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CONSUMER AWARENESS AND WILLINGNESS TO PAY FOR DRIED MANGOES: EVIDENCE FROM PUNJAB, PAKISTAN

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ABSTRACT

Dried fruits are a popular and convenient snack option for many consumers, providing a nutritious alternative to processed snacks. Thus, consumer demand for dried fruits has significantly increased worldwide due to increasing health consciousness and a growing interest in natural and organic food products. Though Pakistan is one of the world's largest producers of mangoes, dried mangoes are a relatively new product in the country's markets. Hence, the study's objective is to understand consumers' awareness and willingness to pay (WTP) for dried mangoes which is crucial for producers and marketers to target and capture the growing market effectively. We collected the data from 300 respondents from three metropolitan cities of Punjab: Lahore, Faisalabad, and Multan. We employed logistic regression to investigate the determinants of consumers' awareness of dried mangoes and Tobit regression to estimate factors affecting willingness to pay. The results show that 46% of respondents knew the dried mangoes. Furthermore, gender, education, income, and access to information are the important factors affecting consumers' awareness. On average, consumers were willing to pay Rs. 373/ 125 grams of dried mangoes. The estimates of the Tobit model show that gender, age, education, income, profession, promotion, packing, and health consciousness significantly affect the consumers' willingness to pay. Therefore, producers and marketers must develop effective positioning, pricing, and promotional strategies based on these factors to target and capture the growing markets for dried fruits.

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INTRODUCTION

Over time, notable differences have been observed in Pakistan in consumers' lifestyles, eating habits, awareness levels, education, and per capita income (Badar et al., 2016). The consumer perception of food quality has changed the demand for processed products. Hence the availability of a variety of processed food products has increased. However, from the marketing potential, consumer research is limited (Yaseen et al., 2016). Exploring the determinants of consumers' choice is essential, as this is directly related to demand and willingness to pay. Consumers demand quality food throughout the year, with a particular focus on price and utility for consumption.

Pakistan is a leading producer of mangoes, with an annual production of 1800 thousand tons (Amis, 2023). Pakistan's fruit exports have a competitive advantage, which may generate significant export revenues (Masood et al., 2023). Because of their flavour and aroma, Pakistani mangoes are well-known worldwide, and their export may help the nation's economy. However, mango is a susceptible and perishable fruit, especially harvest and postharvest losses of mango are reported to be nearly 50% (Owino and Ambuko, 2021). According to National Food Security Policy, postharvest fruit losses are 22% in Pakistan. The cost of the annual harvest and postharvest losses for grains, fruits, and vegetables are estimated at around 228.8 billion rupees (GOP, 2022). Postharvest losses are the major issues farmers face; thus, implementing good agriculture practices (GAP), technology adoption, and postharvest management is necessary to overcome this issue.

Mangoes are mostly consumed in fresh and processed forms, such as jams, juices, smoothies, and jellies, throughout the summer (Ayyaz and Hussain, 2019). Nevertheless, mangoes' poor shelf life requires modern value-addition techniques to develop processed products like dried mangoes, which may increase their shelf life. It may also ensure the availability of mangoes in the off-season to consumers with maintained nutritional properties (Sulistyawati et al., 2020). In world markets, dried fruits like kiwi, bananas, and pineapple are sold in supermarkets and online. Consumer acceptance of dried fruits has positively influenced the demand via promotional activities (Cinar, 2018). Hence, consumers' demand for innovative products like dried fruits rather than fresh mangoes has created opportunities and market expansion for dried fruits.

According to the WHO recommendation, a daily intake of 400g of fruits is necessary (WHO, 2004). Still, in less developed countries, malnutrition rates have been observed due to poverty and a lack of access to healthy food (Mujuka et al., 2021). Fruits intake positively affects health for weight and obesity management (Ullah et al., 2021). Additionally, from health perception, vegetables, and fruits are of great nutritional significance as they provide essential minerals, vitamins, fibre, antioxidants, and

carbohydrates, which are necessary for the daily required portion of the diet (Mongi et al., 2013; Rybicka et al., 2021). The nutritional significance of fruits and vegetables is an essential parameter for a daily portion of the meal, which boosts immunity against many diseases. A 100g of mango contains 83g of water, 0.82g of proteins, 14.9 of carbohydrates, 13.66g of sugar, and other essential minerals like calcium, iron, zinc, and vitamins. At the same time, 100g of dried mango has 16.6g of water, 2.45g of proteins, 78g of carbohydrates, and other essential minerals and vitamins (Zafar and Sidhu, 2017). Therefore, dried fruits are considered the best alternatives to other unhealthy snacks (Rybicka et al., 2021).

There have been numerous studies on consumer awareness and willingness to pay (WTP) for fruits in Pakistan. Yaseen et al. (2016) investigated the preference of consumers to pay a premium price for quality traits of Pakistani-grown mangoes, which aids in understanding consumer preferences and WTP for mango. Badar et al. (2016) examined customer preferences for mango value in the district of Faisalabad to improve the performance of domestic value chains for the mango industry. Grant et al. (2021) evaluated customer preferences for goods with clear labelling and innovative food technologies that can communicate the relevance of packaging and technology adoption for food items. Ullah et al. (2021) analysed WTP for organic fruits in Pakistan. Their study highlighted the health hazards of chemical application on fruits and consumer choices for healthy fruit consumption. Owino and Ambuko (2021) examined mango fruit processing in developing countries, which can highlight the significance of processing fruits such as dried mangoes.

However, all the studies above explain the various aspects of consumer awareness and WTP in Pakistan. Literature shows limited studies on WTP and consumer awareness for dried mangoes in Pakistan. Keeping the importance of mangoes in Pakistan, the current study is aimed to examine consumer awareness and WTP for dried mangoes in Punjab, Pakistan. It draws the policy recommendations to improve the dried mango market in the country.

METHODOLOGY

Sampling and Data Collection

The data was collected from three metropolitan districts of Punjab: Multan, Lahore, and Faisalabad, through a well-structured questionnaire. The reason for selecting these cities is the higher demand for processed products in the big cities. Moreover, the literacy rate in Multan district is 45 %, Faisalabad 60 %, and Lahore 73 % (GOP, 2022), which may suggest consumer awareness may be better in these areas. According to the MICS survey report, districts Lahore, Faisalabad, and Multan have a high asset index score, indicating better livelihood and infrastructure (Burki et al., 2015). Furthermore, people's livelihood and purchasing power are better in these cities, thus making these cities potential markets for dried mangoes.

Through in-person interviews, we collected information on socioeconomic factors, consumers' awareness, and willingness to pay for dried mangoes from 300 respondents. After data collection, it was thoroughly checked to ensure that respondents had answered all the questions asked by the researcher to avoid anomalies in the data.

Econometric Techniques

Due to its mathematical approach, the logistic regression process has been used in several research studies and applications (Greene, 2003). This research study was used to examine the significance of decisions on whether consumers are aware or not of dried mangoes. We employed the following formula for the binary logit:

$$Pr(y = 1|\acute{x}) = \frac{\acute{x\beta}}{1+exp(\acute{x\beta})} = (\acute{x\beta}) \quad (1)$$

Equation 1 illustrates the probability that an event will occur; the dependent variable keeps a value of 1 and specifies the independent factor (x'). The x' shows the vectors of each independent factor. The β coefficient explains the explanatory power of the independent factor. The dependent factor is the possibility of a consumer being aware/not aware of dried mangoes. This dependent factor keeps two distinct values, which are 1 if the consumer is aware of dried mangoes or 0 if the consumer is not aware of dried mangoes.

The model represents the maximum likelihood of a consumer being unaware of dried mangoes. The β coefficient in the given model illustrates the relationship between the anticipated log of odds and deviations in independent regressors of a consumer being aware or unaware of dried mangoes. The odds ratio, the antilog of β (exponent β), can represent the relationship between dependent and independent factors. The odds ratio formula is explained below.

$$\frac{P_i}{1-P_i} = \frac{1+e^{(\acute{x\beta})}}{1+e^{-(\acute{x\beta})}} = e^{(\acute{x\beta})} \quad (2)$$

Where Pi is the possibility of being aware of dried mangoes, Pr (y =1|x') in equation (2) and 1- Pi is the possibility of not being aware of dried mangoes. Equation 2 represents the odds ratio in favour of consuming dried mangoes which is the ratio of the possibility that a respondent is aware of dried mangoes to the Possibility of not being aware of dried mangoes. Suppose the odd ratio is greater than 1. In that case, it means that the probability that a consumer will be aware of dried mangoes instead of unaware of them is less likely due to a unit improvement in the constant factor or an apparent change in the definite component in the regressors. The model is stated in its more general form as follows:

$$Y_i = (\frac{p_i}{1-p_i}) \quad (3)$$

$$\text{Log } (\frac{p_i}{1-p_i}) = \beta_0+\beta_1X_1+\beta_2X_2+ +\beta_4X_4+\beta_5X_5+\beta_6X_6+ \beta_7X_7+ \beta_8X_8+ \beta_9X_{9+} \varepsilon_i \quad (4)$$

Whereas:

P = Possibility of dependent factor (being aware or not aware of dried mangoes)

$$\text{Ln (Odds)} = \text{Ln } [\frac{p_i}{1-p_i}] = \beta_{0+} \beta_i \quad (5)$$

P = 1 if a consumer is aware of dried mangoes and 0 not aware of dried mangoes. This relationship's particular structure is characterized as:

$$\text{Ln}(\frac{p_i}{1-p_i}) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_{3+} \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \varepsilon_i \quad (6)$$

Whereas;

X_1 = gender of consumer (male, female)
X_2 = Marital Status of consumer (married, unmarried)
X_3 = Age of selected consumers (years)
X_4 = Education of consumers (years)
X_5 = Income of consumer (Rs. /month)
X_6 = Profession (formal, other)
X_7 = Awareness Source dried mangoes (mass media, other)
X_8 = Brand Preference dried mangoes (yes, no)
$X_{9=}$ Consume dried fruits (yes, no)

Based on our given function, we employed a binomial logit model to estimate the coefficients of the variables.

To explore the consumers' willingness to pay for dried mangoes, we employed the Tobit regression model. A dependent variable with a significant number of zero values of WTP necessitates using a censored regression model because the traditional Ordinary Least Square (OLS) technique results in biased and inconsistent parameter estimates. Since removing the zeros causes bias, there is no guarantee that the predicted value of the error term will always be zero. Greene (2008) described the Tobit model as:

$$MWTP^*i = B' Xi + \varepsilon_i \quad (7)$$

$$MWTPi = \begin{cases} MWTP * i \; if \; MWTP * i > 0 \\ 0 \; if \; MWTP * i \leq 0 \end{cases} \quad (8)$$

Where MWTPi is the maximum willingness to pay (WTP) that a consumer will pay for dried mangoes, and MWTP*i is the unobserved WTP for such products; β and α in equation 9 are vectors with undetermined coefficients that need to be estimated; Consumer maximum WTP is thought to be influenced by a vector of independent variables called Xi; The error term, denoted by the letter ε_i is assumed to have a normal distribution with a mean of zero and a constant variance.

$$MWTP^* = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \alpha_1Z_1 + \alpha_2Z_2 + \alpha_3Z_3 + \alpha_4Z_4 + \alpha_5Z_5 + \alpha_6Z_6 + \alpha_7Z_7 + \alpha_8Z_8 + \varepsilon_i \quad (9)$$

Whereas,

X_1 = gender of consumer (male, female)
X_2 = Marital Status of consumer (married, unmarried)
X_3 = Age of selected consumers (years)
X_4 = Education of consumers (years)
X_5 = Income of consumer (Rs. /month)
X_6 = Profession (formal, other)
X_7 = Awareness Source dried mangoes (mass media, other)
X_8 = Awareness Source dried mangoes (mass media, other)
X_9 = Brand Preference dried mangoes (yes, no)
X_{10} = Consume dried fruits (yes, no)
X_{11} = demand dried Mangoes in the city (yes, no)
Z_1 = To observe the effect of the promotion factor, Likert scale was employed
Z_2 = To observe the effect of packaging, Likert scale was employed
Z_3 = To observe the effect of a healthy snack, Likert scale was employed
Z_4 = To observe the effect of offseason consumption, Likert scale was employed
Z_5 = To observe the effect of price decrease, Likert scale was employed
Z_6 = To observe the effect of taste, Likert scale was employed
Z_7 = To observe the effect of nutrients, Likert scale was employed
Z_8 = To observe the effect of demand after the survey, Likert scale was employed

Customers in the research area observed that the maximum WTP for dried mangoes was used as the empirical measure for the dependent variable in equation (9).

RESULTS AND DISCUSSION

The results in Table 1 show the descriptive statistics of the variables. It shows that 50 percent of the respondents were male, and 50 percent were female. In comparison, the average age of the respondents was 29 years. Moreover, 38 percent of the respondents were married. Likewise, 46 percent of the respondents were aware of the dried mangoes. Similarly, the average willingness to pay for dried mangoes was Rs 373/125 grams. This outcome follows previous research by Otieno and Nyikal (2017), which found that Kenyan consumers wanted to avoid additions like artificial colour, flavours, or additives in their fruit juices. They would pay up to 200 % more for artisanal juices free of artificial ingredients. Similar findings were found by (Mujuka et al., 2021), who found that consumers in Nairobi are willing to pay an average premium of about 29 % for dried mangoes that are naturally preserved, and (Romano et al., 2016) also concluded in their study that consumers were willing to pay an additional 2.04 units in Brazilian currency. Khan et al. (2018) investigated the consumers' willingness to pay for pesticide-free fruit (PFF) in Pakistan and found that 93.5% of respondents were willing to pay more for PFF.

Table 2 describes the estimate of the logit model to explore the factors affecting the awareness status of dried mangoes among the respondents. It shows that gender, age, education, income, sources of information, and brand preferences are statistically significant factors that describe the awareness level of respondents about dried mangoes.

The estimates of the Tobit regression are reported in Table 3. It shows that gender, age, marital status, education, profession, income levels, awareness sources, health concerns, and taste are important explanatory variables to describe the willingness to pay of the respondents.

Table 1. Data description of independent variables.

Variables	Scale	Mean	S. D	Min.	Max.
Gender	(Male, female)	0.50	0.501	0	1
Age	(years)	29	8.300	17	60
Marital status	(Married, unmarried)	0.38	0.487	0	1
Education	(years)	15.50	3.300	8	22
Income	(Rs. /month)	0.52	0.651	0	2
Profession	(Formal, other)	1.20	0.881	0	3
Price WTP dried mangoes	Rs. / 125 grams	373	45	200	450
Awareness dried mangoes	(Yes, no)	0.46	0.500	0	1
Awareness source dried mangoes	(Mass media, other)	1.56	0.717	0	2
Brand preference for dried mangoes	(Yes, no)	0.35	0.478	0	1
Consumed dried fruit	(Yes, no)	0.73	0.443	0	1

Source: Author's calculations.

Table 2. Statistical results summary logit model.

Awareness dried mangoes	Odds Ratio	Coef.	Std. Err.	Z	P>z
Gender					
Male	2.502*	0.917	1.329	1.73	0.084
Age	0.898**	-0.107	0.047	-2.05	0.040
Marital status					
Unmarried	0.629	-0.463	0.465	-0.63	0.531
Education	0.804*	-0.218	0.090	-1.94	0.053
Profession					
Job	1.531	0.426	0.963	0.68	0.499
Student	.406	-0.900	0.381	-0.96	0.337
Housewife	3.93	1.369	4.292	1.25	0.210
Income					
40,000-80,000	4.627**	1.532	2.958	2.40	0.017
Above 80,000	6.138*	1.814	6.589	1.69	0.091
Awareness source dried mangoes					
Store promotion	3.38	1.218	3.340	1.23	0.218
Mass media	.067***	-2.71	0.052	-3.46	0.001
Brand preference for dried mangoes					
Yes	7.548***	2.021	4.440	3.44	0.001
Consumed dried fruits					
Yes	0.323**	-1.131	0.183	-1.99	0.046
Constant	.00246 ***	-10.611	.0000766	-3.42	0.001
Number of observations	300	LR chi^2 (18)	280.681		
Pseudo R^2	0.684	Prob > chi^2	0.0000		

Note: Statistical significance levels: ***1%; **5%; *10%; Source: Author's calculation.

Table 3. Statistical results summary Tobit model.

Price WTP dried mangoes	Coef.	St.Err.	t-value	p-value
Gender				
Male	5.843*	3.31	1.77	0.079
Age	0.533**	.261	2.04	0.042
Marital status				
Unmarried	11.832***	4.538	2.61	0.010
Education	1.239*	.642	1.93	0.055
Profession				
Job	5.414	3.825	1.42	0.158
Student	9.743*	5.722	1.70	0.090
Housewife	15.09**	6.607	2.28	0.023
Income:				
40,000-80,000	6.851*	3.776	1.81	0.071
Above 80,000	8.401*	6.230	1.35	0.078
Awareness of dried mangoes				
Yes	32.125***	4.548	7.06	0.000
Awareness source dried mangoes				
Store Promotion	1.816	5.047	0.36	0.719
Mass Media	11.763**	4.791	2.46	0.015
Brand preference for dried mangoes				
Yes	16.555***	4.35	3.81	0.000
Promotion effect of dried mangoes	2.731**	1.348	2.03	0.044
Packaging effect dried mangoes	2.718*	1.423	1.91	0.057
Dried mangoes are a healthy snack	2.648*	1.469	1.80	0.073
Consumption of dried mangoes offseason	1.268	1.492	0.85	0.396
Buy dried mangoes taste	2.673*	1.413	1.89	0.060
Buy dried mangoes nutrients	0.711	1.46	0.49	0.627
Constant	252.004***	14.765	17.07	0.000
Number of observations 300	LR chi^2(22)		232.68	
Pseudo R^2 0.096	Prob > chi^2		0.0000	

Note: Statistical significance levels: ***1%; **5%; *10%; Source: Author's calculation.

Factors Affecting Consumers' Awareness of Dried Mangoes

In this study, we found that sociodemographic factors and sources of information are crucial factors in defining the respondent's awareness status of dried mangoes in the study area (Table 2). This study found that dried mangoes are a relatively new product in the Pakistani market, and 46% of the respondents know about dried. The same is the case with other developing countries, where the consumption of processed fruits is low due to the unavailability of fruit processing technologies. These findings are consistent with Mujuka et al. (2021) that in Nairobi, 16% of the consumers are aware of solar-dried mangoes. Similarly, Owureku-Asare et al. (2017) reported that only 3 % of customers had ever tasted dried tomatoes, and only 9 % were even aware that dried mangoes exist in the market. The study found that the likelihood of awareness increases with age. Sun and Liang (2021) reported that with an increase in age, the consumption of dried fruits increases due to its convenience marketing strategies. Similarly, results show that increased education increases the likelihood of awareness of dried mangoes. Well-educated consumers may have a good understanding of the nutrient levels of dried fruits; thus, with increased education, consumption of dried fruits increases. Moreover, knowledge of the goods could influence customer awareness and views towards products, thus influencing their purchasing decisions (Ali and Rahut 2019). Moreover, an increase in income levels increases the likelihood of awareness of dried mangoes increases. These results align with the findings of Ali and Rahut (2019). Similarly, mass media campaigns also increase the likelihood of awareness of dried mangoes. Such campaigns increase the awareness levels of consumers (Mujuka et al., 2021).

Factors Affecting Consumer WTP for Dried Mangoes

Table 3 shows the factors affecting consumers' willingness to pay for dried mangoes in Pakistan. The results show that males were more likely to pay for dried mangoes than female respondents. The results align with Carlsson et al. (2010), who concluded that men are likelier than women to spend more on organic and fair-trade coffee. Similarly, an increase in age increases the likelihood of willingness to pay for dried mangoes. Middle-aged consumers prefer value-added products due to curiosity and knowledge of health benefits (Sun and Liang, 2021). Mujuka et al. (2021) also concluded that an increase in age increases the likelihood of WTP for dried mangoes in Kenya. Similar findings were reported by Carlsson et al. (2010), Otieno et al. (2015), and Khan et al. (2018). The likelihood of WTP for dried mangoes increases with one unit increase in education. This suggests that educated customers are more aware of naturally dried products and their health benefits. Kayışoğlu and Coşkun (2016) found a substantial correlation between the education level of respondents and their familiarity with food additives. Mujuka et al. (2021) concluded that higher education increases the WTP for naturally preserved dried mangoes. Additionally, Ali and Ali (2020) explored that additional yead of education enhances consumer willingness to spend on health and wellness items. While Khan et al. (2018) concluded that education increases the WTP for pesticide-free fruits in Pakistan.

The estimate of income has a statistically significant and positive effect on the WTP of dried mangoes. This finding is aligned with the results of Cinar (2018), who reported that income positively affects WTP for dried bananas, kiwi, and pineapple in Turkey. Romano et al. (2016) reported that consumers with higher incomes demonstrated a higher WTP for pomegranate juice in Brazil. Furthermore, Ullah et al. (2021) also found that higher-income families are more capable and willing to purchase pesticide-free products than lower-income households in Pakistan. Similar findings were made by Khan et al. (2018) that higher-income households have more WTP for pesticide-free fruits. Ali and Ali (2020) also concluded that income positively correlates with the WTP for buying healthy food products.

The study shows that mass media access significantly increases the likelihood of consumers' WTP for dried mangoes. According to (Lou et al., 2019) this outcome is not unexpected given how actively the media has promoted value addition and drawn attention to the substances with health implications. Ali and Rahut (2019) concluded that access to information increases the WTP of consumers. Consumers purchasing from big retail stores were more willing to pay for dried mangoes. This suggests that the growing consumer interest in the value enhancement of fruits and vegetables by retail outlets has a favourable effect. This result is supported by the conclusions made by Ali and Ali (2020), who discovered that those who value shopping experiences spend more money on nutritious food. Furthermore, the findings of Sun and Liang (2021) show that, in the first place, availability has a significant impact on the consumption of dried fruits.

Packaging is another important factor significantly enhancing the respondents' WTP for dried mangoes. (Yao et al., 2020) stated that packaging, storage, and time significantly affect the physiochemical properties of dried mango slices. Thus, proper packing and labelling of products help consumers learn about the contents and processing process of the products. Grant et al. (2021) found that consumers were willing to pay a premium for the clean label and use of advanced food technologies and techniques.

The estimate of product promotion significantly raises the WTP for dried mangoes in the study area. This finding is aligned with the Chege et al. (2019) results, which said that offering nutritional information to customers could increase demand for nutrient-dense foods through appropriate labelling, marketing, and market segmentation. Sun and Liang (2021) concluded that it was necessary to develop more efficient consumer education programs or materials like food labels to promote consumer knowledge of the functional qualities of dried fruits.

The study finds that for consumers who consider dried mangoes a healthy snack, their WTP was significantly higher. Cagalj et al. (2016) concluded that health-conscious consumers are willing to pay a premium of 42% more for organic apples than those who are not health-conscious. Wang et al. (2017) stated that health consciousness significantly impacts the willingness to consume products. Similar results were reported by Khan et al. (2018) and Ali and Ali (2020). Ullah et al. (2021) found that people who are health conscious offered higher premiums than those who were not.

CONCLUSIONS

Consumers' awareness of dried mangoes is 46 %, which is relatively low. Various factors, including gender, age, education, income, and access to information, influence consumers' awareness of dried fruits. Thus, developing effective promotional and consumer awareness programs and materials requires understanding these factors. Hence, media campaigns to influence educated and wealthy consumers can be helpful in expanding the markets of dried mangoes in the country. Consumers' willingness to pay for dried mangoes is influenced by gender, age, education, marital status, profession, income, access to information, and consumers' preferences for health, taste, and packaging. Therefore, producers and marketers must develop effective positioning, pricing, and promotional strategies based on these factors to target and capture the growing markets for dried fruits. The packaging of dried mangoes must be attractive and adequately labelled to provide details of nutritional value, manufacturing, expiration date, and ISO

mark. Moreover, companies must improve and build a robust supply chain to ensure the availability of dried mangoes.

The main limitation of this study is that it is restricted to metropolitan areas of Punjab. Future research may include the big cities from other provinces to explore the factors and market potential of dried mangoes in Pakistan.

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