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Comparative Analysis of Petrochemicals Effects on Ocular Cavity: Prevalence and Pharmaceutical Interventions in the Niger Delta, Nigeria

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ABSTRACT

Background: The eye provides vision, can receive and process visual detail, and enables several photo response functions. Crude oil is a mix of different chemicals; it may be irritating or cause mild to severe conditions when in contact with the eyes. **Aim:** the study aimed to analyze the prevalence and therapeutic interventions of ocular disorders among the two communities in Southern, Ijaw, Bayelsa, Nigeria. **Method:** A descriptive cross-sectional design was used to describe the ocular disorders in selected crude oil-producing communities in the Niger Delta. A sample of 400 individuals from Korokorosei (200) and Amassoma (200) communities were enlisted using the convenience sampling technique; the questionnaire was administered and retrieved after filling. **Results:** There was a high prevalence of ocular disorders in Korokorosei than in Amassoma, and also a majority of the respondents visited the local medicine outlet to get medication in the management of ocular disorders. Respondents from Korokorosei visit the local clinic for treatment; when they had ocular disorder (11% - always, 66% - sometimes, 23%, etc.), 22% (always). 29.5% - always, 65% - sometimes, 5.5% - rarely visit the pharmacy for necessary checks and get medication to treat eye disorders, 6.5%-always, 42%-sometimes, 34%-never visit traditional healer for herbal treatment, 18.5%-always, 52%-sometimes, 29.5%-rarely visit an eye doctor for treatment, 30.5%-always, 64%-sometimes, 5.5%-rarely indicated they make effort to handle the treatment by themselves and 24%-always, 82.5%-sometimes, 5.5%-rarely also said they buy medicines from drug sellers in vehicles and open market to handle their eye problem. **Conclusion:** The prevalence of ocular diseases and related problem were seen more in the oil-producing community than in the non-oil-producing

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community, and pharmaceutical intervention in these communities was very minimal.

Keywords: crude oil, ocular, eye, vision, prevalence, pharmaceutical care, intervention

INTRODUCTION

The eye is a complex organ with unique anatomy and physiology. Consequently, ophthalmic drug delivery is one of the most interesting and challenging endeavors facing pharmaceutical scientists [1,2]. The eyes provide humans with vision, the ability to receive and process visual detail, as well as enable several photo response functions that are independent of vision. Eyes detect light and convert it into electrochemical impulses in neurons. From more complex eyes, retinal photosensitive ganglion cells send signals along the retinohypothalamic tract to the suprachiasmatic nuclei to effect circadian adjustment and to the pretectal area to control the pupillary light reflex [3]. The eye has several natural mechanisms to defend itself against infection or trauma. For example, tears contain lysozymes and interferon, thus keeping the eye lubricated, physically clear from foreign particles, and protecting against infection. The eyelids and eyelashes protect the ocular surface from the environment and help maintain the moist surface of the eye. However, occasionally these defense mechanisms may be disrupted, resulting in ocular inflammation [4].

Most ocular morbidities found in developing countries are preventable and curable but are faced with inadequate availability of ophthalmic services in rural communities. Ocular morbidity is best described as the spectrum of eye disease or disorder experienced by a population or community [5]. Ocular diseases include cataracts, conjunctivitis, macular degeneration, and night blindness [6]. There are different types of eyes, categorized into simple eyes - with one concave photoreceptive surface, and compound eyes - which comprise several individual lenses laid out on a convex surface [7]. Some specific ocular includes age-related macular degeneration, characterized by blurred vision, a dark or empty area in the central area of vision, and distortion of straight lines [8]. There are also bulging eyes, or proptosis, which occurs when one or both eyes protrude from the eye sockets due to space-taking lesions such as swelling of the muscles, fat, and tissue behind the eye [9]. The most common cause of bulging eyes is Graves' disease [10]. Eye floaters - tiny spots, specks, lines, or shapes that enter into the field of vision, appearing to float in front of the eye. They may seem like distant objects, but they are the shadows of cells and fibers inside the vitreous, or gel-like portion of the eye [9]. Glaucoma occurs when a build-up of fluid, creates pressure in the eye, which then damages the optic nerve causing blurry vision. The optic nerve is responsible for the transmission of information from the eyes to the brain, and damage associated with it can lead to severe vision loss, and in the worst case, blindness [11]. Ocular hypertension (intraocular pressure) occurs when the pressure in the eye is above 21 mm Hg, resulting from poor drainage of the aqueous humor [12]. Uveitis is an inflammation of the uvea that can lead to other complications including glaucoma, cataracts, optic nerve damage, retinal detachment, and severe vision loss [13].

Crude oil (petroleum) is a naturally occurring, yellowish-black liquid found in geological formations beneath the Earth's surface, it is composed of hydrocarbon deposits and other organic materials [14]. It is a type of fossil fuel formed when large quantities of dead organisms (zooplankton, and algae), are buried underneath sedimentary rock and subjected to both intense heat and pressure. Petroleum is mostly recovered by oil drilling and refines to produce usable products [15,16]. Regardless of the source, it affects living organisms when released into the environment. Hence people who inhabit petroleum drilling, spilling, and exploration environment have a serious risk of developing acute to chronic disease conditions including cancer, ocular disorders, skin damage, respiratory distress, etc., [17]. When oil is spilled in the ocean, it spreads on the water's surface. The oil slick formed may stay together, or it may break up in rough seas. Waves, currents, and wind spread the oil over large areas. A small part of the oil may dissolve in the water. These people may develop a rash or skin irritation or have other allergic reactions [18]. Skin, when in contact with crude oil for a long time can cause skin reddening, swelling, and burning. The skin effects can get worse if exposed to sunlight.

Light crude oil may also be irritating if it gets contacts the eyes [18]. Ocular disorders that could result from exposure to crude oil include blepharitis, presbyopia, cataract, and glaucoma among others. Ocular diseases affect not just sight but also the quality of life and even blindness if not managed properly [19].

The Niger Delta region is one of the largest crude oils producing areas in Nigeria and currently over 60% of crude oil prospecting and extraction occur in this region resulting in a profusion of access roads, oil pipelines, and wells, gas flaring, dredged spoils and flow stations that are often sited close to schools, farmlands, rivers, streams, private houses and within communities [20]. Oil spills are common throughout these areas, a sequel to pipeline corrosion, spills or leaks at the well heads, poor maintenance of infrastructure, human error, theft, and vandalism [21]. A comprehensive report estimated that the total amount of spillage is about 13 million barrels over 50 years of exploration which is roughly 1.5 million tons per year [22]. The collective impacts of these pervasive massive spills on the environment and local inhabitants are worsened by seasonal floods, which transfer the oil pollution to other areas of the community [23]. Currently, thousands of people who live in this region are being exposed to oil contamination near their homes, farmlands, fishing camps, and drinking water, as well as foods but the consequences of such exposure on their health are not been considered [20].

This exposure to chemicals generated by exploration can result in ocular disorders, which reduces manpower, lowering the total output and production in the community [24,25]. Therefore, adequate ocular pharmaceutical cares, as well as government intervention are very necessary in this region because uncontrolled exposure could lead to partial or total blindness. Hence the study aimed to comparatively access the prevalence, and pharmacotherapeutic interventions of ocular disorders in an oil-producing and non-oil producing communities in Bayelsa state, Nigeria.

METHOD

Study Design

The study's target populations are individuals in oil-producing communities, exposed to oil spillage and those from non-oil-producing community that is not exposed to oil-environmental pollution. The questionnaire was administered at their point of contact with the individuals after explaining the concept of the study to the respondent. A descriptive cross-sectional design was used to describe the ocular disorders in selected crude oil-producing communities in the Niger Delta: prevalence and pharmaceutical interventions.

Data collection instrument

A sample of four hundred (400) individuals from Korokorosei (200) and Amassoma (200) communities was enlisted using the convenience sampling technique, the questionnaire was administered, and the same was retrieved after filling. A questionnaire was designed to obtain information from the selected respondents. A 40-item questionnaire, consisting of four sections was developed for the survey questionnaire. Items included demographic data, the prevalence of ocular disorders, the incidence of eye disorders, the severity of ocular disorders, and management of ocular disorders, to describe the ocular disorders in selected crude oil producing communities in the niger delta: prevalence and pharmaceutical interventions. Inclusion criteria were individuals from the Southern Ijaw Local Government Area of Bayelsa state, and are 15 years and above. Questionnaires were designed, and administered to respondents, and data were collected after verbal permission and interaction with respondents, same were retrieved and data analyzed using SPSS statistical data analysis software. The retrieved copies of the questionnaire were analyzed with IBM SPSS version 23.0, a computer program. Statistical analysis was done through the use of descriptive statistics such as summaries, frequency, distribution charts, and percentages were used to present data. Ethical clearance was obtained from the research and ethics committee of the Korokorosei Community Development Committee. Verbal permission would also be obtained from the individual, either collectively or individually for the questionnaire administration.

RESULTS

Table 1: Data obtained from Korokorosei community

Table 1.1: Demographic data [n = 200].

Variables	**Respondents**	**Frequency**	**Percentage**
Age of respondents (years)	18-29	47	23.5%
	30-39	103	51.5%
	40-59	37	18.5%
	60 & >	13	6.5%
Sex	Male	94	47%
	Female	106	53%
Marital status	Single	59	29.5%
	Married	125	64%
	Widow	13	6.5%
Number of children	1-2	47	23.5%
	3-5	68	34%
	6-8	37	18.5%
	None	48	24%
Occupation	Employed	47	23.5%
	Unemployed	35	17.5%
	Farmer	37	18.5%
	Business/Trader	68	34%
	Student	13	6.5%
Family income level	Low	37	18.5%
	Mid-low	93	46.5%
	Mid-high	70	35%
Educational level	Primary	26	13%
	Secondary	106	53%
	BSC	57	28.5%
	Masco	11	5.5%
Health status	Very good	81	40.5%
	Good	119	59.5%
Eye disease	Chronic	36	18%
	Not chronic	153	76.5%
	None	11	5.5%
Location	Urban area	108	54%
	Rural area	92	46%
Health insurance	Self-employed	113	56.5%
	Workplace	39	19.5%
	Not covered	48	24%

Table 1.1: Shows the demographic data of respondents' health status and nature of eye disorder.

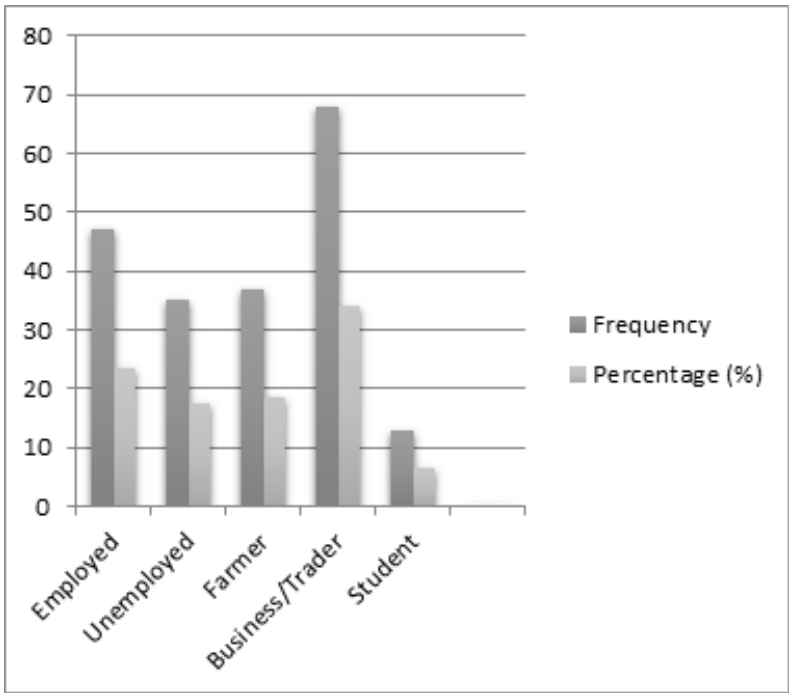

Figure 1: Chart shows the occupational status of respondents.

Table 1.2: Prevalence of Ocular Disorders [n = 200],

Have you experienced or heard someone complained about the following:

Variable	YES (%)	NO (%)	Not sure (%)
Eyes that are sensitive to light	178 (89)	11 (5.5)	11(5.5)
Painful or sore eyes	141 (70.5)	48 (24%)	11(5.5%)
Blurred vision or Poor vision	166 (83)	34(17%)	0%
Itching/scratching or irritating eyes	176 (88%)	24(12%)	0%
Eyes burning (sensation)	117 (58.5%)	37(18.5%)	46(23%)
Watering eyes	106 (53%)	11(5.5%)	83(41.5%)
Reddish Eyes	95 (47.5%)	22(11%)	83(41.5%)
Eyes getting sticky	130 (65%)	22(11%)	48(24%)
Difficulty to read or watch TV as a result of eye problem	142 (71%)	23(11.5%)	35(17.5%)
Difficulty driving at night due to eye problem	120 (60%)	23(11.5%)	57(28.5%)
Difficulty to use a computer or bank ATM due to eye defect	109 (54.5%)	34(17%)	57(28.5%)

Table 1.2 shows the Prevalence of Ocular Disorders in Korokorosei community

Table 1.3: Incidence of Eye Disorders [n = 200].

Which of the following have you or your family member(s) experienced? How often does the person you love or live with do these things, including you?

Variable	Always (%)	Sometimes (%)	Rarely (%)	Never (%)
Eyes that are sensitive to light	56 (28)	83(41.5)	13(6.5)	0
Painful or sore eyes	56 (28)	133(66.5)	11(5.5)	0
Blurred vision or Poor vision	69 (34.5)	96(48)	24(12)	11(5.5)
Itching/scratching or irritating eyes	177 (58.5)	72(36)	11(5.5)	0
Eyes burning (sensation)	105 (52.5)	84 (42)	11(5.5)	0
Watering eyes	48 (24)	139(69.5)	13(6.5)	0
Reddish Eyes	83 (41.5)	93(46.5)	24(12)	0
Eyes getting sticky	84 (42)	92(46)	24(12)	0
Difficulty to read or watch TV as a result of eye problem	73 (36.5)	94(47)	33(16.5)	0
Difficulty driving at night due to eye problem	73 (36.5)	94(47)	33(16.5)	0
Difficulty to use a computer or bank ATM due to eye defect	71 (35.5)	96(48)	33(16.5)	0

Table 1.3 shows the incidence of the ocular disorder in Korokorosei community.

Table 1.4: The severity of Eye Disorders [n = 200].

In your opinion, how severe or mild do you consider the eye problem to be? Please indicate on the table below using a score of 0 - 4: [0 = Not a problem, 1 = Very mild, 2 = Mild, 3 = Severe, 4 = Very severe].

Variable	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)
Eyes that are sensitive to light	13(6.5%)	115(57.5)	13(6.5%)	48(24)	11(5.5)
Painful or sore eyes	0%	119(59.5)	70(35%)	11(5.5)	0
Blurred vision or Poor vision	0%	75(37.5)	103(51.5%)	22(11)	0
Itching/scratching or irritating eyes	13(6.5)	121(60.5)	44(22%)	22(11)	0
Eyes burning (sensation)	28(13)	106(53)	46(23%)	22(11)	0
Watering eyes	37(18.5)	130(65)	22(11%)	11(5.5)	0
Reddish Eyes	50(25)	73(36.5)	66(33%)	11(5.5)	0
Eyes getting sticky	26(13)	86(43)	88(44%)	0%	0
Difficulty to read or watch TV as a result of eye problem	13(6.5)	86(43)	0%	101(50.5)	0
Difficulty driving at night due to eye problem	13(6.5)	128(64)	59(29.5%)	0	0
Difficulty to use a computer or bank ATM due to eye defect	13(6.5)	128(64)	48(24%)	11(5.5)	0

Table 1.4 shows the severity of the ocular disorder in Korokorosei community.

Table 1.5: Management of Ocular Disorders [n = 200].

Indicate how you or a member(s) of your family handle eye problem(s): [Always = All the time, sometimes = Twice in a long while, rarely = Once in a long while, never = Not at all]

Variable	Always (%)	Sometimes (%)	Rarely (%)	Never (%)
Visit the hospital for treatment	22(11)	132(66)	46(23)	0
Depend on God for healing through fasting and prayers	44(22)	145(72.5)	11(5.5)	0
Visit the pharmacy for a check-up and get medication	59(29.5)	130(65)	11(5.5)	0
Visit a traditional doctor for herbal treatment	13(6.5)	84(42)	35(17.5)	68(34)
Visit an eye doctor	37(18.5)	104(52)	59(29.5)	0
Make effort to handle treatment by yourself	61(30.5)	128(64)	11(5.5)	0
Buy drugs from drug sellers in buses and market	24(12)	165(82.5)	11(5.5)	0

Table 1.5. Shows how respondents and their family members manage ocular disorders in Korokorosei community.

The charts below show the Cross-tabulation of the Sex of Respondents, Educational level, and nature of eye disease

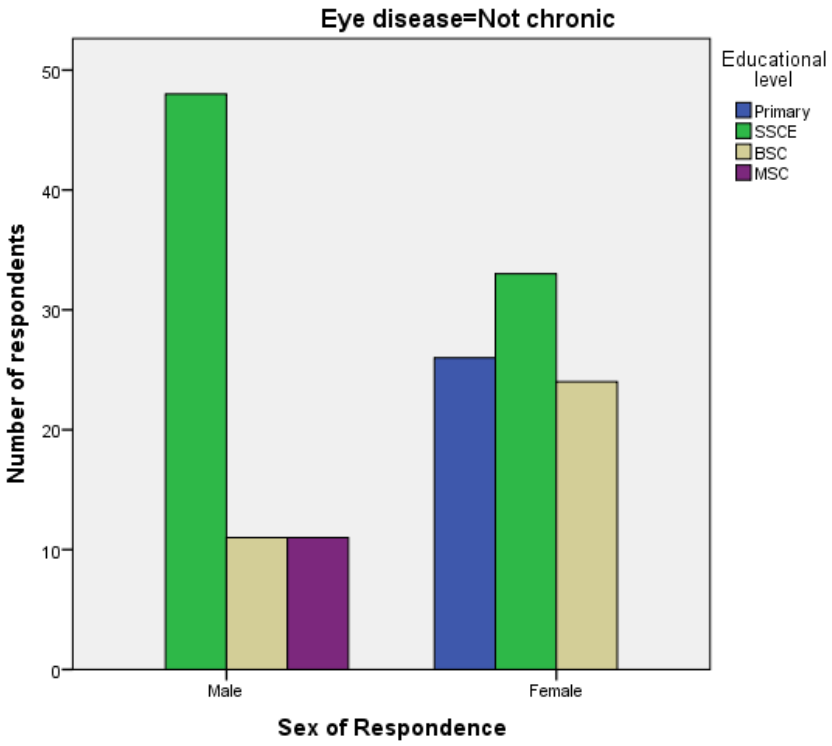

Figure 2: Chart showing the cross-tabulation of sex of respondents, educational level, and nature of eye disease (not chronic).

Table 1.6: Cross-tabulation of sex of respondents, educational level, and eye disease.

Variables									
Eye disease			Educational level				Total	Chi-square	Df
			Primary	SSCE	BSC	MSC			
Chronic	Sex of Respondents	Male		13	0		13		
		Female		12	11		23	8.953[b]	1
	Total			25	11		36		
Not chronic	Sex of Respondents	Male	0	48	11	11	70		
		Female	26	33	24	0	83	43.818[c]	3
	Total		26	81	35	11	153		
None	Sex of Respondents	Male			11		11		
	Total				11		11	0.00[d]	0
Total	Sex of Respondents	Male	0	61	22	11	94		
		Female	26	45	35	0	106	41.811[a]	3
	Total		26	106	57	11	200		

Table 2: Data obtained from Amassoma community

Table 2.1: Demographic data [n = 200].

Variables	**Respondents**	**Frequency**	**Percentage**
Age of respondents (years)	18-29	64	32
	30-39	73	36.5
	40-59	53	26.5
	60 & >	10	5
Sex	Male	116	58
	Female	84	42
Marital status	Single	66	33
	Married	129	64.5
	Widow	5	2.5
Number of children	1-2	14	14
	3-5	52	26
	6-8	56	28
	None	64	32
Occupation	Employed	29	14.5
	Unemployed	23	11.5
	Farmer	15	7.5
	Business/Trader	69	34.5
	Student	64	32
Family income level	Low	2	1.0
	Mid-low	128	64
	Mid-high	70	35

Educational level	Primary	0	0
	Secondary	22	11
	BSC	167	78.5
	MSC	21	10.5
Health status	Very good	20	10
	Good	130	65
	Fair	50	25
Eye disease	Chronic	0	0
	Not chronic	72	36
	None	128	64
Location	Urban area	35	17.5
	Rural area	165	82.5
Health insurance	Self-employed	25	12.5
	Workplace	29	14.5
	Not covered	146	73

Table 2.1. Shows the demographic data of respondents' health status and nature of eye disorder.

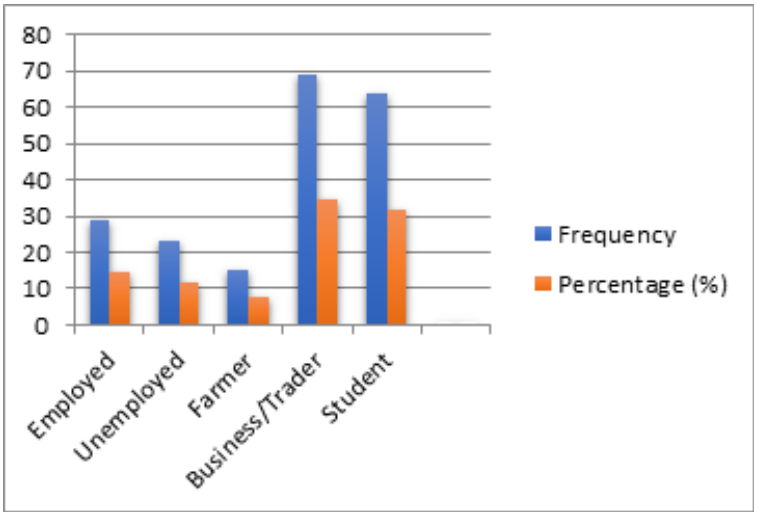

Figure 3: Chart shows the occupational status of respondents.

Table 2.2: Prevalence of Ocular Disorders [n = 200]

Have you experienced or heard someone complained about the following:

Variable	YES (%)	NO (%)	Not sure (%)
Eyes that are sensitive to light	64(32)	136(68)	0
Painful or sore eyes	4(2)	136(67)	62(31%)
Blurred vision or Poor vision	31(15.5)	166(83)	3(1.5)
Itching/scratching or irritating eyes	52(26)	142(71)	6(3)
Eyes burning (sensation)	66(33)	126(63)	8(4)
Watering eyes	111(55.5)	41(20.5)	48(24)
Reddish Eyes	86(43)	66(33)	48(24)
Eyes getting sticky	43(21.5)	56(28)	101(50.5)
Difficulty to read or watch TV as a result of eye problem	43(21.5)	73(36.5)	84(42)
Difficulty driving at night due to eye problem	27(13.5)	82(41)	91(45.5)
Difficulty to use a computer or bank ATM due to eye defect	27(13.5)	95(47.5)	78(39)

Table 2.2 shows the Prevalence of Ocular Disorders in the Amassoma community

Table 2.3: Incidence of Eye Disorders [n = 200].

Which of the following have you or your family member(s) experienced? How often does the person you love or live with do these things, including you?

Variable	Always (%)	Sometimes (%)	Rarely (%)	Never (%)
Eyes that are sensitive to light	0	73(36.5)	106(53)	21(10.5)
Painful or sore eyes	0	73(36.5)	106(53)	21(10.5)
Blurred vision or Poor vision	0	63(33)	113(56.5)	21(10.5)
Itching/scratching or irritating eyes	0	98(49)	102(51)	0
Eyes burning (sensation)	0	83(41.5)	117(58.5)	0
Watering eyes	0	86(43)	114(57)	0
Reddish Eyes	0	93(46.5)	107(53.5)	0
Eyes getting sticky	0	90(45)	100(50)	10(5)
Difficulty to read or watch TV as a result of eye problem	0	90(45)	100(50)	10(5)
Difficulty driving at night due to eye problem	0	63(31.5)	92(46)	45(22.5)
Difficulty to use a computer or bank ATM due to eye defect	0	18(9)	136(67.5)	47(23.5)

Table 3.2 shows the incidence of the ocular disorder in Amassoma community.

Table 2.4: The severity of Eye Disorders [n = 200].

In your opinion, how severe or mild do you consider the eye problem to be? Please indicate on the table below using a score of 0 - 4: (0 = Not a problem, 1 = Very mild, 2 = Mild, 3 = Severe, 4 = Very severe).

Variable	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)
Eyes that are sensitive to light	65(32.5)	111(55.5)	24(12)	0	0
Painful or sore eyes	71(35.5)	103(51.5)	26(13)	0	0
Blurred vision or Poor vision	69(34.5)	110(55)	21(10.5)	0	0
Itching/scratching or irritating eyes	43(21.5)	110(55)	26(13)	21(10.5)	0
Eyes burning (sensation)	42(21)	102(51)	56(28)	0	0
Watering eyes	26(13)	118(59)	56(28)	0	0
Reddish Eyes	46(23)	103(51.5)	51(25.5)	0	0
Eyes getting sticky	59(29.5)	111(55.5)	20(10)	10(5)	0
Difficulty to read or watch TV as a result of eye problem	58(29)	91(45.5)	41(20.5)	10(5)	0
Difficulty driving at night due to eye problem	60(30)	63(31.5)	67(33.5)	10(5)	0
Difficulty to use a computer or bank ATM due to eye defect	38(19)	106(53)	56(28)	0	0

Table 2.4 shows the severity of the ocular disorder in Amassoma community.

Table 2.5: Management of Ocular Disorders [n = 200].

Indicate how you or member(s) of your family handle eye problem(s): (Always = All the time, sometimes = Twice in a long while, rarely = Once in a long while, never = Not at all)

Variable	Always (%)	Sometimes (%)	Rarely (%)	Never (%)
Visit the hospital for treatment	0	47(23.5)	153(76.5)	0
Depend on God for healing through fasting and prayers	0	50(25)	150(75)	0
Visit the pharmacy for a check-up and get medication	0	47(23.5)	153(76.5)	0
Visit a traditional doctor for herbal treatment	0	0	29(14.5)	171(85.5)
Visit an eye doctor	0	116(58)	53(26.5)	31(15.5)
Make effort to handle treatment by yourself	0	59(29.5)	134(67)	7(3.5)
Buy drugs from drug sellers in buses and market	4(2)	79(39.5)	112(56)	5(2.5)

Table 2.5, Shows how respondents and their family members manage ocular disorders in Amassoma community.

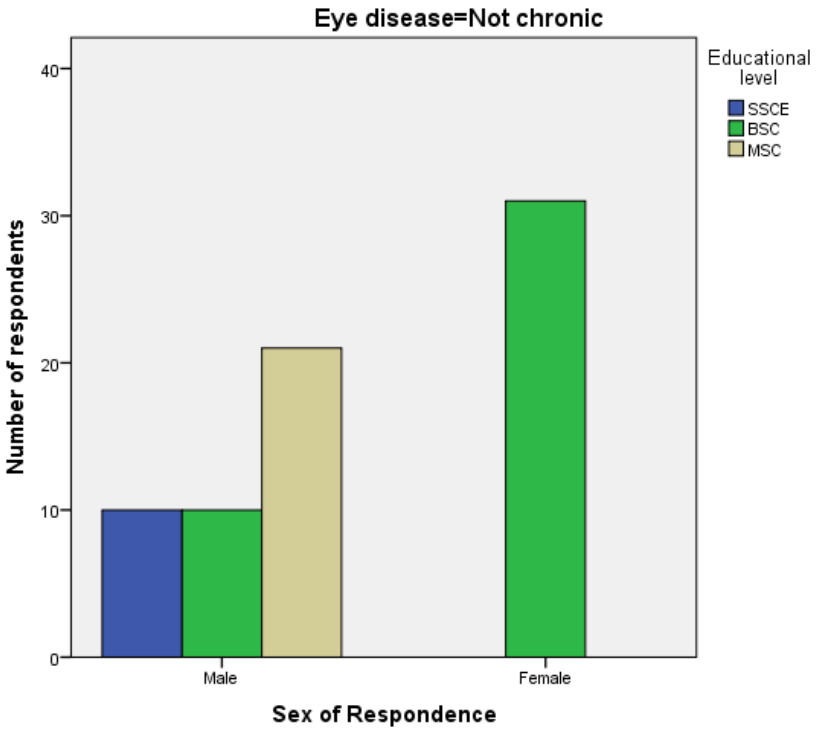

Figure 4: Chart showing the cross-tabulation of sex of respondents, educational level, and nature of eye disease (not chronic).

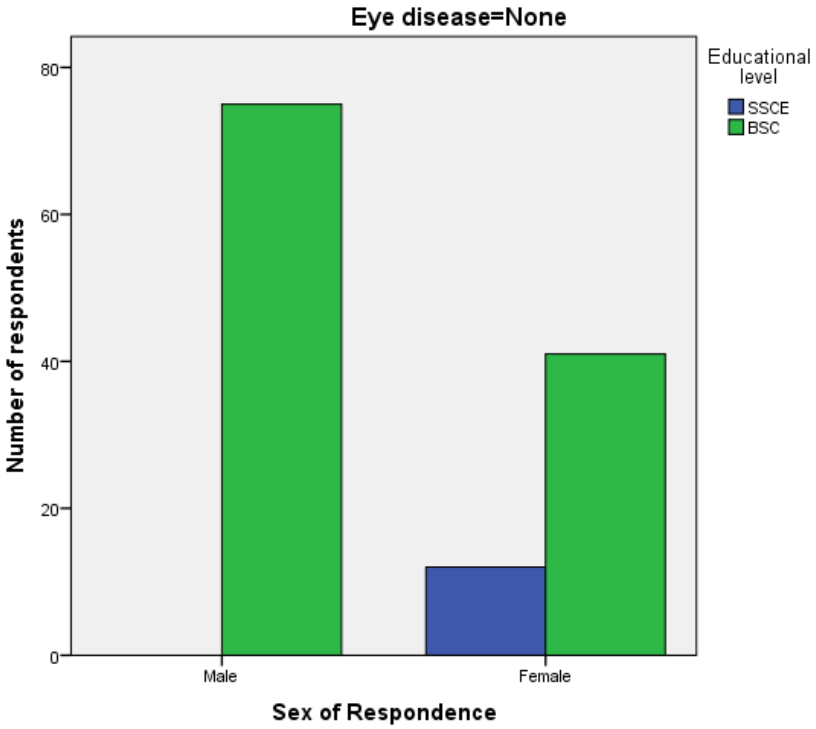

Figure 5: Chart showing the cross-tabulation of sex of respondents, educational level, and nature of eye disease (none).

Table 2.6: Sex of respondents, educational level, and nature of eye disease Cross tabulation.

Variables								
Eye disease			Educational level			Total	x^2	Df
			SSCE	BSC	MSC			
Not chronic	Sex of Respondents	Male	10	10	21	41		
		Female	0	31	0	31	41.161	2
	Total		10	41	21	72		
None	Sex of Respondents	Male	0	75		75		
		Female	12	41		53	18.738	1
	Total		12	116		128		
Total	Sex of Respondents	Male	10	85	21	116		
		Female	12	72	0	84	17.589	2
	Total		22	157	21	200		

DISCUSSION

Following the data analyzed, a total of 400 individuals from two communities participated in the study. Data obtained from Korokorosei community (Table 1.1) indicates that 53% of the respondents were females while 47% were male, on the other hand, 42% of females and 58% of males participated in Amassoma community (Table 2.1). 23.5% of the respondents were between 18-29 years of age, 51.5%, were 30-39 years, 18.5%, were 40-59 years and 6.5% were 60 years and above from the Korokorosei community while 32% of the respondents were between 18-29 years of age, 36.5%, 30-39 years, 26.5%, 40-59 years and 5% were 60 years and above from Amassoma community.

Based on marital status, 64% of the respondents from Korokorosei were married, 29.5%, single and 6.5% were widow/widower, among these categories, 23.5% had 1-2 child/children, 34%, had 3-5 children, 18.5%, 5-8 children and 24% had no child, while 64.5% from Amassoma were married, 33% single and 2.5% were widow/widower, among these categories, 14% had 1-2 child/children, 26%, 3-5 children, 28%, 5-8 children and 32% had no child. In these families, the analysis showed that the majority have poor income, and hence find it difficult to access primary health care in their locality. From the Korokorosei community, 18.5% of the respondents said, they have a low family income level, 46.5% indicated that their family income level was mid-low and 35% said their income level is mid-high, while 1.0% of the respondents from the Amassoma community said, they have low-income level, 64% said their income level is mid-low and 35% indicated mid-low family income. This is reflected in their occupation as the majority of the respondents from both communities are businessmen/women. 23.5% from Korokorosei were employed, 17.5% were unemployed, 18.5% were farmers, 34% were businessmen/women and 6.5% were students while 14.5% from Amassoma were employed, 11.5% were unemployed, 7.5%% farmers, 34.5% businessmen/women, and 32% were students. The health status of the participants was also examined and from their responses, 40.5% from the Korokorosei community said their health status was very good and 59.5% said they were good health-wise, also from the Amassoma community, 10% said their health was very good, 65% said they are good health wise and 25% indicated they were fair in their health, (Table 1.1 and 2.1).

On the nature of the disease among the respondents, 18% from the Korokorosei community indicated they had chronic eye problems, 76.5% said they had eye problems but not chronic and 5.5% showed they had no eye diseases or infections. This is not the same in Amassoma (which is a non-oil producing community), as there was no chronic eye problem observed among the participants, but 36% indicated they had eye problems but not chronic, and 64% said they do not have

any eye problem. This shows that exposure to crude oil or oil spillage correlates with ocular disorders. Foulks, *et al*. 2003 [25], reported that exposure to certain harmful conditions generated by the activities of oil exploration can result in ocular disorders, which reduces manpower, therefore, lowering the total output and production in that community. Also, a study by Levy, *et al*. 2011[24] reported that the ocular surface is a delicate structure that requires extreme care and protection as it is vulnerable to potential environmental abuses of the nature of its function and anatomic location.

Prevalence of the ocular disorder

The prevalence of ocular diseases and related problem were seen more in the Korokorosei community than in Amassoma. In the Korokorosei community, 89% of the respondents confirmed they have experienced eyes that are sensitive to light on several occasions, 70.5% (Painful or sore eyes), 83% (blurred or poor vision), 88% (itching/scratching or irritating eyes), 58.5% (burning sensation), 53% (watery eyes), 47.5% (reddish eyes), 65% (eyes getting sticky), 71% (difficulty to read or watch the television as a result of eye problem), 60% (difficulty to drive at night due to eye problem) while 54.5% said they had difficulty to use the computer or bank ATM due to eye defect. This is not the same as the other community, whose individuals are not exposed to oil spillage or pollution. 34% of the respondents from the Amassoma community confirmed they have experienced eyes that are sensitive to light on several occasions, only 2% had (Painful or sore eyes), 15.5% (blurred or poor vision), 26% (itching/scratching or irritating eyes), 33% (burning sensation), 55.5% (watery eyes), 43% (reddish eyes), 21.5% (eyes getting sticky), 21.5% (difficulty to read or watch the television as a result of eye problem), 13.5% (difficulty to drive at night due to eye problem) and 13.5% said they had difficulty to use the computer or bank ATM due to eye defect, (Table 1.2 and 2.2). This is related to a report by Bausch, 2017; that Skin contact with crude oil that lasts a long time can cause skin reddening, swelling, and a burning sensation. The skin effects can get worse if the skin is exposed to the sun. Skin contact can also make you more likely to develop a rash or skin infection. Light crude oil may also be irritating if it gets contact with the eyes.

Incidence of ocular disorder

The incidence of ocular diseases was also examined among participants. In the Korokorosei community, 28%, 41.1%, and 6.5% of the respondents again confirmed they always, sometimes, and rarely have experienced eyes that are sensitive to light respectively. 28% (always), 66.5% (sometimes) and 5,5% (rarely) said they had Painful or sore eyes, 34.5% (always), 48% (sometimes), 12% (rarely) and 5.5% (never) have experienced blurred or poor vision, 58.5% (always), 36% (sometimes), and 5.5% (rarely) had itching/scratching or irritating eyes, 52.5% (always), 42% (sometimes) and 5.5% (rarely) had burning sensation, 24% (always), 69.5% (sometimes), and 6.5% (rarely) had watery eyes, 41.5% (always), 46.5% (sometimes) and 12% had reddish eyes, 42% (always), 46% (sometimes), 12% (rarely) experienced eyes getting sticky, 36.5% (always), 47% (sometimes), 16.5% (rarely) experienced difficulty to read or watch the television as a result of eye problem, 36.5% (always), 47% (sometimes), and 16.5% (rarely) experienced difficulty to drive at night due to eye problem while 35.5% (always), 48% (sometimes) and 16.5%(rarely) said they have experienced difficulty to use the computer or bank ATM due to eye defect. On the other hand, from the second community (Amassoma); 0% (always), 36.5% (sometimes) 53% (rarely) and 10.5% (never) said they had eyes that eyes sensitive to light, 0% (always), 36.5% (sometimes) 53% (rarely) and 10.5% (never) have experienced Painful or sore eyes, 33% (sometimes), 56.5% (rarely), and 10.%% (never) had blurred or poor vision, 49%% (sometimes), and 51% (rarely) had itching/scratching or irritating eyes, 41.5% (sometimes) and 58.5% (rarely) had burning sensation, 43% (sometimes), and 57% (rarely) had watery eyes, 46.5% (sometimes), 50% and (rarely) had reddish eyes, 45% (sometimes), 50% (rarely), 5% (never) experienced eyes getting sticky, 45% (sometimes), 50% (rarely), and 5% (never) experienced difficulty to read or watch the television as a result of eye problem, 31.5%% (sometimes), 46% (rarely), and 22.5% (never) experienced difficulty to drive at night due to eye problem while 9% (sometimes), 67.5% (rarely) and 23.5% (never) said they have experienced difficulty to use the computer or bank ATM due to eye defect, respectively. The incidence level indicates that the oil-producing community (Korokorosei) has a high incidence of ocular disorders symptoms than the other community (Table 1.3 and 2.3).

The severity of ocular disorder was rated on a scale of 0 – 4, 0 being not a problem, 1 = very mild, 2 = mild, 3 = severe, and 4 = very severe, respectively. As shown in Tables 1.4 and 2.4, more than half of the respondents from the Korokorosei community indicated they had mild eye disorder while a

great number said they have severe ocular disorders. On the contrary, the majority of the participants from the Amassoma community consented they don't have any eye problems but a few of the respondents indicated they had eye problems whose etiology is not linked to crude oil spillage. According to Marland, *et al*., (2007) [17]; they reported that regardless of source crude oil effects when released into the environment are similar, people who inhabit petroleum drilling, spilling, and exploration environment have a serious risk of developing acute to chronic diseases conditions including cancer, ocular disorders, skin damage, and respiratory distress. Omoti, *et al*. 2008 [26]; also reported that exposure to crude oil can lead to ocular disorders that could cause adverse ocular side effects which may manifest as photokeratitis, characterized by pain and grittiness.

Pharmacotherapy of ocular disorders

Pharmaceutical intervention in these communities regarding ocular disorders is minimal as seen from the responses obtained from respondents. Respondents from the Korokorosei community indicated that they visit the hospital for treatment when they had an ocular disorder (11% - always, 66% - sometimes, 23% rarely, etc), 22% (always), 75.5% (sometimes), 5.5% (rarely) depend on God for healing through fasting and prayer when face with eye problems. This could really affect the retinal vision production among these population, thereby causing early ocular disorders [27]. 29.5% - always, 65% - sometimes, 5.5% - rarely said they visit the pharmacy for necessary checks and get medication to treat eye disorders, 6.5%-always, 42%-sometimes, 17.5%-rarely, 34%-never; said they visit traditional healer for herbal treatment, 18.5%-always, 52%-sometimes, 29.5%-rarely; said they visit eye doctor (optomologist) for treatment, 30.5%-always, 64%-sometimes, 5.5%-rarely indicated they make effort to handle the treatment by themselves and 24%-always, 82.5%-sometimes, 5.5%-rarely also said they buy medicines from drug sellers in vehicles and open market to handle their eye problem (Table 1.5 and 2.5). Finally, from the second community, 23.5% indicated they visit the pharmacy sometimes for possible and get medications to treat the ocular disorder. This is shown in Table 2.5. From the chart (Figure 3) obtained (cross-tabulation of eye disease and educational level), there is a strong relationship between educational level and the nature of ocular disorder among participants.

CONCLUSION

Pharmaceutical intervention is little in rural areas; hence, the philosophy of pharmaceutical care is basically on the urban areas. The prevalence of ocular diseases and related problem were seen more in the oil-producing community than in the non-oil-producing community. Many individuals from Korokorosei confirmed they have experienced eyes that are sensitive to light on several occasions, ranging from painful or sore eyes, blurred or poor vision, itching/scratching or irritating eyes, burning sensation, watery eyes, reddish eyes, eyes getting sticky, difficulty to read or watch the television as a result of eye problem, difficulty to drive at night due to eye problem, difficulty to use the computer or bank ATM due to eye defect. This is not the same as the Amassoma community, whose individuals are not exposed to oil spillage or pollution. Thus, crude oil spillage or pollution has negative impacts on oil-producing communities.

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