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Occupational Health Risks Among Cosmetologist: A Case Of Kinondoni Municipality Dar Es Salaam, Tanzania

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Abstract*—Cosmetologists and consumers often assume hairdressing, nail salons and the products used are safe. Unfortunately, they are subjected to various occupational health risks such as some of chemicals ingredients used in nail and hair products have been tied to cancer, miscarriages and lung diseases. Other problems are due to prolonged standing, poor ventilation, poor lighting and unhygienic practice. This study assesses occupational health hazards and illnesses awareness among hairdresser and nail salon workers. By using questionnaire and interview a total of 264 workers participated in the study results shows that majority 88.64% (n=234) are affected with musculoskeletal disorders, 82.58 (n=218) physical injuries, dermatitis 73.86 (n=195), fungal infection 61.36% (n=162), respiratory problems 54.17% (n=143) and infectious diseases 37.88% (100). Other occupational health illness reported by some of respondent includes, nail infection 25.76% (n=68), tuberculosis 21.21% (n=56), Ulcers 9.85% (n=26), cancer 6.44% (n=17), and reproductive or birth disorder 5.30% (n=14). Safety advocates are encouraged by the increased awareness but want better safeguards for salon workers. Although people thought consumers are more vulnerable, but workers in both nail and hair salons can be exposed to hazardous chemicals. Clearly, action is needed to improve conditions for salon workers and to help create and ensure healthier workplaces in the future. Recommendations for salon workers, salon owners, salon product manufacturers, and researchers, as well as long-term policy solutions must be designed so as to improve the health and safety of salon workers.

Keywords—cosmetology; cancer; 2-butoxyethanol; toluene; ethylmercury

I. INTRODUCTION

Cosmetology is the treatment of skin, hair and nails and includes, manicures, pedicures, application of artificial nails, special occasion hairstyling, shampooing hair, cosmetic application, body hair removal, chemical hair relaxers or straighteners, permanent waves, colouring and highlighting of hair, and hair extensions or wig treatments [1]. Cosmetology can be defined as the art and science of beautifying and improving the skin, nails and hair and includes the study of cosmetics and their application [2].

The history of beauty can be dated back in Egypt which is the first civilization to infuse essential oils from the leaves, bark and blossoms of plants for use of perfumes and for purification purposes Queen Nefertiti (1400 B.C.) [3], stained her nails red by dipping her fingertips in henna Queen Cleopatra (50 B.C.) erected a personal cosmetics factory next to the Dead Sea Ancient Egyptians also created khol makeup: originally made from a mixture of ground galena (a black mineral), sulfur, and animal fat to heavily line the eyes, alleviate eye inflammations and protect the eyes from the glare of the sun [2].

Cosmetology is a very common female occupation; more than half a million women in developed countries like United States are employed as cosmetologists, using their skills to apply beauty treatments [4]. Typically, women provide pedicures, manicures, facials, and other beauty treatments [5]. As these workers often start their careers before the age of 20, it is assumed that many begin working before considering family planning [6]. Cosmetology has many specialties, including hairdressers and nail technicians. More than one million individuals are licensed as cosmetologists in the United States, the majority being women and several million individuals practice as hairdressers and barbers worldwide [7, 8]. There are many health risks associated with the cosmetology and beauty industry in the big cities due to the chemicals found in the products, poor ergonomic practice and unhygienic practice of salon workers. It was reported that workers in this sector are exposed to variety of physical, chemical, biological hazards as well as psychosocial stress which threaten their health during their working days [9].

Among African countries, lightening products is popular in western Africa countries where over 75% of women use them while in Sub-Saharan countries; the leading country is South Africa with 35% [10]. The

global concept of beauty in the 21st century tends to be dominated by Eurocentric standards, which includes having a fair complexion [10]. In this context, skin lightening products are appealing and have become a very profitable business.

Besides being a big revenue and employment creator, cosmetology is an activity involving intimate body manipulations which should raise utmost public health concerns expressed through exacting regulatory frameworks approaching the extent of regulation in the medical field [7]. Unsafe or unhygienic practices can lead to the spread of infectious diseases that can affect the health of the client as well as jeopardize the health of the operator. Also the chemicals used in these salons need special attention to consumers as may affect not only consumers even the workers. . Most of the products found in these salons are classified as hazardous and extreme caution should be taken into consideration when using these products. They are made for professional use only; therefore, users must be trained and certified to be handling these products which are not the case for African salons and Tanzania is not exceptional. For example, hairdressing has been reported to be linked with a variety of health issues, including dermatitis, cancer, and respiratory problems [11]. Several researches [7-12] have shown a significant increased risk for bladder cancer among hairdressers, specifically those who had held the job for more than 10 years [12,13] suggests that occupational exposure to hair dyes poses no carcinogenic or other human health risk. However, this review focused on acute toxicity and health effects of hair dyes, not on the potential long-term reproductive effects of exposure. The evidence related to the harmful effects of hair dyes and nail polish on reproductive health is limited.

Apart from chemicals used in salons, some of chemicals are used to pill off the skin [14]. Skin bleaching or to use the more politically correct term skin lightening has been a growing trend not just in Tanzania where 30 per cent of the population use skin bleaching products but in many other African countries too [15]. The World Health Organisation (WHO) estimates that countries such as Nigeria have 77 per cent,59 per cent Togo, 35 per cent South Africa, 27 % Senegal and 25% Mali of their population use some form of skin bleaching product [15]. The skin bleaching industry has become a multi-million-dollar business within Africa; and in Tanzania, the demand for skin bleaching products are in high demand [3].

Many of the skin bleaching products have been banned by the Tanzania Food and Drug Authority (TFDA) [15]. The “Tanzania Food, Drug and Cosmetics Act, (2003), which prohibits the manufacture, sell, supply or distribution of cosmetics that contain prohibited ingredients which may harm or cause injury to the users under normal conditions of use.” These products include a variety of pills, soaps, and creams [15].

Many of the skin bleaching products also contain high levels inorganic mercury [16]. The WHO states that “Mercury salts inhibit the formation of melanin (the protein that gives pigment to the skin, those with darker skin have higher amounts of melanin), resulting in a lighter skin tone [16]. However, if it is used over a long period of time inorganic mercury can have several effects from rashes, skin discoloration to kidney damage, anxiety or clinical depression.

According literature [17], mercury is a common ingredient found in skin lightening soaps and creams. It is also found in other cosmetics, such as eye makeup cleansing products and mascara. Skin lightening soaps and creams are commonly used in certain African and Asian nations. Mercury salts inhibit the formation of melanin, resulting in a lighter skin tone. Mercury in cosmetics exists in two forms: inorganic and organic. Inorganic mercury (e.g. ammoniated mercury) is used in skin lightening soaps and creams. Organic mercury compounds (thiomersal [ethylmercury] and phenylmercuric salts) are used as cosmetic preservatives in eye makeup cleansing products and mascara [17].
Mercury is used in skin whiteners because the metal blocks production of melanin, which gives hair and skins their pigmentation. Other chemicals can do the same thing, but mercury is inexpensive and effective. It’s also toxic. Mercury is rapidly absorbed through the skin and can affect people neurologically [18]. They might experience blurred vision or trouble walking. Severe mercury poisoning can shut down organs and lead to death. High levels found as products gain popularity worldwide. Some creams promising to lighten skin, eliminate age spots and zap freckles contain high levels of mercury, a toxic metal that can cause severe health problems [18].

The data about chemical pollution and health complains of hair cosmetologists are not available in Tanzania. The aim of this study was to assess chemical risk factors in different types of the hairdresser workplace and to evaluate the health risk by using observation of chemicals used by cosmetologists and questionnaire.

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II. Materials and Methods

The study area was conducted at Kinondoni Municipality (Figure 1), which is the northernmost of three municipalities in Dar es Salaam, Tanzania, the others being Temeke (to the far Southeast) and Ilala (downtown Dar es Salaam).

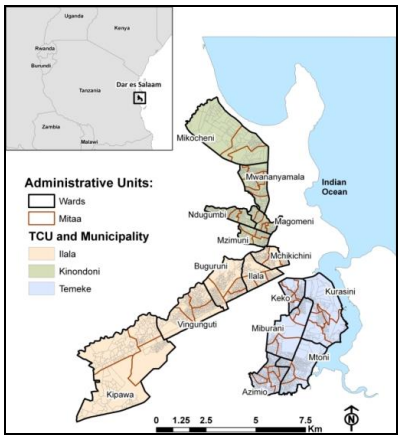

Figure 1 Map of Tanzania Showing Kinondoni Municipality

To the east is the Indian Ocean, to the north and west the Pwani Region of Tanzania. The 2002 Tanzanian National Census showed that the population of Kinondoni was 1,083,913 [19]. Research which was done before [20] by then the Municipality was having about 850 hair salons for both male and females but by now the number have increased tremendously. By using Structured questionnaires, observational, and interview 264 respondents were used

III. Results and Discussion

A. Respondents

Table 1 shows a total of 264 (100%) workers participated in the study whereby 34.47 % (91) provided hairdressing, 14.77% (39) nail services and 50.76% (134) hairdressing and nail services. From the study it was found that most of salons visited provide both hairdressing and nail services.

Table 1 Distribution of Respondents

Salon/Business	Frequency		Percent (%)	
	Male	**Female**	**Male**	**Female**
Hairdressing	43	48	16.3	18.2
Nail services	23	16	08.7	06.1
Hairdressing and nail services	09	125	03.4	47.3
Total	**75**	**189**	**28.4**	**71.6**

Majority of the participants 71.6% (189) were female and Male were just 28.4 % (75). In principle it was found that hairdressing and nail services are dominated by women. This is similarly to the studies [14,21] with the exception of the smaller barber workforce (where majority of them are men), salon workers are predominately women: 94.8% of hairstylists and hairdressers and 85.1% of other personal appearance workers are female [21]. Cosmetology is a very common female occupation; more than half a million women in developed countries like United States are employed as cosmetologists, using their skills to apply beauty treatments [4]. Another study [20], also found that more participant respondents were females 63.8% and few were males 36.3%.

B. Education Background

It was assumed by researchers that he risks present in nail salons are easily mitigated through education. As education and training for salon workers on health and safety issues will enable workers to obtain health and safety knowledge through product labeling, material safety data sheets (MSDS) or compulsory cosmetology school instruction (including specialized textbooks). In the current study, majority of respondents 61.74% have secondary school education (Figure 1). This was followed by 29.17% respondents who have primary school education. However, 1.10% has no formal education. This may add more risk to customers and workers themselves about the chemical used. The more concerns is because majority of workers are women of reproductive age, which are at higher risk for the effects of exposure to potential reproductive toxins. More uncertain, however, is their risk for direr medical issues. Some of the chemicals in nail and hairdressing products are known to cause cancer; others have been associated to abnormal fetal development, miscarriages and other harm to reproductive health. Therefore, the more knowledgeable workers are recommended.

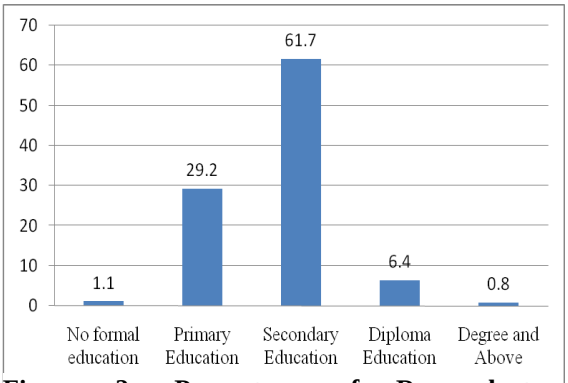

Figure 2: Percentage of Respondents According to their Education Level Place

C. Acquisition of Skills by Hairstylist or Nail Workers

Cosmetologist's uses chemicals of different kind, different strength and others have side effects in which can affect them in different ways. How a chemical affect them and customers depends on how much they are exposed to those chemicals and in what condition. Exposures can "add up," especially when many products are being used at the same time, when the products are used day after day, or when there is poor ventilation in the salon. If they use chemicals all day, every day, they are more likely to get sick than someone who uses the same chemicals once in a while. Follow the steps in this guide to help protect their health. Therefore, educational background about handling of chemicals and training is very important when one is employed as cosmetologist. In developed countries hair salon

owners who also perform styling duties on customers will need to complete formal cosmetology training and earn a license. This is not the case for developing countries like Tanzania, where few cosmetologists have attended the training (Table 3).

Table 2 ***Place Acquired Cosmetologist Skills***

	Frequency	Percent
Cosmetology school	73	27.65
Family or Friends	101	38.26
On the job	73	27.65
Self learner or Curiosity	17	6.44
Total	**264**	**100.00**

Majority of respondent had learnt their skills from their family or friends 38.26% (n=101), few 27.65% (n=73) had received professional training from cosmetology school, 27.65% (n=73) on their job and 6.44% (n=17) self learner just by curiosity.

D. Occupational Health Illnesses to Salon Worker's

Response with regard to Occupational health illnesses to salon workers were summarized in the Table 4. Most of Occupational health illness reported by majority of respondents were musculoskeletal disorders 88.64% (n=234), physical injuries 82.58 (n=218), dermatitis 73.86 (n=195), fungal infection 61.36% (n=162), respiratory problems 54.17% (n=143) and infectious diseases 37.88% (100). Other occupational health illness reported by some of respondent includes, nail infection 25.76% (n=68), tuberculosis 21.21% (n=56), Ulcers 9.85% (n=26), cancer 6.44% (n=17), and reproductive or birth disorder 5.30% (n=14).

Table 3 Occupational Health Illnesses

Occupational health illnesses	Frequency	Percent
Dermatitis	195	73.86
Musculoskeletal disorders	234	88.64
Respiratory problems	143	54.17
Reproductive or birth disorders	14	5.30
Physical injuries	218	82.58
Infectious diseases	100	37.88
Nail infection	68	25.76
Fungal infection	162	61.36
Cancer	17	6.44
Others- Tuberculosis	56	21.21
Ulcers	26	9.85

This is similarly as from the other studies [1-5] that musculoskeletal disorders, physical injuries, dermatitis, fungal infection, respiratory problems, infectious diseases, nail infection and cancer are among of the occupational health illness affected salon workers. From the study it was also found that tuberculosis and ulcers to be among of the occupational health illness affected salon workers.

OSHA's Hazard Communication Standard (OHCS) requires product manufacturers to provide salon owners with a safety data sheet (SDS) for each product used in the salon that may contain a hazardous chemical at 1% or more (or at 0.1% or more for chemicals that may cause cancer) or that could be released into the air above limits set by OSHA or the American Conference of Governmental Industrial Hygienists (ACGIH). The SDS explains the health risks of the product and lists precautions for worker protection. In general, the SDS must provide information about: Hazardous ingredients in the product, how users can be exposed to the ingredients, health and safety risks to users when using the product; and precautions for safely using and storing the product, including what to do in emergencies. However, this is not the case for Tanzanian chemicals where the labels are not feasible though contain hazardous chemicals such as acetone, toluene, methyl Methacrylate (MMA), Glyceryl thioglycolate and many other.

E. Health symptoms experienced and Action Taken

Responses with regard to health symptoms experienced by salon workers and action taken to solve the problem were summarized in the Table 5.

Table 4 Health Symptom Experienced and Action Taken

Symptom experienced (multiple answer option)	Frequency	Percent
Skin irritation	93	35.23
Nose irritation	32	12.12
Eye irritation	50	18.94
Nausea	7	2.65
Fatigue/tiredness	227	85.98
Headaches	76	28.79
Difficulty in breathing	9	3.41
Dizziness	80	30.30
Stress	62	23.48
Leg/foot problem	139	52.65
Back pain	227	85.98
Neck pain	137	51.89
Back pain	56	21.21
waist	38	14.39
Action taken to solve the problem		
Self care	160	60.61
Seek medical care	98	37.12
Stop working	6	2.27
Total	**264**	**100.00**

Most of respondents reported to experience the following symptoms 85.98% (n=227) Fatigue/tiredness, 85.98 %(n=227), Back pain, 52.65% (n=139) leg/foot problem, 51.89% (n=137) Neck pain. Mostly solve their problem by self-care 60.61% (n=160), others 37.12% (n=98) seek medical care and only 2.27% (n=6) stop working. This is similarly as from the literature that fatigue or tiredness, back pain, leg or foot problem, neck pain, skin irritation, eye irritation, dizziness and headache are among of the symptoms experienced by salon workers [2,4]. However, due to a lack of Tanzanian government oversight, many products used in hair and nail salons contain a number of hazardous chemicals that may harm your health. Table 6 lists some particularly toxic chemicals should be avoided in salon products.

Table 5 Harmful Chemicals Commonly found in Salons

Chemical Name	Found in these products	Symptoms of Exposure	Potential Long term Effect
Formaldehyde or methyleneglycol	Nail hardener, nail polish, keratin hair straightness	Breathing problems, coughing, wheezing, skin rashes, eye nose, throat irritation	Cancer, dermatitis
Toluene	Nail polish, nail glue, hair dye, wig glue/hairpiece bonding	Dizziness, headaches, skin rashes, eye, nose, throat irritation	Liver damage, kidney damage, birth defects, pregnancy loss
Methylmethacrylate (MMA)	Artificial nails	Breathing problems, chest tightness, eye, nose, throat irritation, headaches, confusion	Reproductive toxin, asthma
Cyclopentasiloxane or cyclomethicone	Flat iron sprays, thermal protection sprays	When heated forms formaldehyde which leads to breathing problems, coughing, wheezing, skin rashes, eye, nose, throat irritation	Formaldehyde exposure may cause cancer, dermatitis
Styrene	Hair extension glue; lace wig glue	Vision problems, trouble concentrating, tiredness	Cancer
richlorethylene	Hair extension glue; lace wig glue	Dizziness, headache, confusion, nausea, eye and skin irritation	Liver damage, kidney damage, dermatitis, double vision
1,4 Dioxane	Hair extension glue; lace wig glue	Eye and nose irritation	Cancer, liver damage, kidney damage
2-butoxyethanol or Ethylene glycol monobutyl ether	Disinfectants, cleaners	Headache, eye and nose irritation	Reproductive toxin
Dimethylbenzylammonium chloride	Disinfectants	Skin, eye and nose irritation	Asthma
p-phenylenediamine	Hair dye, black henna tatoos	Skin irritation	Dermatitis
Glycerylthioglycolate	Permanent wave solution	Skin irritation	Dermatitis
Ammoniumpersulphate	Hair bleaching	Eye, skin and nose irritation, coughing, shortness of breath	asthma
Acetone	Nail polish remover, hairspray	Eye, skin and throat irritation, dizziness	Eye, skin and throat irritation, dizziness
Ethylmethacrylate	Artificial nails	Eye and skin irritation,	asthma

		rashes on eyelids, face or neck, coughing, shortness of breathing	
Acetonitrile	Nail glue remover	Eye, skin and throat irritation, face flush, chest tightness, nausea	Weakness, exhaustion
Butylacetate, ethylacetate or isopropylacetate	Nail polish, nail polish remover, wig glue/hairpiece bonding	Eye, skin and throat irritation, headaches, dizziness	Eye, skin and throat irritation, dermatitis
Methacrylic acid	Nail primer, eyelash glue	Skin burns, eye, nose and throat irritation	Kidney damage, dermatitis, reproductive toxin
Dibutylphthalate	Nail Polish	Nausea, dizziness, eye and skin irritation	Reproductive toxin, birth defects

F. Inspection period from Occupational Health and Safety inspector

Response with regard to inspection period from Occupational Health and Safety inspector were summarized in the table below

Table 6 Inspection Period from Occupational Health and Safety Inspector

Response	Frequent	Percent
Daily	0	0
Weekly	7	2.65
Monthly	32	12.12
Yearly	59	22.35
Never come	164	62.12
Total	**264**	**100.00**

Most of respondent 62.12% (n=164) indicated that occupational health and safety inspector never come for inspection. Some of respondent replied to be inspected in the following frequency, weekly 2.65% (n=7), monthly 12.12% (n=32), yearly 22.35% (n=59). This shows that most of the salons at Kinondoni Municipality were not inspected by Occupational Health and Safety inspectors at all this was evidenced by lack of OSHA registration certificate and work place policy. This is contrary to section 153 of Tanzania public health act, 2005 emphasize that the authority shall regularly inspect beauty salons, barbershops and the like to ascertain for the compliance of this Act and where the Authority discovers the operation of hairdressing salon, beauty salon, barber shop and the like is in breach of the provisions of this Act, shall close that hairdressing salon, beauty salon, barber shop or the.

G. Correct Methods for Salon Waste Disposal

Cosmetology, other than being a big revenue and employment creator, is an activity involving intimate body manipulations which should raise utmost public health concerns expressed through exacting regulatory frameworks approaching the extent of regulation in the medical field. Unsafe or unhygienic practices can lead to the spread of infectious diseases that can affect the health of the client as well as jeopardize the health of the operator. Illnesses such as hepatitis B, hepatitis C and HIV/AIDS can spread by blood-to-blood contact, so it is essential for staff to understand the precautions required for any procedure that may involve skin penetration and possible blood contamination. Response with regard to the method for salon waste disposal were summarized in the Table 7.

Table 7 Method for Salon Waste Disposal

Type of salon waste	Correct method for disposal	Frequent	Percentage
General waste	Dustbin	183	69.32
	Boxes	8	3.03
	Plastic bag	47	17.80
	Bucket	26	9.85
Total		**264**	**100**
Contaminated waste	Dustbin	163	61.74
	Boxes	8	3.03
	Plastic bag	23	8.71
	Bucket	18	6.82
	Not available	52	19.70
Total		**264**	**100**
Sharps	Dustbin	179	67.80
	Boxes	15	5.68
	Plastic bag	34	12.88
	Bucket	16	6.06
	Burying	2	0.76
	Not available	18	6.82
Total		**264**	**100**
Waste chemical products	Dustbin	128	48.48
	Boxes	1	0.38
	Plastic bag	23	8.71
	Road side	66	25
	Drainage	34	12.88
	Soaked pit	12	4.55
Liquid waste products	Road side	106	40.15
	Bucket	24	9.09
	Drainage	113	42.80
	Soaked pit	18	6.82
	Toilet	3	1.14
Total		**264**	**100**

Majority of respondents 69.32% (183) reported that general waste were disposed through dust bin. Other respondents reported to dispose general waste in the following methods, boxes 3.03% (8), plastic bag 17.8% (47) and bucket 9.85% (26). Most of the salon

visited provide dustbin that was not covered. This is similarly to the study [5] that over half of the salons did not provide bins that were lidded for the storage of general waste (N = 16 or 53%) but used open-type bins.

Method used to dispose contaminated waste reported by respondents were: dustbin 61.74% (163), boxes 3.03% (8), plastic bag 8.71% (23), bucket 6.82% (18) and 19.7% (52) replied they do not produce contaminated waste. In all cases, material with blood spots, such as waxing strips, cotton wool used to spray chemicals was not counted as contaminated hence disposed as general waste. This is contrary to a survey [5] that reported double bagging prior to disposal by landfill of contaminated waste including waste cotton wool, tissues or cloths with any blood spots or human tissue.

Method used to dispose sharp reported by respondents were as follows, dustbin 67.8% (179), boxes 5.68% (15), plastic bag 12.88% (34), bucket 6.06% (16), burying 0.76% (2), not available 6.82% (18) i.e. they don't produce sharps. It was observed that none of the salon visited provides sharps boxes labeled as 'contaminated' and 'for incineration' for used needles most respondents reported to dispose sharps in the dustbin only few respondents reported they don't produce sharp. This is not the case as broken glasses, razors and many others were found in most of salons.

Method used to dispose waste chemical product reported by respondent were: dustbin 48.48% (128), boxes 0.38% (1), plastic bag 8.71% (23), road side 25% (66), drainage system 12.88% (34), soaked pit 4.55% (12). Waste acetone and other poisonous chemicals used in nail salons are considered hazardous waste and must be managed and disposed of safely [11]. Dispose of unwanted nail polish, used containers and other waste nail polish removers as hazardous waste. Cotton balls that have acetone, nail polish remover or other solvent on them should be stored in a metal container with a tight fitting lid. If they are not dripping with solvent, they can be put outside in the garbage at the end of each day.

Method used to dispose liquid waste products reported by respondents was: road side 40.15% (106), bucket 9.09% (24), drainage system 42.8% (113), soaked pit 6.82% (18) and toilet 1.14% (3). The storage and disposal of general and contaminated waste was not satisfactory in many cases. Knowledge of the proper means and channels through which to store and dispose both types of wastes was greatly lacking. It was also observed that there was no segregation of wastes, both type of wastes were disposed in the same dustbin except liquid waste which was disposed mostly in the road side or drainage system.

IV. Conclusion and Recommendation

Like most businesses, salons need to be regulated. The government supports increased emphasis on health and safety in cosmetology classes and personal employment, in continuing education requirements, and in state licensing exams. The NMC also is an advocate for frequent inspections and enforcement of existing laws and regulations, stiffer fines and penalties, and expanded permitting and enforcement authority. Outreach to Vietnamese and other immigrant communities, which now comprise over 50% of the nail salon industry, is critical to the continuing viability of the industry. Many NMC member companies utilize Vietnamese nail technicians to train and educate Vietnamese salons and to staff their toll- free help desks.

The Tanzania Food and Drug Administration (TFDA) need to have the legal authority to premarket testing of products by their manufacturers. For cosmetics, the TFDA has the burden of proof of demonstrating that a product is a hazard to the public rather than the industry demonstrating that their product is safe. Also, the TFDA does not have the authority to require a cosmetic manufacturer to provide them with the necessary information to enable the TFDA to conduct its own pre-market testing. Consumer products such as hair dyes which are sold for professional use in salons and shops do not require the ingredients listed on the label. If a cosmetic contains a substance considered to be adulterated, the TFDA way ban or restrict its use. However, the TFDA can only seize or restrict products after sufficient evidence is gathered (customer complaints/research) to prove a product harmful.

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