refused answering	4 (0.4)	5 (0.5)	4 (0.3)	2 (0.2)	3 (0.3)	3 (0.3)	4 (0.6)	
Diabetes mellitus								$\chi^2 = 181.35, P < 0.0001$
Yes	10 (1.0)	13 (1.4)	29 (2.4)	35 (2.6)	67 (5.7)	51 (5.5)	79 (11.7)	
No	978 (98.9)	920 (98.2)	1143 (97.2)	1273 (97.1)	1089 (93.9)	867 (94.1)	593 (88.0)	
Don't know	0 (0.0)	2 (0.2)	2 (0.2)	1 (0.1)	1 (0.1)	0 (0.0)	0 (0.0)	
Refused answering	1 (0.1)	2 (0.2)	2 (0.2)	2 (0.2)	3 (0.3)	3 (0.3)	2 (0.3)	
Currently having sex (in last 30 days)								$\chi^2 = 571.45, P < 0.0001$
No	727 (73.5)	348 (37.1)	363 (30.9)	417 (31.8)	417 (35.9)	309 (33.6)	298 (44.2)	
Yes	262 (26.5)	589 (62.9)	813 (69.1)	894 (68.2)	743 (64.1)	612 (66.4)	376 (55.8)	
Pelvic inflammatory disease								$\chi^2 = 46.850, P < 0.0001$
No	931 (94.1)	820 (87.5)	1025 (87.2)	1124 (85.7)	997 (85.9)	801 (87.0)	590 (87.5)	
Yes	58 (5.9)	117 (12.5)	151 (12.8)	187 (14.3)	163 (14.1)	120 (13.0)	84 (12.5)	

[Table/Fig 2]: Pap Smear, Pelvic examination, Hepatitis B, Diabetes Mellitus, currently having sex (in last 30 days) and pelvic inflammatory disease by age group of respondents, n= 7,126

Almost 42% of the sample had done a pelvic examination in the last 12 months, and 21% indicated having had a Pap smear in the same period. Table 2 presents information on the cross tabulation between pelvic examination and the age cohort, and Pap smear and the age cohort of the sample. When the respondents were asked when they had done the last pelvic examination, 58.2% did

not respond, 18.0% indicated < 12 months ago, 10.2% mentioned 1-2 years ago, 4.8% stated 2-3 years ago, and 8.8% indicated 3+ years ago.

Of the sample, almost 21% indicated that they had done a Pap smear test. Of those who mentioned that they did a Pap smear test, 20.9% mentioned this was < 12 months ago, 14.5% indicated that it was 1-2 years ago, 8.9% stated that it was 2-3 years ago, and 17.5% had done it 3+ years ago.

[Table/Fig 2] presents information on the Pap smear, pelvic examination, Hepatitis B and other variables by the age cohort of the respondents.

[Table/Fig 3] shows a cross tabulation between pelvic inflammatory diseases and urinary tract infections, and between diabetes mellitus and urinary tract infections [Table/Fig 3].

Characteristic	Urinary Tract Infection			
	Yes	No	Don't know	Refused to answer
Pelvic Inflammatory Disease1	%	%	%	%
Yes	5.6	1.3	0.0	0.0
No	93.0	98.6	57.1	35.0
Don't know	0.0	0.0	42.9	0.0
Refused answering	1.4	0.1	0.0	65.0
Total	800	6334	14	20
Diabetes Mellitus2				
Yes	5.1	3.8	0.0	0.0
No	94.6	96.1	71.4	55.0
Don't know	0.0	0.0	28.6	0.0
Refused answering	0.3	0.1	0.0	45.0
Total	800	6334	14	20

[Table/Fig 3]: Pelvic Inflammatory Disease and Diabetes Mellitus by Urinary Tract Infection

$1\chi^2$ (df = 9) = 4347.01, P < 0.0001, CC = 0.614
 $2\chi^2$ (df = 9) = 3292.88, P < 0.0001, CC = 0.556

[Table/Fig 4] examines the relationship between (1) pelvic inflammatory disease and Hepatitis B, and (2) diabetes mellitus and Hepatitis B. Almost 1% of those with diabetes mellitus reported having Hepatitis B.

A significant statistical difference was found between those who were forced to have sexual intercourse and those who were not, and age at the first sexual initiation (student's t-test = 8.721, P < 0.0001). The mean age at the first sexual initiation for those who were forced to have sexual intercourse was 16.2 years (2.7 years) as compared to 16.9 years (2.8 years) for those who were not forced into a sexual relationship [Table/Fig 4].

Characteristic	Hepatitis B			
	Yes	No	Don't know	Refused to answer
Pelvic inflammatory disease1	%	%	%	%
Yes	16.7	1.7	0.0	1.7
No	83.3	97.9	50.0	97.7
Don't know	0.0	0.1	50.0	0.1
Refused answering	0.0	0.3	0.0	0.5
Total	6	7129	8	25
Diabetes mellitus2				
Yes	33.3	3.9	0.0	4.0
No	66.7	96.0	50.0	95.7

Don't know	0.0	0.0	50.0	0.1
Refused answering	0.0	0.1	0.0	0.2
Total	6	7129	8	25

[Table/Fig 4]: Pelvic Inflammatory Disease and Diabetes Mellitus by Hepatitis B

$1\chi^2$ (df = 9) = 3114.19, P < 0.0001, CC = 0.550
 $2\chi^2$ (df = 9) = 4703.76, P < 0.0001, CC = 0.629

A cross tabulation between the frequency of condom usage with a steady partner and social class revealed no significant statistical association ($\chi^2 = 10.996$, P = 0.202): 46% of those in the lower socioeconomic class indicated that they always used a condom as compared to 43% of those in the middle class and 45% of those in the upper class.

MULTIVARIATE ANALYSES

By using logistic regression analyses, nine variables emerged as being statistically associated with urinary tract infections or pelvic inflammatory diseases [Table/Fig 5]. The nine variables explained 57% of the variance in pelvic inflammatory diseases or urinary tract infections among females in the reproductive ages of 15-49 years in Jamaica.

The model had a statistically significant predictive power (Model $\chi^2 = 41.859$, P = 0.004; the Hosmer and Lemeshow goodness of fit $\chi^2 = 5.6$, P = 0.69), and correctly classified 92.5% of the sample (correctly classified 62.5% of those who indicated having had urinary tract infections or pelvic inflammatory diseases and 97.8% of those who did not indicate having urinary tract infections or pelvic inflammatory diseases [Table/Fig 5]).

Characteristic	Odds Ratio	95% CI
Diabetes mellitus	1.09	0.74 - 1.62
Hepatitis B	7.31*	0.92 - 54.92
Age at first sexual debut	1.30	0.80 - 2.13
Age of respondents	0.86	0.54 - 1.38
Shared sanitary convenience	0.86	0.10 - 7.80
Employment status (1= employed)	0.25	0.02 - 3.33
Dummy religiosity (1= attend church at least once per week)	0.19	0.01 - 3.28
Partner main source of financial support	0.10**	0.02 - 0.58
Pelvic examination in last 12 months	1.54	0.21 - 11.59
Pap smear	9.38*	1.05 - 84.21
Middleclass	1.38**	1.07 - 1.58
Upper class	1.67***	1.27 - 2.19
†Lower class	1.00	
Dummy in a sexual union (1= yes)	6.39	0.02 - 1836.56
Semi-urban	1.21	0.08 - 17.54
Rural	0.44	0.03 - 5.71
†Urban	1.00	
Dummy currently pregnant (1= yes, at the time of the interview)	0.00	0.00 -
Dummy forced to have sex (1= yes)	22.73**	2.86 - 180.56
Dummy currently using contraception (1= yes, during last sexual encounter)	0.11	0.01 - 1.42
Years of schooling	1.97**	1.19 - 3.25
Age began using contraceptive method(s)	1.00	0.63 - 1.58
Number of sexual partners in last 3 months	1.06	0.97 - 1.15
Number of miscarriages	1.25***	1.10 - 1.48
Number of abortion	2.02***	1.49 - 2.73

[Table/Fig 5]: Logistic Regression: Variables of Urinary Tract Infection or Pelvic Inflammatory Disease of Women ages 15-49 years old

Model $\chi^2 = 41.859$, P = 0.004

-2 Log likelihood = 48.10

Nagelkerke R² = 0.570

Hosmer and Lemeshow goodness of fit $\chi^2 = 4.2$, P = 0.83

Overall correct classification = 92.5%

Correct classification of cases of self-reported having urinary tract infection or pelvic inflammatory disease = 62.5%

Correct classification of cases of not having urinary tract infection or pelvic inflammatory disease = 97.8%

†Reference group

*P < 0.05, **P < 0.01, ***P < 0.001

DISCUSSION

The present study found that 17 out of every 100 females within the reproductive ages of 15-49 years reported having had pelvic inflammatory disease, 112 out of every 1000 had urinary tract infection, 4 out of every 100 had diabetes mellitus, and 1 in every 1000 had Hepatitis B. One hundred and twenty-three females of the reproductive ages of 15-49 years reported having had pelvic inflammatory disease or urinary tract infection. There were moderate, significant statistical relationships between (1) urinary tract infection and pelvic inflammatory disease, (2) urinary tract infection and diabetes mellitus, (3) hepatitis B and pelvic inflammatory disease, and (4) hepatitis B and diabetes mellitus. Of those who had urinary tract infection, 6 out of every 100 of them had pelvic inflammatory disease; and 4 out of every 100 had diabetes mellitus. Twenty-one in every 100 of the study population had done a Pap smear, 42 out of every 100 had done a pelvic examination and 1 in 3 of those with Hepatitis B had diabetes mellitus. Nine factors account for 57% of the variability in urinary tract infections or pelvic inflammatory diseases among the women in the reproductive ages of 15-49 years in Jamaica. Furthermore, the studied respondents who were forced to have sexual relationships were 22 times more likely to have urinary tract infections or pelvic inflammatory diseases, and it was seen that the statistical relationship between diabetes mellitus and urinary tract infections disappeared when other variables were included among the possible independent variables.

According to the WHO, 80% of chronic diseases occur in the low and the middle income countries [29]. The high risk of death in the low income countries owes to food insecurity, low water quality, low sanitation, low hygiene, behavioural practices and chronic illnesses coupled with premature mortality which is caused from reproductive health matters. Poverty makes it insurmountable for poor people to respond to illnesses, unless the health care services are free. Money retards good hygiene and stimulates particular behaviours because the individual is likely to respond to the demands of survivability instead of morals and other expected behaviours.

People who are poor, will suffer even more so from chronic diseases. The WHO captures this aptly "...People who are already poor are the most likely to suffer financially from chronic diseases, which often deepen poverty and damage the long term economic prospects" [29]. Diabetes mellitus is among the 5th leading cause of mortality in Jamaica [7].

Diabetes is a disease in which the body does not produce or properly use insulin; it is characterized by abnormally high levels of sugar in the blood. When the amount of glucose in the blood increases, e.g., after a meal, it triggers the release of the hormone, insulin from the pancreas. Insulin stimulates the muscle and fat cells to remove glucose from the blood and stimulates the liver to metabolize glucose, thus causing the blood sugar level to decrease to normal levels.

The World Health Organization estimates that more than 180 million people worldwide have diabetes and this number is likely to more than double by 2030 [29]. Almost 80% of the diabetes deaths occur in the low and middle-income countries and about half of the diabetes deaths occur in people who are under the age of 70 years; 55% of the diabetes deaths occur in women. The WHO has re-

ported that those diabetes deaths will increase by more than 50% in the next 10 years if urgent action is not taken. Most notably, the diabetes deaths are reported to increase by over 80% in the upper-middle income countries between the years 2006 and 2015. Morrison, in an article which is entitled 'Diabetes and hypertension: Twin Trouble', postulated that diabetes mellitus and hypertension have now become two major problems for Jamaicans and for those in the wider Caribbean [34]. This situation was equally collaborated by Callender at the 6th International Diabetes and Hypertension Conference which was held in Jamaica in March 2000.³⁵ Callender found that there was a positive association between the diabetic and the hypertensive patients - 50% of the individuals with diabetes had a history of hypertension [35]. In an article which was published by the Caribbean Food and Nutrition Institute, McCarthy argued that approximately 30% to 60% of the diabetics also suffer from depression, which is a psychiatric illness [36]. Unlike previous studies, this work found a moderate statistical association between diabetes mellitus and Hepatitis B, and that those with the latter ailment were 7.3 times more likely to report having had urinary tract infections or pelvic inflammatory diseases. The current study also found that one in every 3 women of the reproductive ages in Jamaica, who had Hepatitis B, had diabetes mellitus, and that almost 1 in every 100 with diabetes mellitus had Hepatitis B, thus suggesting that the public health concerns of the policies makers must extend beyond chronic illnesses to Hepatitis B.

Literature has shown that STIs are on the rise in Sub-Saharan Africa and the Caribbean, as was evident from the high prevalence and the incidence of the HIV/AIDs statistics [1],[2], and studies have found an association between particular STIs (gonorrhoea and Chlamydia) and pelvic inflammatory diseases [24-27]. There was evidence which verified a strong statistical relationship between the time of IUD insertion and the risk of contracting pelvic inflammatory diseases [37],[38]. Embedded in this finding, was the negative association between a female using a particular contraceptive method and the risk of becoming infected with urinary tract infections or pelvic inflammatory diseases. This was among the justifications for the inconsistent contraceptive usage in the developing countries, as people feared the side-effects of using them, despite their positives which protected them against STIs, pregnancies, and abortions.

Studies have found that a large percentage of Jamaican females who were aged 15+ years have been pregnant [10, 28], and that many of the adolescent pregnancies were unwanted and unplanned [39]. According to Henry-Lee, 66% of the Jamaican women had used contraceptives, but only 34% of the pregnancies were planned [39]. This study found that 59 out of every 100 females who were aged 15-49 years have had sexual intercourse in the last 30 days, and that 64 out of every 100 had used a method of contraception to prevent pregnancy or STIs. Furthermore, 84 out of every 100 females in the study population had been pregnant, 2.2% have had an abortion, 16.2% have had a miscarriage and 5.4% had a still birth; yet only 21% have had a Pap smear examination and only 42% had a pelvic examination.

The current research revealed that the studied respondents who have had a Pap smear were 9.4 times more likely to find that they had urinary tract infections or pelvic inflammatory diseases, thus suggesting that the high prevalence of the unwillingness of the Jamaican females in the reproductive ages to do Pap smears denoted that many such infections were not diagnosed, that they would go untreated and that they would account for the high rates of cervical cancers in Jamaica, and the rest of the developing world [9], [16].

Although the reported miscarriages and abortions were relatively low in this research, they contributed to the increase in pelvic inflammatory diseases and urinary tract infections among women in the ages of 15-49 years. Within the context of a high reported rate of pregnancies among respondents of this study, the positive association between the number of abortions and a greater probability

of reporting pelvic inflammatory diseases or urinary tract infections should not be overlooked because of the illegality of abortions in Jamaica. It seems that the illegality of the act was as a result of the desire of the females to terminate their pregnancies, and thus utilize the services of lowly trained but willing individuals; wherever the execution of this procedure was concerned. This compounded the public health concerns of the high rates of cervical cancer, pelvic inflammatory diseases or urinary tract infections among females of the reproductive ages in Jamaica, and this deduction can be extended to other developing countries in which poverty is high and/or abortion is illegal.

The most potent factor which accounted for the variability in pelvic inflammatory diseases or urinary tract infections among females of the reproductive ages in Jamaica was forced sexual activity. Although only about 12% of the study respondents reported being forced into sexual intercourse, the females who were forced into this activity were 22.7 times more like to report pelvic inflammatory diseases or urinary tract infections. Moreover, a study which was conducted by Crawford and colleagues revealed that most of the adolescent females who were having sexual relationships were involved with older men. These older men, therefore, were involved in multiple partner relationships. Some of them were cognizant that they had contracted a STI and believed that they could be cured by having sexual intercourse with a virgin. The afore-mentioned issue, coupled with inconsistent condom usage during those sexual encounters, expose the young females and other females to the risk of contracting a pelvic inflammatory disease. The present study showed that females who were forced into sexual relationships were eight years younger than those who were not forced into sexual activities, thus suggesting that the males were exposing the young females to high risk factors such as STIs, pelvic inflammatory infections, pregnancies, Hepatitis B, as well as infertility.

It has been well established in the literature, that poverty is associated with morbidities and mortalities in developing nations and among the social strata in those and many other societies. The current research showed that pelvic inflammatory diseases or urinary tract infections were greater among the upper social classes. The justification of the afore-mentioned issue can be explained by IUD insertion, behavioural risk factors, greater visits to health care practitioners and the utilization of Pap smears more than in those in the lower socioeconomic strata in the nation. It is not that the risk behavioural practices of the wealthier and more educated women change to the point that they get engaged in more risky endeavours than those with lower education and lower wealth. As this research revealed, there was no statistical association between social class and the frequency of condom usage with steady partners, thus suggesting that inconsistent condom usage and by extension sexual behavioural practices with regards to condom usage were not different among the social hierarchies among the females of the reproductive ages in Jamaica. Embedded in this finding, was the vetoing power of the males with regards to the reproductive health matters of the females, irrespective of the socioeconomic strata into which they were classified. The vetoing powers of the males over family planning, contraceptive methods, and in particular, condom use was documented in another study [41], which spoke of the low autonomy of the females over their reproductive health matters and their vulnerability to pelvic inflammatory diseases or urinary tract infections as a result of inconsistent condom usage and other methods of contraception.

While the current study does not have information on the behavioural practices of and among women in particular socio-economic strata in Jamaica, except on condom usage (or the lack of), pelvic inflammatory diseases or urinary tract infections, and the knowledge of contraceptive usage, these can be use to extrapolate an interpretation from the women about their sexual behaviour, but they are insufficient proxies for such a behaviour. A study by Wilks et al. [28], however, can be used to provide more information that was not possible from this research, which are pertinent and can be used to

elucidate the issues on the socio-economic strata in Jamaica. They found that almost 39% of the women (ages 15-74 years old) of the upper class had never done a Pap smear as compared to 31% of those in the middle class and 35% in the lower income stratum. In addition to the afore-mentioned issue, 3.1% of the Jamaicans in the lower income stratum, 1.7% of those in the middle class and 2.2% in the upper class reported having had a STI. As it relates to the number of sexual partners in the past 12 months, 47.4% of those in the upper class reported that they have had more than one sexual partner as compared to 45.9% of those in the middle class and 47.5% of those in the lower income strata. Furthermore, more people in the upper income stratum indicated that they had never used a family planning method (30.4%) as compared to 25.1% of those in the middle class and 25.9% of those in the lower class. According to Wilks et al. almost 40% of the Jamaican women who were aged 15-74 years reported that they have had 2 or more sexual partners in the last 12 months as compared to 56% of the males, and that 25% of the females as compared to 26% of the males, had never used a family planning method.

Clearly, we can extrapolate correctly from Wilks et al's work [28] that women in the upper income stratum in Jamaica are engaged in risky sexual practices and inconsistent contraceptive use and are exposing themselves to STI, which would justify their high risk for pelvic inflammatory diseases or urinary tract infections. Thus, it is obvious from the current research, that having access to more material resources as well as educational opportunities does not mean that an individual will decide to be engaged in a less risky sexual behaviour. This was reinforced by studies in Nigeria, which have found an increased risky sexual behaviour among the students in institutions of higher learning [42-44]. Wilks et al's study found that marginally more Jamaicans who had a tertiary level education (or post-secondary) reported having 2+ sexual partners in the last year (46.8%) as compared to those with primary or lower education (49.4%) and almost the same as those with secondary level education (46.9%). They also found that marginally more Jamaicans with tertiary level education reported having had a STI in the year (2.7%) as compared to those with secondary level education (2.2%) and those with primary education or below level schooling [28]. With studies having established the positive association between contracting STIs and pelvic inflammatory disease, it should not be surprising to understand the rationale for a greater risk among upper class women in reporting having had a pelvic inflammatory disease or urinary tract infection in the current study.

Empirical studies from Nigeria and Wilks et al.'s research have demonstrated a rationale for the greater risk of contracting pelvic inflammatory diseases or urinary tract infections among women in the upper income strata as compared to those in the lower income strata. Another rationale which was also embedded in the explanation of the health risk disparity among the social classes in Jamaica was the vetoing power of males in the upper socio-economic class over their women with regards to family planning, condom usage and reproductive health matters. The households in some particular socio-economic classes could not appreciate that the female should bear the same financial supremacy as the males. In Jamaica, statistics revealed that more males were employed in top managerial positions and were earning more income, and that they had more access to material resources than the females [11], which provides an understanding of the vetoing power of the upper class males with regards to family planning over their spouses. Within this context, the behavioural practices of each sex differ and account for the disparities in the reproductive health outcomes which are identified in this paper.

Pender, Murdaugh, and Parsons [45] developed the Theory of Reasoned Action (TRA) to explain some aspects of peoples' behaviour. They opined that both attitudes and subjective norms constitute the building blocks of an individual's actions. The intention and attitude towards behaviour is a function of beliefs concerning the consequences of performing the behaviour and the evaluation

of these consequences as being either positive or negative. The evaluation of the outcomes of behaviour as being desirable, results in a positive attitude, and if undesirable, it is negative. Another determinant of intention, subjective norms, are the functions of what others expect a person to do; that is, what they would approve or disapprove. The TRA assumes that behaviour is under volitional control.

With reference to the "Health Belief Model", the theory suggests that a person's behaviour is determined by his/her intention to perform the behaviour and that this intention is, in turn, a function of his/her attitude towards the behaviour and his/her subjective norm [46].

The best predictor of behaviour is intention. Intention is the cognitive representation of a person's readiness to perform a given behaviour, and it is considered as the immediate antecedent of behaviour. Three things determine this intention: their attitude towards the specific behaviour, their subjective norms and their perceived behavioural control. The theory of planned behaviour holds that only specific attitudes toward the behaviour in question can be expected to predict that behaviour. In addition to measuring the attitudes towards the behaviour, we also need to measure people's subjective norms – their beliefs about how the people whom they care about will view the behaviour in question. To predict someone's intentions, knowing these beliefs can be as important as knowing the person's attitudes. Finally, perceived behavioural control influences intentions. Perceived behavioural control refers to people's perceptions of their ability to perform a given behaviour. These predictors lead to intention. A general rule is that, the more favourable the attitude and the subjective norm, and the greater the perceived control are, the stronger is the person's intention to perform the behaviour in question.

The "Social Cognitive Theory" (SCT) viewed human behaviour as a function triadic, dynamic, and reciprocal interaction of personal factors, behaviour, and the environment [47]. Based on this theory, each of these three factors uniquely determines an individual's behaviour. While the SCT upholds the behaviourist notion that response consequences mediate behaviour, it contends that behaviour is an antecedent which is largely regulated through cognitive processes [48]. Therefore, the consequences of behaviour are used to form the expectations of behavioural outcomes. It is the ability to form these expectations that give humans the capability to predict the outcomes of future behaviour. In addition, the SCT posits that most of the behaviour is learned vicariously.

The SCT's strong emphasis on one's cognitions suggests that the mind is an active force that constructs one's reality, selectively encodes information, performs behaviour based on values and expectations, and imposes the structure on its own actions. Through feedback, a person's own reality is formed by the interaction of the environment and one's cognitions. Cognitions change over time because of maturation and experience. It is through an understanding of the processes which are involved in one's construction of reality, that human behaviour may be understood, predicted, and changed.

With reference to the "Expectancy-Value Theory", behaviour is a function of the expectancies one has and the value of the goals towards which one is working. Such an approach predicts that, when more behaviour is possible, the behaviour which is chosen will be the one with the largest combination of expected success and value. Expectancy-value theories hold that people are goal-oriented beings [49].

The behaviours which they perform in response to their beliefs and values are undertaken to achieve some end. Other factors influence the process. For example, there are the social and psychological origins of the needs which give rise to the motives for behaviour, which in turn may be guided by beliefs, values, and social circum-

stances into seeking various gratifications. There is not enough information on what the multiple factors are, which are influencing the demand for health care in Jamaica.

The current study therefore, showed the reproductive health matters of Jamaican females aged 15-49 years old, particularly urinary tract infections, pelvic inflammatory diseases, Hepatitis B, and Diabetes Mellitus, and that a part of the findings were embedded in the behaviour of these individuals. The identified issues are steeped into the behavioural practices of these women, of which the culture accounts for this experience. While hygiene can account for some of the results in this study, this topic will be separate from the present work. Thus, this study recognized the role of hygiene in some of the results, but they are beyond the scope of this work.

CONCLUSION

There is a reality in Jamaica, that the females begin to have sexual relationships in their adolescence years, and that this sexual initiation is usually with older males. Other realities include inconsistent condom usage, unwanted pregnancies, increased sexually transmitted infections and exposure to other biological predispositions. The increased risk of cervical cancers in the developing nations is due, in part, to the biological predisposition of the immature cervix to infections, when exposed to sexually transmitted infections. The early age of sexual initiation of the Jamaican females, and the fact that this is mostly with older men; there is an increased likelihood of the females engaging in risky sexual behaviour and making themselves highly susceptible to pelvic inflammatory diseases or urinary tract infections.

The current study revealed that 1 in every 10 Jamaican females in the reproductive age group (15-49 years) has reported being infected with pelvic inflammatory diseases or urinary tract infections. In fact, 6 in every 100 females who are aged 15-19 years have had a pelvic inflammatory disease or urinary tract infection, and this was 13 in every 100 among those who were 20-24 years old. Although the incidence of Hepatitis B and diabetes mellitus was very low among the afore-mentioned age cohorts, females with Hepatitis B were 7.3 times more likely to have a pelvic inflammatory disease or a urinary tract infection. A moderate association was found between those with Hepatitis B and diabetes mellitus.

Premarital sexual relationships, early sexual debut and inconsistent condom usage among the females in the reproductive age group (15-49 years) in Jamaica, were not associated with pelvic or Pap smear examinations. It appears that the risky sexual behaviour among the females was associated with a low willingness to know their reproductive health status. An interest finding which emerged from the current work was that females who had done their Pap smears were 9.4 times more likely have a pelvic inflammatory disease, thus suggesting that (1) there were women who had a pelvic inflammatory disease or urinary tract infection which they were unaware of, and (2) there would be premature mortality from particular morbidities among the females in Jamaica (for example, cervical cancer).

Clearly, ignorance is not bliss, as it relates to the reproductive health matters among the Jamaican females, and to know that one's health status is for life. It can be extrapolated from the current study, that young females are preyed upon by older men, and that this encounter was exposing the young females to sexual transmitted infections as well as pelvic inflammatory diseases or urinary tract infections. With the low likelihood of using a condom during forced sexual encounters, the young females are exposed not only to sexual transmitted infections, but also to Hepatitis B.

This study provides a comprehensive understanding of the particular reproductive health risks that the females are exposed to in Jamaica, and the fact that measures can be instituted in keeping with some of the findings that have emerged from the study. There is an issue which must be addressed in Jamaica, and this is, to

add Hepatitis B examination to the list of tests that are performed on rape victims. While the public health intervention programmes should continue to address the reproductive health matters of the poor, the current study highlights the need to fashion programmes for those in the wealthy socio-economic stratum, as well as the new realities which have emerged from this work.

In summary, the present study clearly delineates the inextricable link between; pelvic inflammatory disease, urinary tract infection, diabetes mellitus and hepatitis B, and their effects on women's sexual health and practices; the wider ramifications of such a discovery, is that no aspect of the women's health can be examined, diagnosed and treated in isolation; especially the health facets that are closely interconnected with the crucial area that is synonymous with women's reproductive health.

DISCLAIMER

The researcher would like to note that while this study used secondary data from the Jamaica Survey of Living Conditions, none of the errors in this paper should be ascribed to the Planning Institute of Jamaica or the Statistical Institute of Jamaica, but to the researcher.

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