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Pathogenic Bacteria Found on Surfaces of Canned Drinks and Wines Being Sold In Retail Shops in Ondo state, Nigeria, Health Implications, Food Safety and Quality Assessment

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The aim of this study is to determine the pathogenic bacteria, microbial properties, food safety and quality assessment of canned drinks and wines being sold in retail shops in Ondo state, Nigeria and their health implications. Bacteria were isolated from canned drinks and Wine Lid, body and bottom surface being sold in retail shops. They were identified using conventional method of analysis. The antibiotic susceptibility (Antibiogram) tests were determined on isolates using disc diffusion method. After the inoculation of the selected parts (Lid, body and bottom surface), sixteen(16) Gram positive pathogenic bacteria were identified. Bacteria isolates includes *Bacillus polymyxa* (7), *Lactobacillus casei*, *Microbacterium lacticum, Staphylococcus aureus, Cellulomon asbiazotae, Bacillus subtilis, Clostridium sporogens, Staphylococcus pyogens, Bacillus cereus.* In this study, *Bacillus polymyxa* were the most common organism isolated. Some of the Gram positive organisms were resistant to

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some selected antibiotics. *Staphylococcus pyogens* were resistant to Norfaxacin, Erythromycin, Gentamycin and Ampliclox. *Bacillus polymyxa* were resistant to Norfaxacin, Chloramphenicol, and Gentamycin. *Lactobacillus casei* were resistant to Norfaxacin, Ampliclox and Amoxil. Ultraviolet Spectrophotometer were used to determine the growth dynamic and death rate of the isolates, the addition of antibiotics to the organism at the 48th hour speed up the death rate of the organisms. The result of this study shows that canned drinks and wines top surfaces can harbor pathogenic bacteria, therefore people are encouraged to wash the top surfaces of canned drinks and wines before consumption, to minimize and eliminate the health threat of the isolated pathogenic bacteria in our canned drinks and wine surfaces, this research work will therefore encourage food safety and quality assessment of our canned drinks and wine.

Keywords: Pathogenic residential bacteria; bacteria surfaces; food safety and quality assessment.

1. INTRODUCTION

The surfaces of canned drinks and wines have been muted as a carrier of microorganisms particularly bacteria which are ubiquitous in nature [1] These bacteria have also been implicated as a cause of some serious health challenges particularly for immune-compromised individuals with multiple resistance indexes of the isolated bacteria from canned drinks and wines surfaces [1] There have been several reports on the contamination of surfaces of objects by bacteria ranging from computer keyboards; to automated teller machine keypads [2]; [3]; [4]; [5], [6] More so, there are several other studies which have shown the ubiquity of microorganisms in connection to public health, they are able to colonize or contaminate other surfaces such as mobile phones of hospital staff [7] beverage packages [8] as well as food and household surfaces [9]; [10]

The quantitative analysis of bacteria from aforementioned inanimate objects exist for studies but there are not many studies which have tried to estimate the population of certain species of bacteria on the surface of canned drink and wines samples. Microbial attachment to surfaces, is a potential way of transmission of pathogens in food processing industry, catering and the domestic environment [9] [11]; [12]; [13] Contaminations can be an intermediate step in transmission of pathogens from their original habitat in the environment to food contact surfaces [14]; [15]; [16] Exposure of pathogens on surfaces of Canned drinks and Wines samples may take place either by direct contact with contaminated objects or indirectly through airborne particles. Several studies indicated that various bacteria, including *Escherichia coli*, *Staphylococcus aureus* and *Salmonella* spp. survive on hands, canned drinks surfaces, sponges/cloths and utensils for hours or days after initial contact with the microorganisms [9]

Some rodent and Cockroaches were implicated in some studies to be the major carrier of pathogenic organism in canned drinks and wine surface. This rodents are common to these spaces, as they are difficult to seal and often contain moisture that is attractive to pests [17] Cockroaches are known to carry *Salmonella* spp. and it is believed that they may represent reservoirs capable of spreading this organism to food products [17] Dust on canned drinks and wines could also represent a potential infection hazard, as *Salmonella* spp. have been found viable in dust for up to 10 months [17] Even though the cans are produced under hygienic conditions, they are exposed to some bacteria during storage period, transportation and service. The risk of beverage cans to come in contact with rats, bugs where they are stored is high [18]. Studies have reported that when food poisoning agents such as *Salmonella typhimurium* and *Staphylococcus aureus* were dried and adhered onto stainless steel or glass surfaces in existence of nutrient rich food residue such as milk, meat and egg, they showed resistance to desiccation, surfactant disinfectant such as benzalkonium chloride, as well as 254-nm Ultraviolet UV-C irradiation [19] [20].

It was reported that, microorganisms present on the surface of cans, which usually do not cause diseases directly, but might be opportunistic pathogens located in the tab area and contaminate the drink when the tab is opened, may cause serious diseases such as respiratory and urinary tract infections, and tuberculosis. Because of these reasons, The Food and Drug Administration recommends washing all dirty canned drinks and wines with soap and water before opening. Even though the risks of having dirty cans are quite different from food cans, there is a general abhorrence to drinking out of a can with a visibly dirty top, many people use a perfunctory to wipe of cans with paper products rather than rinsing or washing with soap and

water [21]; [22]; [17]]. This practice constitute a major health challenges after consuming the canned drinks and wine, we needed to be more careful with what we drink, to avert major calamity.

2. MATERIALS AND METHODS

2.1 Sources of Canned Drinks and Wine from Retail Shops

The Canned Drinks and Wine used in this project were obtained from retail shops in Ibaka and Okusa Market, Akungba Akoko,Akoko South West,Ondo State, Nigeria. With a geographical location of 5° 28' 0" North, 7° 44' 0 East.

2.2 Collection of Canned Drinks and Wine Test Sample

For this study, 9 canned drinks swab and 6 wine swabs samples were obtained using the full aseptic precautions. The 30 canned drinks swabs were obtained from Canned Coke, Canned Malt, Canned Fanta and the 20 wine swabs were from a locally made wine and foreign made wine. The samples were collected using the swab-rinse technique of American Public Health Association as described by [23] The surfaces of the swabs collected from canned include Canned drinks and wine; Lid, Body and Bottom surface.

2.3 Isolation of Microorganisms from Test Samples

To obtain microorganisms from canned drinks and wine swabs: The swab stick were inserted into a small test tube containing 9ml of sterile water for a serial dilution procedure.

2.3.1 Serial dilution of test sample

A total of 5 sterile test tubes were dispensed with 9ml of distilled water for each samples. One millimeter of the prepared inoculum was transferred into test tube containing 9ml of distilled water dilution [10^{-1}]. Then using another micro pipette, 1ml of the resulting dilution were transferred into a second test tube containing 9ml of distilled water [10^{-2}]. The procedure were repeated for further dilutions up to 10^{-5} dilution and in the last dilution 1ml of the inoculum was discarded [23].

2.3.2 Pour plates techniques for isolation of isolates

The method used for isolation was pour plates techniques. Sterile Petri dishes were arranged on a working bench for each samples collected and also for the type of organism to be cultivated, which is bacteria. 0.5ml of dilution was poured into the Petri dishes that have already been arranged and properly labeled, about 20ml of nutrient agar were poured into each Petri dish. The plates were inverted and incubated at 37^0C for 24hours to allow bacterial growth on the nutrient agar[24].

2.3.3 Identification of isolates [Macroscopic Examination]

The pure isolates were transferred to agar slants and stored in the refrigerator. The organisms were sub cultured again and identified based on their cultural and morphological examination [Macroscopic examination] Colonial characteristics of all the various isolates were carried out by reco rding their characteristics growth patterns on the plates which were incubated at 37^oC for 24hours.

2.4 Gram Staining of Isolates [Microscopic examination]

Working solution of reagents used for the Gram staining technique was prepared according to manufacturer's instruction. Staining was carried out by emulsifying approximately one isolated 18- 24hours old colony in a drop of water placed at the centre of a clean grease free slide until a thin smear was made. The smear was air heat fixed by passing the slide through a Bunsen burner flame and then air dried. The heat fixed smear was flooded with a basic aniline dye [crystal violet] for 60 seconds. This was flooded with Lugol's iodine and allowed to remain for 60 seconds. This was then rinsed off with running tap water. The smear was decolorized with 70% ethanol which was immediately washed out to avoid total decolorization. The smear was counter stained with Safranin for 60 seconds, washed off with running tap water and blot-dried. The slide was then examined under oil immersion objective microscope. Organisms that retained the purple colour of crystal violet- iodine complex [CV-1 complex] were recorded as Gram- positive, while those that appeared pink were Gram- negative [24].

2.5 Biochemical Characteristics of the Isolate

2.5.1 Catalase test

The purpose of this test is to detect the presence or absence of catalase enzyme. Two drops of hydrogen peroxide were placed on a slide and a 24hours old culture of test organism was added, evolution of gas was observed. Presence of oxygen bubbles indicated that the organism has catalase enzyme while the absence of gas indicated that the test organism does not produce catalase enzyme [25].

2.5.2 Coagulase test

A colony of the test organism was picked aseptically using sterile inoculating loop, an inoculating loop was used to add a loopful of plasma suspension and was checked for clumping of organisms. Clumping of the organism indicate a positive result, while no clumping indicates a negative result [25].

2.5.3 Indole test

The broth culture of the test organisms in a test tube were inoculated with 3ml of trypton broth. It was incubated at 37^0C for 24hours. Then 0.5ml of Kovac's reagent was added to the broth. Positive result shows a pink red color ring, while negative result shows no color change [24]

2.5.4 Hydrogen sulphide [H_2S] test

Some bacterial can metabolize certain sulfur containing compounds under production of H_2S [which is a toxic, flammable and badly smelling gas]. Sulphiteindole motility [SIM] medium which contains ferrous sulfate and sodium thiosulphinate serves as indicator for the production of H_2S. H_2S production was detected when a black precipitate was formed in the medium after the organism has been inoculated into the medium and incubated for 24-48hours [25].

2.5.5 Oxidase test

This is a laboratory test carried out on bacteria isolates to determine if they produced cytochrome C oxidase. Bacteria which produce cytochrome C oxidase have the capacity to oxidize Tetra methyl-p-phenylenediamine on a portion of filter paper, added with visible amount of 18-24hours old pure culture isolates of bacteria. A dark purple color is observed in the region of the mixture of the reagent and the pure colonies. This color showed it is oxidase positive [26].

2.5.6 Haemolysis test

Nutrient agar was prepared and autoclaved at 121^0C for 15 minutes; it was then allowed to cool. 5ml of blood was added to the sterile nutrient agar to prepare blood agar. The prepared blood agar was poured into sterile petri dishes and allowed to solidify. Colony was picked from the stored culture and streaked on the blood agar, it was then incubated at 37^0C for 24hours. After incubation, the results indicate an alpha-haemolysis, beta-haemolysis, and gamma-haemolysis. Alpha haemolysis indicated by a greenish-grey or brownish discoloration around the colony as a result of the partial lysis of the red blood cells. Beta haemolysis is indicated by a clear haemolysis under and around the colonies when grown on blood agar and this clear zone appears as a result of the complete lysis of the red blood cells present in the medium, causing denaturation of haemoglobin to form colorless products. Gamma haemolysis which is also refer to as non-haemolysis as there is no lysis of red blood cells, this occurs as a result of no change of coloration or no zone of haemolysis [27],

2.5.7 Sugar fermentation

The fermentation of sugar test by the test organism was demonstrated by production of acid and gas, phenol red [0.01g], sodium chloride [1.0g] and fermentable sugars [1.0g] were weighed into a conical flask containing 100ml of water. The mixture was swirled so that all components in it can dissolve. 9ml of preparation was dispensed into test tubes containing inverted durham tubes. The tubes were covered with cotton wool and aluminum foil and sterilized in the autoclave at temperature of 121^0C for 15minutes. Sugars used were glucose, mannitol, lactose, sucrose, dextrose. All test tubes were inoculated with respective test organism aseptically and incubated at 37^0C for 3-5 days depending on how fast the organism can utilize the sugar. Changes in color of indicator [phenol red] from red to yellow indicates utilization of sugars that is, positive and if gas detected in the durham tube, it signifies the organism produced gas [25],

2.5.8 Determination of antimicrobial susceptibility test [Antibiogram] of sample

The test was performed to determine the phenotypic resistant of the bacterial isolates to commonly used antibiotics. These tests were carried out following the Kirby-Bauer disc diffusion method.. Inoculum from culture of bacteria isolates on nutrient agar slants were inoculated into test tubes containing sterilized nutrient broth and incubated at 370C for 18h which serve as the stock for the test. Mueller-Hinton agar was prepared and sterilized, then dispensed into sterilized Petri dishes. The plates were allowed to cool for about 15min so as to allow it to gel and excess surface moisture to be absorbed. The inoculum was introduced into plates by streaking before applying the antibiotics impregnated discs. Two types of discs were used; Cephalosporin antibiotic discs [Oxoid]; Cefuroxime [30 µg], Ceftazidime [30 µg],Cefoxitin [30 µg], Cefpodoxime [10 µg], Cefepime [30 µg] and Multi-test Predetermined commercial Gram negative and Gram positive discs which were applied to the surface of the well labeled inoculated agar plated aseptically using sterile forceps. The discs were then placed firmly by slightly pressing on the inoculated plates with the sterilized forceps to ensure complete contact with the agar. After 24h of incubation, each plates was examined, susceptibility to each antibiotics were indicated by a clear zone. The zone of inhibition were measured using a calibrated ruler was held on the back of the inverted petri plate and was recorded [25] guidelines [28].

2.6 Measurement of growth Dynamic and Death Rate [Killing Kinetics] of Isolates Using Ultra Violet [UV] Spectrophotometer.

Growth dynamic refers to the rate at which cells of microorganism multiple at a given time. This test was done to determine the rate of growth of the isolates as well as their killing kinetics . Colony was selected from the stocked culture slant and inoculated into nutrient broth which was incubated for 24hours at 37^0C. A loopful of organism was selected from the broth culture into nutrient broth in three sets which are set A, B, and C respectively. Ultraviolet spectrophotometer were set at 480λ wavelength, warmed up for 15 minutes and then the control were first read, the first reading were taken at zero hour and its continues after every 12 hours for 8 times. At the 5th reading, which is the 48th hour of set B and set C, The readings were taken at 12 hours interval to the 84^{th} hours and recorded for each organism respectively. The A samples are taken has the growth rate while the B samples are taken has the killing time [29].

3. RESULTS

Result of the Pathogenic Bacteria found on Surfaces of Canned Drinks and Wines Being Sold In Retail Shops, Implications, Food Safety and Quality Assessment

Table 1. The Samples were from retail shops in Ibaka and Okusa Market, Akungba-Akoko in Akoko south west on a geographical location of 5° 28' 0" North, 7° 44' 0" East. Canned Malt, [10], Canned Fanta [10], and 20 Local Wine was purchased from retail shop in Ibaka market at 8:00am. Canned Malt was purchased on the 24^{th} of May, 2021, Canned Fanta was purchased on the 28^{th} of May, 2021 while Local Wine was purchased on the 31^{st} of May, 2021. One [1] Canned Coke and one [1] Foreign Wine were purchased from retail shop in Ibaka market at 8:00 am. Canned Coke was purchased on the 26^{th} of May and Foreign Wine was purchased on the 2^{nd} of June, 2021.

Table 2;Shows the result of the dilution factors and colony count of isolates from canned drinks and Wine lid surface, body and bottom surface,. It was observed from the lid surface, CF 10^{-3} has highest number of isolates [98] and LW 10^{-5} has lowest number of isolates [15]. It was observed

Table 1. Sample collected, number of sample collected, place and time of collection

Sample collected	No of Sample collected	Place of collection	Time of collection	Date of collection
Canned Malt[CM]	10	Ibaka	8:00 am	24/5/21
Canned Coke[CC]	10	Okusa	8:00 am	26/5/21
Canned Fanta[CF]	10	Ibaka	8:00 am	28/5/21
Local Wine[LW]	10	Ibaka	8:00 am	31/5/21
Foreign Wine[FW]	10	Okusa	8:00 am	02/5/21

from the body surface, CF 10^{-3} has the highest number of isolates (84) and LW 10^{-5} has the lowest number of isolates [9]. It was observed from the bottom, FW 10^{-3} has the highest number of bacteria isolates and LW 10^{-5} has the lowest number of isolates [11].

Table 3; Shows the morphological characteristics [Macroscopic examination] of isolates which was isolated from the canned drinks and Wine Samples. This includes the Size, Shape, Color, Texture, Opacity, and Edge of the Organism. It was observed from the size of the lid, canned Coke and Malt isolates were big while Canned Fanta, Local wine, Foreign wine were small. Shape of the lid, it was observed that Canned coke, Canned Fanta, Local wine, Foreign wine has regular shape while canned malt isolates has an irregular shape. Color of the lid isolates, all has a creamish color. The texture of the isolates on the lid were all smooth except canned malt which has a rough texture. The size of the body of canned malt, Canned Fanta, and Foreign wine isolates were small while were big. The shape of Canned malt, Canned coke and Canned Fanta isolates were regular while the rest were irregular. The color of Canned coke, Canned malt, and Foreign wine isolates were all creamish except for Canned Fanta which has a brownish color. The isolates of canned malt, canned coke, canned Fanta have a smooth texture while the rest has a rough edges. The opacity of the isolates was all translucent except for canned malt 10^{-5} and foreign wine 10^{-3} which was transparent. The size of the bottom of Canned malt, Canned coke,, Canned coke 10^{-3}, Canned coke 10^{-5}, were all big. The shape of canned malt and Canned coke 10^{-5} only were irregular. The color of all the isolates was all creamish. They all has a rough texture except for Canned coke 10^{-3} which has a smooth texture. Opacity of Canned coke 10^{-3} and canned coke 10^{-5} isolates were translucent.

Table 4; Reveals the result of Gram staining [Microscopic examination] were determined on the bacterial isolates. It was observed that the lid of Canned malt, coke, Fanta, Local wine were all Gram positive. Canned coke, Canned Fanta and Local wine isolates has a rod shape. Canned malt has a short rod shape while Foreign wine has a cocci shape. The body of canned malt 10^{-3} and canned malt 10^{-5} isolates was all Gram positive. Canned malt 10^{-3},Coke 10^{-3}, Canned coke 10^{-5}, Canned Fanta, Local wine, Foreign wine 10^{-3} and Foreign wine 10^{-5} has a rod shape. Canned malt 10^{-5}, Can coke 10^{-3} and Local wine has a short rod shape while canned coke 10^{-5} only has cocci shape. The bottom of canned coke 10^{-3} and canned coke 10^{-5} isolates was all Gram positive and they both has a rod shape.

Table 2. Dilution factors and colony count of isolates on nutrient agar from canned drinks and wine surfaces

	LID Surfaces	
Sample	**Dilution Factor**	**NA [Cfu/ml]**
CM	10^{-3}	55
CM	10^{-5}	46
CC	10^{-3}	58
CC	10^{-5}	36
CF	10^{-3}	98
CF	10^{-5}	75
LW	10^{-3}	22
LW	10^{-5}	15
FW	10^{-3}	80
FW	10^{-5}	45
	BODY Surfaces	
Sample	**Dilution Factor**	**NA [Cfu/ml]**
CM	10^{-3}	35
CM	10^{-5}	19
CC	10^{-3}	42
CC	10^{-5}	39
CF	10^{-3}	84
CF	10^{-5}	52
LW	10^{-3}	18
LW	10^{-5}	9
FW	10^{-3}	54
FW	10^{-5}	35
	BOTTOM Surfaces	
Sample	**Dilution Factor**	**NA [Cfu/ml]**
CM	10^{-3}	28
CM	10^{-5}	21
CC	10^{-3}	28
CC	10^{-5}	15
CF	10^{-3}	51
CF	10^{-5}	46
LW	10^{-3}	13
LW	10^{-5}	11
FW	10^{-3}	47
FW	10^{-5}	23

Key: *CM: Canned Malt CC: Canned Coke CF: Canned Fanta LW: Local wine FW: Foreign wine*

Table 5; Shows the result of Biochemical examination of isolates from canned drinks and Wine samples. This examination includes; Catalase, Motility, Urease, Indole, Hydrogen sulphide, Oxidase, and Haemolysis test. It was observed that the result of the Catalase test for all the lid isolates were positive, Motility test for the lid for all the samples were positive except for

Foreign wine which was negative. Urease test for CC, LW, FW were positive while CM, CF, were negative. Indole test for CC, FW, were positive while CM, CF, and LW were negative. Hydrogen sulphide production for all the lid isolates were positive. Oxidase test for CM, CF, LW, were positive while CC, FW isolates was negative. Haemolysis test for CM, CF, FW were Alpha, CC was Gamma while LW was Beta. The result of Catalase for the body of all isolates was positive. Motlity test for all the body isolates was positive except for CC which was negative. Urease test for the body of CM 10^{-3}, CC 10^{-5}, and CF 10^{-3} were positive while CM 10^{-5}, CC 10^{-3}, LW 10^{-5}, FW 10^{-3} and FW 10^{-5} were negative. Indole test for the body of CM 10^{-3}, CC 10^{-5}, CF 10^{-5}, FW 10^{-5}, were positive while CM 10^{-5}, CC 10^{-3}, LW 10^{-5}, FW 10^{-3} were negative. Hydrogen sulphide production for CC 10^{-3}, CC 10^{5}, CF 10^{-5}, FW 10^{-3}, FW 10^{-5} were positive while CM 10^{-3}, CM 10^{-5}, LW 10^{-5} were negative. Oxidase test for the body of CM 10^{-3}, CM 10^{-5}, CC 10^{-3}, LW 10^{-5}, FW 10^{-3}, FW 10^{-5} were positive while CC 10^{-3}, CF 10^{-5} were negative. Haemolysis test for all the isolates of the body was beta except for CF which was gamma. The result of catalase test, motility, urease, indole test for the bottom isolates was positive. Hydrogen sulphide production for CC 10^{-3} was negative while CC 10^{-5} was positive. Oxidase test for CC 10^{-3} was positive while CC 10^{-5} was negative. Haemolysis test for CC 10^{-3} was alpha while CC 10^{-5} gamma.

Table 6; Shows the result of sugar fermentation determined on the canned drinks and wine samples. All the isolates for the lid was positive and produce gas. For Lactose, Sucrose, and Dextrose sugar except FW which does not produce gas. CM, CF, FW, produce gas were positive for Glucose sugar except for CC and LW which was acid positive only. All the isolates from the lid were positive and produce gas .For Mannitol sugar. CC 10^{-3}, CC 10^{-5}, CF 10^{-5}, LW 10^{-5}, FW 10^{-3} for the body isolates was positive and produced gas. For Lactose, Sucrose and Dextrose sugar. CM 10^{-5}, CC 10^{-3}, CC 10^{-5}, LW 10^{-5}, FW 10^{-3}, FW $10^{-5.}$ For glucose sugar produce acid gas while the produced acid only. CC 10^{-3} and CC 10^{-5} produce acid gas. For lactose, Sucrose, Dextrose and Mannitol while CC 10^{-3} produced acid only.

Table 7; Shows the result of the probable organism which was isolated from canned drinks and wine surfaces after biochemical examination. It was observed that Canned malt, Canned coke, Canned Fanta, and Local wine lid isolates were suspected -*Bacillus polymyxa*, Foreign wine isolates was suspected - *Staphylococcus pyogens.* Canned malt 10^{-3}, Canned malt 10^{-5} body isolates was suspected - *Bacillus polymyxa*, Canned coke 10^{-3} was suspected - *Lactobacillus casei*, Canned coke 10^{-5} isolate was suspected- *Microbacterium lacticum*. Canned Fanta 10^{-5} isolates was suspected - *Bacillus cereus*, Local wine 10^{-5} was isolates, suspected - *Clostridium sporogens*, Foreign wine 10^{-3} isolates was suspected - *Cellulomonas biazotae*, Foreign wine 10^{-5} isolates was suspected - *Bacillus subtilis*. It was observed that all the isolates in the bottom - *Bacillus polymyxa.*

Figures Percentages frequency of antibiotic Susceptibility assay of Gram Positive Bacteria Isolate Isolated from Canned Drink and Wine Surfaces.

3.1 LID Surfaces

Figs. 1,2,3: Antimicrobial Susceptibility assay[Antibiogram] of Gram Positive Bacteria Isolate Isolated From Canned Drink and Wine Surfaces ; Shows the result of Antimicrobial Sensitivity Test determined on the bacterial isolates from Canned drinks and wine surfaces.

Fig. 4. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Malt Lid Surfaces [10^{-3}] *Bacillus polymyx*. It was observed that RD 10%,APX ,10%,CN 7%,,LEV 12%,,AMX 10%,S 12%,E 12%,,S 12%, ,NB,7%,CH 8%,,CPX 12%.

Fig. 5. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Coke Lid Surfaces [10^{-3}] *Bacillus polymyxa*. It was observed that RD 9%, APX 9%,CN 11%,LEV 11%,E 11%,S 9%,,NB 9%,CH 11%,CPX 11%,E 11%.

Fig. 6. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Fanta Lid Surfaces [10^{-3}] *Staphylococcus pyogens*. It was observed that RD 13%,APX 9%,AMX 14%,,S 14%,LEV 14%,E 9%, CH 13%,,CPX 14%.

Fig. 7. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Local wine Lid Surfaces [10^{-3}] *Bacillus polymyxa.* It was observed that RD 11%,APX 9%,CN 11%,LEV 11%,AMX 11%, E 7%,S 10%,NB 9%, CPX .11%.

Table 3 & 4. Colonial morphology, gram staining and microscopy examination of bacterial isolates obtained from canned **drinks and wine lid, body and bottom surfaces**

Sample	Size	Shape	Color	Texture	Opacity	Edge	Gram Staining	Shape of Organism
			LID Surfaces					
CM [10^{-3}]	Big	Irregular	Creamish	Rough	Opaque	Rough	ve+	Short rod
CC [10^{-3}]	Big	Regular	Creamish	Smooth	Translucent	Smooth	ve +	Rod
CF [10^{-3}]	Small	Regular	Creamish	Smooth	Translucent	Smooth	ve +	Rod
LW [10^{-3}]	Small	Regular	Creamish	Smooth	Opaque	Smooth	ve +	Rod
FW [10^{-5}]	Small	Regular	Creamish	Smooth	Opaque	Smooth	ve +	Cocci
			BODY Surfaces					
CM [10^{-5}]	Small	Regular	Brownish	Smooth	Opaque	Smooth	ve +	Rod
CC [10^{-3}]	Big	Regular	Creamish brown	Smooth	Translucent	Smooth	ve +	Short rod
CC [10^{-5}]	Big	Irregular	Creamish brown	Rough	Translucent	Rough	ve +	Cocci
CF [10^{-5}]	Small	Regular	Brownish	Smooth	Translucent	Smooth	ve +	Rod
CM [10^{-5}]	Big	Irregular	Creamish brown	Rough	Translucent	Rough	ve +	Short rod
FW [10^{-3}]	Small	Irregular	Creamish	Rough	Opaque	Rough	ve +	Rod
			BOTTOM Surfaces					
CM [10^{-3}]	Big	Irregular	Creamish	Rough	Opaque	Rough	ve +	Rod
CC [10^{-3}]	Big	Regular	Creamish	Smooth	Translucent	Smooth	ve +	Rod
CC [10^{-5}]	Big	Irregular	Creamish	Rough	Translucent	Rough	ve +	Rod

Key: *CM: Canned Malt, CC: Canned Coke, CF: Canned Fanta , LW: Local Wine , FW: Foreign Wine*

Table 5 & 6. Biochemical and : sugar fermentation test for identification of canned **drink and wine isolates**

Sample	Catalase	Motility	Urease	Indole	H_2S Production	Oxidase	Haemolysis	Lactose	Sucrose	Dextrose	Glucose	Mannitol	Lactose
LID Surfaces													
CM [10^{-3}]	ve++	ve +	ve -	ve -	ve +	ve +	Alpha	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]
CC [10^{-3}]	ve +	ve +	ve +	+	+	-	Gamma	+[Ag]	+[Ag]	+[Ag]	+[A]	+[Ag]	+[Ag]
CF [10^{-3}]	++ ve	ve +	ve -	ve -	ve +	ve +	Alpha	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]
LW [10^{-3}]	ve +	ve +	ve +	ve -	ve +	ve +	Beta	+[Ag]	+[Ag]	+[Ag]	+[A]	+[Ag]	+[Ag]
FW [10^{-5}]	ve +	ve -	ve +	ve +	ve +	ve -	Alpha	+[A]	+[A]	+[A]	+[Ag]	+[Ag]	+[A]
BODY Surfaces													
CM [10^{-3}]	+ ve	+ ve	+ ve	+ ve	- ve	+ ve	Beta	+[A]	+[A]	+[A]	+[A]	+[Ag]	+[A]
CM [10^{-5}]	++ ve	+ ve	- ve	- ve	-	+ ve	Beta	+[A]	+[A]	+[A]	+[Ag]	+[Ag]	+[A]
CC [10^{-3}]	+ ve	- ve	- ve	- ve	+ ve	ve +	Beta	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[A]	+[Ag]
CC [10^{-5}]	++ ve	+ ve	+ ve	+ ve	+ ve	- ve	Beta	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[A]	+[Ag]
CF [10^{-5}]	+ ve	+ ve	+ ve	+ ve	+	- ve	Gamma	+[Ag]	+[Ag]	+[Ag]	+[A]	+[A]	+[Ag]
LW [10^{-5}]	++ ve	+ ve	- ve	- ve	- ve	+ ve	Beta	-[Ag]	-[Ag]	-[Ag]	+[Ag]	+[Ag]	-[Ag]
FW [10^{-3}]	+ ve	+ ve	- ve	- ve	+	+ ve	Beta	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]
FW [10^{-5}]	++ ve	+ ve	- ve	+ ve	+ ve	+ ve	Beta	+[A]	+[A]	+[A]	+[Ag]	+[Ag]	+[A]
BOTTOM Surfaces													
CC [10^{-3}]	+ ve	+ ve	+ ve	+ ve	- ve	+ ve	Alpha	+[Ag]	+[Ag]	+[Ag]	+[A]	+[Ag]	+[Ag]
CC [10^{-5}]	+ ve	ve +	+ ve	+ ve	ve +	- ve	Gamma	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]	+[Ag]

Key: *CM: Canned Malt CC: Canned Coke CF: Canned Fanta LW: Local Wine , FW: Foreign Wine*

Table 7. Identification of organism isolated from canned drink and wine surfaces

LID	Surfaces
Sample	**Probable Organism**
Canned Malt [10^{-3}]	*Bacillus polymyxa*
Canned Coke [10^{-3}]	*Bacillus polymyxa*
Canned Fanta [10^{-3}]	*Staphylococcus pyogens*
Local Wine [10^{-3}]	*Bacillus polymyxa*
Foreign Wine [10^{-5}]	*Staphylococcus aureus*
BODY Surfaces	
Canned Malt [10^{-3}]	*Bacillus polymyxa*
Canned Malt [10^{-5}]	*Bacillus polymyxa*
Canned Coke [10^{-3}]	*Lactobacillus casei*
Canned Coke [10^{-5}]	*Microbacteriumlacticum*
Canned Fanta [10^{-5}]	*Bacillus cereus*
Local Wine [10^{-5}]	*Clostridium sporogenes*
Foreign Wine [10^{-3}]	*Cellulomonasbiazotae*
Foreign Wine [10^{-5}]	*Bacillus subtilis*
BOTTOM	**Surfaces**
Canned Coke [10^{-3}]	*Bacillus polymyxa*
Canned Coke [10^{-5}]	*Bacillus polymyxa*

Fig. 8. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Foreign wine Lid Surfaces [10^{-5}] *Staphylococcus aureus*. It was observed that APX 15%,LEV 26%,RD 16%,E 17%,CPX 26%.

3.2 Body Surfaces

Fig 9. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Malt Body Surfaces [10^{-3}] *Bacillus polymyxa*. It was observed that RD 10%,APX 9%,CN 9%,AMX 10%,LEV 10%,S 11%,E 10%,NB 9%,CH 11%,CPX 11%

Fig 10 ; Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Coke Body Surfaces [10^{-3}] *Lactobacillus casei.* It was observed that APX 9%,CN 13%,LEV 13%,RD 13%,E 13%,S 12%,CH 14%,CPX 13%.

Fig. 11. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Coke Body Surfaces [10^{-5}] *Microbacterium lacticum*. It was observed that RD 13%,APX 13%,CN 13%,AMX 11%,S 11%,LEV 13%,E 7%,NB 7%,CPX 12%,E 7%.

Fig. 12. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Fanta Body Surfaces [10-5] *Bacillus cereus*. It was observed that APX 13%,CN 11%,LEV 7%,E 11%,RD 13%,S 13%, CH 11%,CPX 13%.

Fig. 13. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Local Wine Body Surfaces [10^{-3}] *Clostridium sporogenes*. It was observed that RD 13%,APX 9%,LEV 15%,E 9%,AMX 13%,S 14%,NB 14%,CH 13%,E 9%.

Fig. 14. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Foreign Wine Body Surfaces [10^{-3}] *Cellulomonas biazota.* It was observed that *APX* 8%,LEV 12%,E 11%,,RD 11%,AMX 11%,S 12%,NB 11%, CH 12%,CPX 12%.

Fig. 15. Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned *Malt* Body Surfaces [10^{-3}] *Bacillus* polymyxa. It was observed that RD 10%,AMX 10%,S 12%,APX 10%, CN 7%,LEV 12%,E 12%,NB 7%, CH 8%, CPX 12%.

Fig 16; Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Foreign wine Body Surfaces [10^{-5}] *Bacillus subtilis*. It was observed that RD 10%,APX 11%,CN 11%,AMX 10%,LEV 11%,S 9%,E 11%,NB 7%,CH 9%,CPX 11%.

3.3 Bottom Surfaces

Fig. 17; Shows the Percentages frequency of antibiotic Susceptibility assay [Antibiogram] on Canned Coke Bottom Surfaces [10^{-3}] *Bacillus polymyxa.* It was observed that. RD 13%,CN 13%, LEV 13%,AMX 13%, S 12%,CH 12%,E 12%.

Figs. 18, 19 and 20; Shows the result of growth rate of the bacterial isolates using Ultra violet Spectrophotometer. It was observed from the lid surface at the 0hr, CF was the highest [0.185] while FW was the lowest [0.010]. At the 12hr, it was observed, CF was the highest [0.209] while FW was the lowest [0.020]. At the 24hr, CF was the highest [0.360] while FW was the lowest [0.108]. At the 36hr, LW was the highest [1.416] while FW was the lowest [1.402]. At the 48hr, LW was the highest [1.165] while CC was the lowest [1.071]. At the 60hr, CF was the highest [0.415] while CM and FW were the lowest [0.105]. At the 72hr, CF was the highest [0.331] while FW was the lowest [0.225]. At the 84hr, LW was the highest while FW was the lowest [0.102] and it was observed that the control was 0.00, It was observed from the body surface, at the 0hr, LW was the highest [0.199] while CC 10^{-5} was the lowest [0.038]. At the 24hr, LW was the highest [0.460] while CM 10^{-5} was the lowest [0.183]. At the 36hr, FW 10^{-5} was the highest [1.415] while CM 10-5 was the lowest [1.399]. At the 48hr, it was observed that FW 10^{-3} was the highest [1.218] while CM 10^{-5} was the lowest [1.067]. At the 60hr, it was observed, FW 10^{-3} was the highest [0.415] while CM 10^{-5} was the lowest [0.276]. At the 72hr, it was observed, FW 10^{-3} was the highest while CF 10^{-5} was the lowest [0.275]. At the 84hr, FW 10-3 was the highest [0.260] while CC 10-5 was the lowest [0.027]. It was observed from the bottom surface at the 0hr, CC 10-5 was the highest [0.215] while CC 10^{-3} was the lowest [0.043]. At the 12hr, CC 10^{-3} was the highest [0.336] while CC 10^{-5} was the lowest [0.335]. At the 24hr, CC 10^{-3} was the highest [1.412] while CC 10^{-5} was the lowest [1.409]. At the 48hr, CC 10^{-3} was the highest while CC 10^{-5} was the lowest. At the 60hr it was observed that CC 10^{-3} was the highest while CC 10^{-5} was the lowest. At the 72hr, CC 10^{-3} was the highest [0.340] while CC 10^{-5} was the lowest [0.315]. At the 84hr, CC 10^{-5} was the highest [0.250] while CC 10^{-3} was the lowest [0.249].

Fig. 21, Fig. 22 and Fig. 23; Shows the result of the death rate of the bacterial isolates using Ultraviolet Spectrophotometer. It was observed from the lid surface, At 0hr, LW was the highest while FW was the lowest. At 12hr, LW was the highest while FW was the lowest. At 24hr, CF was the highest while FW was the lowest. At 36hr, LW was the highest while FW was the lowest. At 48hr, CF was the highest while CM was the lowest. At 60hr, FW was the highest while LW was the lowest. At 72hr, FW was the highest while CF was the lowest. At 84hr, CC was the highest while FW was the lowest and it was observed that all the control was 0.00. It was observed from the body surface, At 0hr, LW was the highest while CC 10^{-5} was the lowest. At 12hr, FW 10^{-3} was the highest while CM 10^{-3} was the lowest. At 24hr, FW 10^{-3} was the highest while CM 10^{-3} was the lowest. At 36hr, CC 10^{-3} was the highest while CF 10^{-5} was the lowest. At 48hr, it was observed, CF 10^{-5} was the highest while CM 10^{-3} was the lowest. At 60hr, CM 10^{-5} was the highest while CM 10^{-3} was the lowest. At 72hr, CM 10^{-5} was the highest while FW 10^{-3} was the lowest. At the 84hr, CM 10^{-5} was the highest while CM 10^{-3} was the lowest. It was observed from the bottom surface, At 0hr, CC 10^{-5} was the highest while CC 10^{-3} was the lowest. At 12hr, CC 10^{-5} was the highest while CC 10^{-3} was the lowest. At 24hr, CC 10^{-3} was the highest while CC 10^{-5} was the lowest. At 36hr, CC 10^{-5} was the highest while CC 10^{-3} was the lowest. At 48hr, CC 10^{-5} was the highest while CC 10^{-3} was the lowest. At the 60hr, CC 10^{-5} was the highest while CC 10^{-3} was the lowest. At 72hr, CC 10^{-3} was the highest while CC 10^{-5} was the lowest. At 84hr, it was equal.

4. DISCUSSION

The aim of this study is to determine the microbial properties, food safety and quality assessment. of Canned drinks and wines being sold in retail shops and their health implications It is worthy of note that contamination of the surfaces of canned drinks and wines can be possible from different points as most canned drink and wine surfaces are apparently sterile after production from the factories even to the point where they are distributed to retailers and consumers .[30] reported that it is inevitable that we live amongst millions of microorganisms as they are found in the air we breathe, the food we eat and on our body surfaces as well as other close environments [30] However, most contamination could be because of environmental influences such as the air quality, personal hygiene of handlers, presence and quantity of aerosolized droplets in the storage environment and contamination from other sources. In this study, the isolated organisms were identified to be *Bacillus polymyxa, Bacillus subtilis, Lactobacillus casei, Microbacterium lacticum, Staphylococcus aureus, Cellulomonas biazotae, Clostridium sporogens, Staphylococcus pyogens and Bacillus cereus*, in which *Bacillus sp.* was the most common microorganisms.

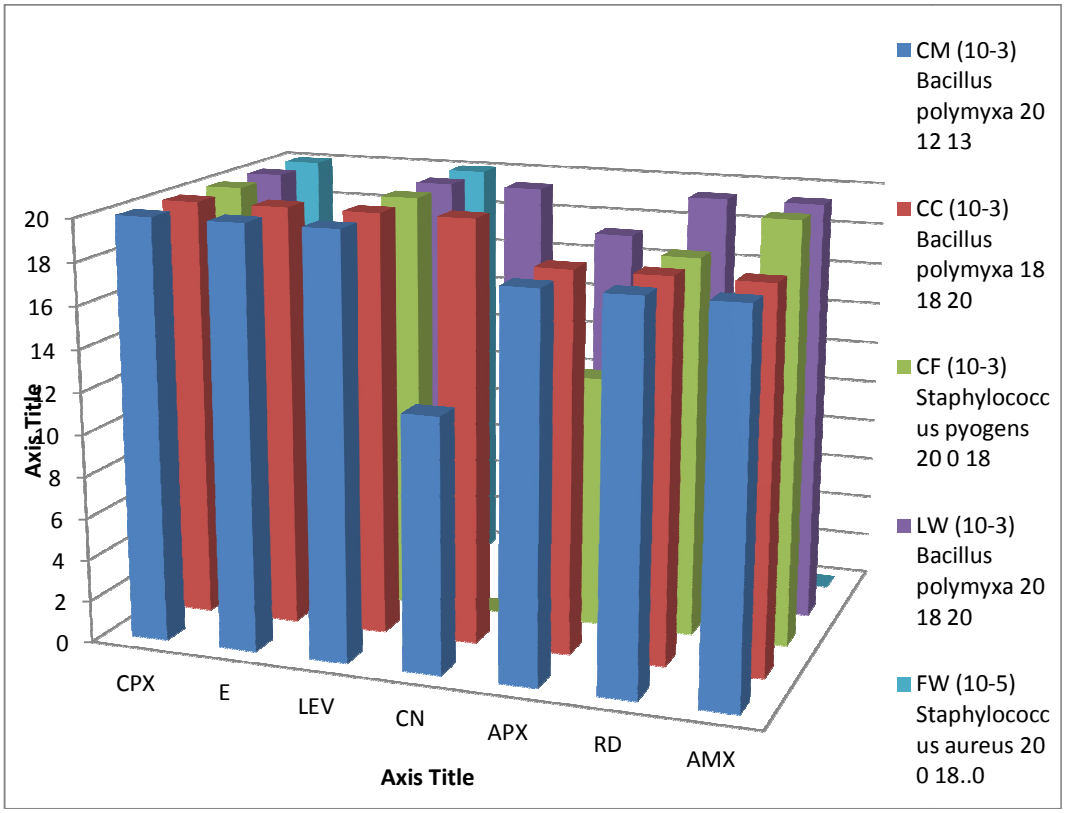

Fig. 1. Antimicrobial Susceptibility assay [Antibiogram] of Gram Positive Bacteria Isolate Isolated From Canned Drink and Wine Surfaces [LID Surfaces]

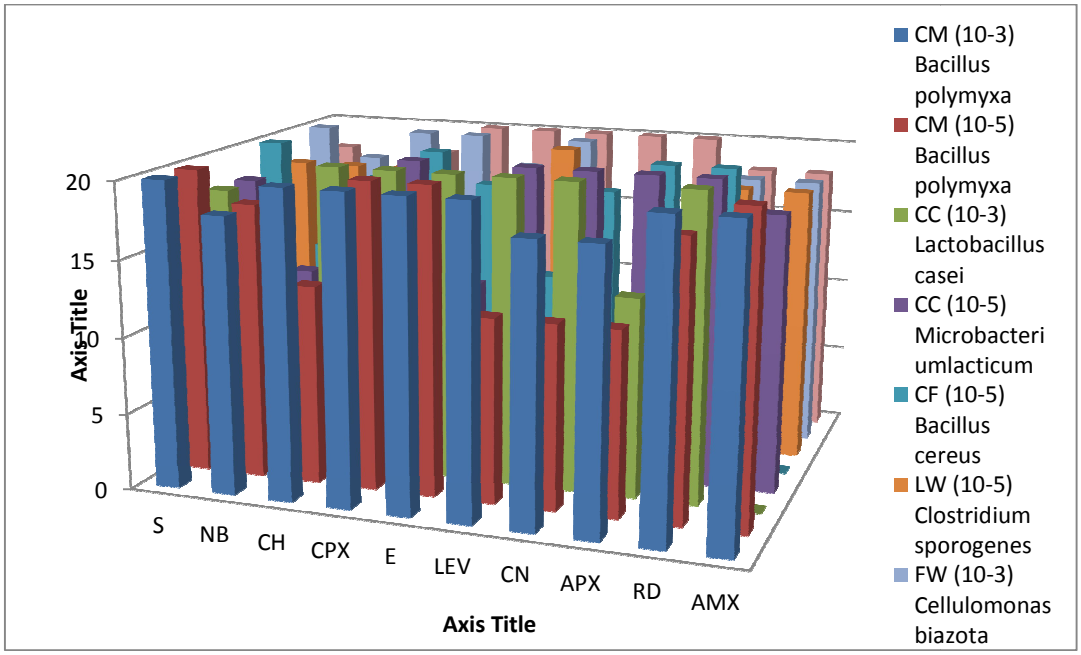

Fig. 2. Antimicrobial Susceptibility assay [Antibiogram] of Gram Positive Bacteria Isolate Isolated From Canned Drink and Wine Surfaces [Body Surfaces]

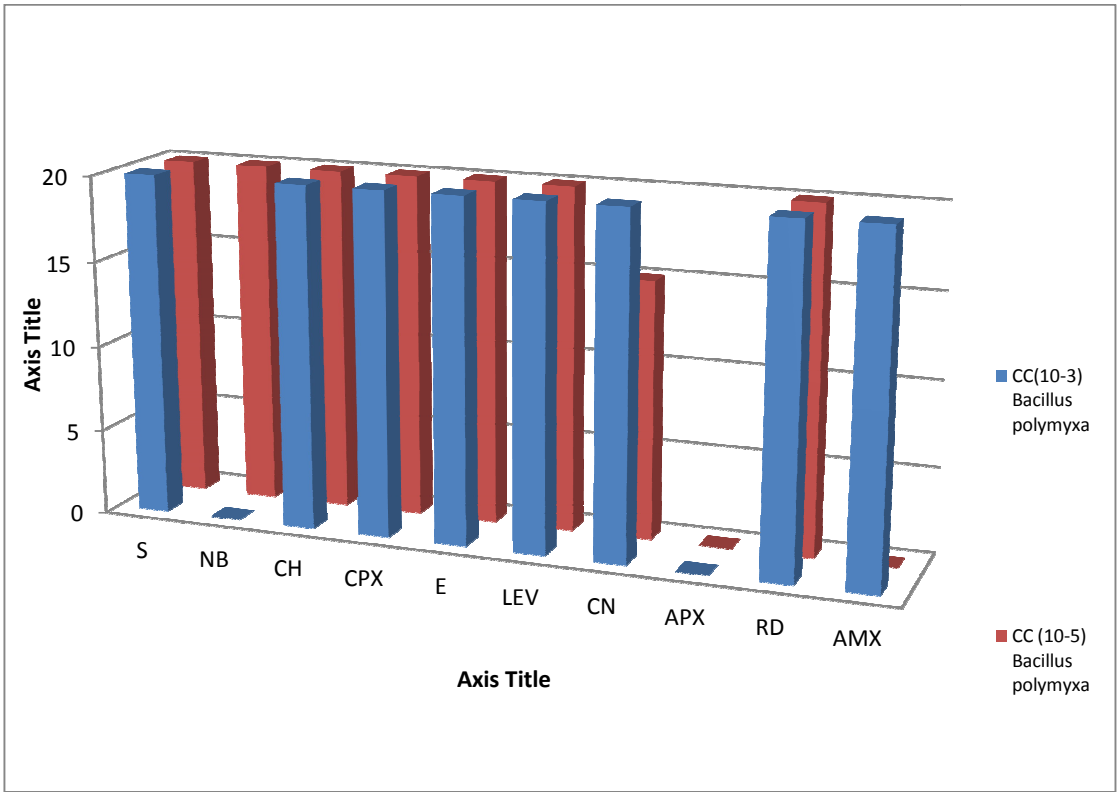

Fig. 3. Antimicrobial Susceptibility assay[Antibiogram] of Gram Positive Bacteria Isolate Isolated From Canned Drink and Wine Surfaces [Bottom Surfaces

The lid surface of CM, CF, LW, FW isolates were susceptible to Streptomycin with a zone of inhibition of 20.0[Resistant] while CC was also susceptible to with a zone of inhibition of 18.0[Resistant] . It was observed, CC, LW isolates were susceptible to Norfaxacin with a zone of inhibition of 18.0[Resistant] while CF, CM, and FW were resistant to Norfaxacin with a zone of inhibition of 12.0[Susceptible] and 0.0 respectively. CC, CF, LW, FW was susceptible to Chloramphenicol while CM was resistant with a zone of inhibition of 13.0[Susceptible]. It was observed, all isolates were susceptible to Ciprofloxacin with a zone of inhibition of 20.0. CM, CC was susceptible to Erythromycin while the rest were resistant with a zone of inhibition of 13.0. All the isolates from the lid surface were all susceptible to Levofloxacin with a zone of inhibition of 20.0. CC and LW isolates were the only isolates that were susceptible to Gentamycin while the rest were resistant with zone of inhibition of 18.0 while CF and FW were resistant. CM, CC, CF, LW were susceptible to Rifampicin while FW was resistant. All the isolates from the lid surface were susceptible to Amoxil except FW which was resistant. It was observed from the body surface of the sample that all the isolates were susceptible to Streptomycin. CM 10^{-3}, CM 10^{-5}, LW 10^{-3}, FW 10^{-3} were susceptible to Norfaxacin while CC 10^{-3}, CC 10^{-5}, CF, FW 10^{-5} were resistant to Norfaxacin. All except CM and CC were resistant to Chloramphenicol. All organisms were susceptible to Ciprofloxacin except for LW. LW was resistant to Erythromycin with a zone of inhibition of 12.0 while others were susceptible. CM and CF were resistant to Levofloxacin while others were susceptible. All isolates were susceptible to Rifampicin, CC 10^{-3} and CF 10^{-5}were resistant to Amoxil. The organisms isolated from the bottom surface of the samples were all susceptible to Streptomycin with a zone of inhibition of 20.0. CC 10^{-5} was susceptible to Norfaxacin. The isolates were all susceptible to Chloramphenicol, Erythromycin, Ciprofloxacin and Levofloxacin. All the isolates were susceptible to Rifampicin. CC 10^{-3} was susceptible to Amoxil while CC 10^{-5} was resistant.

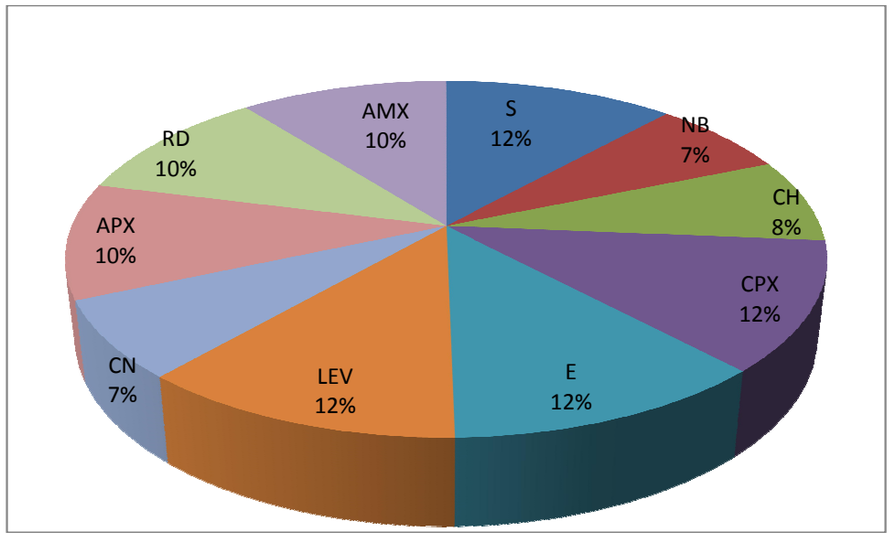

Fig. 4. Percentages frequency of antibiotic Susceptibility assay on Canned Malt Lid Surfaces [10^{-3}] Bacillus polymyx

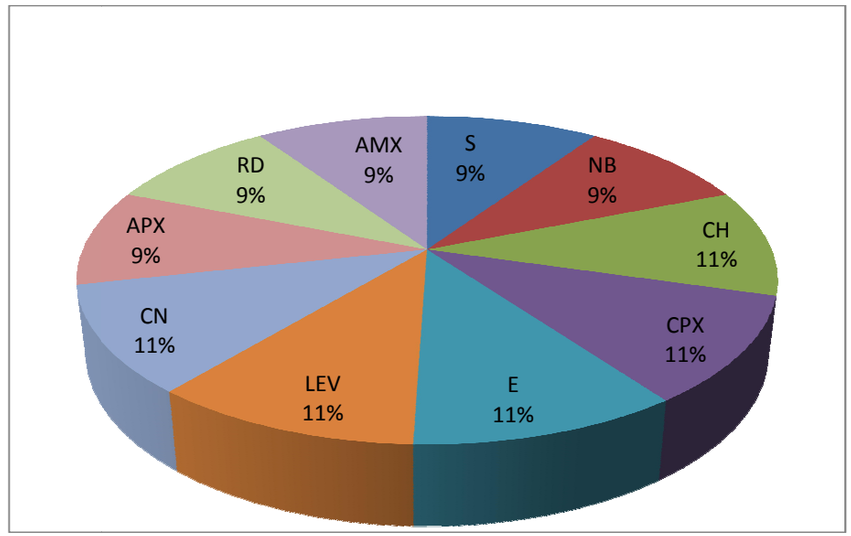

Fig. 5. Percentages frequency of antibiotic Susceptibility assay on Canned Coke Lld Surfaces [10^{-3}] Bacillus polymyxa

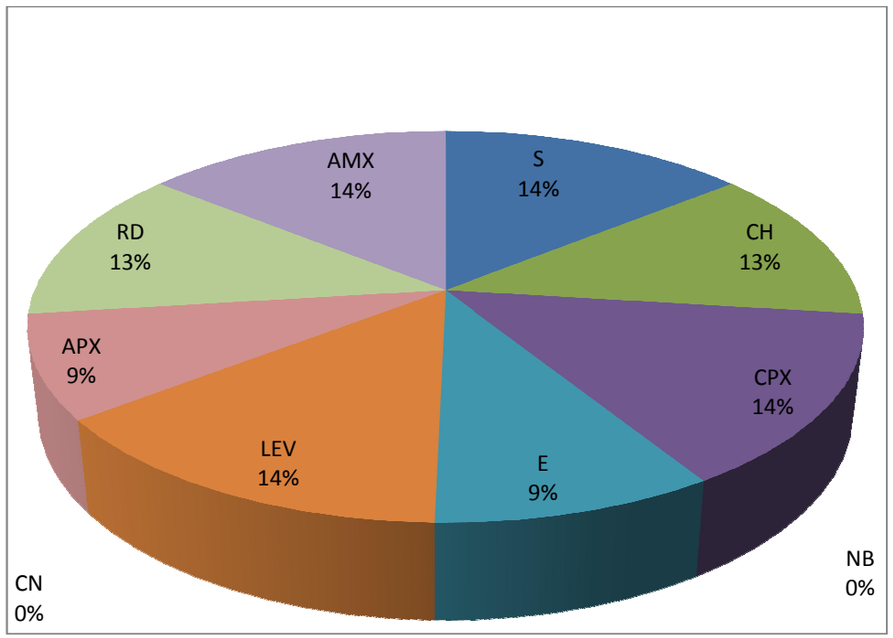

Fig. 6. Percentages frequency of antibiotic Susceptibility assay on Canned Fanta Lid Surfaces [10^{-3}] *Staphylococcus pyogens*

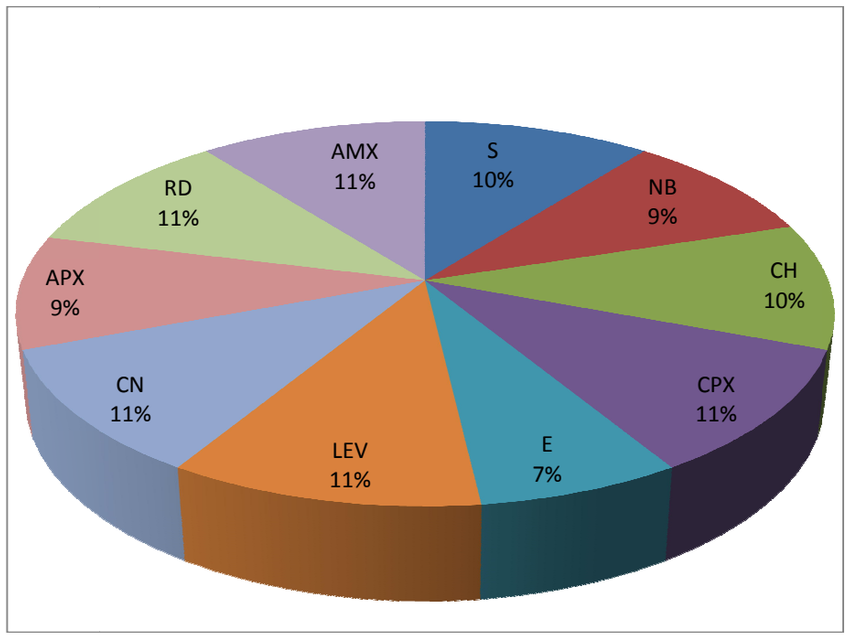

Fig. 7. Percentages frequency of antibiotic Susceptibility assay on Local wine Lid Surfaces [10^{-3}] *Bacillus polymyxa*

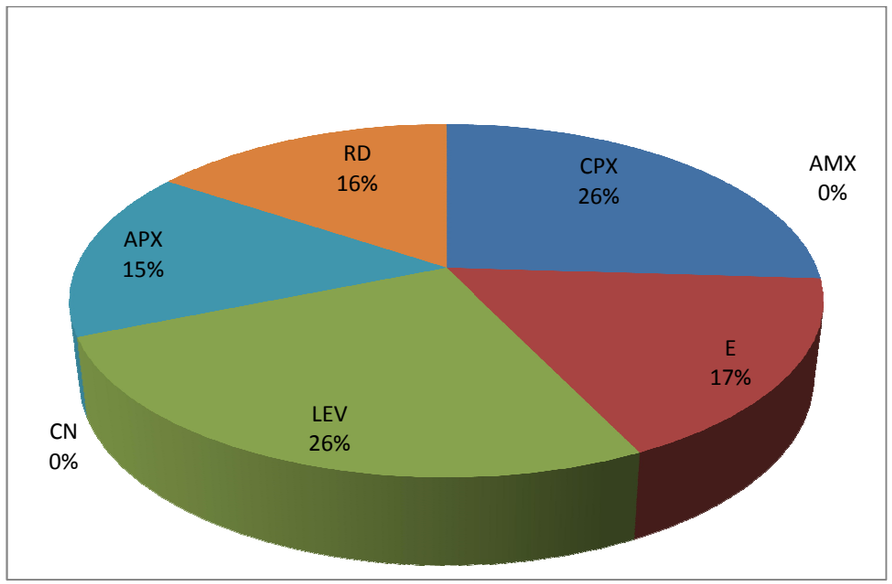

Fig. 8. Percentages frequency of antibiotic Susceptibility assay on Foreign wine Lid Surfaces [10^{-5}] *Staphylococcus aureus*

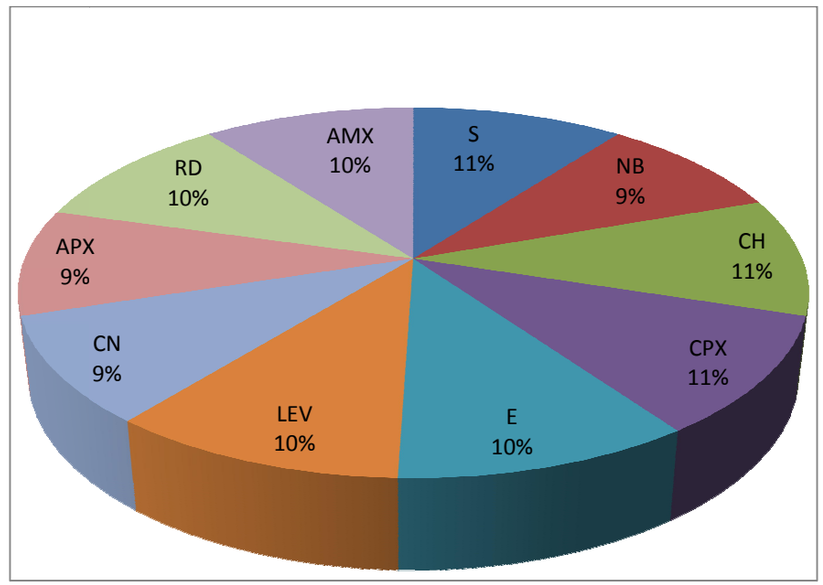

Fig. 9. Percentages frequency of antibiotic Susceptibility assay on Canned Malt body Surfaces [10^{-3}] *Bacillus polymyxa*

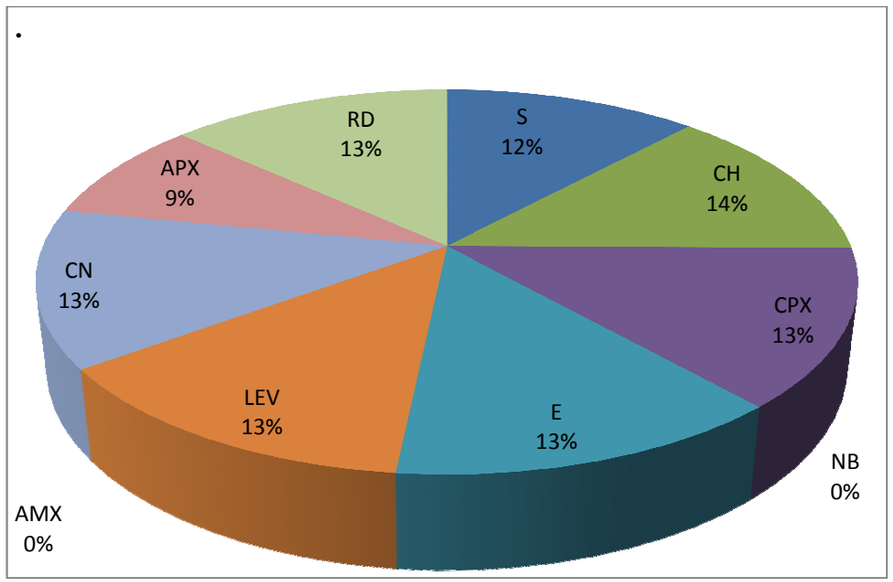

Fig. 10. Percentages frequency of antibiotic Susceptibility assay on Canned Coke body Surfaces [10^{-3}] *Lactobacillus casei*

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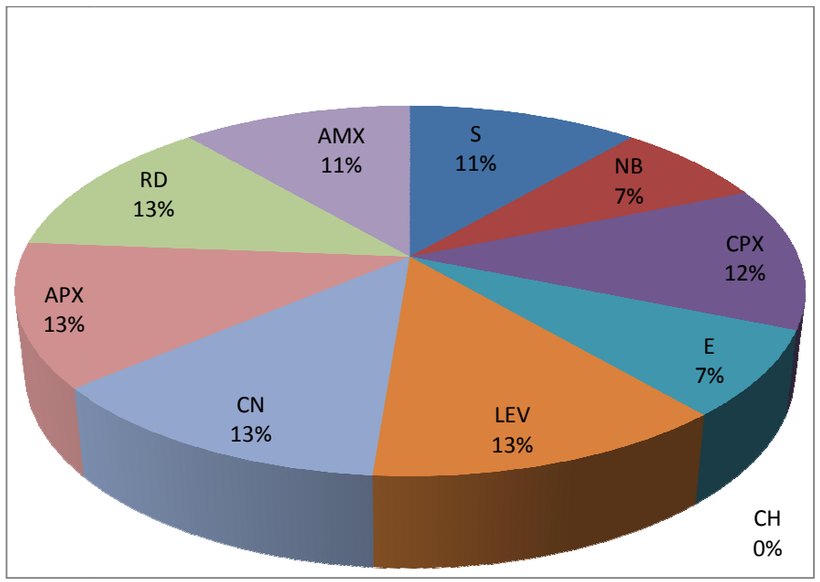

Fig. 11. Percentages frequency of antibiotic Susceptibility assay on Canned coke body Surfaces [10^{-5}] *Microbacterium lacticum*

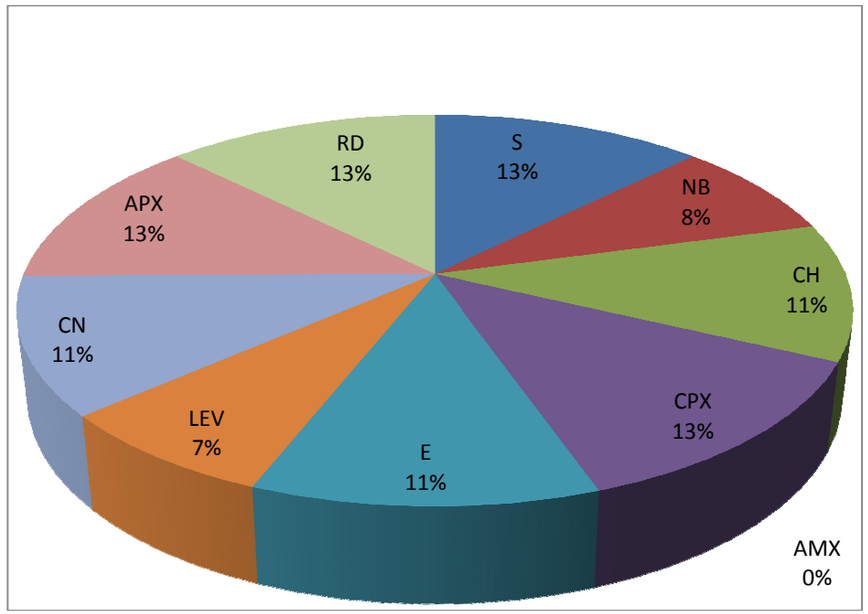

Fig. 12. Percentages frequency of antibiotic Susceptibility assay on Canned Fanta Body Surfaces [10-5] *Bacillus cereus*

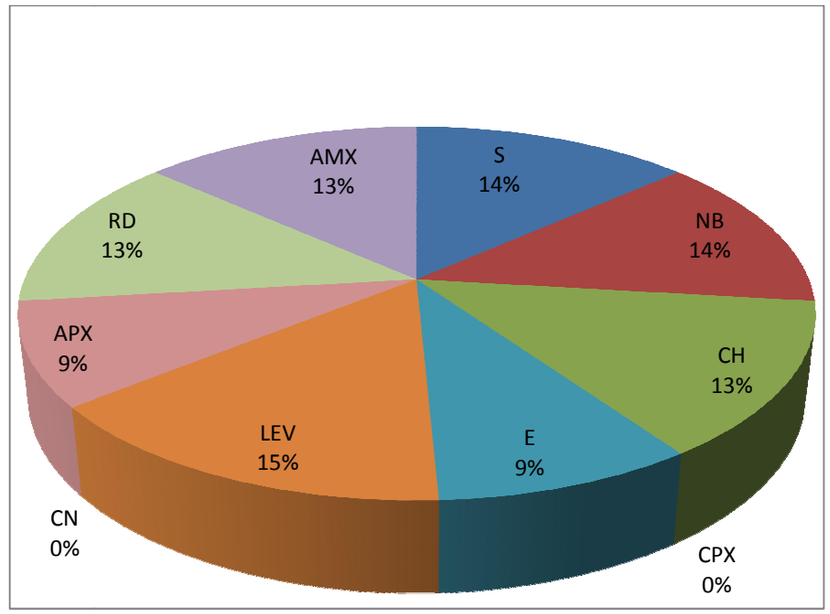

Fig. 13. Percentages frequency of antibiotic Susceptibility assay on Local Wine Body Surfaces [10^{-3}] *Clostridium sporogenes*

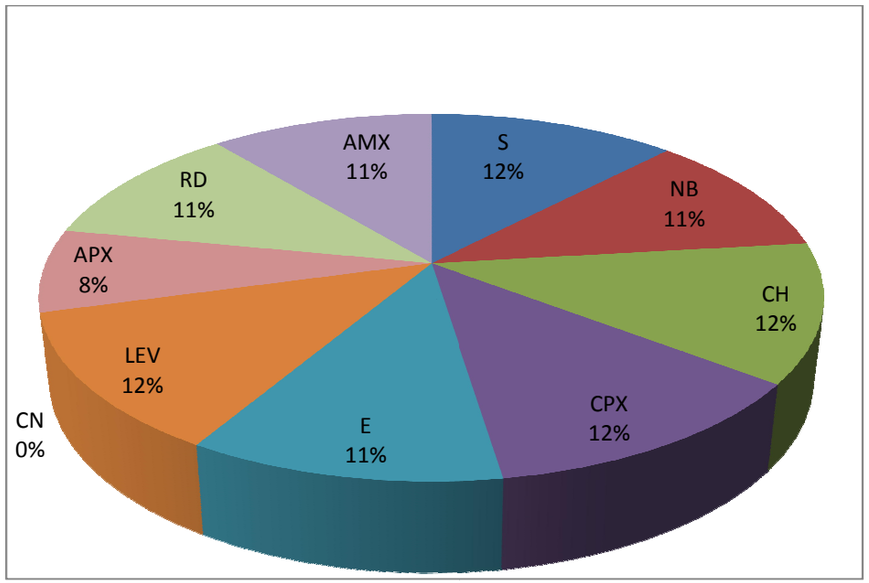

Fig. 14. Percentages frequency of antibiotic Susceptibility assay on foreign Wine Body Surfaces [10^{-3}] Cellulomonas biazota

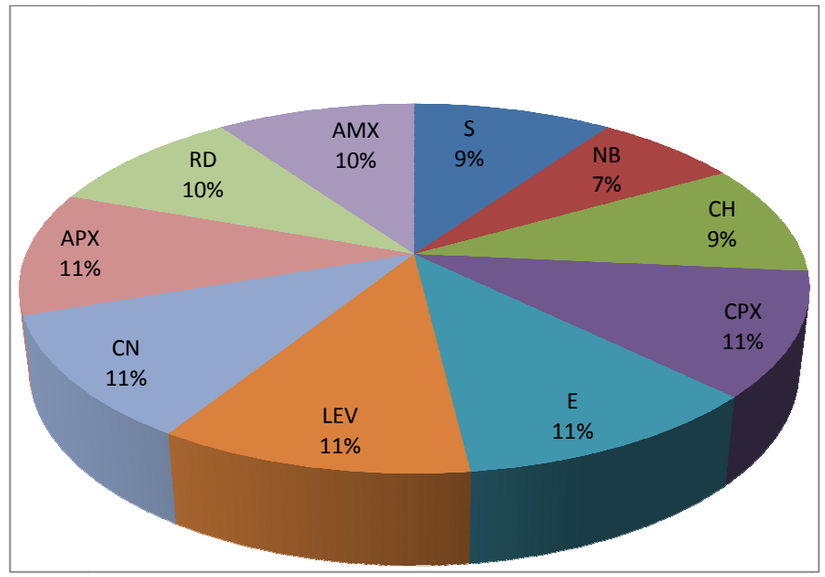

Fig. 15. Percentages frequency of antibiotic Susceptibility assay on Can Malt Body Surfaces [10^{-3}] *Bacillus polymyxa*

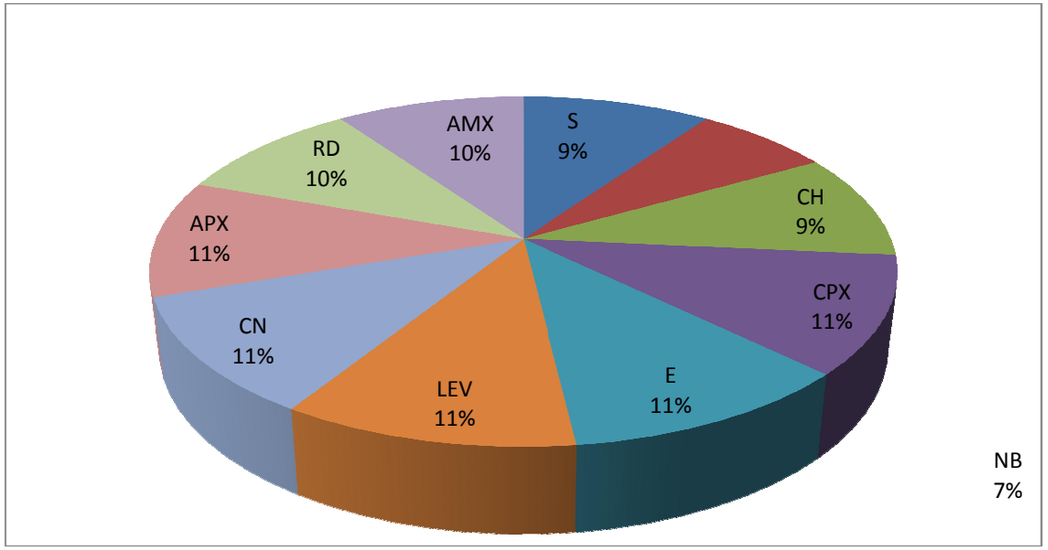

Fig. 16. Percentages frequency of antibiotic Susceptibility assay on foreign wine Body Surfaces [10^{-3}] *Bacillus subtilis*

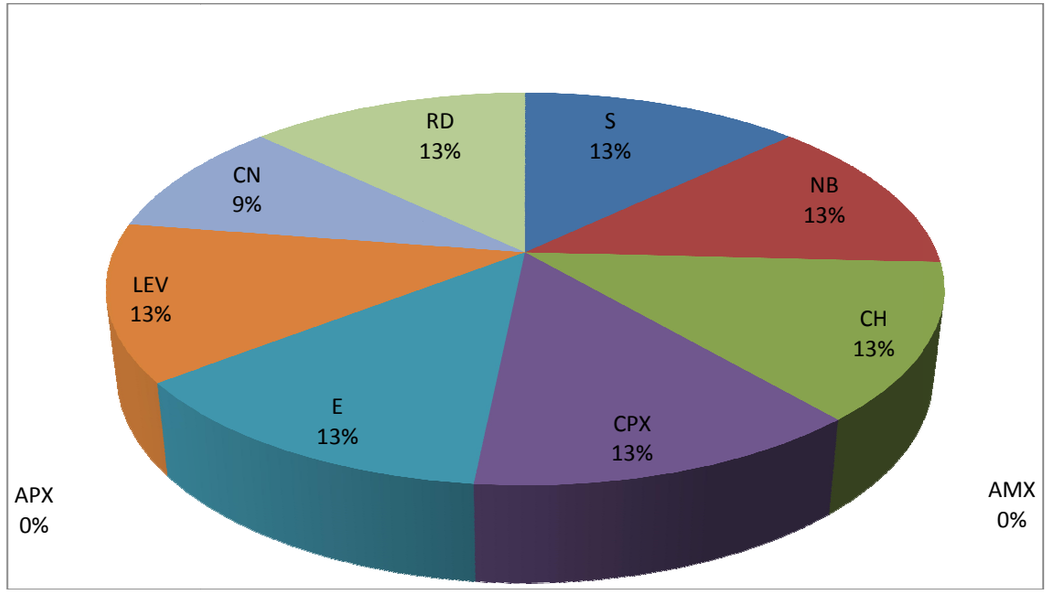

Fig. 17. Percentages frequency of antibiotic Susceptibility assayon Canned Coke Bottom Surfaces [10^{-5}] *Bacillus polymyxa*

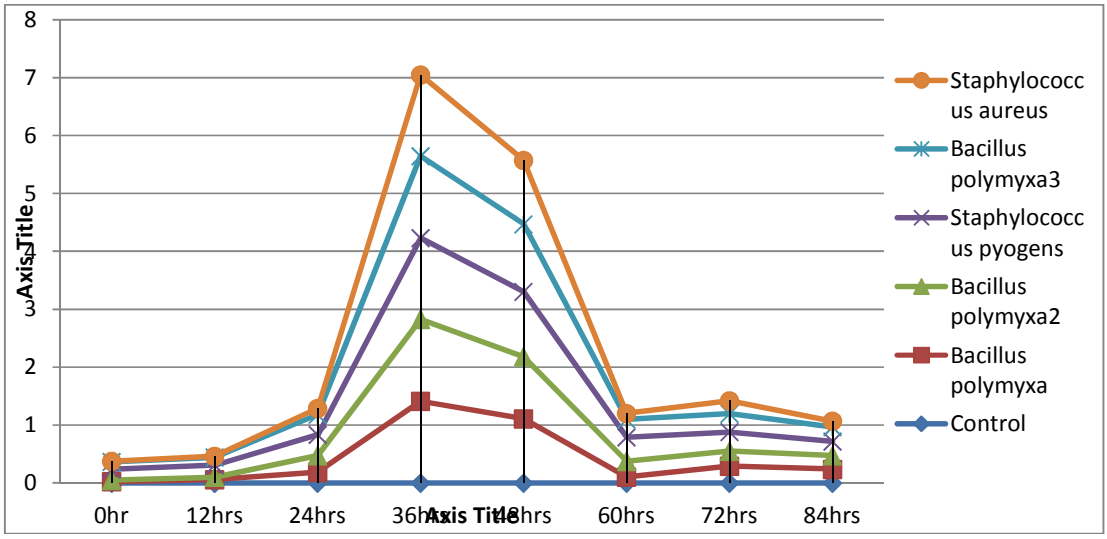

Fig. 18. Growth Dynamic of Bacterial Isolates on Canned Drink and Wine [Lid Surfaces] Using Ultraviolet Spectrophotometer with Wavelength of 480 Λ

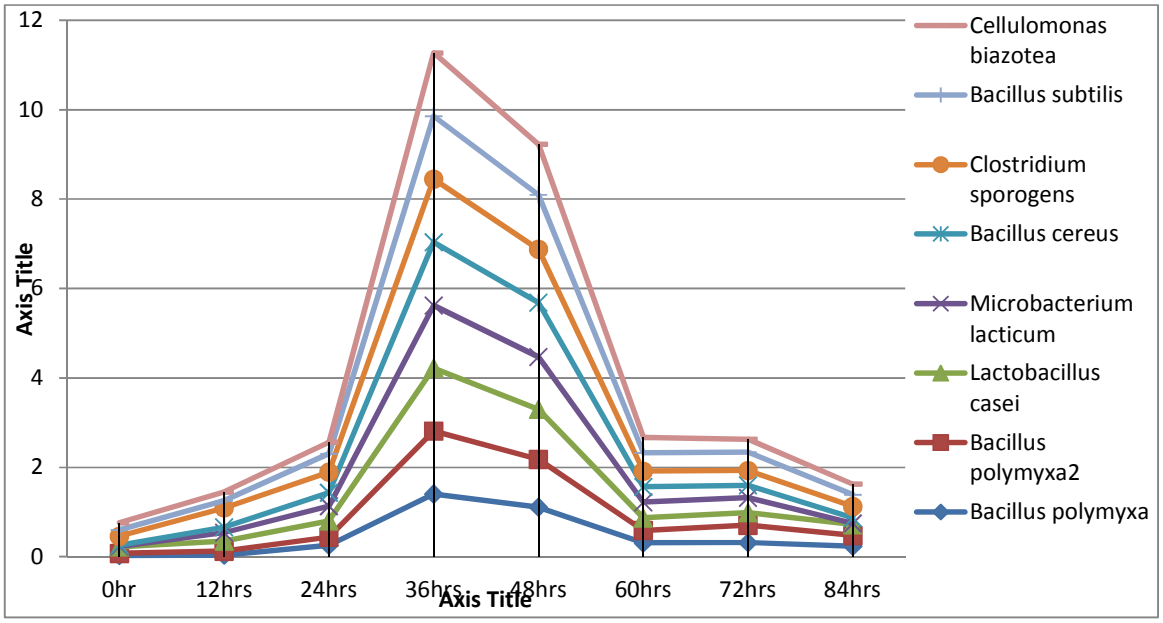

Fig. 19. Growth Dynamic of Bacterial Isolates on Canned Drink and Wine [Body Surfaces] Using Ultraviolet Spectrophotometer with Wavelength of 480Λ

The results obtained in this study is similar to that obtained from [1] who isolated *Staphylococcus aureus,* and *Bacillus cereus* from surfaces of canned drink. In this study, most isolates were found to be sensitive to Ciprofloxacin. Some of them were resistant to commonly used antibiotics. *Staphylococcus aureus* and *Lactobacillus casei* were resistant to Norfaxacin, Gentamycin, and Amoxil. *Microbacterium lacticum* was resistant to Norfaxacin and Chloramphenicol. The reason for microbial contamination on the top surfaces of beverage cans and wines could be at storages, the transportation of cans and intensity on enter and exit activities of goods and customers in market.

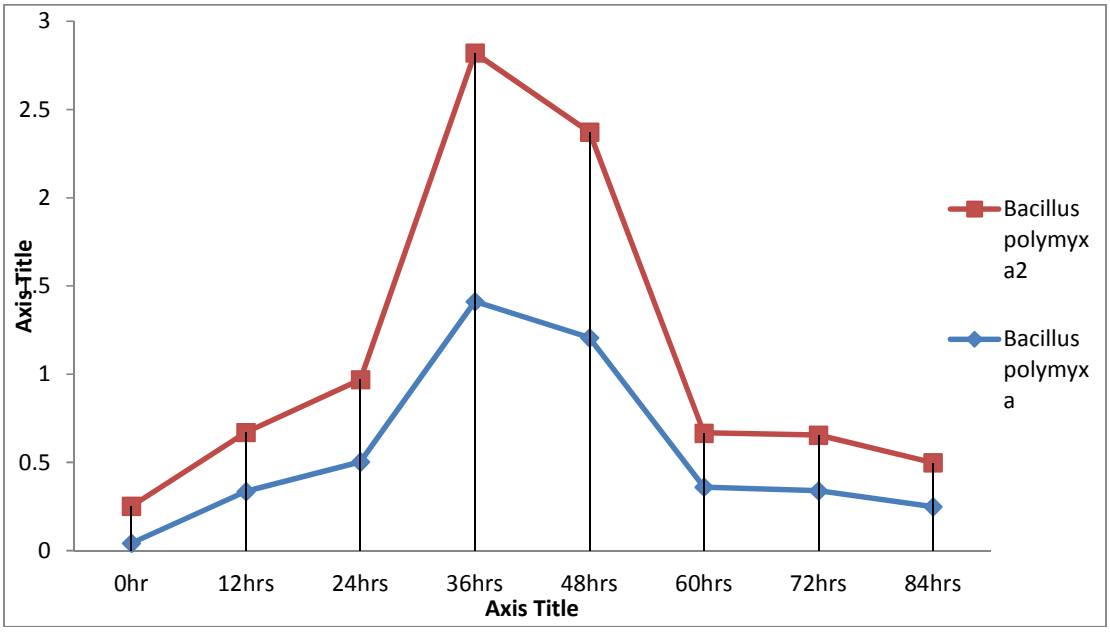

Fig. 20. Growth Dynamic of Bacterial Isolates on Canned Drink and Wine [Bottom Surfaces] Using Ultraviolet Spectrophotometer with Wavelength of 480Λ

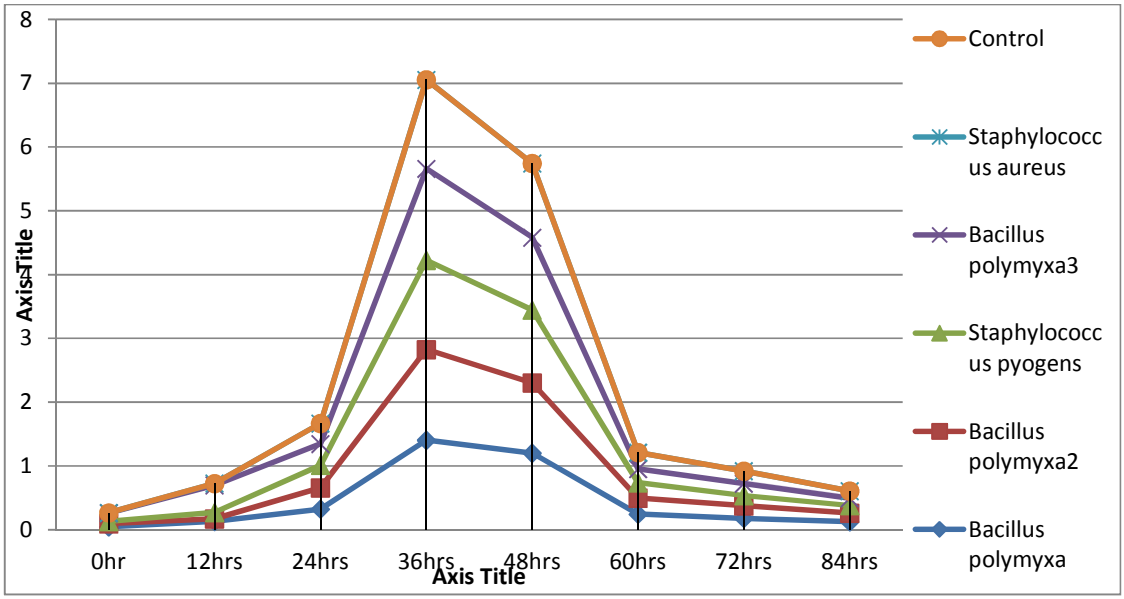

Fig. 21. Growth Dynamic and Killing Time of Bacterial Isolates on Canned Drink and Wine [Lid Surfaces] with Addition of Ciprofloxacin Antibiotic at 48th Hour Using Ultraviolet Spectrophotometer with Wavelength 480λ

[9] Investigated the contamination levels of beverage cans and indicated that 83 out of 96 [86.5 %] of the cans analyzed presented total counts of mesophilic aerobic microorganisms lower than 50 cfu/cm2. In a study by [17] aerobic and anaerobic bacteria, *Bacillus* spp., *Clostridium perfringens*, coagulase-negative *Staphylococcus* and mold counts were investigated. The average number of microorganisms listed for food and beverage cans revealed high contamination levels of 5.30 log cfu/cans top surface area for bacterial counts

and 5.84 cfu/cans top surface area mold spore counts. Major importance in these findings was the identification of *Bacillus* and *Staphylococcus*, organisms very capable of causing foodborne illness. [30] reported that they were obtained 127 isolates from Canned drinks. After filling operation of beverage cans, the protection of packaging should be considered during transportation to points of sale, to prevent contamination on the top surfaces of canned drinks and wine. When canned drinks and wine were removed from their shrink packaging at the points of sale, the contact between outer surfaces of packaging with the top surfaces of canned drinks and wine should not be allowed. canned drinks and wine should be placed on clean shelves with clean hands [30].

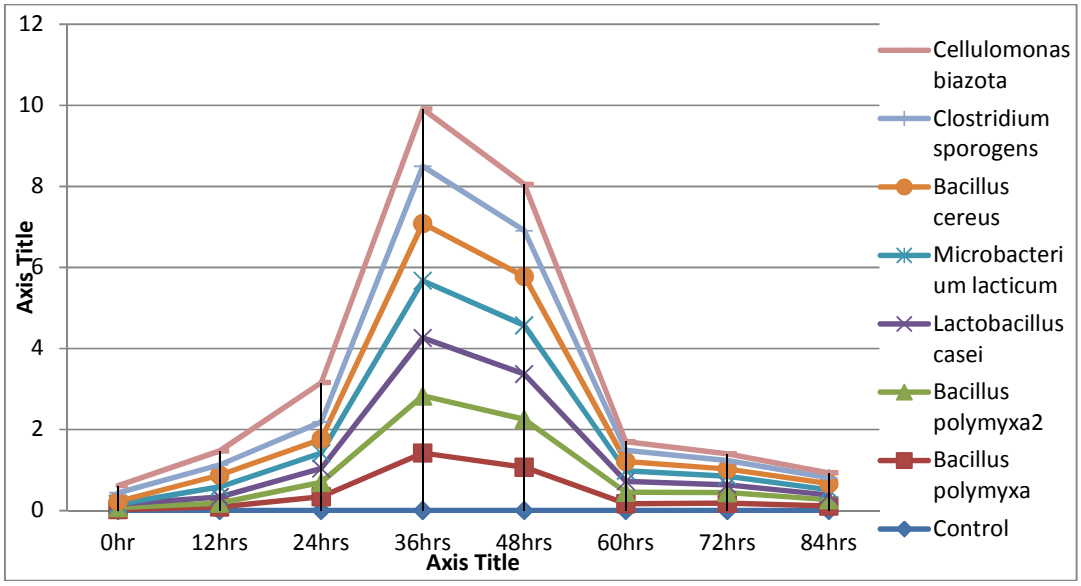

Fig. 22. Growth Dynamic and Killing Time of Bacterial Isolates on Canned Drinks and Wine [Body Surfaces] with Addition of Ciprofloxacin Antibiotic at 48th Hour Using Ultraviolet Spectrophotometer with Wavelength 480λ

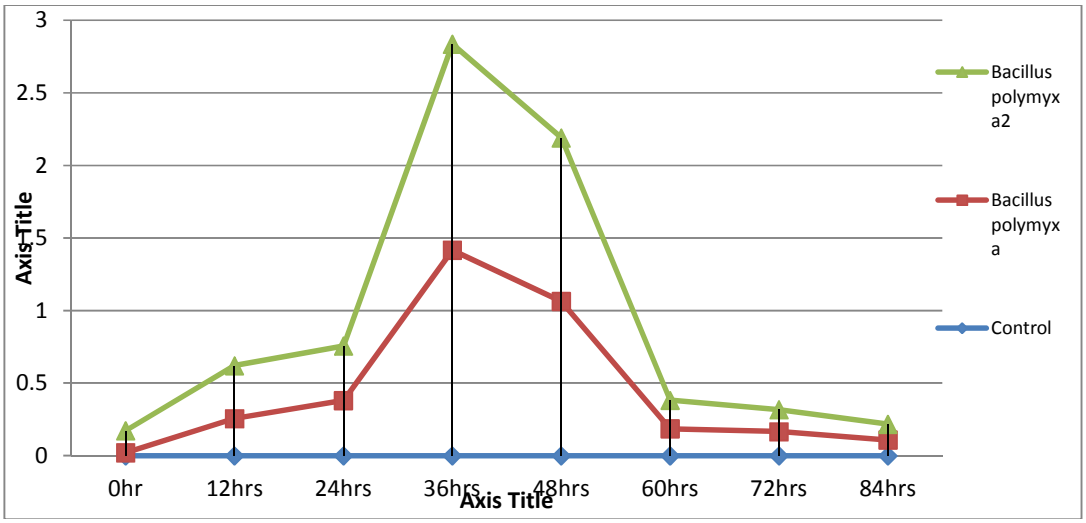

Fig. 23. Growth Dynamic and Killing Time of Bacterial Isolates on Can Drinks and Wine [Bottom Surfaces] with Addition of Ciprofloxacin Antibiotic At 48th Hour Using Ultraviolet Spectrophotometer with Wavelength 480λ

Top surfaces of canned drinks at shelves could be exposed to contamination through ambient air, consumers, dirty shelves, staff and insects. The surface contamination observed is a clear reflection of the poor hygienic practices of the vendors as well as the surrounding environmental conditions which favour the survival and proliferation of the bacterial pathogens. For this reason, at the places like market, grocery and restaurant, the important care measures must be taken on environment and personal hygiene and to struggle with pests and rodents [30]

Microbial indicators are a microorganism or group of microorganisms that is indicative of the possible presence of pathogens and the detection and enumeration of indicator organisms and whose presence in given numbers points to inadequate processing for safety [31]. [28] also suggested that pathogens remain viable on dry stainless steel surfaces and present a contamination hazard for considerable periods of time depending on the contamination levels and type of pathogen. If microorganisms remain on a given surface for a relatively long time, they can multiply and, eventually, form biofilms [32]. Packaging materials supply a means to preserve, protect, market and distribute foods, on the other hand in this study demonstrated that the surface of canned drinks and wines could be contaminated by the microorganisms.

It was observed during this study, the isolated organisms may pose a big health menace and food Safety. Quality assessment of retailed canned drinks and wines is necessary to reduce scourge of pathogenic organisms like *Bacillus polymyxa, Bacillus polymyxa Staphylococcus pyogens, Bacillus polymyxa,* and *Staphylococcus aureus* which were isolated from the Lid surface, *Bacillus polymyxa*, *Lactobacillus casei, Microbacterium lacticum, Clostridium sporogenes, Cellulomonas biazotae* and *Bacillus subtilis* isolated from the body surface and *Bacillus polymyxa,* isolated from the bottom of canned drinks and wine. All this organisms were pathogen, there is need to uphold the pathogenic assessment and quality control of canned drinks and wine, people don't observe hygienic practice before drinking the canned drink, this study is an eye opener to wholesome hygienic practice, and this should be encouraged. Use of sterile cotton wool or clean cloth to clean the lid of canned drinks before drinking and washing the top of the canned drink before drinking should be a day to day activity of all retained shops before selling to the populace [33].

Ultraviolet spectrophotometer were used to determine thephase, log phase or exponential phase, stationary phase, and death phase. During lag phase, bacteria adapt themselves to growth conditions. It is the period where the individual bacteria were maturing and not yet able to divide. During the lag phase of the bacterial growth cycle, synthesis of RNA, enzymes and other molecules occurs. During the lag phase cells change very little because the cells do not immediately reproduce in a new medium. This period of little or no cell division is called the lag phase and can last for hours. During this phase cells are not dormant [34] *Skarstad, et al., 2007*]. The log phase [sometimes called the logarithmic phase or the exponential phase] is a period characterized by cell doubling. The number of new bacteria appearing per unit time is proportional to the present population [35,36].

If growth is not limited, doubling will continue at a constant rate so both the number of cells and the rate of population increase doubles with each consecutive time period. At the exponential phase, Ciprofloxacin was added to speed up the rate of death of the organisms. This helps us to understand that antibiotics can be used to speed up the death rate of the organism. In the study, it was observed that at 0 hour, *Clostridium sporogenes* has the highest growth rate and *Microbacterium lacticum* has the lowest growth rate. After the addition of Ciprofloxacin at the 48th hour, *Bacillus cereus* has the highest number of death rate and *Lactobacillus casei* has the lowest number of death rate. Stationary phase results from a situation in which growth rate and death rate are equal. The number of new cells created is limited by the growth factor and as a result the rate of cell growth matches the rate of cell death. At death phase [decline phase], bacteria die. This could be caused by lack of nutrients, environmental temperature above or below the tolerance band for the species, or other injurious conditions [36,37], It can be deduce that antibiotic is useful to eliminate the recalcitrant pathogens in food industries and quality assessment of our wholesome product. Food industry should adopt the practice of using antibiotic to disinfect this product before being sold to the retail market and also, the reatail market should also cultivate the practice of in-house fumigation in the retails shop for proper quality adherence, to prevent this so called

pathogenic microorganisms with the antibiotics investigated during this research work [38].

5. CONCLUSION

Microorganisms are ubiquitous, but what we neither drink nor eat must be void of pathogenic organism for good health welfare, therefore canned drinks and wine must be washed thoroughly before drinking especially the top lid, to prevent getting in contact with microorganisms. it has been deduced that the surfaces of canned drinks and wines has been found to harbor bacteria therefore, cleaning the surfaces of canned drinks before consumption is essential to reducing or removing microbial contaminants.

6. RECOMMENDATION

According to the result obtained by the microbiological analysis of canned drinks and wine surfaces, the top surfaces of canned drinks and wines can pose a risk to health of consumers; I hereby recommend that the surfaces of can drinks and wines surfaces should be washed with soap and water before consuming the content.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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