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**CONSUMERS' AWARENESS REGARDING THE EFFECT OF
ANTIBIOTIC USED IN ANIMAL FEED ON HUMAN HEALTH**

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ABSTRACT – leave the space before mentioning of the units

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The main aim of the study were to determine the consumers' awareness regarding the effect of antibiotic used in animal feed on human health and to explore relationship between the selected characteristics of the respondent consumers and their awareness. The study was conducted at Mohammad Nagar residential area under Batiaghata upazila of Khulna district and Nirala residential area of Khulna City Corporation, Khulna, Bangladesh following descriptive and diagnostic type of research design. Forty respondents from each of the residential areas were interviewed as the sample of the study and data were collected through personal interview method using an interview schedule by the researcher herself during January–February, 2019. Most (80%) of the respondents were highly aware while only one fifth (20%) of the respondents had medium awareness about the effect of antibiotic used in animal feed on human health. Consumers were highly aware about that resistance is grown in pathogenic organisms causing diseases in human body against antibiotics which are used in patient treatment resulting in treatment failure. But consumers were less aware about allergic reaction and painful rash which are possible with many antibiotics. The mean awareness score of the consumers resided at Nirala was higher than that of Mohammad Nagar residential area but it did not differ significantly. This might be due to proximity of the two residential areas. Among ten selected characteristics of the respondents; education, family education, annual family income, exposure to communication media, nutritional knowledge, animal protein consumption behavior and attitude showed positive significant relationship with their awareness regarding the effect of antibiotic used in animal feed on human health. Consumers in the study area are concerned about the effect of antibiotic used in animal feed on human health.

Key Words: Consumers' awareness, antibiotic, animal feed, human health.

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1. INTRODUCTION

Human health is directly related to the environment and in particular the nature and quality of food. Quality of food from animal products is widely concerning public health agencies around the world since antibiotic and veterinary drugs have played an important role in the field of animal husbandry and agro-industry. At present, the occurrences of residues in increasing form and resistance have become burning issues [1].

Antibiotics and veterinary medicinal products (VMPs) are crucial to meet the challenges of supplying sufficient quantity of food for the vast and fast growing world population as drugs

41 improve the rate of weight gain, improve feed efficiency, prevent and treat diseases in food
42 producing animals [2]. The safe and effective use of antibiotic in animal production has received
43 considerable attention in most of the countries in the world [3]. Human health can either be
44 affected by the residues of drugs in food of animal origin, which may cause direct side effects or
45 indirectly through selection of antibiotic resistance bacteria that may spread to human [4, 5, 6].
46 Resistant microorganism can get access to human, either by direct contact or indirectly through
47 milk, meat, and egg. It is documented that drug resistant bacteria such as Salmonella,
48 Campylobacter and Staphylococcus from food of animal origin were developed by human beings
49 [5, 6].

50 In general, harmful effects of antibiotics and drugs residues on health, which may be mutagenic,
51 carcinogenic, reduction in reproductive performance, drug allergy and acute toxicity or
52 poisoning in human [1, 7, 8]. Drug low-level contamination generally may not generate a
53 violation problem on human health. However, extensive use of drugs may increase the risk of an
54 adverse effect of residues on the consumer including the occurrence of antibiotic resistance. In
55 this study an attempt has been made to find out the effects of antibiotics used in animal feed on
56 human health and how far the consumers are aware of this issue in the selected areas of Khulna
57 district.

58 **The study was conducted to fulfill the following objectives:**

- 59 i. To analyze the selected characteristics of the consumers.
- 60 ii. To determine consumers' awareness regarding the effect of antibiotic used in animal feed
61 on human health.
- 62 iii. To explore relationships between the selected characteristics of the consumers and their
63 extent of awareness regarding the effect of antibiotic used in animal feed on human
64 health.

65 **2. MATERIALS AND METHODS**

66 **2.1 Design and Locale of the Study**

67 The present study was a descriptive and diagnostic type of research. It was designed to study
68 consumers' awareness regarding the effect of antibiotic used in animal feed on human health.
69 The study was based on collection of data by door to door interviewing of the respondents. The
70 study was conducted at Mohammad Nagar residential area under Batiaghata upazila of Khulna
71 district and Nirala residential area of Khulna City Corporation, Khulna, Bangladesh.

72 **2.2 Population and Sampling**

73 All the household heads of Mohammed Nagar and Nirala residential areas of Khulna were
74 considered as the population of the study. Forty family heads from each of the residential areas
75 were interviewed as the sample of the study. Thus the sample size stood 80.

76 **2.3 Data Collection and Processing**

77 The primary data were collected by the researcher herself through face to face interview using
78 interview schedule during January–February, 2019. Reviewing related studies, the researcher
79 considered some of the selected characters of the respondents as independent variables for the
80 study. The characteristics were age, educational qualification, family size, family education,
81 annual income, exposure to communication media, nutritional knowledge, animal protein

82 consumption behavior, training exposure and attitude towards antibiotic used in animal feed.
 83 Consumers' awareness regarding the effect of antibiotic used in animal feed on human health
 84 was considered as dependent variable in this study.

85 All qualitative data were converted into quantitative form by means of applying some
 86 appropriate scoring technique. In several instances, indices and scales were constructed through
 87 the simple accumulation of score assigned to individual or pattern of attributes.
 88

89 **2.3.1 Measurement of Selected Characteristics (Independent Variables)**

90 The measurement of selected characteristics (independent variables) is shown in Table 1.

91 **Table 1. Measurement of selected characteristics (independent variables)**
 92

Selected characteristics (independent variables)	Measuring Unit
Age	Actual year
Educational qualification	Years of schooling
Family size	Number
Family education	Years of schooling
Annual income	'000'BDT
Exposure to communication media	Score
Nutritional knowledge	Score
Animal protein consumption behavior	Score
Training exposure	Score
Attitude	Score (following Likert scale)

93
 94 **2.3.2 Measurement of Consumers' Awareness (Dependent Variable)**
 95 To determine consumers' awareness, five (5) statements related to the effects of antibiotic used
 96 in animal feed on human health were incorporated in the interview schedule. To determine the
 97 awareness score of the respondents a five point rating scale such as strongly agree, agree,
 98 undecided, disagree and strongly disagree were employed against the five (5) statements and a
 99 score of 5, 4, 3, 2 and 1 was employed against the scales respectively. The awareness score of a
 100 respondent could range from 5 to 25, where '5' indicate low awareness and '25' indicate high
 101 awareness. Based on awareness score, the respondents were categorized into three groups as low
 102 awareness (≤ 8), medium awareness (9-16) and high awareness (>16). To compare among
 103 statements, an awareness index (AI) was calculated using following formula:

104 $AI = N_{sag} \times 5 + N_{ag} \times 4 + N_{ud} \times 3 + N_{da} \times 2 + N_{sda} \times 1$

105 Where,

106 AI = Awareness Index

107 N_{sag} = Number of respondents rated the impact as strongly agree

108 N_{ag} = Number of respondents rated the impact as agree

109 N_{ud} = Number of respondents rated the impact as undecided

110 N_{da} = Number of respondents rated the impact as disagree

111 N_{sda} = Number of respondents rated the impact as strongly disagree

112 The awareness index (AI) score could range from 80-400 where 80 indicates low awareness and
 113 400 indicates high awareness on a particular statement regarding the effect of antibiotic used in
 114 animal feed on human health.

115 For better understanding of the relative position of the statement the AI score was converted to
 116 percentage using following formula:

$$117 \quad \% \text{ AI} = \frac{\text{Observed AI Score}}{\text{Highest Possible AI Score}} \times 100$$

120 2.4 Data Analysis

121 Data were compiled, tabulated and analyzed based on the objectives of the study. Different
 122 statistical treatments such as number, mean, standard deviation, range, minimum, maximum,
 123 rank order and percentage were used to describe the variables. To explore relationship between
 124 any two variables, Pearson Product Correlation Coefficient (for interval and ratio type of data)
 125 and in some cases Spearman Rank Correlation Coefficient (for ordinal type of data) were used.
 126 Data analysis was done using the concerned software Statistical Package for Social Science
 127 (SPSS) 20.

128 3. RESULTS AND DISCUSSION -- leave the space before mentioning of the units

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130 3.1 Facts on the Selected Characteristics of the Consumers (Respondents)

131 Data presented in Table 2 indicate that majority (51.3%) of the respondents was young aged and
 132 highest proportion (41.3%) of the respondents had secondary level of education. Highest
 133 proportion (45%) of the respondents' family had secondary level of education followed by
 134 higher secondary (27.5%) and graduate (25%). Majority (70%) of the respondents had small
 135 sized family, belonged to high income group(57.5%), had medium exposure to communication
 136 media(72.5%), had medium nutritional knowledge(61.3%) and consumed high amount of animal
 137 protein(62.5%). Most (90%) of the respondents did not receive any training on human health
 138 especially the effects of antibiotics used in animal feed on human health and had moderately
 139 favorable attitude(80%).

140 **Table 2. Distribution of the respondents according to their selected characteristics (N=80)**

Selected Characteristics	Categories	Score	Respondents (N=80)		Mean	SD	Range	
			Number	Percentage			Min.	Max.
Age (Years)	Young aged	≤ 35	41	51.3	38.08	12.85	16	70
	Middle aged	36-50	24	30				
	Old aged	> 50	15	18.8				
Education (Years of schooling)	Illiterate	0	0	0	12.34	3.61	1	17
	Primary	1-5	3	3.8				
	Secondary	6-10	33	41.3				
	Higher Secondary	11-12	10	12.5				
	Graduate	13-16	18	22.5				
	Post graduate	>16	16	20				

Family size (No. of members)	Small	1-4	56	70	4.2	0.97	2	7
	Medium	5-6	22	27.5				
	Large	≥7	2	2.5				
Family education (Years of schooling)	Illiterate	0	0	0	10.21	2.69	3	15.5
	Primary	1-5	2	2.5				
	Secondary	6-10	36	45				
	Higher secondary	11-12	22	27.5				
	Graduate	13-16	20	25				
	Post graduate	>16						
Annual family income (BDT "000")	Low income	≤200	3	3.8	422.93	185.07	180	960
	Medium income	201-350	31	38.8				
	High income	>350	46	57.5				
Exposure to communication media (score)	No Exposure	0	0	0	14.63	3.94	6	23
	Low exposure	1-9	10	12.5				
	Medium exposure	10-18	58	72.5				
	High exposure	>18	12	15				
Nutritional knowledge (score)	No knowledge	0	0	0	8.84	3.05	2.5	16
	Poor knowledge	Up to 6	20	25				
	Medium knowledge	7-12	49	61.3				
	High knowledge	13-18	11	13.8				
Animal protein consumption behavior (score)	Low consumption	1-5	2	2.5	10.61	2.07	4	14
	Medium consumption	6-10	28	35				
	High consumption	>10	50	62.5				
Training exposure	Yes		8	10				
	No		72	90				
Attitude (score)	Less favorable	≤ 10	1	1.3	17.7	3.31	10	28
	Moderately favorable	11-20	64	80				
	High favorable	21-30	15	18.8				

141

142 **Table 3. Rank order of sources of animal protein based on animal protein consumption**
 143 **index**

Source of animal protein	APCI		Rank order
	Score	Percentage	
Egg	204	85%	2 nd
Milk	195	81.25%	3 rd
Chicken	210	87.5%	1 st
Beef	143	59.58%	4 th
Mutton	96	40%	5 th

144 **APCI= Animal protein consumption index

145 Among the sources of animal protein chicken ranked 1st (APCI= 210, percentage= 87.5%)
 146 compared to other sources of animal protein and mutton ranked last (APCI=96,

147 percentage=40%). This might be due to the low and high market price of chicken and mutton
 148 respectively.

149 **3.2 Consumers' Awareness regarding the Effect of Antibiotic Used in Animal Feed on**
 150 **Human Health**

151 The computed scores of awareness of the respondents ranged from 14 to 24 with mean and
 152 standard deviation of 18.93 and 2.63 respectively. According to the scores on awareness, the
 153 respondents were distributed into three groups as shown in Table 4.

154

155

156 **Table 4. Distribution of the respondents according to their awareness**

Categories	Score	Respondents (N=80)		Mean	Standard Deviation	Range	
		Number	Percentage			Min.	Max.
Low awareness	≤ 8	0	0	18.93	2.63	14	24
Medium awareness	9-16	16	20.0				
High awareness	> 16	64	80.0				

157 Most (80%) of the respondents were highly aware about the effect of antibiotic used in animal
 158 feed on human health. Only one fifth (20%) of the respondents had medium awareness about the
 159 effect of antibiotic used in animal feed on human health (Table 4). Therefore, it is clear that, all
 160 the respondents were more or less aware about the effect of antibiotic used in animal feed on
 161 human health. The findings of the present study have harmony with the findings of Mallick and
 162 Mondol [9]. They conducted a study on farmers' awareness regarding deforestation at Jalma
 163 union of Batiaghata upazila under Khulna district of Bangladesh.

164 **Table 5. Rank order of the statements related to antibiotics used in animal feed and their**
 165 **effect on human health based on Awareness Index (AI)**

166

Sl. No.	Statements	AI*		Rank Order
		Score	Percentage	
1.	Resistance grow against the antibiotics which are used in patient treatment	327	81.75%	1 st
2.	Some antibiotics can cause stomach upset and other gastrointestinal side effect	286	71.5%	4 th
3.	Allergic reaction and painful rash are possible with many antibiotics	271	67.75%	5 th
4.	Some antibiotics may cause cancer.	320	80.00%	2 nd
5.	Many antibiotics may adversely affect human fertility	307	76.75%	3 rd

167 ** AI= Awareness Index

168 Data presented in Table 5 indicate that consumers were highly aware about that the resistance is
 169 grown against antibiotics which are used in patient treatment (AI=327, rank= 1st). But consumers

170 were less aware about allergic reaction and painful rash are possible with many antibiotics
 171 (AI=271, rank= 5th).

172 The mean awareness score of the consumers resided at Nirala residential area (x=19.65) was
 173 higher than that of the Mohammad Nagar residential area (x=18.2). But it did not differ
 174 significantly (t=1.99). This might be due to proximity of the two residential areas.

175 **3.3 Relationship between the Selected Characteristics of the Respondents and Their**
 176 **Awareness Regarding the Effect of Antibiotic Used in Animal Feed on Human Health**

177 The purpose of this section is to determine the relationships of the selected characteristics of the
 178 respondents with their awareness regarding the effect of antibiotic used in animal feed on human
 179 health. The selected characteristics of the farmers included: age, educational qualification, family
 180 size, family education, exposure to communication media, nutritional knowledge, animal protein
 181 consumption behavior and attitude towards antibiotic used in animal feed. Each of the above
 182 characteristics constituted an independent variable while consumers' awareness regarding the
 183 effect of antibiotic used in animal feed on human health was the only dependent variable in this
 184 study. Relationships of the nine selected characteristics of the respondents with their awareness
 185 have been presented in the Table 6.

186 **Table 6. Correlation between the selected characteristics of the respondents and their**
 187 **awareness regarding the effect of antibiotic used in animal feed on human health**

Independent variable (selected characteristics)	Dependent variable (focus variable)	Correlation coefficient	Remark
Age		0.055 NS	PPCC
Education		0.520**	PPCC
Family size	Consumers' awareness regarding the effect of antibiotic used in animal feed on human health	-0.147 NS	PPCC
Family education		0.419**	PPCC
Annual family income		0.426**	PPCC
Communication media exposure		0.619**	SRCC
Nutritional knowledge		0.725**	PPCC
Animal protein consumption behavior		0.310**	SRCC
Attitude		0.663**	SRCC

188 NS= Non-significant, **Correlation highly significant at 1% level of probability and *Correlation highly significant
 189 at 5% level of probability, PPCC = Pearson's Product Moment co-efficient of correlation, SRCC = Spearman Rank
 190 Correlation Coefficient.

191
 192 Among the selected characteristics of the respondents; education, family education, annual
 193 family income, exposure to communication media, nutritional knowledge, animal protein
 194 consumption behavior and attitude showed positive significant relationship with their awareness
 195 regarding the effect of antibiotic used in animal feed on human health. It means that education,

196 family education, annual family income, exposure to communication media, nutritional
197 knowledge, animal protein consumption behavior and attitude increase awareness of consumers
198 also increases. Similar results were also found by Sultana *et al.* [10] regarding age. The findings
199 of the studies conducted by Hasan [11], Shanto [12] and Khatun [13] have harmony with the
200 present study regarding educational qualification. Similar result was described by Hasan [11],
201 Hoque [14] and Mallick and Mondol [9] regarding family size. The findings of the studies
202 conducted by Hasan [11] Shanto [12] and Khatun [13] have similarity with the present study
203 regarding annual family income. Hasan [11] and Shanto [12] observed similar result regarding
204 exposure to communication media. The findings of the studies conducted by Hoque [14], Hasan
205 [11] and Jalal [15] have harmony with the present study regarding knowledge.

206

207 4. CONCLUSION

208 Based on the finding of the study and its' logical interpretation it can be concluded that most of
209 the respondents were highly aware about the effect of antibiotic used in animal feed on human
210 health. Only one fifth of the respondents had medium awareness about the effect of antibiotic
211 used in animal feed on human health. Consumers were highly aware about that resistance is
212 grown in pathogenic organisms causing diseases in human body against antibiotics which are
213 used in patient treatment resulting in treatment failure. But consumers were less aware about
214 allergic reaction and painful rash which are possible with many antibiotics. The mean awareness
215 score of the consumers resided at Nirala residential area was higher than that of the Mohammad
216 Nagar residential area but it did not differ significantly. This might be due to proximity of the
217 two residential areas. Among the selected characteristics of the respondents; education, family
218 education, annual family income, exposure to communication media, nutritional knowledge,
219 animal protein consumption behavior and attitude showed positive significant relationship with
220 their awareness regarding the effect of antibiotic used in animal feed on human health. In pursuit
221 of the findings and observations, it is clear that the consumers in the study area are concerned
222 about the effect of antibiotic used in animal feed on human health. Government and the producer
223 should develop new strategies for a prudent use of antibiotic in food producing animal to ensure
224 food safety.

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