An Assessment of Knowledge, Attitudes and Behaviour Regarding the Human Papillomavirus

N Perrotte[1], A Gomez[2], G Mason[3], D Stroup[4]

ABSTRACT

Objectives: *This report is based on a study conducted in February 2010 that assessed the knowledge and attitudes toward cervical cancer and human papillomavirus (HPV) in Grenada which has a high incidence of cervical cancer.*

Methods: *The participants were 71 students at the St George's University. There were 58 females and 13 males who participated in the study, a ratio of 4.5:1. Participants were asked to complete a survey on their knowledge and attitudes about HPV, cervical cancer and the associated risk factors. Other evaluations of their levels of risk and Pap smear practices were also assessed.*

Results: *The data reflected low knowledge and infrequent screening practices, from a public health perspective, when compared with developed countries. The data showed a significant deficit in knowledge of both males and females. Almost 95% of the women surveyed were able to correctly identify the purpose of a Pap smear as compared to 69.2% of the men surveyed. When the participants were asked what was the cause of cervical cancer, 63.8% of women and 53.8% of males were correctly able to identify the HPV.*

Conclusions: *Enhanced educational programmes are needed to reduce the burden of cervical cancer that exists in Grenada.*

Keywords: Cervical cancer, human papillomavirus, Pap smear

Evaluación de Conocimientos, Actitudes y Comportamiento en Relación con el Virus del Papiloma Humano

N Perrotte[1], A Gomez[2], G Mason[3], D Stroup[4]

RESUMEN

Objetivos: *Este informe se basa en un estudio realizado en febrero, 2010, el cual evaluó los conocimientos y actitudes hacia el cáncer cervical y el virus del papiloma humano (VPH) en Granada – país con una alta incidencia de cáncer cervical.*

Métodos: *Los participantes fueron 71 estudiantes de la Universidad del Saint George. Los participantes en el estudio fueron 58 hembras y 13 varones, en una proporción de 4.5:1. A los mismos se les pidió llenar una encuesta sobre conocimientos y actitudes sobre el VPH, el cáncer cervical y los factores de riesgo asociados. También se tomaron en cuenta otras evaluaciones con respecto a sus niveles de riesgo y prácticas de pruebas citológicas.*

Resultados: *Los datos reflejaron un bajo conocimiento así como prácticas poco frecuentes de tamizajes, desde el punto de vista de la salud pública, en comparación con los países desarrollados. Los datos mostraron un déficit significativo de conocimientos, tanto por parte de los varones como de las hembras. Casi el 95% de las mujeres encuestadas pudieron identificar el propósito de la prueba citológica correctamente, en comparación con el 69.2% de hombres encuestados. Cuando se les preguntó a los participantes cuál era la causa del cáncer cervical, el 63.8% de las mujeres y el 53.8% de los varones pudieron correctamente identificar el VPH.*

From: [1]478 Lindbergh Place NE, Apt 240, Atlanta, GA 30324, USA, [2]Transglocal.org, 1918 Brickell Ave, #503, Miami, FL 33129, USA, [3]Department of Sociology, Psychology and Social Work, The University of the West Indies, Kingston 7, Jamaica and [4]PO Box 894, Decatur, GA 30031-0894, USA.

Correspondence: Dr N Perrotte, 478 Lindbergh Place NE, Apt 240, Atlanta, GA 30324, USA. E-mail: n_perrotte@msn.com

Conclusiones: *Se necesitan programas educativos perfeccionados a fin de reducir la carga de cáncer cervical que actualmente existe en Granada.*

Palabras claves: Cáncer cervical, virus del papiloma humano, prueba citológica

INTRODUCTION

Cervical cancer is a major public health problem in the developing world. In 2002, the number of new cases of cervical cancer was estimated to be 493 000 worldwide, prevalent cases were 1.4 million, and there were 273 000 deaths among women throughout the world (1). The developing countries, including Latin America and the Caribbean, accounted for approximately 80% of those numbers (1–3). In these areas, age standardized incidence was greater than 25 per 100 000, while in developed countries it was less than 7 per 100 000. Similarly, the age standardized mortality rates for developed regions averaged 3–8 per 100 000, while in the less developed countries it was 10–25 per 100 000 (1).

A study to assess human papillomavirus (HPV) prevalence in Jamaica found that 24% of women were seropositive (4), almost twice the prevalence in the United States of America [USA] (5). Despite the lack of data on HPV prevalence in Grenada, there is information regarding cervical cancer incidence (6). From 1996 to 2000, 680 new cases of any cancer were reported to the Grenada cancer registry. Of those incident cases, 43% were cervical cancers, followed by prostate cancer at 30% and breast cancer at 26% of all cases. The age standardized cancer incidence is 60.7 per 100 000 (6). The average age at diagnosis was 46.8 years (6). The age standardized mortality has an average age of 72.2 years (6). It was second to breast cancer as a cause of death in females (6).

Public health education and screening programmes in the Caribbean have not been effective as the region has one of the highest rates of cervical cancer worldwide (2). Developing countries face many obstacles in their screening programmes, including inadequate equipment and supplies, inadequate provider training, limited cytological services, and difficulty in patient follow-up and treatment (2). Due to the small number of women who are reached in these programmes, low coverage becomes the major deficiency (2).

There is also the burden of costs that comes with diagnosis. Unfortunately, the women most at risk are also women living in poverty (2). This is also compounded by the environmental conditions in the clinics; these are often overcrowded, lack privacy and are often controlled/managed by male health providers (2).

Both cervical cancer incidence and mortality increase with age in many regions of the world. The greatest burden is seen in women 35–54 years old (2). Data from Latin America and the Caribbean show that the greatest proportion of deaths in this age group is from cervical cancer (2, 7). However, this group is often not targeted for either screening or surveillance. The highest incidence of HPV infection is in the 18–24-year old group and it is the persistence of that infection that will lead to cervical cancer at age 35–54 years (2, 5). Countries which have screening programmes in place often target women in their early twenties as part of their prenatal and postnatal care: an age group which does not have as high an incidence of cervical cancer (2).

A proper understanding of the knowledge, attitudes and behaviours of young adults requires an extensive assessment of multiple factors including social, educational and cultural. Some of the major risk factors which have been shown to be associated with HPV and the development of cervical cancer that were addressed in this pilot study were age at first sexual intercourse, number of sexual partners, the use of condoms, the use of oral contraceptives and smoking (2, 5, 7).

The most important risk factor for cervical cancer is HPV infection, the persistence of that infection and the lack of screening (2). It has been documented that HPV is present in 99.7% of cervical cancers worldwide (2). Other risk factors that contribute to the development of cervical cancer include lack of education, low socio-economic status, obesity, HIV/AIDS or medication induced immunosuppression, history of an abnormal Pap smear result or cervical dysplasia, history of herpes simplex virus 2 infection, lack of accessibility to healthcare and poverty (2, 7).

Sexual behaviour is the best predictor of acquisition of the infection (2, 5). There are several sexual risk factors associated with the acquisition of cervical cancer. The risk factors are age less than 25 years, increasing number of partners, early age of first sexual encounter (16 or less) and a male partner who has had or has multiple sexual partners. It has been shown that the risk of infection rises proportionately with an increasing number of sexual partners (5).

In Jamaica, it was found that 69% of women had had their first sexual encounter by age 16 (8). The situation appears to be similar in Grenada, where a study was done looking at the sexual behaviour of adolescents. It found 19% of the 10–12-year age group, 31% of the 13–15-year age group and 50% of the age group 16–18 years had had sexual encounters (9). The study also found that 65% of the respondents had multiple partners and this was particularly common among males as compared to females 66% to 34 % (9).

One study in the Caribbean in 1998 found that on average 4.7% of men used condoms with their wives (10). The percentage of men using condoms varied between 1.3 per cent in the Dominican Republic to 17 per cent in Jamaica (10). There is a strong correlation between a man's sexual behaviour and contraction of HPV infection by a woman (11).

Due to the high cervical cancer rate in Grenada and other Caribbean islands and the fact that simple Pap smear screenings are low risk and low cost (2), we conducted this pilot study. We surveyed a convenience sample of undergraduate students at the St George's University. The purpose of the study was to assess knowledge, attitudes and behaviour as it relates to HPV and cervical cancer and the actual practices of young adults. While it is difficult to generalize the views of the group to the entire population given its size and sampling method, some assumptions can be made for this is a highly educated group who 'should' be more knowledgeable about issues, including HPV and cervical cancer.

SUBJECTS AND METHODS

Several research questions addressed relationships between important risk factors and preventive practices concerning HPV including Pap smear adherence and knowledge about HPV and cervical cancer. The research questions examined were:

    C What types of person are at higher risk of contracting HPV?
    C Does knowledge level differ based on risk level?
    C Does knowledge level differ based on Pap smear adherence?

The study used a mixed sampling approach with a cross-sectional survey design. The students of the Introduction to University Life class were targeted for this study as they were readily available and would be able to address the questions in the survey. It was a convenience sample for the participants of the class were targeted and had a choice to participate in the study (self-select). There was no exclusion criterion. As it was a convenience sample, the participants were not wholly representative of the population. The participants were unmatched for age, gender, marital status and sexual activity.

The goal was to recruit 62 persons for the study. This was based on the hypothesis of finding whether 45% of the survey population would be aware of the role of HPV as a causative agent in cervical cancer. Sixty-two persons will give a confidence level of 97%. The class consisted of 75 potential participants, but one chose not to participate and three questionnaires had to be discarded for they were incomplete. The students were allowed to fill out the questionnaire regardless of age. The study targeted both men and women.

The instrument was self-administered. It had 29 closed-ended questions which took about five minutes to complete. The questionnaire assessed demographic information such as age, educational level, marital status and race. It also included questions focussed on knowledge of HPV and cervical cancer and the associated risk factors. There were also questions that looked at beliefs and attitudes of the study population.

The data assessed knowledge and compared risk levels, whether or not a Pap smear was done and gender were analysed using the Student's t-test. Chi-square tests were used to examine the relationship between females' level of risk and their Pap smear adherence. In order to minimize some of the confounding factors that were present given that this was a convenience study, the study was stratified along age and gender. The data were analysed using the Statistical Package for Social Sciences (SPSS) programme Software, Version 11.

RESULTS
Demographic
Completed forms were obtained from 71 participants (Table 1). The majority of the participants were women (58 of 71,

Table 1: Demographic information of participants

Demographic	Female (n = 58)		Male (n = 13)	
	n	(%)	n	(%)
Age (years)				
18 – 21	18	(31.0%)	7	(53.8%)
22 – 24	19	(32.8%)	2	(15.4%)
Over 24	21	(36.2%)	4	(30.8%)
Country of origin				
Grenada	50	(86.2%)	9	(69.2%)
Other Caribbean islands	8	(13.8%)	4	(21.8%)
Marital status				
Single	52	(89.7%)	12	(92.3%)
Married	6	(20.3%)	1	(7.7%)
Age when 1st had intercourse (years)				
10 – 12	1	(1.7%)	0	(0.0%)
13 – 15	5	(8.6%)	3	(23.1%)
Over 16	42	(87.5%)	9	(69.2%)
Never had sex	10	(17.2%)	1	(7.7%)
Number of sexual partners[1,2]				
1	10	(20.8%)	1	(8.3%)
2	17	(35.4%)	1	(8.3%)
3 – 5	11	(22.9%)	4	(33.4%)
More than 5	10	(20.8%)	6	(50.0%)
Number of sexual partners in last 30 days[1]				
0	18	(37.5%)	1	(8.3%)
1	29	(60.4%)	6	(50.0%)
2	1	(2.1%)	4	(33.4%)
3 – 5	0	(0.0%)	1	(8.3%)
Use of condoms[1]				
Never	7	(14.6%)	1	(8.3%)
Occasionally	25	(52.1%)	6	(50.0%)
Often	10	(20.8%)	0	(0.0%)
Always	6	(12.5%)	5	(41.7%)
Cigarette smoking activity				
Never	54	(93.1%)	7	(53.8%)
Occasionally	4	(6.9%)	6	(46.2%)

Note: [1]The numbers and percentages here are based on those respondents (48 females, 12 males) who had ever had sex.

[2]After regrouping number of sexual partners into few (ie, 0 to 2 partners) and many (ie, more than two partners), a significant gender difference was observed, with males having more partners than would be expected, $\chi^2(1) = 7.16$, $p < 0.05$, Cramer's V= 0.317.

81.6%), residents of Grenada (59 of 71, 83.1%), and unmarried (64 of 71, 90.1%). Most participants were sexually active: 48 of 58 women (83%) and 12 of 13 men (92.3%). Of the 48 women who had had sexual intercourse, 36 did not have children. Of the 12 who did have children, most had one child (41.7%) or two children (33.3%); 25% had three or more children

Sexual activity

The majority of the women (42 of 58, 87.5%) had their first sexual encounter at ages 16 and over with one participant in the 10−12-year old range. Similarly, most males (69.2%) had their first sexual encounter at age 16 and over. The women surveyed were older than the males and initiated sexual encounters at a later age.

The data showed that younger males were more sexually active than the older women (Table 1). After categorizing number of sexual partners into few (ie, 0 to 2 partners) and many (ie, more than 2 partners), a significant gender difference was observed (χ^2 (1) = 7.16, $p < 0.05$) with more males falling into the "many" category than would be expected due to chance.

Risk factors

The major risk factors assessed for the 48 women who were sexually active were lifetime number of partners greater than five, the age of first sexual encounter of 15 years and younger, two or more partners in the last 30 days and smoking (Table 2). The women who had one or more of these risk factors were deemed high risk. This resulted in 32 (66.67%) women being labelled low risk and 16 (33.3%) being labelled high risk.

Pap smears

Among the 48 women who were sexually active, 25 (52.1%) women had done Pap smears. Of those, 8 (32%) reported that the experience was embarrassing and 11 (44%) reported that it was painful. In this study, 13 (52%) were extremely concerned about developing cervical cancer, 7 (28%) were a little or moderately concerned and 6 (20%) had very little concern. In terms of their actual risk of contracting cervical cancer, 3 (12%) thought their risk was very high, 9 (36%) thought their risk was average, 5 (20%) thought they were at low risk and 7 (28%) thought they were very low risk.

Of the 48 women who were sexually active, 23 had not done a Pap smear. These women were then asked why they had not done a Pap smear and they were able to select multiple answers to this question. Twenty (62%) reported that they were unaware of the need for the test, 5 (16%) thought the test would be embarrassing, 5 (16%) also thought that the experience would have been painful and 4 (13%) reported that they were unable to get an appointment.

Women who had not done Pap smears were as concerned about contracting cervical cancer as those who had done Pap smears. However, in comparison to the women who had done a Pap smear, a greater percentage of these women believed

they were at low to average risk of contracting cervical cancer and a much smaller percentage believed that they were at high risk. These differences in self-perception may explain why 62% of them did not think that they needed to have a Pap smear (Table 2).

Table 2:   Females' risk factors for HPV and cervical cancer based on Pap smear activity

Demographic Factor	Females who ever had a Pap smear (n = 25)		Females who never had a Pap smear (n = 23)	
	n	%	n	%
Age at 1st sexual encounter (years)				
Under 16	4	16	2	6
16 and over	21	84	21	94
Number of lifetime partners				
5 or less	16	64	22	96
More than 5	9	36	1	4
Partners in last 30 days				
None	6	24	12	52
1	18	72	11	48
2*	1	4	——	——
Smoke				
Never	23	92	21	91
Occasionally	2	8	2	9

Note: *No female participant had more than two sexual partners in the last 30 days.

Knowledge

Knowledge was assessed based on being able to correctly identify the purpose of a Pap smear, what an abnormal Pap smear means, how HPV is contracted, how HPV is recognized, the cause of cervical cancer and the number of partners associated with higher risk (Table 3). All women got an average of 3.76

Table 3:   Participants' knowledge of HPV and cervical cancer

Knowledge item	Women (n = 58) Number who got item correct	%	Men (n = 13) Number who got item correct	%	All (n = 71) Number who got item correct	%
Purpose of Pap smear	55	94.8	9	69.2	64	90.1
What abnormal Pap smear means	40	69.0	8	61.5	48	67.6
How HPV contracted	42	72.4	9	69.2	51	71.8
What causes cervical cancer	37	63.8	7	53.8	44	62.0
How to recognize HPV	11	19.0	3	23.1	14	19.7
Whether number of sexual partners increases risk	33	56.9	8	61.5	41	57.7

questions correct (SD = 1.48); the number of correct answers was not statistically different for the 48 women who were sexually active (3.83; SD = 1.89). The high risk group (M = 4.06, sd = 1.12, n = 16) had slightly more knowledge than the low risk group (M = 3.72, SD = 1.51, n = 32), t (46) = 0.81, $p > 0.05$.

The knowledge of the women was analysed based on whether or not they had done a Pap smear. Although both groups performed best with their knowledge of the purpose of a Pap smear and performed worst on their knowledge of recognizing HPV, there were still significant differences between the groups in their knowledge. Women who had done a Pap smear were overall significantly more knowledgeable (M = 4.40, SD = 1.29, n = 25), than those who had never done a Pap smear (M = 3.22, SD = 1.43, n = 32), t (55) = 3.23, $p < 0.05$.

Comparisons of women's knowledge for individual items indicated several differences based on whether or not the woman had ever done a Pap smear. For instance, women who ever had a Pap smear were significantly more likely to get the item "Ever heard of HPV" correct, $\chi^2(1) = 4.71$, $p < 0.05$. These women were also significantly more likely to know what an "Abnormal Pap smear means" compared to females who had not had a Pap smear, $\chi^2(1) = 5.00$, $p < 0.05$, and to know "How to recognize HPV", $\chi^2(1) = 6.43$, $p < 0.05$. The knowledge of two other items, "Whether number of male partners increases risk" and "How HPV is contracted", showed that individuals were more aware of the correlations and this tended toward significance, $\chi^2(1) = 3.64$, $p = 0.06$ and $\chi^2(1) = 3.21$, $p = 0.07$, respectively. Table 4 shows the details for these comparisons.

Table 4:   Females' knowledge of HPV and cervical cancer based on Pap smear activity

Knowledge Items	Females who ever had a Pap smear (n = 25)		Females who never had a Pap smear (n = 32)	
	Number who got item correct	%	Number who got item correct	%
Purpose of Pap smear	25	100	29	90.6
Abnormal Pap smear means*	21	84	18	56.3
How HPV contracted#	21	84	20	62.5
How to recognize HPV*	8	32	2	6.3
What causes cervical cancer	17	68	19	59.4
No. male partners increases risk#	18	72	15	46.9
Heard of HPV*	22	88	20	60.25

Note: 1.   One participant who had never had sex did not indicate if she ever had a Pap smear so the total for this table is 57 instead of 58.

2.   Knowledge items with an * are those in which the groups differed significantly at the $p = 0.05$ level.

3.   Knowledge items with an # are those in which the groups differed significantly at the $p = 0.10$ level.

The imbalance in numbers by gender (*ie*, 58 women *versus* 13 men – a ratio of 4.5 to 1) means that comparisons must be interpreted with caution. Nonetheless, there were no significant differences by gender for knowledge of all six items, t (69) = 0.77, $p > 0.05$, or for any individual item. Performance for all six items were men (M = 3.38, SD = 1.98) and women (M = 3.76, SD = 1.48). However, a higher percentage of females (n = 43, 74.1%) had heard of the HPV than males (n = 8, 61.5%).

DISCUSSION

This study showed that there was a significant gap among persons who are considered to be knowledgeable about HPV. The study also showed that there was a lack of basic education on HPV and cervical cancer, the causes and associated risk factors. However, it supported the sole hypothesis, that > 45% of the study population were aware of HPV. Therefore, the most important intervention that can be performed with this population will be further education.

The study was limited by several factors. The study was a convenience sample which was skewed to persons who were favourably disposed to discussing matters of a personal or sexual nature. Therefore, one must be careful in making generalizations as the sample may not truly represent the population in Grenada.

Another limitation is that the sample represents an educated segment of the Grenadian population given that they were recruited from the St George's University campus where they are students. They all had a high school education and were in their first year of university education. It has been shown that this population tends to be at lower risk for developing cervical cancer later in life as they were more knowledgeable about healthy lifestyles and preventative measures to ensure healthier life outcomes (2). There may be an unmeasured confounder in that the students are more aware than the general public.

The results indicate that there are significant deficits in the knowledge surrounding cervical cancer and the associated risk factors. The item about being able to recognize HPV (which was the weakest item) is particularly important for understanding why the virus is being spread. In identifying the purpose of a Pap smear, the women far outperformed the men, but this may be because women are more aware of this issue. Interestingly, the items that men need to be more aware of in terms of spreading the virus (how contracted, what causes it, how to recognize it) are the ones they performed worse on. There was a similar trend for women in terms of their knowledge of the relationship between the number of sexual partners and risk of HPV. This again speaks to why there is the high incidence of cervical cancer in the region.

Given the lack of knowledge and misconceptions re HPV, here are some suggestions which will help address those problems. In order to start the education process, there will need to be allocation of resources toward the education of women about screening. There is a push to get more preven-

tative healthcare on both the local and global stage and this will be an appropriate step. "Better screening, treatment, and affordable vaccines can prevent doubling of cervical cancer deaths" was stated as a conclusion at a meeting held in Mexico City, May 12, 2008 (12). This will depend on the political will from both the government and the medical association. This will mean using the media and healthcare personnel for the implementation of an educational campaign combined with screenings.

Another way to get effective screening done is through cost allocation. Due to the presentation of cervical dysplasia and cancer in women in their 30s−40s, there is an argument for discontinuation of cervical cancer screening at age 50 years as a means of reducing cost (13).

Streamlining funds by targeting the women who are older is another means of addressing this problem. A study of five developing countries, namely India, Kenya, Peru, Thailand and South Africa showed that doing a visual inspection of the cervix with acetic acid or Pap smear test with HPV DNA testing at age 35 years was sufficient to reduce the lifetime risk of cervical cancer by 25−36% (16). The cost involved was less than US$500 per year of life saved. The risk of cancer declined a further 40% with a second test at age 40 years (14).

There will need to be a media campaign encouraging women to get screened. It will need to target women from 35−54 years, the age group where there is significant mortality from cervical cancer. The use of information leaflets is one avenue that can be used to educate patients, as well the television and radio. These can be tailored to the culture and community that is being served.

Recently, there has been the introduction of the cervical cancer vaccine, which has been widely accepted (2, 3, 5). As a result, there is a push to get girls and young women vaccinated to prevent cervical cancer (2, 3, 5, 15). However, this is an expensive measure. It costs approximately US$360 for three doses for one female (5). This could prove to be very expensive to be incorporated into the regular vaccinations that are administered in Grenada. The Ministry of Health budget in 2010 was EC$55.7 (US$ 20.7) million (16). In order to carry out a vaccination programme, it will mean additional cost to starting a new programme, educating the population and the additional ancillary staff that the process will require. Based on estimates from the population census, there are approx 17 000 females who are between the ages of 9−26 years (17), which is the recommended age range that requires vaccination (3, 5). The cost of US$360 per female will cost the government US$6 million or about 30% of the 2010 health budget and so is not feasible.

In conclusion, while the sample was not representative of the general population (since it was only university students) it provided a glimpse of a segment of Grenadian young adults, which is telling. It could be assumed that the general population may be less knowledgeable than the sampled group. The study shows that there is a disparity in the actual screening practice that is conducted, even though most persons are aware of the importance of doing Pap smears. There are many factors that will need to be addressed and will require the effort of both the medical fraternity and government.

REFERENCES

1. International Agency for Research on Cancer (IARC) Globocan 2002. [Accessed January 23, 2012]. Available from http://www.paho.org/english/ad/dpc/nc/pcc-cc-sit-data.htm
2. Pan American Health Organization (2004). A situational analysis of cervical cancer Latin America and the Caribbean. Pan Am Health Organ 2004 ed. Washington, D.C. PAHO 2004.
3. Pan American Health Organization (2005). Immunization Unit Family and Community Health. [Accessed on January 23, 2012]. Available from http://www.paho.org/english/ad/fch/im/sne2702.pdf
4. Strickler HD, Kirk GD, Figueroa P, Ward E, Braithwaite AR, Escoffery C et al. HPV16 antibody prevalence in Jamaica and the United states reflects differences in cervical cancer rates. Int J Cancer 1999: **80:** 339−44.
5. Centers for Disease Control and Prevention (2007), Human Papillomavirus: HPV Information for clinicians. Centers for Disease Control and Prevention. [Accessed January 23, 2012]. Available from http://www.cdc.gov/std/hpv/common-clinicians/ClinicianBro-fp.pdf
6. Asulin Y, McCann TJ, McCarthy CW, Hage RW, Rooney PJ, Macpherson CNL. Cancer incidence and mortality in Grenada. West Indian Med J 2004; **53:** 368−73.
7. Reynolds D. Cervical Cancer in Hispanic/Latino Women. Clin J Oncol Nurs 2004 **8:** 146−50.
8. Figueroa JP, Ward E, Luthi TE, Sten H, Vermund SH, Brathwaite AR et al. Prevalence of Human Papillomavirus among STD clinic attenders in Jamaica: Association of Younger Age and Increased Sexual Activity. Sex Transm Dis 1995; **22:** 114−8.
9. Richards C. Assessment of knowledge and attitudes of women in Grenada towards cervical cancer (Masters Dissertation) St George's University; 2001.
10. Almonte M, Albero G, Molano M, Carcamo C, Garcia PJ, Perez G. Risk factors for Human papillomavirus exposure and co-factors for cervical cancer in Latin America and the Caribbean. Vaccine 2008; 265: L16–L36.
11. Wellings K, Collumbien M, Slaymaker E, Singh S, Hodges Z, Patel D. Sexual behaviour in context: A global perspective. Lancet 2006; **368:** 1706−28.
12. Pan American Health Organisation (2008) better screening, treatment, and affordable vaccines can prevent doubling of cervical cancer deaths. [Accessed January 23, 2012]. Available from http://www.paho.org/English/DD/PIN/HPV-Executive_Summary.pdf
13. Cruickshank ME, Chambers G, Murray G, McKenzie L, Donaldson C, Andrews J et al. Age restricted cervical screening: HPV testing at age 50 identifies a high risk group for cervical disease. Int J Gynecol Cancer 2002; **12:** 735−74.
14. Goldie SJ, Gaffikin L, Gldhaber-Fiebert, JD, Gordillo-Tobar AB, Levin C, Mahe C et al. Cost-effectiveness of cervical cancer screening in five developing countries. N Engl J Med 2005; **353:** 2158−68.
15. Centers for Disease Control and Prevention (2009), ACIP provisional recommendations for HPV vaccine for clinicians. Center for Disease Control and Prevention. [Accessed April 3, 2010]. Available from http://www.cdc.gov/vaccines/recs/provisional/downloads/hpv-vac-dec2009-508.pdf
16. Government of Grenada 2010 Budget. [Accessed on April 3, 2010]. Available from http://www.gov.gd/egov/docs/budget_speech/budget2010.pdf
17. Government of Grenada Population Census 2001. Statistics Office, Ministry of Finance. [Accessed June 19, 2007].