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### EFFECTS OF HEALTH EDUCATION INTERVENTION ON KNOWLEDGE, ATTITUDE AND PRACTICE OF YOUTHS CONCERNING HIV/AIDS IN A RURAL NIGERIAN COMMUNITY

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#### ABSTRACT

Acquired Immune Deficiency Syndrome (AIDS) caused by Human Immunodeficiency virus (HIV) has been a major public Health issue affecting millions of individuals around the World. No continent is spared.

HIV/AIDS is the most deadly of all the sexually transmitted infections. HIV/AIDS epidemic could have incalculable implications for Agriculture, Business and Socio-Economic development of a country.

This intervention study was carried out between June and October 2006 with the aim of assessing the impact of health education on the Knowledge Attitude and Practice of youths concerning HIV/AIDS. Preliminary KAP was assessed among study and control groups with the aid of a structured questionnaire designed by the researchers. This was followed by the intervention stage with health education given to the youths in the study group and subsequent evaluation of the impact using the same instrument used at the preliminary stage. The study took place in Ikerre Ekiti, a rural community in Ekiti state, Nigeria.

The results showed increase in the level of knowledge among the intervention group on STI & HIV/AIDS from 70.7% to 100%. The attitude and practice of the study group were also statistically different from the control group after intervention.

It was concluded that infection rate can be reduced by public health initiatives such as health education. To reduce the rate of spread of HIV infection, it is recommended that HIV/AIDS education be vigorously pursued amongst adolescents.

**KEYWORDS:** Impact, Intervention, Youths, HIV/AIDS, Nigeria

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#### INTRODUCTION

The use of health education initiative in reaching out to the society on various health related issues with tangible outcome, have been documented (1). In the absence of curative drugs and prophylactic vaccines, one of the ways currently available for dealing on a large scale with HIV/AIDS, STI and reproductive health issues is through development of appropriate standards of behaviour, with information being translated into behaviours that promote health (2).

Education has impact on HIV/AIDS & STI and its consequences by providing knowledge that will inform self – protection, promote behaviour that will lower infection, promote caring for those who are infected, reduce stigma, silence, shame and discrimination.(1,3,4) This study was

therefore carried out to determine the influence of health education intervention on the KAP of youths in the study area.

#### METHODOLOGY

**Study Population** The study population comprised of youths from Ikere-Ekiti community in Ekiti state, Nigeria. The experimental group were two randomly selected youth organizations from the 10 registered youth organizations in Ikere-Ekiti. The control group were youths from another two randomly selected youth organizations in Ikere-Ekiti.

Youths aged 12-23 years as at the time of the study were included in the study.

**Study Design:** This was an experimental study that was carried out in three stages viz: pre-intervention, intervention and post intervention stages. In the pre-intervention stage, questionnaires were administered to both the study and control groups to generate quantitative data. In the intervention stage, respondents in the study group were given health education session consisting of lectures and distribution of information, education and communication materials. At the post intervention stage, the same questionnaire used in the pre-

intervention stage were administered again to the study and control groups to determine the effect of the health education on HIV/AIDS knowledge, attitude and practice of the study group. Post-intervention data were collected after three months.

**Sampling method and Data analysis:** Multistage sampling method was adopted. The list of all registered social youth organizations in the community obtained from the Ministry of Youths and Sports. Simple random sampling technique by ballot was used to select both the experimental and control groups.

The respondents from the youth organizations were selected using the nominal roll from where the required number of respondents in each association was selected by the systematic random sampling technique. In all a total of 500 respondents were selected for both experimental and control groups.

The instrument for data collection was a pretested questionnaire designed by the researchers.

Data was analysed using the version 3.2 of the computer software, EPI-INFO .

**RESULTS**

**Demographic Characteristics**

The mean age was 16.25 years control group and 16.33 years in the study group. There was therefore statistical difference between the ages of the control and the study groups. The age range of both groups was also 12 to 23 years. The control group had 72% females while the study group had 69% female respondents.

Students constituted 98.4% and 98% in both groups with 95.2% and 94% of them in tertiary institutions respectively.

**Level of Knowledge :**Table 1 shows the respondents’ pre and post intervention knowledge about HIV/AIDS.

**Table 1: Pre and post intervention knowledge level of the participants.**

Knowledge	Pre Intervention			Post Intervention		
	Study	Control	p-value	Study	Control	p-value
Every heard about HIV/AIDS						
Yes						
No	176 74	175 75	1.0000	250 0	177 73	0.000
Knew the cause of HIV/AIDS						
Yes						
No	27 223	25 225	0.8835	240 10	25 225	0.0000
Weight loss greater than 10%						
Yes						
No	27 223	25 225	0.8835	240 10	25 225	0.0000
Persistent Fever						
Yes	16	15	1.0000	250	15	0.0000
No	234	235		0	235	
Chronic diarrhea						
Yes	18	19	1.0000	235	19	0.0000
No	232	231		15	231	
Transmission via unprotected sex						
Yes						
No	140 110	180 70	0.0003	235 15	180 70	0.0000

**Level of Awareness among the Respondents about Preventive Measures:** This is depicted in table 2.

**Table 2: Level of awareness among the respondents about preventive measures for HIV/AIDS**

Preventive Measures	Pre Intervention			Post Intervention		
	Study	Control	p-value	Study	Control	p-value
Abstinence						
Yes	21	17	0.6126	250	17	0.000
No	229	233		00	233	
Faithful to one partner						
Yes	85	80	0.7036			
No	165	170		240	80	0.0000
				10	170	
Use of condom						
Yes	18	13	0.8948	240	13	0.0000
No	232	237		10	237	
Screening of blood						
Yes	34	32	0.8948	245	32	0.0000
No	216	218		05	218	
Use of sterile instruments						
Yes	168	170	0.9238	235	170	0.0000
No	82	80		15	80	

**ATTITUDE OF RESPONDENTS TO HIV/AIDS :** This was examined using some signal attitudinal questions and the outcome is depicted in table 3.

**TABLE 3: Attitude of respondents towards HIV/AIDS pre and post intervention.**

Attitude	Pre Intervention			Post Intervention		
	STUDY	CONTROL	p-value	STUDY	CONTROL	p-value
Ever seen anyone with HIV/AIDS						
Yes	102	101	1.0000	132	102	0.0093
No	148	149		118	148	
Knew anybody dying of AIDS						
Yes	17	14	0.7107	152	14	0.0093
No	148	149		118	148	
Willing to discuss HIV/AIDS						
Yes						
No	70	70	0.9206	248	70	0.0000
	180	180		02	108	
Willing to attend seminar on the topic						
Yes	9	52	0.8237	245	52	0.0000
No	201	198		05	198	
Willing to use condom						
Yes						
No	10	14	0.8237	242	14	0.0000
	240	236		08	236	
Can engage in unprotected sex						
Yes	140	180	0.0002	20	180	0.000
No	110	70		230	70	
Sharing needles for drug use						
Yes						
No	99	110	0.3645	7	110	0.0000
	151	140		243	140	

**Practice of Respondents Concerning HIV/AIDS:** This was examined with their practice on safe sex. The outcome is depicted in table 4

**Table 4: Practice of Safe Sex among the Respondents .**

Practice	Pre Intervention			Post Intervention		
	Study	Control	p-value	Study	Control	p-value
Ever discussed about HIV/AIDS						
Yes	120	118	0.9286	240	120	0.0000
No	130	132		10	130	
Ever had casual sex						
Yes	78	79	1.0000	60	79	0.7236
No	172	171		190	171	
Still have sex						
Yes	04	03	1.000	90	03	0.0000
No	246	247		160	247	
Ever used condom						
Yes	12	11	1.0000	80	11	0.0000
No	238	239		170	239	
Will use condom at every intercourse						
Yes	06	05	1.0000	160	05	0.0040
No	244	245		90	245	

### DISCUSSION

In this study there was significant increase in the level of knowledge among the intervention group (from70.7% to 100% p = 0.0000). In a similar study by Oladimeji and Williams in Ibadan 90.6% awareness level after intervention was recorded(5). In another study in Zimbabwe, there was an increase in the level of knowledge among the intervention group from 20% to 90%(6).

This means that health education is an essential tool for HIV/AIDS knowledge improvement. There was statistical difference in the number of youths who were willing to adopt the use of condom during sexual intercourse after intervention. It was also discovered that there was reduction in the number of youths who were willing to engage in unprotected sexual intercourse after intervention. The implication of these, is that health education has a major role to play in influencing reduction in the attitude of youths towards HIV/AIDS risky behaviour as has been found in similar studies elsewhere (7). There was statistical difference between the number youths who were willing to attend seminars on the issue before and

after intervention (p-value =0.0000) so also were those that were willing to discuss about HIV/AIDS (p-value = 0.0000). These imply that people would welcome further health

education sessions as a public health initiatives to stem the epidemic rate of STD/HIV/AIDS(8).

Almost 64% of the 250 respondents in this study claimed that they will use condom consistently during intercourse after intervention. Consistent and correct use of condoms have been shown to provide close to 98% protection against infection(3). This has to be interpreted carefully as most of them may agree to consistent use but may find it difficult in practice. It is also important to note that consistent use is not the same as correct use. Further studies and training on the correct use of condom need to be carried out in the study area.

### CONCLUSION AND RECOMMENDATIONS

This study demonstrated that majority the youths studied had heard of HIV/AIDS pre intervention but the level of awareness concerning the etails of transmission and prevention was poor. Despite the fact that many of them were aware of the disease the level of risky behaviour was still high. Health education strategies using well designed information, education and communication (IEC) programmes on HIV/AIDS have been shown in this study to impact on the knowledge, attitude and practice of the intervention group. Health education on a larger scale is recommended for the youths in the study area, there should be formation of anti-AIDS sub units in the various youth clubs to enhance the peer effects of subsequent interventions. There is need for further studies to investigate the correct use of condom in the study area. Health education concerning

HIV/AIDS is recommended as part of the school curriculum as most of the respondents are students.

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### **KNOWLEDGE, ATTITUDE AND PRACTICE OF THE TRAINEE SEAFARERS TO HIV/AIDS AND STIs AT APAPA SEAPORT, LAGOS.**

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#### **ABSTRACT**

The epidemic of human immunodeficiency virus (HIV) in Nigeria is being fuelled by ignorance and other Sexually Transmitted Infections (STIs). Little is known about HIV-risk related sexual behavior of the Nigerian sailors. This study describes the baseline knowledge, attitude and practice of the trainee sailors to HIV.

Ninety four (83.2%) of the 113 trainee interviewed consented to participate in voluntary counseling and confidential testing (VCT) programme. Each trainee completed an anonymous self- administered questionnaire and was tested for syphilis, trichomoniasis and HIV.

Seventy one (75.5%) of the respondents were between ages 21-25 years. Twenty three (25%) did not believe that having sex with commercial sex workers puts them at high risk of HIV while eighteen (19.1%) did not believe that condoms were protective. Only ten (10.6%) practiced abstinence while three were homosexual. Despite all these, sixty three (67%) believed that they were at little or no risk of HIV, prevalence of which was found to be 5.3% among them. Seventy one (75.5%), fifteen (16%), twenty (21%) and (20.2% of respondents believed that genital ulcers, gonorrhea, syphilis and HIV respectively were not sexually transmitted. Trichomoniasis and syphilis were found in two (2.1%) and one (1.1%) respondents respectively. Female sex ( $P=0.002$ ) and trichomoniasis ( $P=0.017$ ) were found to significantly influence HIV infection.

There was a high level of ignorance about HIV and STIs among respondents. This was further highlighted by the high rate of high-risk behaviors. Therefore, sustained educational programs and promotion of condoms are recommended to address this problem.

**KEY WORDS:-** Trichomoniasis, seafarers, HIV, STIs, syphilis.

## **INTRODUCTION**

About 40 million people worldwide are living with HIV, with an estimated 15,000 new infections occurring daily. It is also the leading cause of death in sub-Saharan Africa <sup>1,2</sup>. Sub-Saharan Africa accounts for almost 70% of the global total of HIV-positive

people and 83% of cumulative AIDS deaths <sup>3</sup>. Nigeria with a prevalence of 5.0% accounts for over 3 million people living with HIV, where it is estimated to be spreading at the rate of one person per minute, threatening Africa's most populous nation <sup>4</sup>

It has been shown conclusively that acquiring Sexually Transmitted Infections (STIs) increases the risk of acquiring HIV. This is not only because they share the same routes of transmission but STIs actually increase the efficacy of acquisition and transmission of HIV by 1.5- to 7- fold <sup>2</sup>. Therefore commercial sex workers (CSWs) and men that have sex with men are at a high risk<sup>5,6</sup>.

Sexual transmission of HIV is also fuelled by mobility, with migrant workers spending long periods of time away from home and frequently visiting CSWs, then returning home to infect their spouses. HIV is therefore spreading among traveling salesmen, soldiers, long distance truck drivers and sailors <sup>6</sup>

A recent study among Nigerian Naval personnel showed that most of them believed that AIDS exists and over 50% of them also felt that a cure was available in Nigeria<sup>7</sup>. The study also showed that 40% of those who had been with CSWs had not used a condom during the last encounter. In this study we targeted trainee seafarers at the Apapa seaport to determine their baseline knowledge, attitude and practices as it relates to HIV and STIs and to determine the prevalence of these infections. Follow up studies are planned to determine the effect of the profession on their attitudes towards HIV and practice of safer sex.

## **MATERIALS AND METHODS**

### **Study population.**

The study was performed over a period of two months on trainee seafarers that were less than one year in training at the Nigerian Ports Authority, Apapa, Lagos. The seafarers were 150 in all. One hundred and thirteen (75.3%) of them were available for counseling out of which 94 (62.7%) agreed to participate. Written informed consent was obtained from each participant after counseling on safe sex practices. Participation in the study was voluntary and confidential.

### **Knowledge, attitude and practices of participants regarding HIV and safer sex.**

A self-administered questionnaire was given to the participants to evaluate their knowledge, attitude and practices toward HIV and STIs.

### **Specimen collection and transportation**

For HIV and syphilis testing, 5mls of blood was collected from each participant into sterile, plain screw cap plastic tubes and transported to the laboratory on ice and the serum was separated within an hour and stored at -70 °C. For *Trichomonas vaginalis* microscopy, first void urine was collected from male participants into sterile universal containers while self-administered sterile swab sticks were used by the female participants to collect vaginal secretions. These were transported to the laboratory immediately.

### **HIV testing**

The GENIE II HIV-1/HIV-2 kit (Bio-rad, 3 Bd Raymond Poincare 92430 Marnes La Coquette, France) was used for qualitative detection of HIV antibodies in participant's sera.

All tests were controlled with manufacturer's provided positive and negative controls and interpreted in line with manufacturers manual.

All samples were further tested by quantitative EIA standard method using GENSCREEN<sup>®</sup> PLUS HIV Ag-Ab for HIV 1 & 2 (Bio-rad, 3 Bd Raymond Poincare 92430 Marnes La Coquette, France), a fourth generation kit. The presence of detectable HIV antibodies or antigen was determined by comparing the absorbance measured for each sample to the calculated cut-off value in line with manufacturer's instructions.

### **Syphilis testing.**

Serum from each participant was tested for antibodies to syphilis with Rapid Plasma Reagin kit (Becton and Dickinson and co. 7, loveton circle Sparks, Maryland 21152 USA) in line with manufacturer's instructions. All reactive samples were further tested by specific *Treponemal pallidum* heamagglutination assay (TPHA) for confirmation. Samples reactive by TPHA were considered positive for *T. pallidum*.

### ***T.vaginalis* testing**

Sediment from centrifuged urine from males and the wet preparations of vaginal secretion from females were examined microscopically within two hours of collection. Demonstration of ovoid trophozoites with the typical jerky motility was considered diagnostic of *Trichomonas vaginalis*.

### **Data analysis**

The completed questionnaires were checked for completeness and open-ended questions were coded. The data was analyzed with Epi-Info software package, version 6.0. Chi-square analysis was used to determine association between variables. P-values of <0.05 was taken as significant.

## **RESULTS**

### **Socio demographic-data.**

The ages of the 94 respondents ranged from 15 to 40 years with the largest percentage (75.5%) belonging to the 21-25 years age group, (table i). Only one respond Seventy one (75.5%) were males, while the rest were females. Eighty seven (92.6 %) had secondary school education while the rest had higher diploma. Most were Christians with 51% being Pentecostals and 13.8% being Catholics. Only 6.4% of them were Moslems.

he most common tribes were the Hausa/Fulani (25.5%), followed by the Ibos (22.3%) and the Yorubas (8.5%). The rest were from other tribes.

sex with more than two persons in the last 3 months, (table ii). Fifteen (15.9%) never used a condom when they had sex,

**Table i: HIV prevalence in different age groups**

AGE GROUP	HIV POSITIVE	HIV NEGATIVE	TOTAL NUMBER OF RESPONDENTS	% POSITIVE
15-20	0	3	3	0
21-25	4	67	71	5.6
26-30	1	18	19	5.3
31-40	0	1	1	0
Total	5	89	94	5.3

**Table ii: Number of sex partners in previous 3 months and HIV prevalence.**

SEX PARTNERS	HIV POSITIVE	HIV NEGATIVE	TOTAL NUMBER OF RESPONDENTS	% POSITIVE
0	0	29	29	0
1	2	44	46	4.3
2	2	7	9	22
3 or more	1	9	10	10
Total	5	89	94	5.3

37 (39.4%) sometimes used condom while 33 (35%) always used condoms, (table iii).

Eight respondents had sex with CSWs while another

eight had sex with casual acquaintance. The rest had regular partners. Three (3.2%) of the respondents were involved in homosexual activities.

**Table iii: Use of condom and HIV prevalence**

CONDOM USE.	HIV POSITIVE	HIV NEGATIVE	TOTAL NUMBER OF RESPONDENTS	% POSITIVE
ABSTINENCE	0	10	10	0
NON USE.	2	13	15	13
SOMETIMES	2	35	37	5.4
ALWAYS	1	31	32	3.1
Total	5	89	94	5.3

**HIV/STDs knowledge and attitude.**

Eighty five (90%) of the respondents had heard of HIV/AIDs but fourteen (14.9%) did not know how it is transmitted. Twenty seven (28.2%) believed that it could not be transmitted from mother-to-child. Some also believed that it could not be transmitted by blood transfusion (9.6%) and contaminated needles (25.5%). Some believed that HIV couldn't be prevented by abstinence (12.8%), condom (19.1%), mutual fidelity (16.0%) and avoiding sex with CSWs (25.5%). Forty (42.6%) respondents knew someone who was living with or had died of AIDS, while 24 (25.5%) had a close relative infected with HIV. About 67% believed that they had little or no risk of HIV. Only six (6.4%) felt they were at high risk and three of these believed it was because they were very sexually active while the other three believed it would be through the barber. Seventy five (79.8%) respondents had never been tested for HIV. Twenty three (24.5%) were not aware that HIV could be contracted through sex.

**HIV/STIs prevalence.**

Five respondents tested positive for HIV by rapid EIA method, while 13 respondents tested positive for HIV by quantitative EIA method including the five that were positive by rapid EIA. The five that tested positive by both methods were regarded as 'HIV POSITIVE', four of who were female. The eight that were positive by quantitative EIA alone were regarded as 'discordant' and were advised to have a re-bleed after six months. Two (2.2%) of the respondents had trichomoniasis while only one (1.1%) had syphilis.

The two respondents with *T. vaginalis* infection were also HIV positive, but the single respondent positive for *T.pallidum* infection was not positive for HIV or *T.vaginalis*.

**DISCUSSION**

The respondents generally had a good knowledge of routes of HIV infection with 90% being well informed. However, some still harbor misconceptions such as the belief that HIV/AIDs is not transmitted by sexual intercourse and that it cannot be prevented by abstinence, condom, mutual fidelity and avoiding sex with CSWs. Despite the

relatively good knowledge about sexual transmission of HIV, only 32 (34%) of the respondents used condom always. Similar findings were noted during the 2003 national survey<sup>5</sup> which showed an awareness of over 88% with only 19% having a complete knowledge of HIV transmission. The percentage of respondents (67%) who believed that they had little or no chance of contracting HIV is similar to the latest national figures (72%) in the civilian population<sup>5</sup>. This low perception of risk is probably influenced by the widespread denial of the existence of HIV in the country.<sup>8</sup> It has been found that fewer women encourage the use condom during risky sex than men (32% and 51% respectively)<sup>5</sup>, this may explain why female sex is more associated with HIV infection in this study ( $p = 0.002$ ).

The prevalence of HIV in this potentially high risk group (5.3%) is a bit higher than the national figure of 5.0%<sup>5</sup>. This is not surprising since many engage in risky sexual practices such as having multiple sexual partners, homosexuality, visiting CSWs and poor usage of condom.

The prevalence of trichomoniasis in Nigeria vary widely and it depends on the population examined. While Konje *et al* found a prevalence of 2.52% among adult women from the cytology clinic of the University College Hospital, Ibadan<sup>9</sup>, Anorlu *et al*, found a prevalence of 74.5% in patients with vaginal discharge in Lagos<sup>10</sup>. Our result (2.1%) is close to that of Konje *et al*.

The prevalence of syphilis is generally low in Nigeria. Dada *et al*. found syphilis prevalent of 4% among female sex workers in

Lagos<sup>11</sup> while Obiechina *et al*, found a prevalence of 2.1% among the HIV patients who attended the skin clinic of the University of Nigeria, Teaching Hospital, Enugu<sup>12</sup>. The prevalence found in this study (1.1%) is even much lower than the two. This may be due to the fact that since more than half a century ago when Mahoney *et al* successfully treated the first four cases of syphilis with penicillin, it remains the drug of choice<sup>13</sup>. Also, most antimicrobials used to treat other STIs have been found to eradicate incubating syphilis<sup>14</sup>.

The association of trichomoniasis with HIV in this study ( $p = 0.017$ ) makes it an important disease that requires regular surveillance and quick intervention. Emphasis must therefore be placed on primary prevention of STIs and not specifically limited to HIV but addressing the entire problem of STIs. Interventions targeted at the seafarers must also include education on safer sex.

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### ANTIMICROBIAL SUSCEPTIBILITY OF NEISSERIA GONORRHOEAE ISOLATED FROM PATIENTS ATTENDING PRIVATE CLINICS IN ZARIA.

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#### ABSTRACT

A total of 125 *Neisseria gonorrhoeae* strains were isolated from patients attending private clinics in Zaria, Kaduna State, Nigeria. Out of the 125 gonococcal isolates, 90 (72%) were resistant to penicillin G, 85 (68%) to ampicillin, 70 (56%) to tetracycline, 55 (44%) to erythromycin and 26 (22%) isolates were resistant to gentamicin. All the 125 *Neisseria gonorrhoeae* isolates were susceptible to ceftriaxone, cefuroxime and ofloxacin. Out of the 90 *Neisseria gonorrhoeae* isolates resistant to penicillin, 65 (72.2%) were positive for  $\beta$ -lactamase production (PPNG). The remaining 25 (27.7%) penicillin resistant strains were  $\beta$ -lactamase negative. The findings of this study have shown high prevalence of multi-drug resistant strains of *Neisseria gonorrhoeae* amongst attendees of private clinics in Zaria.

**Key words:** *Neisseria gonorrhoeae*, antibiotic susceptibility, resistance, PPNG.

#### INTRODUCTION

Parts of West Africa have been reported to be one of the two origins of penicillin resistant strains of *Neisseria gonorrhoeae*. The penicillinase-producing *Neisseria gonorrhoeae* (PPNG) strains were first reported in both England and the U.S.A. in 1976 (1; 2). The origins of these PPNG strains were traced to West Africa and the Far East Asia (3). Joesoef et al. (4), reported substantial increase in resistance to penicillin (89%) and tetracycline (98%) in Surabaya, Indonesia. Quinolone-resistant *N. gonorrhoeae* strains are very common in East Asia (5). In Nigeria, Bakare et al (6) reported that 59 (92%) of 64 isolates from male patients at Special Treatment Clinic, University College

Hospital, Ibadan were penicillinase-producing *N. gonorrhoeae* (PPNG) and 5 (7.8%) were non-penicillinase-producing *N. gonorrhoeae* (NPPNG). In 1987, it was estimated that PPNG constituted 70-80% of gonococcal isolates in Nigeria (7). Jatau et al. (8) reported that 189 (84%) of 225 penicillin-resistant strains of *N. gonorrhoeae* clinical isolates obtained from various locations of Kaduna state were positive for  $\beta$ -lactamase production.

Based on these reports, we decided to determine the anti-microbial susceptibility patterns of *Neisseria gonorrhoeae* isolates cultured from patients attending private clinics in Zaria.

#### MATERIALS AND METHODS

##### Bacterial isolates

One hundred and twenty-five *Neisseria gonorrhoeae* strains isolated from 35 female and 90 male patients presenting at various private clinics in Zaria with urethritis and cervicitis were screened for their susceptibility patterns against eight antibiotics, using the agar diffusion plate method.

#### **Antibiotic susceptibility testing**

Pure *Neisseria gonorrhoeae* isolates were screened against eight antibiotics made up of: penicillin G (2.4mcg), ampicillin (10 mcg), tetracycline (10 mcg), erythromycin (5mcg), gentamicin (5 mcg), ceftriaxone (0.1 mcg), cefuroxime (10 mcg) and ofloxacin (10 mcg) purchased from Oxoid Unipath, U.K. Reference *Neisseria gonorrhoeae* strains were obtained from WHO collaborating Centre Reference and Research in Gonococci, Copenhagen, Denmark. An inoculum of  $10^9$  c.f.u. per ml of each *Neisseria gonorrhoeae* was made from a 24 hours growth on modified Thayer-Martin agar plates. The inoculated plates were left for 10 minutes at room temperature before the antibiotic discs were aseptically placed on them. The inverted plates were incubated in an atmosphere of 5% CO<sub>2</sub> at 36°C for 24 hours. The zone of inhibition was measured and interpreted using the guidelines of the National Committee on Clinical Laboratory Standards (NCCLS).

#### **Determination of Beta-lactamase production and Minimum Inhibitory Concentrations**

Beta-lactamase production was detected using the

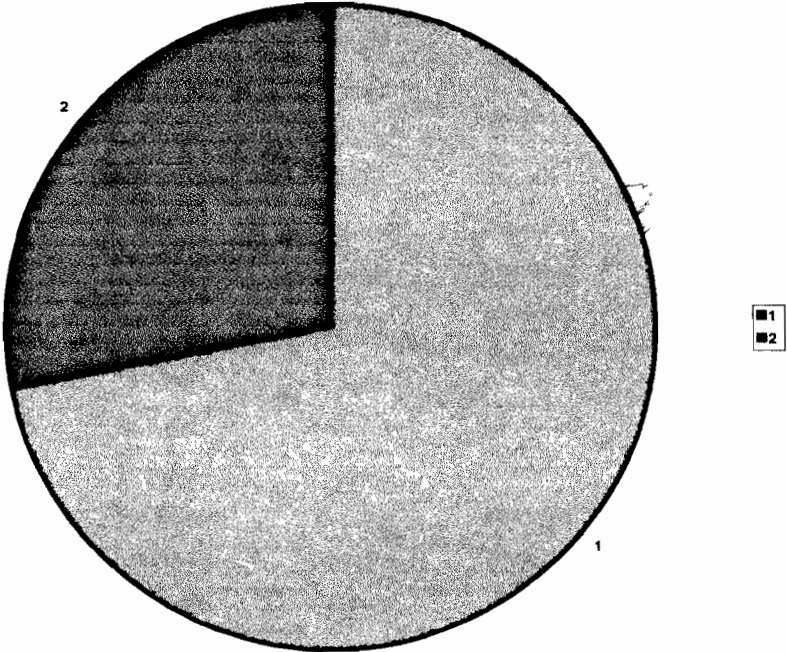
Rapid Iodometric Method (9). Minimum Inhibitory Concentrations (MICs) of penicillin G, ampicillin, tetracycline, erythromycin, gentamicin, ceftriaxone, cefuroxime and ofloxacin were determined on each *N. gonorrhoeae* isolate using tube dilution methods (10).

#### **RESULTS**

Male patients dominated clinic attendance during this investigation (Figure 1). Out of the 125 *Neisseria gonorrhoeae* isolates, 90 (72%) were resistant to penicillin, 85 (68%) to ampicillin, 70 (56%) to tetracycline, 55 (44%) to erythromycin and 26 (22%) were resistant to gentamicin. All the 125 *N. gonorrhoeae* isolates were susceptible to ceftriaxone, cefuroxime and ofloxacin (Table 1, Figure 2). Out of 90 gonococcal isolates, 65 (72.2%) were  $\beta$ -lactamase (penicillinase) positive. The remaining 25 penicillin resistant strains were  $\beta$ -lactamase negative. The Minimum Inhibitory Concentrations (MICs) of penicillin, ampicillin and tetracycline were higher than 0.125mcg/ml. Penicillin had an MIC of 32.0 mcg/ml against four (4) isolates, ampicillin had 32.0 mcg/ml against two (2) isolates and tetracycline had 32 mcg/ml against one (1) isolate. Cefuroxime, ceftriaxone and ofloxacin had the value of 0.125 mcg/ml against all the isolates tested. The MICs of most drugs, in common use for treatment of gonorrhoea, such as penicillin, ampicillin and tetracycline were high (Table 1).

**TABLE 1.** Minimum Inhibitory Concentrations of various antibiotics tested against *Neisseria gonorrhoeae* isolates

Antibiotics	% of isolates with MIC values (mcg/ml)			
	0.125	>0.125	>32	Total
Penicillin	0.0	96.8	3.2	100
Ampicillin	0.0	98.4	1.6	100
Tetracycline	0.0	99.2	0.8	100
Erythromycin	0.0	100	0.0	100
Gentamicin	0.0	100	0.0	100
Cefuroxime	100	0.0	0.0	100
Ceftriaxone	100	0.0	0.0	100
Ofloxacin	100	0.0	0.0	100



**FIGURE 1.** Distribution of *Neisseria gonorrhoeae* infections among male and female patients.

- 1. Males
- 2. Females

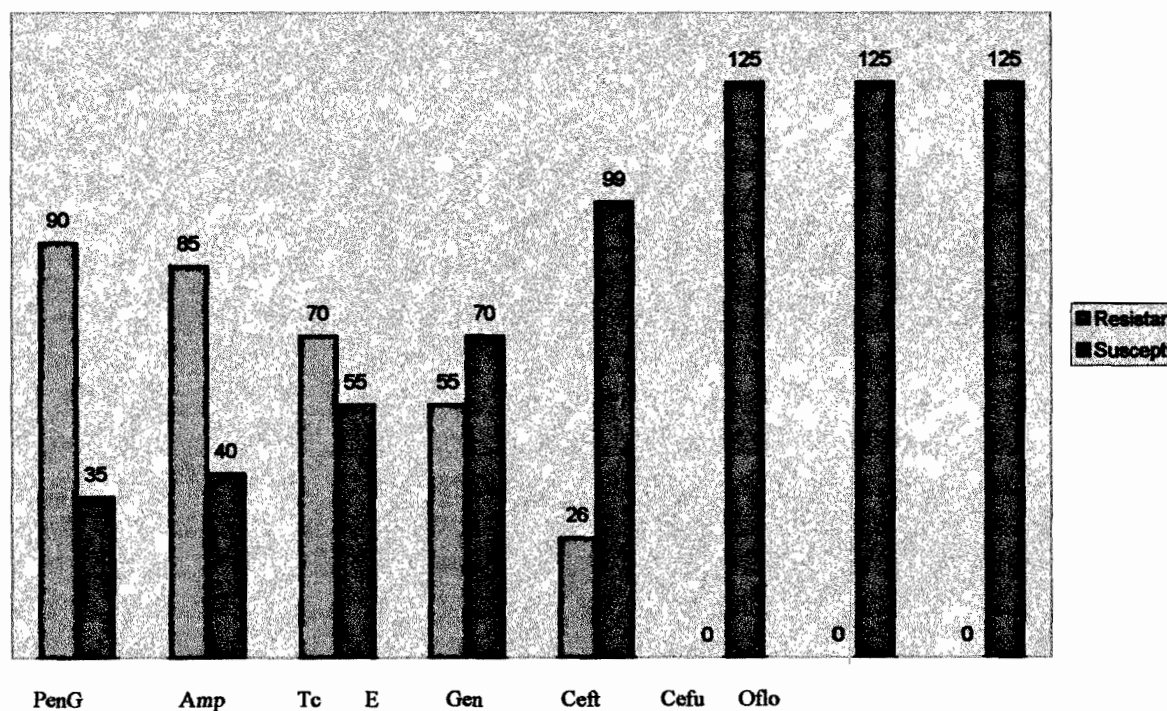


FIGURE 2. Antibiogram of *Neisseria gonorrhoeae* showing susceptibility and resistance to various antibiotics.

Key,

PenG= penicillin G  
E= erythromycin  
Cefu= cefuroxime

Amp.= ampicillin  
Gen= gentamicin  
Oflo= ofloxacin

Tc= tetracycline  
Ceft= ceftriaxone

## DISCUSSION

The anti-microbial susceptibility patterns of the *Neisseria gonorrhoeae* isolates showed that most were resistant to antibiotics that are commonly used as primary therapy against gonorrhoea. There were fewer isolates that were resistant to gentamicin than to penicillin, ampicillin, tetracycline and erythromycin (Figure 2). All the *Neisseria gonorrhoeae* isolates were susceptible to ceftriaxone, cefuroxime and ofloxacin. The resistance exhibited by these *Neisseria gonorrhoeae* isolates could be attributed to indiscriminate use of anti-microbial agents and self

medication that results in sub-therapeutic dosage, thereby stimulating the development of resistant mutants (7), a phenomenon that is empirically known to be common among men. This may account for the dominance of male patients in this study.

Penicillin had MIC of 32.0 mcg/ml against four *Neisseria gonorrhoeae* isolates, ampicillin had MIC of 32.0 mcg/ml against two isolates while tetracycline had the same MIC against one isolate (Table 1). The high MICs of penicillin, ampicillin and tetracycline confirmed the high level of resistance by the isolates to

these antibiotics. It also confirmed our earlier report on the high prevalence rate of *Neisseria gonorrhoeae* strains resistant to commonly used antibiotics for the treatment of gonorrhoeae in Zaria (8).

The high penicillin and tetracycline resistance is similar to such increase in resistance by *N. gonorrhoeae* that resulted in C.D.C. recommending the use of newer fluoroquinolones and selected extended-spectrum cephalosporins as primary therapy against uncomplicated gonococcal infections in the U.S.A. (11). The susceptibility of the 125 *Neisseria gonorrhoeae* clinical isolates to quinolones is, however, contrary to reports that *Neisseria gonorrhoeae* strains resistant to quinolones (QRNG) are wide spread in Asia (5), and that their prevalence is endemic in California and Hawaii, U.S.A. (12).

Beta-lactamase production was detected in 65 (72.2%) of the 90 penicillin resistant strains. The remaining 25 (27.8%) penicillin resistant strains were  $\beta$ -lactamase negative. The high prevalence rate of penicillinase-producing *Neisseria gonorrhoeae* (PPNG) found in our study is in agreement with earlier report that PPNG constitutes 70-80% of *N. gonorrhoeae* isolates in Nigeria.

Anti-microbial resistance mechanisms are of two types:

1. chromosomal resistance which results from serial changes in the structure of penicillin-binding proteins and/or outer membrane permeability, and
2. the production of  $\beta$ -lactamase by plasmid bearing strains of *N. gonorrhoeae* that was first reported in 1976 (13).

The initial epidemiologic report on PPNG strains showed that there was a spread of these strains from Asia and Africa to all other parts of the world.

The high prevalence of PPNG strains among patients attending private clinics in Zaria poses serious public health problems because the  $\beta$ -lactamase has been found to be identical with that found in *Haemophilus influenzae* which is reported to have acquired resistant plasmid from other Gram-negative bacilli (13).

Gonorrhoeae has a high prevalence rate in Zaria. The situation should attract public health officials' attention because Zaria is an academic center and should not be allowed to serve as a source of PPNG and TRNG spread-particularly now that the world is a global village that travelers can be sources of spread of sexually transmitted diseases (14). All STD should be treated promptly and screened for (for cure). All *Neisseria gonorrhoeae* isolates should be tested for susceptibility to drugs in common use. Specialized clinics for STDs should be established to ensure [roper control and prevention of such diseases.

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# INTESTINAL HELMINTHIASIS IN CHILDREN IN A SUBURB OF LAGOS, NIGERIA: EVALUATION OF RISK FACTORS AND HABITS

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## Abstract

Various risk factors have been known to predispose children to intestinal helminths infections. We evaluated the impact of multisectoral risk factors on infection prevalence in school children using questionnaire and stool examination.

Pupils' hawking habits, schools, classes, antihelminthic prophylaxis, parents' occupation and mothers' educational status were the significant risk factors identified. Logistic regression identified four of the aforementioned factors, age, sex, disposal of excreta and/or septic tanks overflow into open drainages as factors influencing prevalence in this population. Irregular deworming probably reduced the effect of prophylactic use of antihelminthic on prevalence. Hawkers (odds ratio = 3.78) and pupils living in faeces contaminated environs were identified as at risk groups.

Public enlightenment campaigns on worms' infestation control strategies, including the reduction of environmental contamination with faeces should reduce intestinal helminthiasis in these children.

**Key words:** Intestinal helminths, risk factors, risk habits, hawking.

## INTRODUCTION

Infection with intestinal helminths is a common problem amongst children in the tropics. Children are easily infected and re-infected because of their habits, personal and community hygiene. Severe infections may lead to bowel perforations and severe malnutrition as worms can deplete up to 60% of the nutrition supply of children (1, 2). It has been reported that 1 in every 3 Nigerian children is infected and 60% of Nigerian mothers do nothing to prevent these worms' infections (3). This report informed this survey conducted in Lagos Mainland local government

area (LMLGA) to identify at risk groups and risk factors that influence infection prevalence among school children within the LMLGA. Such predisposing factors or habits could be targeted for change through advocacy while at risk groups could be targeted for treatment. Risk factors and habits evaluated include individual, familial and community variables, consistent with the current multisectoral approach to the control of intestinal helminthiasis (4,

5, 6).

## MATERIALS AND METHODS

Lagos Mainland local government area is located in the heart of Lagos state, Nigeria. Attending a school within the LMLGA and being aged 6-16 years were the study inclusion criteria. Private and public schools were equal among the 6 randomly selected schools. Informed consent was obtained from the LMLGA, the school authorities and the students. Information on individual, familial and community hygiene were obtained using questionnaire. Stool samples were collected from 177 consenting pupils. The Formol-Ether concentration method was used for stool examination (7). Data was analyzed using Epi Info 2002 and the graph drawn with Microsoft Excel 2000 package. Univariate (Chi square test) and multivariate (logistic regression) analyses were conducted to define associations between risk factors or habits and the prevalence of infection.

## RESULTS

**Sex and age:** Out of the 177 students recruited for the study, 72 were females and 105 were males. Amongst these, 87 students (49.2%) made up of 38 females and 49 males were infected. The influence of sex on prevalence was not statistically significant ( $p=0.215$ ) though prevalence was 6.1% higher in females (odds ratio = 1.28 [95% CI: 0.70-2.33]). Prevalence according to age was not significant ( $p=0.12$ ) but ages 10 and 9 were the most infected.

**School and class:** Infection was 36.8% higher in public schools than in private schools ( $p=0.000$ ). The distribution of infection across the classes was statistically significant ( $p=0.007$ ) with primary 4

pupils infected the most (age: mean = 10.24, range = 8-16, median = 10 and mode = 9).

**Personal habits and hygiene:** Children who took their bath once daily were more infected (56.2%) than those who took their bath twice (47.6%) and thrice (50.0%) daily ( $p=0.69$ ). Hands washing after toilet use and walking barefoot had an insignificant effect on infection. Infection was higher in pupils who washed their hands before eating ( $p=0.003$ ). From the study, 22.0%, 69.5%, 5.6% and 2.8% of the pupils used pit, water systems, bucket and other toilet facilities respectively, with an insignificant influence on prevalence ( $p=0.147$ ). Patronizing food vendors had an insignificant effect on prevalence ( $p=0.44$ , odds ratio = 1.06 [95% CI: 0.54-2.07]). The difference in prevalence amongst hawkers (75%) and non-hawkers (44.2%) was statistically significant ( $p=0.003$ ) (table 1).

**Sources and treatment of drinking water:** Their sources of drinking water included pipe-borne water (81.4%), borehole (14.7%), well (3.4%) and stream (0.6%). Half of those who drank pipe-borne water were infected. Prevalence in those who 'boiled', 'filtered', 'boiled and filtered' and 'didn't treat' drinking water was not significantly different ( $p=0.62$ ) though prevalence was 19% lower in pupils who boiled and filtered drinking water.

**Community hygiene:** Eighty-three percent of the study population had open drainages near their houses. Of these, 21.8% dispose excreta into the drainage, 33.6% had septic tanks overflowing into the drainage and 33.8% confirmed that water pipelines transverse those drainages. Both means of faecal contamination had no significant effect on the prevalence, but on the

average the risk of infection was 10% higher in pupils living in such environs.

**Enlightenment:** The effect of both parents' occupation on prevalence was statistically significant (fathers'  $p = 0.005$ , mothers'  $p = 0.01$ ), while only that of their mothers' educational status was significant (fathers'  $p = 0.086$ , mothers'  $p = 0.046$ ) (fig 1).

**Use of antihelminthics:** Thirty-three percent of pupils had never ever taken antihelminthic drugs. Their reasons were ignorance of drug availability though

knowledgeable about worms (61.1%), 'did not like worm medicines' (7.4%) while 31.5% did not know about worms. Pupils' major reasons for taking antihelminthic drugs were stomach ache (29.9%), presence of worm in stool/vomit (11.9%) and routine medication (7.3%). Forty-three percent of antihelminthic users were infected while 61.0% of non-users were infected ( $p = 0.014$ ). 7 out of 13 pupils who took drugs months before the study and 25 out of 60 who took drugs the previous year were infected.

**Table 1: Univariate association of some risk factors and habits with intestinal helminthiasis**

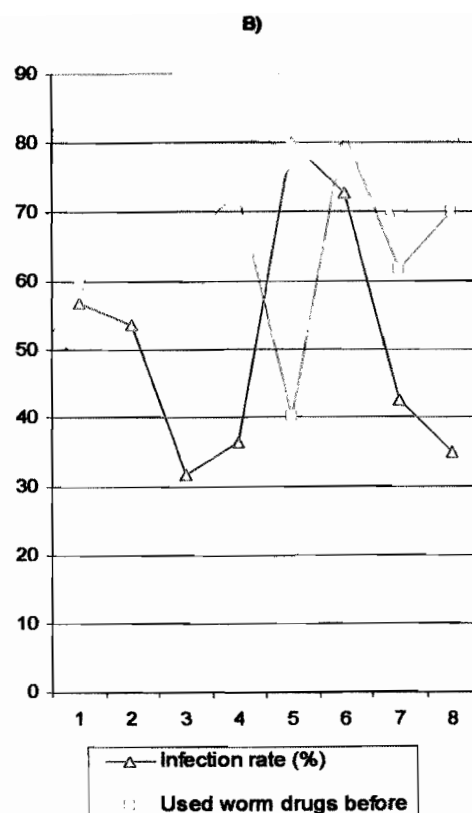
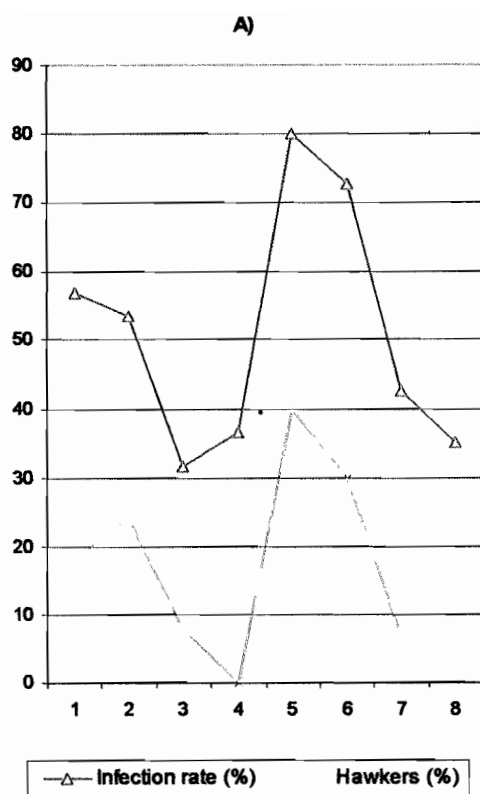
Risk factors / habits		% Infection	<sup>a</sup> Odds ratio (95% CI)	P – values
Use of Antihelminthics	Have used	43.2	0.486 (0.257 – 0.920)	0.014*
	Never used	61.0		
Hawk?	Yes	75.0	3.780 (1.420 – 10.080)	0.003*
	No	44.2		
Fathers' education	Educated	46.0	0.210 (0.020 – 1.960)	0.086
	None	80.0		
Mothers' education	Educated	45.2	0.310 (0.08 – 1.220)	0.046*
	None	72.7		
Fathers' occupation	Low skilled	56.8	2.630 (1.260 – 5.480)	0.005*
	Professional	33.3		
Mothers' occupation	Low skilled	54.8	2.340 (1.110 – 4.910)	0.012*
	Professional	34.1		
School	Private	32.3	0.210 (0.110 – 0.400)	0.000*
	Public	69.1		
Hand washing always before food?	Yes (n = 160)	51.9	6.470 (1.400 – 29.830)	0.003*
	No (n = 14)	14.3		
Faecal disposal into open drainages?	Yes	56.2	1.500 (0.680 – 3.310)	0.159
	No	46.1		
Septic tank overflow into drainages?	Yes	55.1	1.540 (0.770 – 3.080)	0.113
	No	44.3		

\*Significant values asterisked ( $p < 0.05$ ). <sup>a</sup>Odds ratios apply to the first risk factor/habit option.

<b>Table 2: Multivariate association of risk factors and habits with intestinal helminthiasis</b>				
<b>Risk factors</b>	<b>Odds Ratio</b>	<b>95% C.I.</b>	<b>Coefficient</b>	<b>P-Value</b>
Age	1.0557	0.8134 - 1.3701	0.0542	0.6837
Dispose excreta? (Yes/No)	1.1475	0.3769 - 3.4930	0.1376	0.8086
Drugs? (Yes/No)	0.6365	0.2241 - 1.8075	-0.4518	0.3962
Hawk? (Yes/No)	1.6453	0.4905 - 5.5186	0.4979	0.4200
Mother Educated? (Yes/No)	0.8654	0.1622 - 4.6174	-0.1446	0.8656
Mother's occupation (Low skilled/Professional)	2.1615	0.6424 - 7.2732	0.7708	0.2131
Schools (Public/Private)	<u>3.3560</u>	<u>1.1802 - 9.5428</u>	1.2107	<u>0.0232</u>
Septic overflow? (Yes/No)	1.3801	0.5102 - 3.7329	0.3221	0.5257
Sex (Female/Male)	1.2741	0.4695 - 3.4579	0.2423	0.6344
CONSTANT	*	*	-1.7149	0.3508
Significant values underlined ( $p < 0.5$ ). *Asterisked cells not applicable. Likelihood ratio chi square test: 18.24 with 9 degrees of freedom ( $p = 0.0325$ ).				

Pupils' hawking habits, prophylactic use of antihelminthics, parents' jobs, mothers' education, their schools and classes were the relevant statistically significant variables identified by univariate analysis

(table 1). Four of these together with age, sex and the two environmental variables were included as confounders in the best logistic regression model, though only the schools attended was significant (table 2).



**Figure 1: Hawking (A), use of antihelminthics (B), community hygiene (C) and prevalence across different group of parental educational status and occupation.**

Y-axis = Positive values (%); X-axis = Groups:

1 = Trading Fathers                      4 = Professional Mothers  
2 = Trading Mothers                      5 = Uneducated Fathers  
3 = Professional Fathers                6 = Educated Mothers  
7 = Uneducated Mothers                8 = Educated Fathers

## DISCUSSION AND CONCLUSION

The higher prevalence in females obtained is consistent with the findings in Port Harcourt (8) and in Benin (6), both in Nigeria. This may have to do with the domestic chores the girl-child performs. The significant influence of class and not age of pupils on prevalence seems to implicate the pupil's knowledge and personal hygiene. Similarly, the influence of schools' ownership on prevalence could be attributed

to better hygiene and care. Most pupils claimed to always wash their hands before eating yet infection was significantly higher in these. Coupled with the insignificant effects of hands-washing after toilet use, hands hygiene may not be the main infection route amongst these pupils. The insignificant effects of patronizing food vendors and water treatment seem to support this. Other risk factors and habits should be

assessed, especially the means of environment contamination with faecal matter and how pupils become exposed. The risk of infection was higher for pupils living in faecally contaminated areas and a sizable student proportion used toilet facilities with high potentials for environmental contamination. Such studies may explain why hawkers were identified as a high risk group.

Control of the burden of intestinal helminths should involve the government, parents and the pupils. Human and animal waste products should be hygienically disposed of and efforts made to reduce and possibly eliminate their contamination of our environment. Regular mass deworming could be incorporated in educational policies. Reinvigorated enlightenment campaigns on intestinal helminths targeting care groups should be embarked upon. Children should be taught personal hygiene at home and in schools. Enlightenment of the parents and pupils on worms' control and chemotherapy should increase the number of pupils taking antihelminthics as routine medication. The prevalence amongst antihelminthic users indicates either high incidence and/or impaired drug efficacy. If effective broad-spectrum antihelminthics are used, then the prescribed frequency of routine medication could be increased as irregular deworming may be responsible. The facts that 11.0% of antihelminthics users took drugs within study year, 50.8% the previous year; while the rest took drugs 2-10 years ago suggest this.

In spite of the current socio-economic conditions in Nigeria, efforts should be made to dissuade child-hawkers **both** for the child's health and education. Hawkers **could** be targeted for mass deworming.

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