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Knowledge and Attitude towards Ebola Virus Disease among Secondary School Students in Abakaliki, South-east, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author EUN designed and wrote the protocol of the study. Authors AFU, EUN and NCE performed the statistical analysis. All authors wrote the first draft of the manuscript. Authors EUN, AFU, CA and NCE managed the analyses of the study. Authors EUN, CA, AFU, UCM, NCE and COM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Ebola virus disease (EVD) is an acute haemorrhagic fever. It is also a zoonotic disease which has posed a serious public health problem in the West African Sub-Region. The study was conducted to determine the level of knowledge and attitude towards EVD among Secondary School Students in Abakaliki, Ebonyi State, Nigeria.

Methods: A cross-sectional descriptive study was carried out among 318 secondary school students in Abakaliki, Ebonyi State, selected through multistage sampling method. Information and permission were obtained from the State Ministry of Education, Informed consent from the principals of the schools and their class teachers. Assent was obtained from selected students prior to the study. Data was collected with pre-tested semi-structured questionnaires and analyzed using statistical package for the social science (SPSS) version 20. Results were treated with strict confidentiality.

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Results: Majority of the respondents (85.5%) were between 15 to 19 years. Students in SSS 2 constituted the greatest proportion of respondents, 57.0% and 48.8% for public and private schools respectively. One hundred percent of the respondents had heard about EVD. Knowledge of EVD was generally poor for majority of the students in both schools, the proportion being higher in the public (65.8%), compared to the private schools (40.6%). Greater proportion (70.6%) of those in private schools had positive attitude to EVD compared to 53.8% in public schools.

Conclusion: Respondents from private schools were more knowledgeable and exhibited more positive attitude than respondents from public schools.

Recommendation: Sensitisation and health education of secondary school students on EVD.

Keywords: Knowledge; attitude; EVD; secondary school students.

1. INTRODUCTION

Ebola virus disease (EVD) formerly known as Ebola haemorrhagic fever is a severe, often fatal disease in humans and non-human primates. Ebola first appeared in 1976 in 2 simultaneous outbreaks in Nzara, Sudan and in Yambuku, Democratic Republic of Congo. No cases of Ebola Zaire had ever been reported in West Africa until the recent outbreak. It is caused by Ebola virus of the family *Filoviridae*. The suspected natural reservoirs include fruit bats and non-human primates. EVD is transmitted by physical contact with body fluids, secretions, breast milk, tissues or semen from infected persons or immediately after death especially during funeral rites [1,2]. There is no specific treatment and so infected persons die within few days of infection with 50-90% case fatality rate with Zaire Ebola Virus variant being the most lethal [3-7]. United States of America, United Kingdom, Spain and Italy also reported imported EVD cases [8,9]. On 20th July 2014, Nigeria recorded the index case a Liberian diplomat that flew from Liberia to Lagos. There was widespread panic and dissemination of conflicting and potentially harmful information following the declaration of an outbreak on 24th July by Nigerian authorities [10,11]. The outbreak in Nigeria ended with 8 deaths (40% case fatality rate) in September 2014 [7]. Fear, misconceptions and unusual behaviors by the general populace including health workers greeted the emergence and spread of EVD [12]. The WHO had on 8th August 2014 declared EVD outbreak a Public health Emergency of International Concern (PHEIC) in view of its unusual spread, significant negative implications on the health and socio-economic life of communities, countries and regions [8]. EVD in Nigeria was successfully contained following concerted efforts by national and international agencies. Consequently Nigeria was declared EVD free by the World Health Organization

(WHO) on 20th October 2014. The study was carried out to ascertain the knowledge and attitude towards Ebola virus disease among secondary school students in Abakaliki.

In Australian pilgrims, 89% of participants were aware of the current Ebola outbreak before travelling. Of this, 78% reported mass media as their main source of information, followed by the Internet (9%), general practitioners (GPs) (6%), friends and family members (5%) and travel agents (1%). Respondents aged 45 years and below and those with a university education were more aware of Ebola disease [9]. The younger and more educated pilgrims had more awareness than the older and less educated ones. This may be due to their literacy level and access to many information sources. In Lagos, 33% of the respondents do not know the cause of EVD. Three commonest mode of spread known by the respondents were contact with a person who is sick of EVD (69.4%), touching body fluids of person infected with EVD (47.3%) and contact between infected animals and men (33.4%). Top three signs and symptoms of EVD mentioned were fever (56.9%), vomiting (48.3%) and abnormal bleeding (38.1%) [13]. Also 98% and 84% of the population were aware that EVD could be transmitted through direct and indirect contacts respectively. Transmission by non-human primates was known to 88% of them. Ninety five percent of health workers and 70% of general population knew that Ebola could be contacted through direct contact with blood and body fluid of infected person and isolation of infected or exposed persons is a measure aimed at limiting the spread of infection respectively. Ninety one percent of them had the knowledge that transmission could occur by contact with primates. The high knowledge of causative agent of EVD in Lagos may also be attributed to its cosmopolitan nature and multiple sources of information. In a related study, 41% had a satisfactory knowledge of EVD while 44% and

43.1% also had satisfactory knowledge of modes of spread and preventive measures respectively [13].

The mean knowledge score in an Indian study among Dental Practitioners was $23.84 \pm 5.1\%$. It showed that 78% were aware of fever, intense weakness, muscle pain and internal and external bleeding as the symptoms of Ebola HF. Availability of PCR and ELISA as diagnostic tests were known only to 37.9% [14]. A study in Sierra Leone showed that only 39% had comprehensive knowledge of EVD [13]. In Australia, of those who had heard of Ebola, 60% stated that the virus transmits through contact with infected body fluids, 17% said it spreads through air. In Congo it was shown that 66.3% chose to call the health service and 33.7% could practice other attitude [15].

2. MATERIALS AND METHODS

The study was conducted in Abakaliki, South-East, Nigeria. The people of this area are predominantly peasant farmers with some civil servants. This is a school-based descriptive cross-sectional study conducted in 2015. There are 8 accredited government (public) and 21 private secondary schools in Abakaliki urban. For the purpose of this study, one private school (Holy Ghost secondary school) and one public school (Abakaliki High School) were selected using simple random sampling technique. The schools selected were predominantly day co-educational as there were 4 private and 3 public of such schools. The study population comprised of secondary school students attending the selected schools in Abakaliki. Only senior secondary school (SSSI – SSS3) students attending the selected schools were included in this study and un-assented ones were excluded. A simple random sampling technique was used to select representative sample of 318 respondents using their class register. A pretested, semi-structured interviewer-administered questionnaire designed after a thorough review of relevant literature [16] was used. The questionnaire comprised of two sections A and B. Section A consists of three questions on socio-demographic characteristics while section B comprised of 10 questions with 43 response options to assess respondents' knowledge of Ebola virus disease transmission, prevention and source of information. Data were analyzed using statistical package for the social sciences (SPSS) version 20 [17] and findings presented in tables. All the variables were

categorized. Frequencies and proportions were calculated for the variables. Measurement of knowledge of EVD comprised of awareness of Ebola, modes of transmission and methods of Ebola prevention. A set of 10 questions with 43 response options were used. Each correct response was determined by ability to rightly identify the answer to the question, such response was scored one and every wrong response was scored zero. There was therefore a maximum of 23 points on knowledge. The score range was between 0 and 23 and converted to 100%. Score greater than 50% was categorized as good knowledge 25 to 50% as fair knowledge and below 25% as poor knowledge. Attitude towards Ebola was assessed using 6 variables with dichotomized options of positive and negative responses. Each positive response was scored 1 while a negative response was scored 0. Maximum score was 6 points which was converted to 100%. Score below 50% were categorized as negative attitude while those above were seen as positive attitude. Chi-squared statistical test was used to find association between variables at a significant level of $p\text{-value} < 0.05$.

Ethical clearance was obtained from Federal Teaching Hospital Ethical Committee and information about the schools was obtained from the State Ministry of Education.

Informed consent was obtained from the principals of the schools and their class teachers while assent was gotten from selected students prior to the study.

3. RESULTS

Table 1 shows that a total of 318 students were interviewed from the two schools; public school, 158 (49.7%) and privately run institutions, 160 (50.3%). Students aged between 15 and 19 years were greatest in proportion 272 (85.5%) while there were only 2 students aged 25 years and above. One hundred and fifty four (48.4%) males and 164 (51.6%), females were cumulatively interviewed in the course of the survey. In both types of school, students in SSS 2 constituted the greatest proportion of respondents; 90 (57.0%) and 78 (48.8%) for public and private schools respectively.

Table 2 shows that the entire student (100%) had heard about Ebola Virus Disease (EVD) from one source or another. However, the electronic media was their commonest source, with television

constituting more than half 174 (54.7%), and radio accounting for 63 (19.8.0%). The least sources of information were health workers and school teachers 14 (4.4%) respectively.

In our study, more than half of the respondents knew that a case or person suspected to have EVD can present with fever, vomiting and bleeding. Greatest proportion 70.4% identified bleeding as symptom of EVD infection while 13.4% knew that joint pain is one of the symptoms.

Knowledge of the causative agent of EVD was high among the respondents as 285 (89.6%) correctly identified virus as the offending organism. Majority of the respondents 221 (69.5%) also knew that contact with an EVD suspect/case and eating bush meat 216 (67.9%) could transmit EVD. Hand washing was the most commonly known way of preventing EVD for the greatest proportion of the respondents 200 (62.9%) followed by those who knew that avoiding contact with EVD suspect/case is

effective in EVD prevention. However, less than half of them 129 (40.6%) knew about use of hand sanitizer as a preventive measure.

Table 3 showed the relationship between knowledge of EVD and the type of school attended by students. Knowledge of EVD was generally poor for majority of the student in both schools, 169 (53.1%), the proportion being higher in the public 104 (65.8%) compared to the private schools 65 (40.6%). The proportion of students with positive attitude was higher 113 (70.6%) among students attending private school compared to 85 (53.8%) of their counterparts in public schools. The reverse is the case for negative attitude.

Only 31 (9.7%), student had excellent knowledge of EVD and those attending private secondary schools 18 (11.3%), were in the majority compared to 13 (8.2%) from the public schools. The association between knowledge and type of school was found to have high statistical significance, (p = 0.001).

Table 1. Socio-demographic characteristics

Variable	Public school		Private school		Total (%)
	Frequency	Proportion	Frequency	Proportion	
Type of school	158	49.7	160	50.3	318
Age of respondents (years)					
10 – 14	18	10.1	22	13.8	38 (11.9)
15 – 19	140	88.6	132	82.5	272 (85.5)
20 – 24	0	0.0	4	2.5	4 (1.3)
≥ 25	2	1.3	2	1.3	4 (1.3)
Gender of respondents					
Male	75	47.5	79	49.4	154 (48.4)
Female	83	52.5	81	50.6	164 (51.4)
Class in school of respondent					
SSS 1	33	20.9	19	11.9	52 (16.4)
SSS 2	90	57.0	78	48.8	168 (52.8)
SSS 3	35	22.2	63	39.4	98 (30.8)

Table 2. Awareness and sources of information about EVD

Variable	Frequency	Proportion (%)
Awareness of EVD	318	100
Main source of information about EVD		
Television	174	54.7
Radio	63	19.8
Family member	33	10.4
Friends	20	6.3
Health worker	14	4.4
Teacher	14	4.4

Table 3. Knowledge of and Attitude of respondents towards EVD

Variables	Public (n = 158)		Private (n = 160)		Total (%)
	Frequency	Proportion	Frequency	Proportion	
Respondents knowledge of EVD					
Poor	104	65.8	65	40.6	169 (53.1)
Fair	41	25.9	77	48.1	118 (37.1)
Excellent	13	8.2	18	11.3	31 (9.7)
Respondents' attitude towards EVD					
Positive	85	53.8	113	70.6	198 (62.3)
Negative	73	46.2	47	29.4	120 (37.7)

Out of the 318 respondents, 198 (62.3%) had positive attitude toward EVD patients or those that had recovered while attitude was negative for 120 (37.7%) of them.

The relationship between type of school and attitude of the students towards people with EVD is statistically significant with p-value < 0.05.

The proportion of students who had poor knowledge of EVD was greatest among students between the ages of 20-24 years as 3 (75.0%) of them were graded as having poor knowledge. None out of the 38 students between the ages of 10-14 had excellent knowledge. However, 2 (50.0%) out of the 4 students aged 25 years and above had excellent knowledge. Males were relatively more knowledgeable than the females, though with a small margin. This is shown by the fact that 7 (11.0%) males had excellent knowledge compared the proportion of females 14 (8.5%) who were considered as having excellent knowledge. The table also shows that the proportion of students with poor knowledge was greatest among SSS 2 students as 101 (60.1%) were graded as having poor knowledge compared to 29 (55.8%) and 39 (39.8%) respectively for SSS 1 and SSS 3. However, the students of SSS 3 had the highest proportion of respondents with excellent knowledge of EVD. Except for the variable gender ($p > 0.05$), the relationship between socio-demographic attributes of the students and their knowledge of EVD was statistically significant.

All the students 4 (100%) aged 25 years and above had positive attitude towards people who are suffering or had suffered from EVD. Negative attitude was found mostly among those aged 20-24 years, 3 (75%), a relationship that was not significant. Gender and attitude to EVD had significant relationship ($p < 0.05$). In terms of class in school, the proportion of students with positive attitude towards EVD was greatest

among the SSS 1 students 24 (46.2%), while proportion of those with negative attitude was highest among the SSS 3 students 65 (66.3%). However this relationship is not statistically significant.

Table 4 compares the relationship between knowledge and the socio-demographic characteristics of students between schools. The finding here shows that no student aged 25 years and above had poor knowledge among those studying in the private schools. So also, no student 10-14 and 20-24 years in either type of schools had excellent knowledge. Both males and females in public schools had greater proportion of students who had poor knowledge of EVD [49 (65.3%) and 55 (66.3%) respectively] compared to those who had poor knowledge in the private schools [33 (41.8) and 32 (39.5%) respectively]. Generally, students of public schools had greater proportions of respondents graded as having poor EVD knowledge across the classes compared to those in private. However 2 (6.1%) SSS 1 students in public schools had excellent EVD knowledge whereas none of their counterpart in private schools was that knowledgeable. Across the variables tested, statistical significant relationship was found between classes of respondents in the private secondary schools ($p < 0.05$).

For both types of school, all (100%) students aged 25 years and above exhibited negative attitude towards people affected by EVD. Across gender, students of the private schools had greater proportion [61 (77.2%) males and 52 (64.2%) females] of those with positive attitude compared to their counterparts in the public schools [35 (46.7%) of males and 50 (60.2%) of females]. Students in the private schools had greater proportion of respondents who exhibited favorable attitude towards people who had suffered or are suffering from EVD. Similarly, apart from SSS 3 students in private schools,

greater proportion of students of other classes in the public school showed negative attitude to EVD. The relationship between attitude and socio-demographic characteristics of the respondents was found to have statistical significance only for students' class in both schools ($p < 0.05$).

4. DISCUSSION

This study showed that all the students were aware of Ebola virus disease (EVD) and that the major source of information was the television followed by the radio. This is similar to the results reported by Nwabueze et al where 95% of the respondents were aware of EVD [18]. High awareness of 96% was also reported in a study done by Koralek et al. [19]. Similar results have been shown by other authors that the mass media is an important source of information as reported by secondary school students [18,19]. This shows that television and radio are very important channels for the dissemination of information for this group and therefore will be very useful medium for providing information that will promote the health of that age group. Indeed the mass media has a potential for reaching large populations [20]. Perhaps this might be the advantage of the television and radio had over the other source of information that the students mentioned. Very few students got information about EVD from their teachers. This also falls in with other findings elsewhere [18]. This suggests that there is an existing information and knowledge sharing gap between the students and their teachers. One would have expected that students should receive such information from their teachers since the school is a place of learning and health education too. This situation could have arisen either because the teachers awareness and knowledge about EVD is poor or that it has been taken for granted that EVD has become a common knowledge and therefore not an important information to share or reinforce among the students. It could also be that the school curriculum has not provided a period of teaching that should cover information on such topics of public health importance. These are areas for further research.

Majority of the respondents (89.6%) knew the cause of EVD. This result is similar to those found by Holakouie et al. [21] and by Koralek et al. [19]. However, a study in Sobi, Ilorin showed that only 22.2% of the respondents knew

the cause of the illness [22]. It is worthy to note that this hospital based study was not conducted among a general population and that may explain why it found a very low level of knowledge among respondents. Majority of our respondents knew that fever and bleeding were signs of EVD. A similar high level of knowledge of signs and symptoms of EVD was also found by Holakouie et al. [21]. This high knowledge reported in our study about the cause and symptoms may have been due to the publicity given to the epidemic by the electronic media which formed greater proportion of the source of information as volunteered by the students. The information contained in the messages will usually start by explaining the cause of EVD as a virus and all the symptoms [23]. It could be that this contributed to the level of awareness that the students have. It is possible that some students in the proportion that do not know about the cause and symptoms of EVD may not have had access to any electronic media in order to listen to the information that was broadcast by the media houses [24]. This underscores the need to employ all media for communication during epidemics in order to get the widest coverage of information spread.

Known routes of transmission reported by the students were through contact, air borne, and eating bush meat. Other authors have reported such knowledge of routes of transmission known by students as contact with sweat, urine, body fluids of infected person, and eating bush meat. [18,19,25] knowledge of routes of transmission of infections is an important step in the control of outbreaks [26]. Poor knowledge of route of transmission of an infection may therefore lead to harmful practices that will have a further negative impact on the control of outbreaks. The proportion that had correct knowledge of route of transmission of EVD was moderately high. However it still reveals the need to engage students more in health education activities during periods of outbreaks on the routes of transmission of infections.

Majority of the students (62.9%) reported avoiding contacts (53.5) as method of prevention of EVD. Similar results have been reported by other authors [21,22]. Avoiding contact is an important aspect of the control measures during EVD outbreak. It must have contributed to the termination of the transmission of the infection during the outbreak that occurred in West African countries in 2014.

Table 4. Relationship between knowledge and socio-demographic characteristics and type of school

Social demographics	Knowledge grades									
	Public school (n = 158)					Private school (n = 160)				
	Poor N (%)	Fair N (%)	Excellent N (%)	Total	χ^2 (p- value)	Poor N (%)	Fair N (%)	Excellent N (%)	Total	χ^2 (p- value)
Age (years)										
10 – 14	12 (75.0)	4 (25.0)	0 (0.0)	16	6.41 (0.17)	10 (45.5)	12 (54.5)	0 (0.0)	22	8.70 (0.19)
15 – 19	91 (65)	37 (26.4)	12 (8.6)	140		52 (39.4)	63 (47.7)	17 (12.9)	132	
20 – 24	0 (0.0)	0 (0.0)	0 (0.0)	0		3 (75.0)	1 (25.0)	0 (0.0)	4	
≥ 25	1 (50.0)	0 (0.0)	1(50.0)	2		0 (0.0)	1 (50.0)	1 (50.0)	2	
Gender										
Male	49 (65.3)	19 (25.3)	7 (9.3)	75	0.24 (0.89)	33 (41.8)	36 (45.6)	10 (12.7)	79	0.54 (0.76)
Female	55 (66.3)	22 (26.5)	6 (7.2)	83		32 (39.5)	41 (50.6)	8 (9.9)	81	
Class										
SSS 1	20 (60.6)	11 (33.3)	2 (6.1)	33	4.13 (0.39)	9 (47.4)	10 (52.6)	0 (0.0)	19	9.57 (0.05)
SSS 2	64 (71.1)	18 (20.0)	8 (8.9)	90		37 (47.4)	35 (44.9)	6 (7.7)	78	
SSS 3	20 (57.1)	12 (34.3)	3 (8.6)	35		19 (30.2)	32 (50.8)	12 (19.0)	63	

Table 5. Relationship between attitude and socio-demographic characteristics between types of school

Social demographics	Attitude towards EVD							
	Public school (n = 158)				Private school (n= 160)			
	Positive N (%)	Negative N (%)	Total	χ^2 (p- value)	Positive N (%)	Negative N (%)	Total	χ^2 [Fisher (p- value)]
Age (years)								
10 – 14	8 (50.0)	8 (50.0)	16	2.50 (0.27)	17 (77.3)	5 (22.7)	22	5.32 (0.16)
15 – 19	77 (55.0)	63 (45.0)	140		93 (70.5)	39 (29.5)	132	
20 – 24	0 (0.0)	0 (0.0)	0		3 (75.0)	1 (25.0)	4	
≥ 25	0 (0.0)	2 (100)	2		0 (0.0)	2 (100)	2	
Gender								
Male	35 (46.7)	40 (53.3)	75	2.92 (0.08)	61 (77.2)	18 (22.8)	79	3.27 (0.08)
Female	50 (60.2)	33 (39.8)	83		52 (64.2)	29 (53.8)	81	
Class								
SSS 1	17 (51.5)	16 (48.5)	17	7.82 (0.02)	11 (57.9)	8 (42.1)	19	7.66 (0.02)
SSS 2	42 (46.7)	48 (53.3)	90		63 (80.8)	15 (19.2)	78	
SSS 3	26 (74.3)	9 (25.7)	35		39 (61.9)	24 (38.1)	63	

Table 6. Logistic regression for predictors of EVD knowledge*

Variable		Wald Statistic (X^2)	df	P-value	AOR (CI)
Type of school	Private (Public)	18.18	1	< 0.001	2.81 (1.74 – 4.53)
Age group of respondents (years)	15 – 19 (10 -14)	1.25	1	0.26	4.18 (0.34 – 51.17)
	20 – 24 (10 - 14)	0.78	1	0.38	2.95 (0.27 – 32.45)
	≥ 25 (10 - 14)	2.55	1	0.11	14.92 (0.54 – 410.83)
Class of respondent	SS2 (SS1)	0.62	1	0.43	1.35 (0.64 – 2.84)
	SS3 (SS1)	2.42	1	0.01	2.00 (1.15 – 3.33)

The model shows that respondents from public school were about 3 times more likely to have poorer knowledge of EVD (AOR = 2.81; CI = 1.74 – 4.53), than their counterparts in the private school. Similarly, students in SS3 were likely to be twice more knowledgeable in EVD relative to those in SS1 (AOR = 2.0; CI = 1.15 – 3.33).

*For the logistic regression model knowledge grades were dichotomized into good and poor knowledge. Scores greater or equal to 50% constituted good EVD knowledge while lower scores were considered poor

This study compared the overall knowledge and attitude of private and public Secondary Schools students towards EVD. Students from private secondary school had better knowledge score than students in public secondary school (Table 6). This difference was significant ($P < 0.001$). It has been reported that educational activities in private schools are of better standards than in public schools [27]. This could be a reason for the significant difference in knowledge score between the two groups. This result reveals the need to pay attention to the contents of the curriculum of the schools especially public schools. Another factor that may be playing an important role here is the economic background of students attending public schools. These students attending public school may not have access to television or radio from where they can get health information about EVD while those attending private school may have the opportunity and access to electronic media source of information. Parental influence by virtue of parents' educational status may have been another factor that contributed in making the private school students to have better knowledge score than the public students. Parents' educational status can influence the upbringing of their wards and children. This also reflected in the attitude score of the students when private and public schools were compared with students of private school having better scores.

Class of the students was associated with having a good knowledge of EVD. This was also found by Gidado et al.¹³ The explanation could be as a result of increased expectation of knowledge

as one goes from lower class to a higher class. However it will be a preferred situation if all students in the different classes had good knowledge and positive attitude towards EVD.

Logistic regression model shows that respondents from public school were about 3 times more likely to have poorer knowledge of EVD (AOR = 2.81; CI = 1.74 – 4.53) than their counterparts in the private school. Similarly, students in SS3 were likely to be twice more knowledgeable in EVD relative to those in SS1 (AOR = 2.0; CI = 1.15 – 3.33). This differential knowledge of EVD between schools may be explained by the fact that private schools are better equipped with sources of information compared to public schools.

5. CONCLUSION

The study found high awareness of EVD. Class of the students was associated with having a good knowledge of EVD. Respondents from private schools were more knowledgeable and exhibited more positive attitude than respondents from public schools. This difference was significant ($P < 0.001$). We therefore recommend sensitization and public health education of secondary school students on EVD.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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