

Cost estimation of a school-based intervention for improving HIV/AIDS risk perception among secondary school adolescents in Enugu State, Nigeria

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Abstract

Early sexual debut is common in Nigeria and increases HIV risk among adolescents. About 152,000 adolescents are living with HIV. Lack of knowledge and appropriate sexual reproductive health services are some factors responsible. This paper estimated the cost of secondary school-based HIV/AIDS intervention for schools in Enugu State, Nigeria. The rationale for estimation is to avoid unaffordable and ineffective interventions. The cost was estimated between March to October 2019 for schools in urban and rural areas with population of 1595 students. The cost estimation was aided through UNAID proposed guideline. The estimation was done by classifying intervention into cost of training, cost of services and cost of commodities. The cost was estimated at \$5954. The estimated cost in urban is lesser than that of rural. This estimated cost of intervention may inform stakeholders with the knowledge of cost implications to avoid unaffordable school-based HIV interventions in Enugu State, Nigeria.

Keywords: AIDS, HIV, school-based intervention, cost estimation.

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Introduction

Sexual and reproductive health of adolescents has always been an issue of concern in global public health and has become a challenge. Adolescence is a critical stage of human development, when at this stage children are becoming sexually active.¹ Adolescents, at this stage, are exposed to the affluence of unrestricted information through internet, mobile phone technology, and electronic media.¹ They are exploratory and often indulge in risky sexual practices for the reason of experimentation and peer influence. Adolescents are vulnerable to Sexually Transmitted Diseases (STDs), and this constitutes a public health challenge in Nigeria.²

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In 2019, 152,000 adolescents (between ages 10-19) were living with HIV, making up 8% of the total number of people with HIV in Nigeria.³ Several factors increase HIV vulnerability among young people, including lack of knowledge and appropriate sexual reproductive health services.⁴ According to the National Bureau of Statistics (NBS),⁵ early sexual debut is common in Nigeria, with 15% of girls and 4% of boys having sex prior to age 15 years. This increases HIV risk among this group as often the virus is passed from older men to younger women.⁶ Despite their elevated risk, reports showed that few adolescents test for HIV regularly.⁶ Furthermore, Nigeria has the second-largest HIV epidemic in the world (National Agency for the Control of AIDS).⁷ In 2017, 3.1 million people were living with HIV in Nigeria.⁸ However, in 2019, a recently published Nigeria HIV/AIDS Indicator and Impact Survey,⁹ one of the largest population-based HIV/AIDS household surveys ever conducted, found the prevalence to be just 1.9million, which is 1.4% of the total population with adolescents contributing 8% of people living with HIV.³ The apparent decline has been attributed to better surveillance.

Adolescents' vulnerability to HIV is not only because of being sexually active in schools, but also many sexual contacts among them are unprotected.¹⁰ Another reason for their vulnerability to HIV is lack of sex education, including education on prevention of STDs.¹¹ Consistently, studies have attributed adolescents' high-risk sexual behaviours to poor in-depth knowledge about sexual health risks and low self-risk perception towards HIV/AIDS.¹² These reasons necessitate school health education initiatives to increase level of knowledge, influence, attitudes and encourage safe sexual practices among adolescents. School-based health education is used to increase HIV-related knowledge and shape safer sexual behaviours to help prevent new infections among this vulnerable group.¹³ It gives an opportunity to reach large numbers of young people in an environment already equipped to facilitate educational lessons and group learning.¹⁴

The term school-based, educational intervention means any intervention which is aimed at children (between ages 5 and 18) and mainly delivered in an educational setting

(such as a school). It helps to improve students' health literacy, behaviours, and achievements. School-based health promotion could be particularly valuable in developing countries facing challenges of low health and a high burden of diseases.¹⁵ Another reason for necessity of school-based intervention is that researchers have identified lack of knowledge as one of the leading issues to the increase in HIV vulnerability among secondary school students.^{4,8,11}

Researchers have conducted studies on school-based intervention and found that it is efficacious.¹⁶ Fonner et al observed in their meta-analysis of school-based HIV interventions that interventions with school-based and community-based components had the largest impact on changing HIV-related behaviours.¹⁷ Fawole et al,¹⁸ in his study on school-based intervention on AIDS, reported that knowledge about HIV transmission and prevention was significantly higher after the intervention. However, school based intervention grants a comprehensive programme by providing education on abstinence, as well as, information on engaging in safer sex and prevent pregnancies and sexually transmitted infections.¹³ It is necessary to provide students with HIV risk-reduction education intervention in order to protect from getting infected. There is a need to reach adolescent students through effectively proven methods of health promotion.¹⁹ To implement this type of intervention, there is a requisite to know the cost of implication. Cost estimation is the art of assigning value and predicting the cost of activities. Cost estimation is needed to provide decision-makers with the means to make rational decisions, choose between alternatives and to set up budget for projects. In school-based health interventions targeting HIV risk reduction, cost estimation is important as many interventions are moving out of the realm of efficacy studies.²⁰ Estimates of intervention cost inevitably require some modification as the programme is transported into community agencies; different inputs might be used or different prices might be paid for the same input.²⁰ Thus, a good understanding of inputs and their value is required. In this paper, an estimation of the cost of a school-based intervention for improving HIV risk perception among secondary school adolescents in Nigeria was conducted. There are few studies on cost estimation of school-based HIV intervention. Most of the studies are on the effect of intervention, modeling the cost and cost-effectiveness analysis.^{2,18,21} UNAID estimated that funding towards HIV/AIDS from all sources including public spending totaled \$19 billion.^{9,22} This implies a massive investment in above intervention. Foster²⁰ estimated family-based cost of preventive interventions averaged about \$4,000 per family. Studies on cost interventions often demonstrate cost-effectiveness of HIV intervention but not

all interventions are affordable.²²

Cost estimation in this study followed a step by step guideline according to UNAID costing guideline.²² The guideline is as follows; prioritizing target population; setting coverage target for reaching a specific sub-population; choosing and designing effective intervention packages and activities for target population; computing cost of intervention as unit costs; estimating total resource needs based on size of sub-population; examining impact of planned interventions on incidence and prevalence of HIV; optimizing strategic allocation of resources (re-examining); and finally, resource gap. This study was limited to cost estimation; hence, it did not go beyond estimating the total cost of resources needed for intervention into examining impact of intervention prevalence of HIV, optimizing strategic allocation and resources gap as contained in the guideline developed by UNAID.²²

The rationale for this present cost estimation is on the fact that information obtained is applicable in implementation of school-based intervention and budget appropriately to avoid unaffordable and ineffective intervention. Also, some studies argued that most interventions are not affordable and effective.²² Therefore, it is pertinent to estimate the cost of intervention before implementation, which will help to inform interventionists on cost implication of interventions and thus facilitate implementation. Hence, the objective of this study was to estimate cost of school-based intervention for improving HIV/AIDS risk perception among secondary school adolescents in Enugu state, Nigeria.

Methodology

The study is a cost allocation analysis of cost of intervention for improving HIV risk perception among adolescents in public secondary schools in Nigeria using UNAIDS guideline. The cost estimation study was done for both rural and urban public schools from March to October, 2019 in Enugu, Nigeria. The Research Ethics Committee of the Faculty of Education, University of Nigeria, Nsukka reviewed and approved the study (REC/FE/2019/000035). The population comprised of 30 public secondary school children in Nsukka Local Government Area of Enugu State, Nigeria. The total number of students from 30 public schools was 8,444. There are 14 rural public secondary schools and 16 urban public secondary schools in study area. The cost estimation for HIV intervention was proposed to cover 6 (six) schools with a population of 1,595 students from SS1-SS2. This constituted 3(three) rural schools of 621 students and 3(three) urban schools of 974 students who were randomly sampled. The intervention programme was proposed to cover health education concerning perceived

risk of HIV, testing of HIV status, distribution of self-help materials, and small group counseling. The intervention was proposed to last for 14 days (two weeks) to be able to cover all 6 public secondary schools.

The estimated cost of service delivery was possible with the information acquired through pilot study. In the pilot study, a questionnaire instrument was developed by researchers and titled HIV cost estimation questionnaire. The instrument contained different ranges of cost for different intervention personnel and related services and materials. The instrument was administered to 30 health workers, which included; ten (10) medical doctors, five (5) health educators, five (5) lab attendants, five (5) health counselors and five (5) outreach workers who were also health workers. Their responses were analyzed using a statistical mean. The result was used for school-based cost estimation of HIV intervention. Other information regarding stationary, transportation, and cost of awareness was informed by the local market in the study area. The estimated cost was analyzed using percentages and pie chart. The explicit cost was estimated in a spreadsheet shown in the results section.

Results

Table 1 is a spreadsheet structure containing a simple estimation module for different essential elements of intervention, for example, training, light refreshment, remuneration for health workers, laboratory materials, stationery and cost of transportation. The estimation was done for rural and urban areas with a total population of 621 and 974 students respectively. The total estimated cost (TEC) was 5,954USD. The total estimated cost for training (TECT) before intervention was \$287. This entails cost of allowance for two trainers \$114, cost estimate for allowance of trainees \$45, training materials and refreshment \$128. The awareness contact estimated cost (ACEC) was \$50. The training was proposed to last for 2days with an estimate of 14hours. Five (5) trainees consisted of outreach workers who were expected to work as supervisors of intervention, take clinical notes, and carry out interviews when necessary on recipients of intervention. The trainers are health educators from health centers and hospitals. The refreshment is proposed to be given intermittently in the process of training. Hence, before and during intervention, awareness wouldbe created through phone calls to the

Table-1: Breakdown of explicit cost.

Resources Directly Related to Service L Day		Two Urban Schools		Two Rural Schools	
		target number	Unit cost USD	Unit cost USD	Total cost USD
Population of School Children		974			621
Section A:					
Resources Directly Related to Service Delivery before Intervention for 2 Day					
A	Services				
1	Training of Intervention assistants and supervisors				
a.	Trainer/2day	2	20,520(\$57)	-	41040 (\$114)
b.	Trainees remuneration/2days (programme supervisors (2), outreach workers(3)	5	3,240(\$9)	-	16,200 (\$45)
d.	Training materials		10,800(\$30)	-	21,600(\$60)
e.	Food and refreshment/2days		12,240(\$34)	-	24,480(\$68)
	Total Cost of Training				103,320(\$287)
2	Awareness Contacts				
A	Media awareness		18,000(\$50)	-	18,000(\$50)
B	Health materials		23,040(\$64)	-	23,040(\$64)
	Total Cost of Awareness Campaign				41,040(\$114)
Section B:					
Resources Directly Related to Service Delivery During Intervention for 12 Days					
3	Personnel	17	Unit cost	Unit cost	Total
a.	Health Educators/day x 6 days	2	40,320(\$112)	45,000 (\$125)	80,640 (\$224)
B	Doctor	3	100,080(\$278)	120,240(\$334)	300,240(\$834)
C	Lab attendants	5	50,040(\$139)	60,120(\$167)	250,200(\$695)
D	Counselors	5	35,280(\$98)	40,680(\$113)	176,400 (\$490)
E	Outreach workers	2	20,160(\$56)	25,200(\$70)	40,320 (\$112)
	Total Cost of Personnel Services				847,800 (\$2,355)
B.	Materials				
b.	Testing materials		52,200(\$145)	50,040(\$139)	52,200 (\$145)
c.	Stationeries		13320(\$37)	12,600 (\$35)	13320 (\$37)
D	Transportation				7,200(\$20)
	Total Cost of Medical Materials		72,720(\$202)	73,440(\$204)	146,160 (\$406)
	Grand Total Cost		2,143,440	5,954	

Table-2: Percentage Summary of the explicit estimated cost.

S/No	Intervention Activities	Number of days	Total number of personnel	Local currency N	USD \$ (%)
1	Training	2 days			
	Allowance for Intervention assistants trainers		2	N41,040	114 (1.9)
	Intervention assistant training allowance		5	16,200	45 (0.8)
	Training materials and refreshment			46,080	128 (2.1)
	Total			103,320	287 (4.8)
2	Commodity Services				
	Health material			23,040	64 (1.1)
	Testing materials			102,240	284 (4.8)
	Stationery			25,920	72 (1.2)
	Transportation			18,000	50 (0.8)
	Awareness contact			18,000	50 (0.8)
	Total			187,200	520 (8.7)
3	Service Delivery Allowance	12 days			
	Doctors		3	660,960	1,836 (30.8)
	Health educators		2	170,640	612 (10.3)
	Laboratory attendants		5	550,800	1,530 (25.7)
	Counselors		5	379,800	1,055 (17.7)
	Outreach workers		2	90,720	252 4.2%
	Total			1852920	5,147 (86.4)
	Total cost		N2,143,440	USD 5,954	

allowance for two outreach workers was estimated at \$112 and \$140 for urban and rural schools, respectively. This estimated cost covers cost of accommodation of health workers. The service delivery lasted for 12 days to attend all the recipients of intervention. The medical doctors were expected to carry out medical consultations with recipients and refer them for testing. The students were tested for HIV after their consultation with the doctor and thereafter be counseled if necessary.

From the spreadsheet, cost was also estimated for other materials, which included test material, stationary and transportation, and their percentage cost was\$145/\$139; \$37/\$35; and \$20/\$30 for

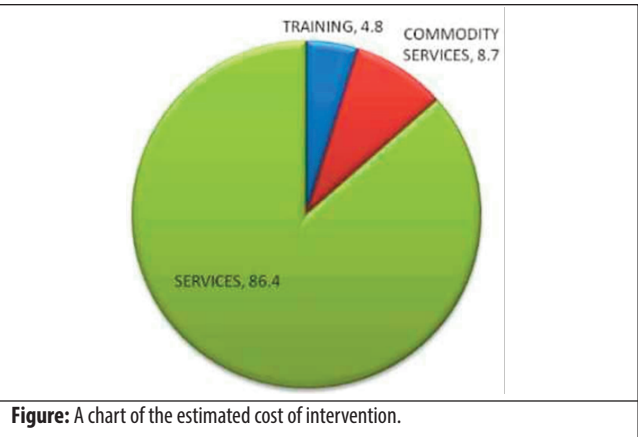
both urban and rural schools, respectively. Hence, the total estimated cost of this proposed intervention was\$3,696. The cost estimation on medical test material, stationary and transportation were informed through the information gathered from lab attendants from medical centers around, local markets, and from locations of the intervention, respectively.

Table 2 shows the percentage analysis of estimated cost. The analysis was classified into: training; commodity services and service delivery. For training, 4.8% of TEC (total estimated cost) was estimated, which included 1.9% allowance for intervention assistant trainees; 0.8% for intervention assistant training allowance and 2.1% for training materials and refreshment. For commodity services, the cost estimated is 86.4% of TEC. This entailed 1.1% for health material distribution. Testing material had 4.8%, stationary 1.2%, transportation 0.8% and awareness contact 0.8%. For service delivery allowance, 4.2% of TEC was estimated, which comprised 30.8% for doctors, 10.3% for health educators, 25.7% for laboratory attendants, 17.7% for counselors and 4.2% for outreach workers.

Figure shows at a glance the estimated cost of various classifications of intervention activities. From the pie chart, it could be seen that bulk of the cost is on services followed by commodity services and lastly cost related to training.

Discussion

This research work estimated the cost of a school-based HIV/AIDS intervention for public secondary schools in



schools, advertising intervention through local media and using posters on HIV and preventive measures and need for school-based interventions. The cost of awareness creation was determined through visitation of local media stations and communication centers within study area.

Resources directly related to service delivery during intervention for 12 days was estimated at \$2,243 for three urban schools and \$2,792 for three rural schools. The services delivery covers two health educators estimated allowance \$224 and \$250 for urban and rural schools, respectively; three medical doctors with estimated allowance of \$834 and \$1,002 for urban and rural schools, respectively; three laboratory attendants with estimated cost of allowance of \$695 and \$835 for urban and rural schools, respectively; cost estimated to five counselors is \$490 and \$565 for urban and rural, respectively and

Nigeria. The cost of intervention was estimated at about \$5,954. The cost estimation as reported in this research shows that the cost of intervention varies with location (urban and rural). The cost of intervention in urban is lesser than that of rural and the reason is that facilities are more accessible in urban areas than rural. These costs are especially reasonable when calculated on per-person and per-hour bases especially when compared to other cost estimated interventions.²⁰ This is because the costs of some intervention are higher than our current cost estimation for school-based intervention.^{20,22} Jacobsen and Walensky²¹ argued that studies on cost intervention demonstrate cost-effectiveness in HIV intervention but not all the interventions are affordable. Most of the intervention from works of literature could not be compared with present cost estimation because interventions vary concerning recipients, population size, type of intervention, duration, design of the intervention, environment and so many other factors. All these factors determined the cost of interventions and they vary. At the level of above estimated cost, it could not be determined as to whether the cost is effective or not because intervention has not been carried out.

Conclusion

The costs of school-based intervention examined were relatively modest at about \$5954. These costs are especially reasonable when calculated on per-person and per-hour bases especially when compared to other cost estimated interventions. Also, the cost estimation as reported in this research showed that the cost of intervention varies with location. The estimated cost of intervention in urban is lesser than that of rural. The cost estimation of school-based HIV intervention might enlighten government, non-governmental organizations, and health workers amongst others with the knowledge of cost implications of school-based HIV intervention in case of implementation.

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Conflict of Interest: None.

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