

# Consumer Food Hygiene and Safety Practices in the Households in Langata Sub-County, Nairobi County, Kenya

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**Abstract-** Foodborne diseases comprise a broad range of diseases and are responsible for substantial morbidity and mortality worldwide. It is an increasing public health problem in developing as well as developed countries. Increased risks of illness at home may result from unsafe food handling behaviours. Additionally, failure to associate the home as a potential location to acquire foodborne diseases may be a serious barrier for implementation of safe food handling behaviours. The home has become a multifunctional setting comprising of many activities that influences the need for and practice of food safety. In Kenya, there are several studies that have been done in various settings but few documented studies have been done at the household level. This study aimed at evaluating consumer food hygiene and safety practices in the household in Langata Sub-County, Nairobi County, Kenya. The study determined the sociodemographic factors that influence food hygiene and safety practices in the household, established consumer knowledge on safe food handling practices, established consumer attitude on food hygiene and safety practices in the household and established consumer food hygiene and safety practices in the home environment. This study utilized a cross-sectional study design targeting consumers who had the sole responsibility of food preparations in the households. A multistage sampling approach was used. The study was conducted in all the five wards of the sub-county which include; Karen, Soweto Nyayo Highrise, Mugumoini, Langata and Nairobi West. Data was obtained from a total of 385 respondents using interviewer administered questionnaire. Key informant interviews of public health officers, community health assistants and community health volunteers was also used to provide additional information. Data was analysed using SPSS version 20 and presented using tables and pie charts, while association between variables was assessed using Chi-square statistics and Odds Ratio. Findings show that consumer food hygiene and safety practices were at 42.9% in Langata sub-county. Occupation ( $\chi^2=39.609$ ,  $df=4$ ,  $p=0.000$ ), type of house ( $\chi^2=14.986$ ,  $df=2$ ,  $p=0.000$ ), main source of water ( $\chi^2=8.163$ ,  $df=3$ ,  $p=0.041$ ) was statistical significant in relation to food hygiene and safety practices by consumers. 64% of the consumers had good knowledge on food hygiene and safety practices while 79.5% of consumers had positive attitude towards good food hygiene and safety practices. The findings of this study show the need to address food hygiene and safety practices in the households.

**Index Terms-** Foodborne disease, Consumer, Food Hygiene, Food Safety Practices

## I. INTRODUCTION

Food safety is a global health goal and foodborne diseases are a major health issue (Velusamy, Arshak, Korotsynska, Oliwa & Adley, 2010). According to Badrie, Gobin, Dookeran, & Duncan (2006), the most common food handling mistakes include serving contaminated foods, inadequate cooking, heating and re-heating foods, obtaining foods from unsafe sources, cooling and storage of foods in inappropriate ways and allowing too much of a time lapse. Consumer's behaviors and attitudes towards safe food should be taken into account in order to completely define the term "food safety" and to determine the wrong behaviors and beliefs of the consumers (Büilent, 2013). Although proper food handling, preparation, storage, and feeding practices may prevent many foodborne diseases, each year millions of people become ill and thousands die from these diseases (Kumiko et al., 2009).

World Health Organization estimates 40% of foodborne disease cases originate in the home (Bloomfield & Nath, 2013). Up to 70% of diarrhoea cases in developing countries is said to be caused by pathogens transmitted through food (Kumiko et al., 2009). In Kenya, approximately 88% of diarrhoea associated deaths are attributable to unsafe water, inadequate sanitation and insufficient hygiene (UNICEF, 2006). In the year 2013, Langata reported the highest number of diarrhoea cases managed in the community in Nairobi County, there were 5096 diarrhoea cases managed that year (DHIS, 2014).

The home has become a multifunctional setting and which directly impacts upon the need for better food safety in the home. In particular, the rising population of the elderly, children and other immune compromised individuals living at home who are likely to be more susceptible to the impact of foodborne disease is an essential aspect to consider. Consumer food hygiene and safety practices research is required and relevant to ascertain how food is handled in the domestic kitchen, determine what is known about food safety and why some safe food handling practices are implemented and others are not. In Kenya, few documented studies have been undertaken to assess the roles played by food handlers in the transmission or control of food borne diseases in various setting in particular there is scanty information of food safety in the home environment (Oloo, 2010; Githiri, Okemo & Kiminywe, 2009).

## II. MATERIALS AND METHODS

This was a cross-sectional study which was employing both quantitative and qualitative data collection approaches. It considered respondents with sole responsibility of food preparations in the household and aged 18 years and above and had lived in Langata sub-county for at least six months.

Langata sub-county was selected because it had the largest number of diarrhoea cases in Nairobi County as per 2013 District Health Information System. The study was carried out in all the five wards and they included Soweto Nyayo Highrise, Karen, Langata, Nairobi West and Mugumoini. Probability proportionate sampling of households was done. Systematic random sampling was used to select the respondent's households. In the households, 385 consumers with the responsibility of food preparation were interviewed. Additional qualitative data was obtained through 8 Key informant interviews (KII).

Data checking and cleaning were done simultaneously during data collection. At the end of every field day, data was checked for completeness and consistency. After cleaning, quantitative data was analyzed using the SPSS version 20 for data analysis while association between variables was assessed using Chi-square statistics. Qualitative data was analysed using content analysis based on key themes generated from the objective. A p value of < 0.05 was considered significant.

## III. RESULTS

### Objective 1: The Level of Consumer Food Hygiene and Safety Practice

A total of 385 consumers were interviewed on food hygiene and safety practices. Thirteen questions were given to the respondent. Overall, one to have perfect practice was to score 52 points. Of these any respondent who scored 27 points and above was treated as having good practice while those who scored 26 points and below were treated as having bad practice. Interviewed respondents' were categorized into two groups; those who practice and those who did not. Less than half 165 (42.9%) of the participants were categorized practicing good food hygiene and safety. The practice of cooking food thoroughly was scored higher 200 (51.9%) compared to keeping clean 175 (45%), separating raw and cooked food 114 (30%), keeping food in safe temperature 178 (46.2%) and use of safe water and raw material which rated 174 (45.2%) as shown in table 1.

Further statistical analysis showed that in separating raw and cooked food, there was a difference between those who practiced good and bad food hygiene and safety practices ( $\chi^2=64.023$ ,  $df=1$ ,  $p=0.000$ ).

**Table 1 : Food hygiene and safety practices (n=385)**

	Frequency	Percentage
<b>Food Hygiene and Safety Practice</b>		
Good Practice	165	42.9
Bad Practice	220	57.1
<b>Keeping Clean</b>	$\chi^2=3.182$ , $df=1$ , $p=0.074$	
Good Practice	175	45
Bad Practice	210	55
<b>Total</b>	<b>385</b>	
<b>Separating Raw and Cooked food</b>	$\chi^2=64.023$ , $df=1$ , $p=0.000$	
Good Practice	114	30
Bad Practice	271	70
<b>Total</b>	<b>385</b>	
<b>Cooked Food Thoroughly</b>	$\chi^2=0.584$ , $df=1$ , $p=0.445$	
Good Practice	200	51.9
Bad Practice	185	48.1
<b>Total</b>	<b>385</b>	
<b>Keeping Food in Safe Temperature</b>	$\chi^2=2.184$ , $df=1$ , $p=0.139$	
Good Practice	178	46.2
Bad Practice	207	53.8
<b>Total</b>	<b>385</b>	
<b>Use of Safe Water and raw materials</b>	$\chi^2=3.556$ , $df=1$ , $p=0.059$	
Good Practice	174	45.2
Bad Practice	211	54.8
<b>Total</b>	<b>385</b>	

### Objective 2: Socio-Demographic Factors that Influence Food Hygiene and Safety Practices in the Household

Socio-demographic characteristics of the respondents are shown in table 2. The results indicate that the mean age of the respondents interviewed was  $33.08 \pm 9.61$ , with a median of 35. Out of a total number of 385 respondents who participated, 26 (6.8%) were below 20 years, 151 (39.2%) were aged between 21 to 30 years, 116 (30.1%) were aged 31 to 40 years, 76 (19.7%) were aged between 41 to 50 years and 16 (4.1%) were aged 51 years and above. Majority of the respondents were female 258 (67.0%).

Further results indicated that gender and age does not influence food hygiene and safety practices ( $\chi^2=0.564$ ;  $df=1$ ;  $p=0.453$ ) and ( $\chi^2$ ; 6.458  $df=4$ ,  $p=0.167$ ) respectively. However, the number of people in household, main source of water, type of housing were found to influence food hygiene and safety practices, ( $\chi^2 =10.467$ ;  $df =3$ ;  $P=0.015$ ), ( $\chi^2 =8.163$ ;  $df=3$ ;  $P=0.041$ ) and ( $\chi^2=14.986$ ;  $df=2$ ;  $P= 0.000$ ) respectively as shown in table 2.

**Table 2: Demographic Characteristics of the Participants (N=385)**

Socio-Demographic Factors	Hygiene and Safety practices		$\chi^2$	df	p value
	Good Practices	Bad Practices			
<b>Gender</b>					
Male	51 (40.2)	76 (59.8)	0.564	1	0.453
Female	114 (44.2)	144 (55.8)			
<b>Age categories in years</b>					
<20 years	11 (42.3)	15 (57.7)	6.458	4	0.167
20-30 years	54 (35.8)	97 (64.2)			
31-40 years	53 (45.7)	63 (54.3)			
41-50 years	40 (52.6)	36 (47.4)			
>51 years	7 (43.8)	9 (50.3)			
<b>Highest education level</b>					
None/non formal	1 (11.1)	8 (88.9)	3.939	3	0.270
Primary	53 (42.4)	72 (57.6)			
Secondary	86(43.9)	110(56.1)			
Tertiary	25(45.5)	30 (54.5)			
<b>Marital status</b>					
Single	50 (39.7)	76 (60.3)	2.964	2	0.227
Married	107 (45.9)	126 (54.1)			
Separated or divorced	8 (30.8)	18 (69.2)			
<b>Religion</b>					
Christians	114 (42.2)	193 (57.8)	2.125	3	0.556
Muslim	18 (51.4)	17 (48.6)			
Hindu	1 (20.0)	4 (80.0)			
Traditional/Not attached	5 (45.5)	6 (54.6)			
<b>Type of house</b>					
Permanent	70 (48.6)	74 (51.4)	14.986	2	0.001
Semi-Permanent	69 (48.6)	73 (51.4)			
Temporary	26 (26.3)	73 (73.7)			
<b>Number of people in HH</b>					
<two	37 (38.9)	58 (61.1)	10.467	3	0.015
Three- four	51(35.2)	94 (64.8)			
Five- six	61 (54.0)	52 (46.0)			
>seven	16 (50.0)	16 (50.0)			
<b>Main source of water by HH</b>					
Piped water in house	90 (49.7)	91 (50.3)	8.163	3	0.041
Piped water in public stand	60 (38.5)	96(61.5)			
From water vendors	11 (28.2)	28 (71.8)			
Borehole	4 (44.4)	5 (55.6)			

### Objective 3: Consumers' Knowledge on Food Hygiene and Safety Practices

The third objective of this study was to assess the consumer knowledge on food hygiene and safety. Knowledge of the participants in regards to food hygiene and safety was measured using a dichotomous scale. Fourteen knowledge questions were asked to participants and answers were graded by giving a point for the right answer and 0 point for the wrong answers.

Overall results indicate that 63.9% (246) of the respondents had adequate knowledge while 36.1% (139) had inadequate knowledge as shown in figure 1. Further analysis showed that the overall consumer knowledge was not a factor influencing food hygiene and safety ( $\chi^2 = 0.586$ ;  $df=1$ ;  $P < 0.444$ ). However, there were knowledge statements on food hygiene and safety that were found to influence food hygiene and safety as shown in table 3.

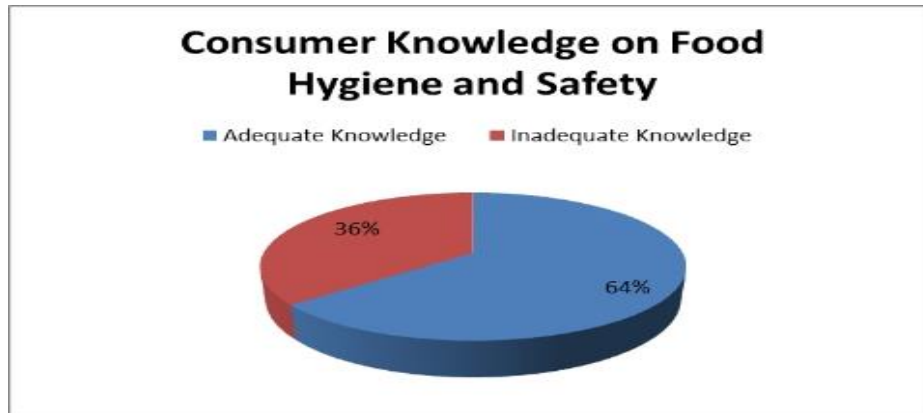


Figure 1: Consumer Knowledge on Food Hygiene and Safety

Results indicated that 97.9% (n=377), 73.8% (n=284) and 33.2% (n=128) were aware that handwashing with soap and running water before handling food is crucial, wiping clothes

spread microorganisms and hands should not be wiped with reusable towels respectively as shown in table 3.

**Table 3: Consumers' Knowledge in Food hygiene and Safety Practices (n=385)**

Knowledge Statements	Correct Answer	Incorrect Answer	Chi square
One should wash hands with running water and soap before handling food.	377 (97.9%)	8 (2.1%)	$\chi^2=3.074, df=1, p=0.080$
Hands should be dried with a reusable towel.	128 (33.2%)	257 (66.8%)	$\chi^2=0.165, df=1, p=0.685$
Wiping clothes like hand towels can spread microorganisms.	284 (73.8%)	101 (26.2%)	$\chi^2=0.091, df=1, p=0.069$
The same cutting board can be used for raw and cooked foods provided its clean	163(42.3%)	222 (57.7%)	$\chi^2=9.962, df=1, p=0.002$
Raw food needs to be stored separately from cooked food	339 (88.1%)	46(11.9%)	$\chi^2=1.391, df=1, p=0.238$
Cooked leftover do not need reheating thoroughly before eating	264 (68.6%)	121 (31.4%)	$\chi^2=3.861, df=1, p=0.049$
Cooked food should be kept very hot before serving	306 (79.5%)	79 (20.5%)	$\chi^2=3.058, df=1, p=0.080$
Meat should be cooked until juice are clear	352 (91.4%)	33 (8.6%)	$\chi^2=8.974, df=1, p=0.003$
Safe water can be identified by the way it looks	217(56.4%)	168(43.6%)	$\chi^2=17.249, df=1, p=0.000$
Storing food in containers with lids prevents contamination	290 (75.3%)	95(24.7%)	$\chi^2=7.268, df=1, p=0.007$
Meat products should be stored separate from other cooked food minimize cross-contamination	319 (82.9%)	66(17.1%)	$\chi^2=0.123, df=1, p=0.725$
Cooked food can stored at room temperature for more the two hours	154 (40%)	231(60%)	$\chi^2=2.828, df=1, p=0.093$
Washing vegetables and fruits before eating makes them safe	367 (95.3%)	18 (4.7%)	$\chi^2=8.837, df=1, p=0.003$
For as long as food taste, smells and looks okay it is safe to eat	188(48.8%)	197 (51.2%)	$\chi^2=0.684, df=1, p=0.408$

**Objective 4: Consumer Attitude on Food Hygiene and Safety Practices**

Attitude of the respondents on food hygiene and safety practices was measured using Likert scale (Likert Scale, 1932). Twelve attitude statements were given to the participants and the responses were scored. Overall one with a perfect positive attitude would score 55 and above. Of these, any respondent who scored 38 points and above was treated as having positive attitude while those who scored 37 points and below were treated as having negative attitude. Results indicate that 90.9% (355) of the participants had a positive attitude with the proposition that hand washing with soap and running water during food

preparation prevents food contamination, 89.6% (345) of the participants had a positive attitude that keeping surface clean reduces risks of contamination however, 46.8% (180) had a negative attitude on the statement that using different cutting boards and knives for raw and cooked foods or ready to eat foods is not necessary.

Further analysis in this results showed that attitude may not be a factor in food hygiene and safety practices ( $\chi^2=0.048$ ;  $df=1$ ;  $p$  value=0.827).

**Table 4: Attitude on Safe Food Handling Practices**

	<b>Attitude statements</b>	<b>Positive Attitude (n %)</b>	<b>Negative Attitude (n %)</b>
1.	Frequent hand washing with water and soap during food preparation is essential	355 (90.9%)	35 (9.1%)
2.	Keeping kitchen surfaces clean reduces the risk of food contamination	345 (89.6%)	40 (10.4%)
3.	Washing hands with soap after touching raw meat, fish or eggs before cooking is important.	329 (85.5%)	56 (14.5%)
4.	Using different cutting boards and knives for raw and cooked foods or ready to eat foods is not necessary	205 (53.2%)	180 (46.8%)
5.	Keeping raw and cooked food separate helps to prevent food contamination	326 (84.7%)	59 (15.3%)
6.	Covering cooked food leftovers and ready to eat food does not prevent food contamination	186 (48.3%)	199 (51.7%)
7.	Leftover soups and stews should always be boiled for at least 1 minute before consumption	280 (72.7%)	105 (27.3%)
8.	There is no problem of reheating cooked food leftover more than once	185(48.1%)	200 (51.9%)
9.	It does not matter the cleanliness of the food store where food is purchased	282(73.2%)	103(26.8%)
10.	Inspecting food freshness and wholesomeness is valuable	310(80.5%)	75(19.5%)
11.	It is not proper to throw away foods that have reached their expiry date	298 (77.4%)	87(22.6)
12.	It does not matter if cooked food stays for more than two hours at room temperature	160(41.6%)	225(58.4%)
13.	It is safer to thaw food in a cool place	133(73.9%)	47 (26.1%)
14.	It does not matter how long food is kept in the refrigerator as long as the food looks and smells ok	116(64.4%)	64(35.6%)

**IV. DISCUSSION**

**The Level of Consumer Food Hygiene and Safety Practice**

The results of this study demonstrated that food hygiene and safety practices were average (42.9%) among households in Langata Sub-County, Nairobi County. This implies there are a big percentage of consumers in Langata who carry out unsafe food handling practices despite having reported high knowledge in safe food handling practices. Several studies reviewed by Redmond & Griffith (2003) reported that consumers carried out unsafe food handling practices which contributed to food poisoning. A study conducted on Mauritius consumers reported 51.3% of consumers having fairly good food hygiene and safety practices Gunsam & Mahomed, (2012).

Separating raw and cooked food is important in minimising food contamination. In this study, results showed that there was a difference between those who practiced good and bad practice. Maybe the difference could be as a result of different knowledge

levels, availability of enough utensils and storage areas to enable the consumer have the ability to separate raw and cooked food.

**Socio-Demographic Factors that Influence Food Hygiene and Safety Practices**

Although gender, age, level of education and marital status were not factors influencing good food hygiene and safety practices in this study, literature has shown these factors are relevant (Jevsnik et al., 2008). The findings are similar to a study conducted on consumer food safety knowledge and practices in the home in Turkey by Unusan (2007) who found no statistical significance of demographic profile on food handling practices. In this study, the type of housing was a factor influencing good food hygiene and safety ( $\chi^2=14.986$ ,  $df= 2$   $p=0.000$ ). People living in households that were permanent and semi-permanent houses were more likely to be practitioners of food hygiene and safety than those in temporary houses. This might be explained by the fact that, type of housing is a common social economic



indicator which may suggest stability in terms of resources and facilities for food safety. Agustina et al., (2013) reported that homes in low socioeconomic urban areas in East Jakarta with limited facilities tend to have poor hygiene practices such as using dirty cooking or eating utensils for their children. The absence of basic sanitation facilities in a low socioeconomic family may lead to poor food hygiene and sanitation practices in the households.

The results of this study showed that the number of people in the household influenced food hygiene and safety practices ( $\chi^2=10.467$ ;  $df=3$ ;  $p=0.015$ ). Majority of the household had three to four people living together ( $n=145$ ). In study carried out by Agustina et al., (2013) reported that children belonging to families with more than six household members had 2.3 times higher risk of suffering from diarrhoea. In regards to number of people in a household, Meysenburg et al, (2014) reported insignificant differences but noted that those having a child one year or younger were practitioners. Household with children may adhere to food safety due to their desire to avoid harming children under their care.

The main source of water was a factor influencing practising good food hygiene and safety ( $\chi^2=8.163$ ;  $df=3$ ;  $p=0.041$ ). Those with piped water in the houses and piped water in the compound were classified as practitioners than those using boreholes. The least practitioners were those who sourced water from vendors. This probably is because the former have sufficient water for washing while the latter are limited in hygiene and safety practice because of shortage of water. Availability and accessibility of water is an important factor in hygiene practice.

### Consumers' Knowledge on Safe Food Handling Practices

Knowledge of food hygiene and safety is essential for consumers to make informed choices and implement safe food handling practices in their daily lives. In this study, more than half of the consumers were aware of food hygiene and safety practices, although there were gaps in their knowledge. This might be explained by the fact that almost two thirds of the participants had secondary education and above. Similar findings were reported for Mauritius consumers who reported 65% of consumers had adequate knowledge (Gunsam & Mohamed, 2012). In this study, overall consumer knowledge was not a factor influencing food hygiene and safety practices. The findings are similar to studies reviewed by Redmond and Griffith (2003) where it was concluded that knowledge of food safety practices does not always result into implementation of good practice. Other studies have reported otherwise, a survey on consumer information needs on food hygiene and safety (Gunsam & Mohamed, 2012).

High knowledge was revealed in washing vegetables and fruits before eating 95.3%, meat should be cooked until juices are clear 91.4%, storing foods in containers with lids prevents contamination 75.3% and cooked leftover do not need reheating thoroughly before eating 68.6%. Having good knowledge in these factors was found to influence good food hygiene practices. In this study low knowledge was reported by consumers, less than a half were aware that the same cutting board cannot be used for raw cooked foods as long as they look clean. This may be due to lack of alternatives. This is a concern, since major

outbreaks are often associated with cross contamination. In qualitative studies conducted by Langiano et al., (2012) and Les Études de Marché Créatec, (2007) indicated that some discussants used separate cutting surfaces for different foods. These findings differ with Gunsam and Mahomed, (2012) who reported high knowledge.

Knowledge that safe water can be identified by the way it looks was found to be a factor influencing good food hygiene and safety practices. Water is an important factor in food hygiene and safety. It is essential for consumers to know that they cannot identify safe water by its physical appearance.

### Consumers' Attitude on Food Safety Practices in the Home

In this study results indicate that majority 79.5% of the respondents had positive attitude towards food hygiene and safety. Further results indicated there was no significance relationship between overall attitude and practice ( $\chi^2=0.048$ ;  $df=1$ ;  $p\text{ value}=0.827$ ). However, attitude is an important factor besides knowledge in ensuring a downward trend of foodborne diseases (Azmi et al., 2006).

Positive attitude on covering cooked food leftovers and ready to eat food does not prevent food contamination, left over soups and stews should always be boiled for at least one minute before consumption and there is no problem of reheating cooked food leftover more than once did influence food hygiene and safety practices ( $\chi^2 =59.047$ ;  $df=1$ ;  $P=0.000$ ), ( $\chi^2 =7.700$ ;  $df=1$ ;  $P=0.006$ ) and ( $\chi^2 =45.472$ ;  $df=1$ ;  $P=0.000$ ). Participants who had positive attitude in regards to these variables were more likely to have good food hygiene and safety practices.

## V. CONCLUSION

- Unsafe food handling practices were reported like leaving perishable foods at room temperature for more than 2 hours and not covering the head while preparing food in the kitchen.
- Socio-demographic factors associated with food hygiene and safety practices included type of housing, number of people in household and main source of water.
- Knowledge was good but there were gaps in areas such as wiping hands with a reusable towel and the same cutting board can be used for both cooked and raw food provided it looks clean.
- Attitude on covering cooked leftover food prevents contamination was found to influence good food hygiene and safety practices.

### Recommendation

- This study revealed that food hygiene and safety practices remain a public health concern. Whereas knowledge is high actions remains low. Therefore improvement efforts through health education can be done to cultivate safe food handling practices. Policy maker need to develop local contextualized guidelines to enhance safe food handling behaviour and practices.
- Attitude that it is not good to throw away expired food was high and it is not important to have background

information of store of bought food. This is a significant phenomenon and a public health concern.

- Safe food handling practices that were reported to be poor like covering of the head while preparing meals, leaving cooked food at room temperature for more than two hours and putting leftover cooked foods for more than 3 days in the refrigerator among others reported in this study need to be looked at keenly. This major issue warrants major household education probably through mass media by SMS or household campaign.

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