

East African Medical Journal Vol. 95 No. 1 January 2018

EVALUATION OF BACTERIOLOGICAL RISKS OF BARBERSHOPS IN KENYATTA MARKET, NAIROBI COUNTY. KENYA

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EVALUATION OF BACTERIOLOGICAL RISKS OF BARBERSHOPS IN KENYATTA MARKET, NAIROBI COUNTY. KENYA

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ABSTRACT

**Background:** There is a growing concern that barber shops could serve as potential reservoirs of bacterial, fungal or even viral pathogens. Along with this background little is known about microbiological hazards associated with barbershops in Kenyatta Market, Nairobi County.

**Objective:** To determine the microbiological hazards of barber shops by isolating and identifying potential bacterial pathogens from materials and equipment used in barber shops by swabbing surfaces of combs, brush, shaving machines/ clippers, customer apron, shelve and towels using moistened sterile cotton swabs.

**Design:** Cross sectional study design was used to evaluate microbiological hazards of barber shops.

**Setting:** Kenyatta market and its environs, barber shops.

**Subjects:** All barbers within Kenyatta market as well as those around Ngumo and who consented to participate in the study and whose barber shops have the materials and equipment of interest.

**Results:** A total of 56 bacterial isolates were isolated from the barbershop's materials and equipment. The overall prevalence of pathogenic bacteria was Staphylococcus aureus 17(68.0%), E. coli 14 (56%), P. aeruginosa 14 (56.0%) and Klebsiella spp. 11(44.0%). P. aeruginosa microbial hazards were more associated with the customer aprons 6 (24.0%) , E. coli with shelves 8 (32.0%) and S. aureus with shaving machines 10 (40.0%), Klebsiella spp. was more associated with shelves, brushes and customer aprons respectively 3(12.0%). Chi square test of association showed that there was association in the type of bacteria isolated from materials and equipment at  $\chi^2 = 45.710$ ,  $df = 23$ ,  $P = 0.001$ . A one sample t-test analysis to test for the variation in the bacteria strains in the barber shops indicated that there was no significant difference in the number of the bacteria strains isolated in the shops ( $t = 1.29$ ,  $P = 0.211$ ).

**Conclusion:** Barbering procedures particularly in Kenyatta market is associated with risks of bacterial infections both to the clients and the barbers through contaminated barber shop materials and equipment. In this regard, barbershops in

**Kenyatta market could serve as potential reservoir for potential bacterial pathogens for transmission to the general public. This should be a public health concern that calls for legislative mechanism to instill sanitary practices in this important public health practice.**

## INTRODUCTION

The habitual visit to the barbers for a haircut and a shave is an essential part of life in many countries, including Kenya. However, the poor hygienic standards in some barbershops in developing countries including Kenya are alarming despite the declaration of health as a fundamental human right.

Barbering practices include hair cutting, face and scalp massaging, nail trimming, pedicure, manicure and shampooing/dyeing of hair, draping, finger waving, hair styling, shaves and tapering. All these are associated with significant health risks of acquiring communicable diseases and skin conditions in which the barber and the client are exposed to (1). For a barber to effectively provide these services, he must possess and use proper safe shaving tools such as knives, blades, combs, barber chair, hair clipper, barber cloth or wrap, hairbrush, barber neck paper/tape, barber mirror or back mirror, hair cream, hair dryer, hair blower or blow drier, shaving razor, hair scissors and shave brushes. Besides these materials, hair gel, shaving oil and moustache wax are also used.

Since the barber tools are shared, there is significant risk of infections through clippers, combs, scissors, towels and hair brushes unless proper hygienic practices are in place (2). It is for this purpose that regulatory policies and guidelines are necessary to regulate the barber industry in order to contain any communicable diseases. According to (3), if instruments and materials used on the client are not sterilized or are not properly handled and used hygienically, sharp instruments such as razors, clippers and scissors may become

contaminated if they pierce the skin of an infected person (clippers can accidentally pierce and penetrate the skin). Diseases of the scalp related to shaving includes Staphylococcus aureus and other bacterial and yeast infections. Of these infectious diseases, Methicillin Resistant Staphylococcus aureus (MRSA) seems to be of greatest concern (4). Both MSSA and MRSA cause skin infections that can be minor (folliculitis) or very severe (furuncles, carbuncles, abscesses) (4). They may also cause severe pneumonia and septicemia (blood poisoning). These pathogens are transmitted by simple contact. Other pathogens likely to be transmitted through barbers include viruses such as Hepatitis B, C and HIV (4). Hepatitis B is the easiest to transmit and the most common way of transmission is contact with the blood of an infected person. The transmission occurs through cuts in the skin, damaged skin as in eczema and other sickness of the skin, the eye, internal parts of the mouth and nose (4).

Dander and hair clippings are a source of allergens for certain atopic (sensitized) individuals and manifest itself by causing a wide variety of symptoms, including eczema and localized or generalized hives and skin rashes; itching, watery or puffy eyes; respiratory conditions such as nasal discharge and sneezing. According to (1) various health hazards, including communicable diseases and skin conditions are associated with barbers' profession. Barbering practices have also been associated with diseases such as allergy. According to (5) the frequency of allergy complaints have been found to be significantly higher in older individuals and in women and in most cases those having history of allergy. This is as a result of

chemicals allergens and irritant used in barbershops which frequently cause health problems such as respiratory tract reactions, asthma, dermatitis, rhinitis, and ocular diseases in barbers (5).

(Ibrahim et al, 2007) (3) found out that Infections associated with the barbering are contributed by lack of knowledge and awareness among barbers about health hazards associated with their profession and this may contribute significantly to the spread and transmission of infectious agents among clients and the barbers. (Ibrahim et al, 2007) (3) reported that there is a significant difference in the level of awareness among barbers in respect of age; educational status and duration of working and a significant difference ( $p < 0.05$ ) in the awareness of those with formal education. He found out that Age group (15-25) had a better knowledge about the health hazards than barbers in age group (26-50).

The microbial pathogens of focus in this study were those bacteria that are associated with the skin conditions. These are pathogens when the barber fails to disinfect or sterilize the machine prior to and after shaving can cause skin infections. Contagious infectious diseases of the skin and blood have been found to be associated with barbering and include *Staphylococcus aureus*, *Streptococcus* sp. *Enterobacterium* sp. *Enterococcus* spp, *Pseudomonas* spp, *E. coli*, *Klebsiella* spp. (6).

These pathogens are transmitted from one individual to another by contact or through contaminated implements such as combs, brushes or razors without proper disinfection (7). The study aimed at determining bacterial pathogens and drug resistance profile at the barbershops at Kenyatta market, Nairobi County.

## METHODS

Samples were collected from 25 barber shops within Kenyatta Market, Nairobi

County. The study utilized a two-stage sampling strategy. Briefly a list of all barber shops in Kenyatta market was serialized. A random number generator was used to generate 25 numbers ranging between the first and the last serial number of the listed facilities. Barber shops were randomly selected from the total number of barber shops in Kenyatta market. Six items were considered for swabbing from each barber shop. In facilities where more than one of each item exists, only one was randomly selected. To determine the types of microorganisms present, combs, brushes, shaving machines/clippers, apron, towels and shelves were swabbed with a moistened sterile cotton swab. After taking each swab, the swab stick was placed back into the casing to avoid contamination and was labeled appropriately. All the samples collected were transported without delay in cool box to Mycology/opportunistic Infection Laboratories, Center for Microbiology Research-KEMRI and processed using standard methods. Briefly, primary isolation were done on selective and differential microbial media and identification of contaminating microorganisms was done using Gram staining, microscopic examination and biochemical tests (8).

## RESULTS

The bacteria isolated from the 25 barber shops were; *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella* sp. These bacterial pathogens contaminated shelves, brushes, apron, towels, combs and shaving machines from all the 25 barber shops sampled.

*Bacteria pathogens isolated and the type of infestation in barbershops:* From 25 barber shops the types of bacteria isolated were as shown in table 1. 4 barbershops had the four types of target bacterial strains. 5 barbershops had 3 types of target bacteria, 9

barbershops had 2 bacteria organism while 6 barbershops had 1 bacteria isolated.

**Table 1:**

*Bacteria pathogens isolated and the type of infestation*

No. of shops	No. of bacteria	Type of Bacteria isolated
4 barbershops	4	<i>P. aeruginosa</i> , <i>Klebsiella spp.</i> , <i>Staphylococcus aureus</i> , <i>E. coli</i>
5 barbershops	3	<i>Escherichia coli</i> , <i>Staphylococcus aureus</i> , <i>P. aeruginosa</i>
9 barbershops	2	<i>Staphylococcus aureus</i> , <i>P. aeruginosa</i> ,
6 barbershops	1	<i>Staphylococcus aureus</i>

Based on the 25 shops sampled in this study, the prevalence of *Staphylococcus aureus*, was 68.0%, *E. coli* (56%), *P. aeruginosa* (56.0%) and *Klebsiella spp* 44.0% as shown in Table 2

**Table 2:**

*Prevalence of bacteria pathogens isolated from barbershops*

Bacteria isolated	Prevalence	P=%, n= 25 shops
<i>Klebsiella sp.</i> ,	11	44.0%
<i>Staphylococcus aureus</i> ,	17	68.0%
<i>E. coli</i>	14	56.0%
<i>P. aeruginosa</i> ,	14	56.0%

Out of the 25 barber's shops from the shelves: *P. aeruginosa* was isolated from in only one shop, *S. aureus* in four shops, *E. coli* in eight shops while *Klebsiella spp.*, were isolated in three shops.

**Figure 1**

*Shelf/Bench*



From the hair brushes; *P. aeruginosa* was isolated in three shops, *S. aureus* in three shops, *E. coli* in two shops while *Klebsiella spp.*, was found contaminating three shops.

**Figure 2**  
Customer Brush



Customer Aprons; *P. aeruginosa* was isolated in six shops, *S. aureus* in six shops, *E. coli* in five shops while *Klebsiella spp.*, was found contaminating three shops.

**Figure 3**  
Customer Apron



Towels; *P. aeruginosa* was isolated in four shop, *S. aureus* in eight shops, *E. coli* in four shops while *Klebsiella spp.*, was found contaminating one shop.

Combs; *P. aeruginosa* was isolated in four shops, *S. aureus* in two shops, *E. coli* in three shops while *Klebsiella spp.*, was found contaminating one shop.

**Figure 4**  
Combs



Shaving machine; *P. aeruginosa* was isolated in four shops, *S. aureus* in ten shops, *E. coli* in four shops while *Klebsiella spp.*, was found contaminating one shop.

**Figure 5**  
*Shaving Machine*



The bacterial pathogens isolated from barber equipment are as summarized in Table 3.

**Table 3:**  
*Types of bacteria isolated and identified from the materials*

Material sampled	Bacteria isolated
Shelves	<i>P. aeruginosa</i> , <i>S. aureus</i> , <i>E. coli</i> , <i>Klebsiella spp.</i>
Brushes	<i>Klebsiella spp.</i> , <i>S. aureus</i> , <i>P. aeruginosa</i> , <i>E. coli</i>
Customer apron	<i>E. coli</i> , <i>S. aureus</i> , <i>Klebsiella spp.</i> , <i>p. aeruginosa</i>
Towels	<i>E. coli</i> , <i>S. aureus</i> , <i>P. aeruginosa</i>
Combs	<i>P. aeruginosa</i> , <i>S. aureus</i> , <i>E. coli</i> , <i>Klebsiella spp.</i>
Shaving machines	<i>E. coli</i> , <i>S. aureus</i> , <i>Klebsiella spp.</i> , <i>p. aeruginosa</i>

**Table 4:**  
*Frequency of pathogenic bacteria isolated and identified from the materials*

	<i>P. aeruginosa</i>	<i>E. coli</i>	<i>S. aureus</i>	<i>Klebsiella spp</i>
Shelves	1 (4.0%)	8 (32.0%)	4 (16.0%)	3 (12.0%)
Brushes	3 (12.0%)	2 (8.0%)	3 (12.0%)	3 (12.0%)
Customer Apron	6 (24.0%)	5 (20.0%)	6 (24.0%)	3 (12.0%)
Towels	4 (16.0%)	4 (16.0%)	8 (32.0%)	1 (4.0%)
Combs	4 (16.0%)	3 (12.0%)	2 (8.0%)	1 (4.0%)
Shaving machine	4 (16.0%)	4 (16.0%)	10 (40.0%)	1 (4.0%)

$\chi^2$  vale = 45.710, df = 23, P = 0.001

## DISCUSSION

Data from this study revealed that barbershops in Kenyatta Market, Nairobi harbor microbiological hazards namely *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, and *Klebsiella spp.* This agrees with a similar study done in Ethiopia on microbiological hazards in barbershops in a university setting which showed that both bacteria and fungi were associated with barbershops (9). Based on this analysis a one sample t-test analysis of variation indicated that there was no

significant difference in the number of the bacteria strains isolated from barber shops ( $t = 1.29$ ,  $P = 0.211$ ).

In this study at least one pathogenic bacteria was isolated from all the barbershops. These pathogenic bacteria were as follows, 16 % of the barbershops had four pathogenic bacteria identified, and 44% of the barber shops from this study had two pathogens while 24 % of the barber shops had only one of the four pathogenic bacteria isolated.

In this study we isolated the four types of pathogenic bacteria from 25 barber shops.

Out of 25 barber shops the prevalence of these organisms differed from one shop to another. The most prevalent organism according to the study was *Staphylococcus aureus* 68.0% followed by *E. coli* 56%, *P. aeruginosa* 56.0% and least was *Klebsiella spp* at 44.0%. The most dominating organism according to the study was *Staphylococcus aureus*. The dominance of this particular pathogenic bacteria could be attributed to poor sanitary and unhygienic conditions on the materials and equipment as well as barbershops in general. This is as a result of multiple users of the equipment and materials in barber shops. According to (9) the most prevalent pathogenic bacteria associated with barber shops include *S. aureus*, *E. coli*, *pseudomonas spp* and *Klebsiella spp*. The prevalence of *S. aureus* was highest and the findings of the study agrees with a similar study done in Nigeria about microbiological hazards associated with barber shops that indicated *Staphylococcus Aureus* being the most dominating organism (1).

According to the study at least one of the four target organism in the study was isolated and identified from the six materials that were swabbed. This agrees with a similar study by (1) whose results showed that out of the target organism, one of the five bacterial and five fungal species were isolated from the materials that were swabbed. (3) Concur with the findings of this study where from the swabs collected on the material's and equipment's surfaces he was able to isolate and identify bacterial pathogens that were the main contaminants from various barber shops. Surfaces have always been known to be contaminated with organisms and according to the study by (8) the computer's keyboards indicated that they were contaminated with *staphylococcus aureus* which is a worrying public health issue. According to (8) contamination of these devices justifies how easily surfaces and materials in barber shops

can easily be infested with pathogenic bacteria.

From the results 8(32 %) of the barber shops had *E. coli*, four 4(16 %) of the barber shops had *S. Aureas*, 3(12%) of the barber shop had *Klebsiella spp* and 1(4.0%) of the barber shop had *pseudomonas aeuroginosa* among all the 25 shelves sampled. Among all the 25 shelves the most prevalent bacteria was *E. coli*, followed by *staphylococcus aureus*, *Klebsiella spp* and the least common was *Pseudomonas aeruginosa*.(10) is in agreement with this findings where his study found out that barbershop's materials and equipment were contaminated by both pathogenic gram negative and gram positive bacteria with high levels of barber shop contamination where 60.7% of the barber shops had *staph aureus*, 45.5% had *E. coli*, (87.9%) had *pseudomonas aeruginosa* and 43.3% of the barber shops had *Klebsiella spp*. (11) found out that the most prevalent bacteria was *pseudomonas aeruginosa* (87.9%) and the least prevalent was *Klebsiella spp* (43.3%) which disagrees with the findings of this study where *staph aureus* was the most prevalent. According to (4), *E. coli* was found to be the most common organism among all the shelves sampled and swabbed and this also concurs with this study's findings. According to the study most of the barbers in Kenyatta Market place their materials and equipment such as combs, brushes and shaving machines and clippers on the benches and shelves after shaving or attending to a client which exposes them to more contamination with pathogenic bacteria from within and without the barber shop. Therefore, the use of these barber shops materials and equipment that already have been infested with pathogenic bacteria expose the barbers as well as the public in general to pathogenic bacteria which in the long run pose a high risk of infection to the clients and barbers. This agrees with a similar study by (4) who indicated that most of the barber shops

shelves are used for a similar purpose and little or no attention has been given to these useful material. Due to lack of attention, materials are exposed to dust and other form of dirt and more severely infestation with pathogenic bacteria which pose a risk of infection to the clients and the barbers.

According to the study brushes are used to rub off little hairs that stick to the customer's cloth and on the skin surface after and before shaving. The study has found out that these brushes are contaminated with pathogenic bacteria. The most dominating pathogens were staphylococcus aureus, Klebsiella spp and P. aeruginosa. Presence of the pathogenic bacteria on barber shop brushes according to the study can be attributed to this common practice of wiping off little hairs that stick to the customer's cloth and on the skin surface after and before shaving. This practice by barbers makes it easy for bacterial pathogens to be transmitted from one customer to the other and in the long run pose a risk of infection to the customers and the barbers due to poor hygiene and sharing of one brush among different clients within the facilities. This study concurs with a similar study by (1) who reported that brushes in barber shops is one of the major instrument which posed a risk of infection to clients and the barbers by pathogenic bacteria. The manner in which this material is being used according to (1) allows pathogens to be transmitted from one customer to the other.

Combs, Shaving machines and clippers, customer aprons and face towels were all found to be infested with pathogenic bacteria which in general pose a risk of causing and transmitting infection to clients and the barbers. This findings agree fully with (11) who reported in his study that contamination of towels, brush, apron, clippers, combs and shelves if used on an infected customer would certainly spread pathogenic bacteria to other clients. This risk of exposure to pathogenic bacteria was as a

result of poor sanitary practices which according to (3) is true in that if the instruments and equipment used in barber shops are not sterilized appropriately expose the clients and the barbers at risk of infection. Disease such as Ringworm head lice, herpes, staphylococcus and streptococcus according to (12) have been found to be transmitted from one person to another via direct contact which is a similar case in barber shops.

Presence of these organisms in almost all the materials sampled indicated that unsafe or unhygienic practices in barber shops in Kenyatta Market poses a potential risk of infection by bacterial pathogens to both the barber and the clients. This agrees with the studies done in Ethiopia, Pakistan, and Bangladesh that found out that the sanitary practices in barbershop, however, are largely underestimated and unaddressed as one of a route of blood-borne disease transmission (13). According to (14) other countries have reported that barbers used sharp instruments which may facilitate the transmission of HBV and HCV. Barbering procedures according (15) could create opportunities for HIV as well as other blood borne and skin diseases transmission. This has been associated with barbering operations such as cutting, face and scalp massaging, nail trimming, pedicure, manicure and shampooing/dyeing of hair and various health hazards including communicable diseases and skin conditions are associated with barbers' profession to which their clients are exposed to (1) Isolation and the prevalence of these pathogens from the surfaces of these materials concurs with a similar study which found out that the barbering profession/practices pose a risk of infection with Staphylococcus spp, Klebsiella, Pseudomonas, E. coli and scabies as well as hepatitis B, C and HIV through contaminated razor blades, clippers and shaving machines (3). Infection from barber

shops is not only caused by contaminated materials and equipment but also the exposure to chemical and thermal hazards (16) which cause allergic related reaction. Use of chemicals such as dettal, Methylated spirit, Bleach (jik), Ethanol, savlon and surgical spirit in barber shops to disinfect the equipment and materials during shaving have been found to expose the barbers and the customers to allergy (Ronda et al, 2009)(17). This is in agreement with (16) who found out that dermatitis caused by allergic contact is a response to allergen. People who are allergic to these chemicals become ill of dermatitis which is as a result of direct contact. This agrees with the study where disinfectants use in barbershops within Kenyatta Market is a common practice. According to (11) the increased use disinfectants such as shampoo and alcohols containing chemicals pose an occupational health risks to barbers', hairdressers and the clients which according to him could be attribute to lack of appropriate measures such as general window ventilation and indoor ventilation to prevent this exposure. As a result these chemicals lead to allergies that cause irritation to the nostrils leading to flu and skin rashes (11). This is in agreement with a similar study by (17) whose study revealed that exposure to cosmetic disinfectants in barber shops causes allergy and this according to the study is a result of in appropriate measure to prevent it. Ronda et al, (2009) (17) recommended that areas of dye preparation and chemicals including the whole work place should be well ventilated.

Studies have also revealed that allergies in barber shops are caused by the usage of glove in barber shops and dermatitis can occur at the site of primary contact and secondary sites. Although the glove are worn during shaving, they shed glove powder on the machines, brushes combs, and on the customer aprons (16). A barber or a client who is exposed to powder rubber gloves and is allergic to it may not only get

dermatitis on their hands while wearing and shaving , but also dermatitis can be expressed on the face or neck of the client while shaving. This does not occur willingly but tiny amounts of allergen fall off the glove by accident (16). Ringworm an infection caused by dermatophytes are easily transmitted by direct contact or by contact with contaminated equipment and towels is of primary importance. If towels, brush, apron, clippers, combs and razors are used on an infected client successively without proper cleaning and disinfection, the likelihood of spreading an infectious diseases or infestation is almost certain (11). The practice of barbering has continued to expose its practitioners and their customers to multiple infectious diseases. Different microbiological reports have supported this view that barbershops are contributing to the spread of infectious diseases and allergic conditions including scabies, ringworm infection and dermatitis. A cross-sectional survey in 2001 among 150 barbers reported that cross infection happened in barbershops (8).

## CONCLUSION

This present study therefore confirms that barbering procedures particularly in Kenyatta Market present the risks for bacterial infections to both the clients and the barbers through the use of contaminated barber shop materials and equipment. In this regard, barbers from this Market could serve as potential core group for indirect and direct infectious disease transmission in the general population. This should be of great concern and calls for prompt and effective control of infections in barber shops and a comprehensive approach has to be adopted with the involvement of all relevant sections and groups. The results of our study clearly indicate that much effort has to be put in educating clients of barbershops and service providers about hazards

inherent in barbering practice and the importance of putting preventive measures in place.

### RECOMMENDATIONS

This study therefore, recommended that enough attention should be given to hygienic practices in barbershops through routine supervision and monitoring by agencies of the government. In addition, practical-oriented training on how to carry out decontamination with emphasis on the use of correct procedure and potent disinfectants should be organized for the barbers. All these can be organized through the barbers' union using peer education approach. To minimize transmission of microorganisms, operators must perform procedures in a safe and hygienic manner.

### ACKNOWLEDGEMENTS

To the office of the Director, Mycology/opportunistic Infection Laboratories, Center for Microbiology Research-KEMRI and School of biomedical sciences, department of microbiology-JKUAT for their support and guidance. The authors are indeed grateful to the authorities of both KEMRI and JKUAT. To (Kenyatta market community) and its environs to together with the authorities for allowing me to conduct this objective study. To the owners of the facilities (barber shops) and the respondents (barbers) who gave me a chance and a conducive environment for their cooperation in answering questions and allowing me to collect samples during data collection. The study was conducted with the approval of the supervisors and the Institutional Review Board (IRB) of the Kenya Medical Research Institute (KEMRI).

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