Avian Influenza practices among rural community in Egypt

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Abstract: Background: Avian influenza (AI) is currently a threat to global health. Prevention and control largely depend on population awareness and behavior. **Aim of study:** is to assess practices among rural community related to avian influenza. **Material and Methods:** Descriptive design, using an interviewing questionnaire and observational checklist, was conducted in Damanhour, Kafr EL-Dooar and Abo El-Matameer Cities. **Results:** Of the total 210, the entire sample was dealing with poultry; the mean age of the total studied sample was 40 years. The entire sample was females as the common performance of backyard farming in Egypt managed by females, nearly three quarter (74.8%) of the studied houses had birds shed outside the house, half of the studied houses (50.5%) separated the different types of birds, less than half of the studied houses (47.6%) was clean the bird shed and well-ventilated. Nearly all the studied houses (94.3%) had ceiling of shed. Less than three quarter of houses (72.4%) had presence of birds in cages into the shed. The observed practices in this study include monitoring one of the procedures of participant when dealing with poultry; (shed cleaning, dealing with eggs, dealing with dead birds, slaughtering and cooking). The present study shows that more than half of the studied houses had fair score regarding the observed practices. Less than three quarter of the study group (72.9%) heard about avian flu (AF) information from television; few mentioned other sources (e.g., school, doctors, nurses, relatives, neighbors). Regarding total knowledge score, 49.0% of the studied sample had poor scoring. **Conclusions and Recommendations:** The level of community knowledge and practices about AI disease was fair. Therefore, designing and implementing health educational programs about AI to improve the community practices should have the priority to encourage people to take a more active role.
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1. Introduction

Today there is a growing concern on the national and the international levels about the problem of infectious diseases. These diseases remain a leading cause of death and a major health problem worldwide for three main reasons; **one** re-emergence of old infectious diseases, **two** emergence of new infectious diseases, and **three** persistence of intractable infectious diseases. (1)

Some experts amusingly announced that world would soon be able to close the book of infectious diseases once and for all. Of course, that was before the beginning of the AIDS pandemic in 1981, and before the discovery of the hepatitis C virus, as well as many other viruses capable of causing severe disease in humans(2)

Currently, highly pathogenic avian influenza (HPAI) is a threat to global health. Alongside these massive avian outbreaks, the World Health Organization (WHO) in March 2012 reported more than 598 confirmed human cases of avian influenza A (H_5N_1), approximately two thirds of whom have subsequently died. Nearly all of these cases are traceable to exposure to infected poultry or birds, but there has not yet been a mutation allowing the H_5N_1 and H_7N_7 viruses to spread efficiently in human. (3)

New influenza virus pandemics in the 21st century are a certainty, but whether H5N1 will be the next pandemic virus is far from certain. What is already true, however, is that H5N1 viruses are taking a huge toll on the poultry industry in many developing countries, and this directly or indirectly impacts both economic and social well-being. Scientists are concerned about the highly pathogenic H5N1 virus for three reasons: it threatens domestic poultry, especially chickens, throughout the world; also it has passed from poultry to humans and caused serious illness and death. Avian influenza A virus may be transmitted from animals to humans in two main ways: directly from birds or from avian virus-contaminated environments to people, through an intermediate host, such as pig. (4,5)

Avian flu causes high mortality among the poultry population, which is one of the biggest sources of income for poor people living in rural areas. Its outbreak and spread into the continent would therefore imply a serious threat to food security and the livelihoods of the rural communities in the continent. (6) So, appropriate messages should be developed to inform the rural population about the need to restrain or stop the movement of animals, as well as the measures to be taken if a family identifies

a sick or dead bird within its small flock. The importance of hygiene in reducing the mechanical spread of the disease on vehicles, equipment, footwear and clothing should be re-emphasized. [7]

The key to address the threat of avian flu in all populations is prevention of the disease and containment of its spread. So, nurse should take the leading role in taking preventive measures for this unfortunate disaster, if it occurs. Therefore not surprising that community health nurse now plays an essential role within the framework of the preparedness plan for an influenza pandemic. During normal times, they are involved in capacity building activities, giving presentations to health professionals and the public on good hygienic practices, communicable disease prevention and infection control measures. Furthermore, they will be actively involved in related public health education activities and hotline services to support disease surveillance and special operations. In addition to that, they play a crucial intermediary role between the public and the public health system in developing, fostering and maintaining this inter-relationship. [8]

Although vaccination in many countries has been implemented in poultry and humans, numerous outbreaks are still being reported, indicating that vaccination alone is not an effective control method for prevention of avian flu. High-risk groups are persons who have contact with poultry, such as those who slaughter, farm, raise, transport, sell and children playing with poultry. To control AI, it is necessary to create a communication plan to keep families adequately informed on how to avoid or reduce exposure.

The effective design and delivery of AI prevention and containment messages depend on the acquisition of knowledge on the overall human/avian interaction especially in rural communities. In Egypt, in the past years only some studies have been published investigating knowledge, attitude and preventive practice about avian flu among target groups and general population. This area of investigation seems to be an important one because members of the public often misunderstand their risk of health problem. [9] Therefore; the intent of the present study is to assess the preventive practices among rural poultry breeders in El- Beheira Governorate.

The research question of this descriptive, correlational study was:

1. What are the avian influenza preventive practices among home poultry breeders in El-Beheira Governorate?

2. Material and Methods

Research design:

The descriptive study design was adopted to carry out this study.

Study setting:

El- Beheira Governorate was selected because it is one of the most common Egyptian governorates in the production of chicken, eggs and because of reported high transmission of H5N1 viruses among poultry. Also, most of its population is dealing with live or dead poultry in selling, raising, slaughtering, transporting, cleaning, or preparing food. So; it is identified to be at risk of human avian influenza (HAI) infection. By 20% proportional allocation, three administrative cities in El- Beheira Governorate (**Damanhour, Kafr EL-Dooar and Abo El-Matameer Cities** were randomly selected to be the place of study. It is composed of suburban and rural areas. It is characterized by inferior housing, inadequate sanitation, poor domestic and personal hygiene, unemployment and poverty.

Subjects

The subject included all poultry breeders living in the pre-mentioned selected houses.

Sampling technique:

The map of El-Beheira governorate was taken from the Ministry of Health (MOH); it is divided into 15 administrative centers. Three centers were randomly selected. The sample was selected from the homes of poultry breeders using World Health Organization standard cluster sampling technique as it allows representative sample of the target population to be studied while at the same time providing statistically valid data. Thirty clusters were selected, within each cluster, seven houses were selected. Thus the total number of the houses included in the sample reached 210. One person per household (either the head of the household, spouse, or the oldest person), aged more than 15 years and available at the time of interview was asked to participate in the study.

Inclusion criteria

:Houses with poultry breeding were only selected.

Tool for data collection:

One tool was used by the researchers in order to collect the necessary information from poultry breeders at selected homes.

This tool includes:

Part I:

Demographic information such as age, marital status, educational level, employment status, income, family size, crowding index.

Part II:

Observation checklist was developed by the researcher and used to collect data about the house. This part is concerned with general data about the house, water supply, and poultry location. These data

were collected by direct observation of the respondents' house by the research team. Also it includes observation of shed and practices related to poultry breeding.

Observation of practices related to poultry breeding during home visit as:

- Shed Cleanliness
- Proper handling of eggs
- Poultry Slaughtering
- Proper handling of dead birds
- Cooking of poultry

Part III:

Knowledge refers to understanding the concepts of AI related to the following: definition of disease, causative agent, source of agent, modes of transmission among birds and human, symptoms in birds and human, and prevention of transmission.

Methods

1-Selection of clusters

Steps carried out in selecting the thirty clusters using WHO Standard cluster sampling technique. (10)

2-Selection of houses:

Steps carried out in selecting the houses of poultry breeders in each cluster, using WHO procedure. (10)

3- Data collection methodology:

Tool of data collection was designed based on recent relevant literature.

☒ **Pilot study** was carried out in order to ensure the clarity of the tool.

☒ **Test- retest reliability** was conducted on 30 homes of poultry breeders and after 10 days the retest was conducted on the same 30 homes of poultry breeders. Correlation coefficient was: observational practices r = 0.945

4- Data collection: -

Early during the home visits, the first step done before the data collection was establishment of relationship with the person who is responsible of poultry at home. After that, the purpose of the study was explained to the breeders focusing on the confidentiality of the collected data and assuring the ethics in conducting the research. Each interview took approximately from two and half to three hours. The data was collected during the period from (September 2011-February 2012)

Ethical consideration:

Oral consent was obtained from poultry's breeders after explanation of the aim of the study. Privacy was maintained during process of home visit. Confidentiality and anonymity of individual response were guaranteed during the visit.

Statistical analysis:

After data were collected, they were coded and transferred into especially designed formats to be suitable for computer feeding. Following data entry, checking and verifying processes were carried out to avoid any errors during data entry. Frequency analysis, cross tabulation and manual revision were all used to detect any errors.

- Data was analyzed using PC with Statistical Package for Social Sciences (SPSS) version 16.0.
- The level of significance selected for this study was p equal to or less than 0.05.
- The following statistical measures were used:

A- Descriptive statistics:

Count and percentage*:* Used for describing and summarizing quantitative data, Arithmetic means Standard deviation (SD) and range: They were used as measures of central tendency and dispersion respectively to summarize quantitative data.

B-Analytical statistics:

Mann Whitney test and Kruskal Wallis test, Spearman's Rho correlation were used to test correlation, between two quantitative variables not normally distributed or dichotomous qualitative variable.

C- Scoring system

1- Scoring was done regarding observed practices which demonstrated by respondents and observed by the researcher. It includes five procedures: shed cleaning (9 items), dealing with eggs (4 items), dealing with dead birds (8 items), slaughtering (7 items) and cooking (8 items)

The items of previous procedure were scoring as following: A score "0" was given to the incorrect and not performed observed item. A score "1" was given to correct observed item.

Poor practice (less than 50%)
Fair practice (50-<75%)
Good practice (75%-100%)

2- The total knowledge score was obtained for each participant (0 -14). The percent total knowledge score was calculated as follows;

Less than 50% ⟶ Poor level of knowledge < 7 points
50-<75% ⟶ Fair level of knowledge 7-11 points
75%-100% ⟶ Good level of knowledge 11-14 points

3. Results:

The observation of rural environment:

Almost all the respondents had separate bathroom and kitchen; they used electricity as source

of lighting and have a natural source for ventilation. Regarding to their source of water supply, the majority of rural respondents (88.1%) had treated water inside their house. They used drains as methods of sewage treatment and about half of them used rubbish box as method for rubbish disposal. Most of the studied houses (89.5%) had stove in kitchen, 6.7% had brick oven and 3.8% had coal cooking and Wabour Gaz.

Sample characteristics

- The mean age of the total studied sample was 40 years. Their age ranged from 17 to 76 years. The entire sample was females as the common performance of backyard farming in Egypt managed by females.

Almost all females in the studied houses breed mixed type of poultry including turkeys and ducks. Around half of the sample separates each type of birds.

Table (1): Socio-demographic characteristics of poultry's breeders within the family

Characteristics of poultry's breeders	Studied sample (n=210)	
	No.	%
Position of poultry's breeder within the family		
Wife	182	86.7
Grandmother	15	7.1
Offspring	13	6.2
Age of poultry's breeder		
15-	40	19.0
35-	154	73.3
55-	14	6.7
75 or more	2	1.0
Min-max	17-76	
Mean±SD	40.48±10.5	
Marital status	**N = 210**	
Married	174	82.9
Widow	23	10.9
Single	13	6.2
Education		
Uneducated (illiterate)	67	31.9
Reads & writes	19	9.0
Primary education	19	9.0
Preparatory education	16	7.6
Secondary education	71	33.8
Higher education or university	18	8.7
Working condition		
Non –working	165	78.6
Working	45	21.4
Types of work	**N=45**	
• Employee	36	80
• Craftwork	1	2.2
• Non craftwork	1	2.2
• Private work	7	15.6

Socio demographic characteristics

Around one third of the sample (31.9%) was uneducated and more than three quarter of them (78.6%) was unemployed, while less than quarter of them (21.4%) was working. The majority of them (82.9%) were married followed by widow and only low percent (6.2%) were single girls present in the family. Half of the sample (51%) earned 250 L.E to less than 500 L.E per month. As well, about three quarter of them live in a family composed of two to four family members followed by five to eight family members.

Table (2): Social characteristics of poultry's breeders

Social characteristics of poultry's breeders	Studied sample (n=210)	
	No.	%
Monthly income		
More than 1000	2	1.0
500-1000	74	35.2
250-500	107	51.0
Less than 250	27	12.8
Crowding index		
1-	76	36.2
3-	123	58.6
5-	8	3.8
7-8	3	1.4
Min-Max	1-8	
Mean±SD	2.86±0.99	
Family Size		
Small family size (from2-4 individuals)	154	73.3
Large family size (from 5-8 individuals)	56	26.7

Observation of home environment and poultry shed

Table (3) shows observation of home environmental characteristics regarding the studied houses; it demonstrates that, approximately 98.1% of the studied houses had houses made of red bricks. 71.4% of the studied houses the floor are tile. While, 47.1% of the studied houses their sources of ventilation were doors and windows. Nearly all of the studied houses (98.0%) the natural illumination were available.

Regarding water sources and sewerage system, 88.1% of the studied sample had tap water inside their house. Moreover, nearly less than two thirds (61.4%) had public sewage and 4.3% were disposal in canals and drains. While, concerning garbage disposal, 45.7% gathered in covered containers, and 4.8% disposal thrown out on the street.

Most of the studied houses (85.2%) had separate kitchen, 7.7% kitchen was part of living room and 7.1% it part of the bathroom. Kitchen floor was tiles in 69.5%, cement in 13.8%, ceramic in 11.9%, and

sand in 4.8%. Regarding kitchen's ventilation, 63.8% of them had door and window as a source of ventilation. In addition, 66.2% of the houses had natural and artificial light sources and most of the studied houses (89.5%) had stove in their kitchen.

Table (3): Distribution of the studied houses regarding their environmental characteristics

Housing characteristics	Studied houses (n=210)	
	No.	%
Construction material of house: Mud bricks	4	1.9
Red bricks	206	98.1
Floor type: Tile	150	71.4
Concrete	45	21.4
Sand	15	7.2
Source of ventilation		
Door	8	3.9
Window	4	1.9
Door & window	99	47.1
More than one window	99	47.1
Natural illumination		
Available	206	98.0
Not available	4	2.0
Water source		
Tap water	185	88.1
Water pump	5	2.4
Zeer	2	1.0
Canal	1	0.5
Public source of water	17	8.0
Type of sewerage system		
Public sewage	129	61.4
Plantation	72	34.3
Canals & drains	9	4.3
Garbage disposal		
Gathered in covered containers	96	45.7
Gathered in non-covered containers	82	39.0
No containers	22	10.5
Thrown out on the street	10	4.8
Kitchen place		
Separate room	179	85.2
Part of the bathroom	15	7.1
Part of living room	16	7.7
Kitchen floor		
Tiles	146	69.5
Cement	29	13.8
Sand	10	4.8
Ceramic	25	11.9
Kitchen's ventilation: Door	21	10.0
Window	55	26.2
Door & window	134	63.8
Kitchen's lighting		
Natural illumination	43	20.5
Artificial light sources	28	13.3
Both	139	66.2
Kitchen appliance: Brick Oven	14	6.7
Stove	188	89.5
Others (Coal cooking and Wabour gaz)	8	3.8

Observation of poultry shed

Observation of birds shed in the studied houses demonstrates that, nearly three quarter of the studied houses (74.8%) had birds shed outside the house compared to quarter (25.2%) had birds shed inside the house. Regarding material of birds shed inside the house, 73.6% of them had bricks birds shed inside the house and more than half (58.4%) of them put the birds shed in the backyard inside the house.

Regarding material of birds shed outside the house, vast majority (82.2%) of them had bricks birds shed, 11.5% had wood, and 47.1% of them put the birds shed on the roof, one quarter (25.5%) of them put it side by side to the house and 16.6% within a meter or two meters from the house. Nearly all the studied houses (94.3%) had ceiling, 64.6% had ceiling made of wood, and less than one quarter (21.7%) made of bricks.

Table (4): Observation of birds shed in the studied houses

Characteristics of birds shed	Studied houses (n=210)	
	No.	%
Presence of the birds shed:	53	25.2
Inside the house		
Outside the house	157	74.8
Material of birds shed inside the house	N=53	
Wood	14	26.4
Bricks	39	73.6
Place of birds shed inside the house	N=53	
Near bedrooms	2	3.8
In the entrance	18	34.0
In the backyard	31	58.4
The room above the bathroom	2	3.8
Material of birds shed outside the house	N=157	
Bricks	129	82.2
Wood	18	11.5
Plastic	2	1.3
Bamboo	8	5.0
Place of birds shed outside the house	N=157	
Side by side to the house	40	25.5
Within a meters from the house	26	16.6
On the roof	74	47.1
Uninhabited apartment	10	6.4
In the garden	4	2.5
The basement	3	1.9
Presence of ceiling: Yes	198	94.3
No	12	5.7
Type of ceiling	N=198	
Bricks	43	21.7
Wood	128	64.6
Plastic	27	13.7

Observation of shed's characteristics of the studied houses, reveals that, less than three quarter of houses (72.4%) had presence of birds in cages into the shed, majority (77%) of them had wood cages

and more than one tenth (16.4%) kept birds in plastic cages. In addition, more than three quarter of birds in the shed (77.0%) had a combination between all types, while less than one fifth of birds in the shed were chicken only.

Only half of the studied houses (50.5%) separated the different types of birds, 37.6% of the studied houses was separated each type of birds in a separate cage. While the rest of them either separated with rods inside the cage (2.4%), put blocks of wood inside the shed (6.2%) and separated with bricks in (4.3%) of them. Nearly half of the studied houses (47.6%) the bird shed was clean and well-ventilated, while 8.1% not clean nor well ventilated. Regarding the illumination inside the poultry shed, 51.0% of the studied sample was insufficient.

Table (5): Observation of shed's characteristics of the studied houses

Characteristics of birds shed	Studied houses (n=210)	
	No.	%
Presence of birds cages in the shed: Yes	152	72.4
No	58	27.6
Type of cage	n=152	
Iron	10	6.6
Wood	117	77.0
Plastic	25	16.4
Types of birds in the shed (n=210)		
Chicken	42	20.0
Ducks	2	1.0
Geese	0	0.0
Combination between all types	166	79.0
Separation of different types of birds: Yes	106	50.5
No	104	49.5
Type of separation (n=106)		
Each type is in a separate cage	79	37.6
Separated with rods inside the cage	5	2.4
Blocks of wood inside the shed	13	6.2
Separated with bricks	9	4.3
Bird shed cleanliness: Clean and well-ventilated	100	47.6
Moderate cleaning	93	44.3
Not clean nor well ventilated	17	8.1
Illumination inside the poultry's shed: Sufficient	103	49.0
Insufficient	107	51.0

The main source of information about avian flu:

Most of studied group (72.9%) heard information about avian flu (AF) from mass media including television. While, the rest of them mentioned other sources (e.g., school, doctors, nurses, relatives, neighbors). Regarding their knowledge about the symptoms of bird flu on humans, 14.8% of the studied sample reported correct and complete answer and 56.2% of them reported incomplete answer. While, nearly less than three quarter (71.4%) of the studied sample reported incomplete answer and 1.9% only of them reported the correct and complete answer about modes of transmission of bird flu to human. Moreover, less than half of the studied sample (40%) had incomplete knowledge regarding preventive measures of avian flu, while, 19.5% of them know the correct and complete answer.

Concerning the total knowledge scores of the studied group, 49.0% of them had poor scoring (less than 50%), 42.9% had fair score (50 – to less than 75%), and 8.1% only had good score (75 -100%).

Table (6) Distribution of studied sample regarding their knowledge about avian flu

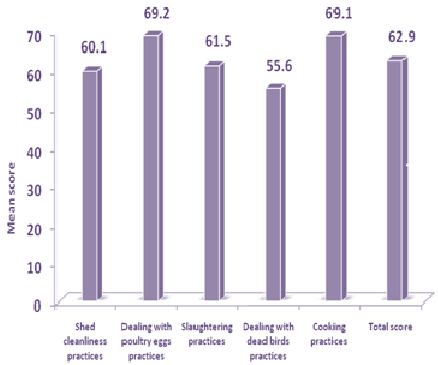
Knowledge about avian flu	Studied sample (n=210)	
	No	%
Symptoms of bird flu on humans: Incorrect answer or didn't know	61	29.0
Incomplete answer	118	56.2
Correct and complete answer	31	14.8
Mode of transmission to human: Incorrect answer or didn't know	56	26.7
Incomplete answer	150	71.4
Correct and complete answer	4	1.9
preventive measures of avian flu: Incorrect answer or didn't know	85	40.5
Incomplete answer	84	40.0
Correct and complete answer	41	19.5
Total knowledge score (%): Poor (Less than 50)	103	49.0
Fair (50 - <75)	90	42.9
Good (75 - 100)	17	8.1
Min-Max	0-92.3	
Mean ± SD	46.6±21.8	
Source of knowledge about avian flu: Mass media	153	72.9
Others (family, relatives, neighbors, and school)	41	29.5
Rural health units (doctors, and nurses)	8	3.8
No information	8	3.8

Observed preventive practices

Observed practices include monitoring one of the procedure of participant when dealing with poultry; (shed cleaning, dealing with eggs, dealing with dead birds, slaughtering and cooking). The present study shows that more than half of the studied houses had fair practices' score, followed by good with mean 62.9± 16.8. Figure 1 portrays the mean scores of different observed practices. It was observed that high mean percent score was in dealing with poultry's eggs with mean 69.2. However, low mean percent score was in dealing with dead bird with mean 55.6.

Table (7): Total observed practices scores of the poultry's breeders

Observed practices	Studied sample	
	No.	%
Total observed houses: Accepting observation	195	92.9
Refusing observation	15	7.1
Total score: (n=195)		
Poor (less than 50%)	30	15.4
Fair (50-<75%)	104	53.3
Good (75% -)	61	31.3
Mean ± SD	***62.9±16.8***	



Figures (1) Mean observed practices scores of poultry breeders

Table (8) shows correlation between environmental characteristic of the studied houses, knowledge and observed practice scores, it demonstrates that, there were significant correlation between knowledge score and kitchen floor in which ***X^2=10.98 and p=0.012***. Also, there were significant correlation between knowledge score and presence of insects inside home in which ***X^2=6.3 and p= 0.043***.

Regarding observed practices, There were significant relation between observed practice score and kitchen place in which ***Z=2.1 and p=0.036***, and kitchen's ventilation in which X^2***=9.11 and p= 0.01*** and also kitchen appliance in which ***Z=2.57 and p= 0.01***.

Table (9) reveals that, regarding knowledge score, positive significant correlations was observed between level of knowledge and observed practice score p= 0.004. Moreover there was positive significant correlation between level of knowledge and education level in which p=0.0001. In addition to that, there was negative significant correlation between knowledge score and both employment status and crowding index in which p= 0.0001 and 0.04 respectively. Regarding observed practice score, there were positive significant correlation between it and knowledge score p = 0.004. Figure (2) scatter curve reveals strong positive correlation between knowledge score and observed practice score among poultry's breeders.

Table (8): Correlation# between environmental characteristics of the studied houses, knowledge and observed practice scores of the persons.

Housing characteristics	Studied houses (n=210)		
	Knowledge Score	Observed Practice Score	
Kitchen place:			
Separate room	47.6±21.4	64.3±15.7	
Not a separate room	40.4±23.5	57.6±16.6	
Mann Whitney test (p)	Z=1.62 (0.105)	***Z=2.1 (0.036)****	
Kitchen floor: Tiles	47.1±22.4	63.1±14.8	
Cement	37.1±15.8	63.9±19.2	
Sand	50.0±15.1	47.5±16.3	
Ceramic	52.9±24.3	66.7±17.4	
Kruskal Wallis test (p)		***X^2=10.98 (0.012)****	X^2=5.3 (0.151)
Kitchen's ventilation:	43.2±19.1	58.2±9.6	
External door			
Window	47.3±21.3	59.1±17.0	
Door & window	46.6±22.5	65.8±15.8	
Kruskal Wallis test (p)	**X^2=0.919 (0.63)**	***X^2=9.11 (0.01)****	
Kitchen appliance:			
Brick oven/coal/wabour gaz	44.4±25.2	53.1±14.1	
Stove	46.8±21.5	64.2±15.9	
Mann Whitney test (p)	**Z=0.467 (0.641)**	***Z=2.57 (0.01)****	
Presence of insects inside home			
Flying insects	48.4±21.5	64.8±15.2	
Crawling insects	50.5±28.4	60.2±14.4	
Both	39.8±21.0	58.8±17.9	
Kruskal Wallis test (p)	***X^2=6.3 (0.043)****	**X^2=5.82 (0.054)**	

Table (9): Correlation# between knowledge score, practice score and characteristics of poultry's breeders about avian flu

Variables	Knowledge Score		Observed Practice score	
	R	*P*	R	*P*
Knowledge score	---		***0.212***	***0.004****
Observed Practice score	***0.212***	***0.004****	----	
Age of the person	-0.09	0.17	-0.04	0.59
Education (Not educated/Educated)	***0.39***	***0.0001****	0.05	0.53
Employment (Employed/Not employed)	***-0.29***	***0.0001****	-0.001	0.99
Monthly income	0.01	0.85	0.01	0.85
Crowding index	***-0.14***	***0.04****	-0.06	0.45
Family size	-0.10	0.14	0.06	0.42

#Spearman's Rho Correlation R Correlation coefficient =0-1 *P*
Significant correlation < 0.05

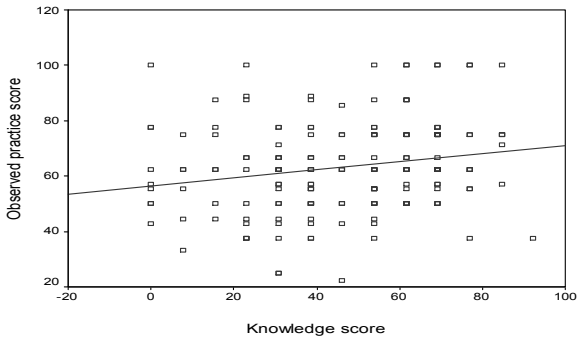


Figure (2): Correlation between knowledge score and observed practice score among studied persons responsible for birds

Correlation between knowledge score and observed practice score and characteristics of the poultry shed were presented in **table (10),** it shows that, there were positive significant correlation between knowledge score and separation of different types of birds in which r= 0.18, *p*= 0.009. No significant correlation observed between knowledge score and location of the birds' shed in relation to house (inside /outside), presence of ceiling, and presence of bird' cages in the shed and finally cleaning of the shed. Regarding observed practices, there was positive significant correlation between observed practice score and presence of birds cages in the shed as r =0.18 *p*= 0.01and with cleaning of the shed when r=0.29 *p*= 0.0001.

Table (10): Correlation[#] between knowledge score, observed practice score and characteristics of the poultry's shed

Variables	Knowledge Score		Observed Practice score	
	R	*P*	R	*P*
Location of the birds shed in relation to house (inside/outside)	-0.023	0.74	-0.021	0.78
Presence of ceiling (no/yes)	0.056	0.416	0.08	0.26
Presence of birds cages in the shed (no/yes)	-0.023	0.742	***0.18***	***0.01****
Separation of different types of birds (no/yes)	***0.18***	***0.009****	0.12	0.104
Cleaning of the shed (not clean/ clean)	0.016	0.82	***0.29***	***0.0001****

[#]**Spearman's Rho Correlation**

4. Discussion

Highly pathogenic avian influenza (HPAI) caused by avian influenza virus sub-type H5N1 is a serious infectious disease in poultry, resulting in severe mortality in domestic birds and major disruption to production and trade. Outbreaks were not generally recognized in village poultry. However, the situation has changed in the last decade with the emergence of a new relationship between domestic poultry and wild birds in Asia. Unexpectedly, in early 2006, the disease spread quickly to 32 countries in less than four months. [(11)]

On 17 February 2006, highly pathogenic avian influenza A (H5N1) was first reported in the poultry population in Egypt. Since that time, the infection had affected at least 21 governorates forcing over 1.5 million individuals to lose their source of livelihood. [(12)] In March 2012, the statistics of human infection and fatalities continue to rise. Specifically, 164 human cases, including 58 fatalities have been recorded in Egypt. These numbers rank Egypt the third in the list of recorded human cases and fatalities in the world after Indonesia and Vietnam, and remain by far the highest in Africa. [(13)]

Preventing the spread of the disease to human should be the focus of the prevention strategy. So, early identification of preventive practices performing by population is extremely important. Despite Egypt's status as one of the country with the highest levels of avian influenza infection in the world, small number of studies have been done to characterize the dynamics of transmission, how they may have changed over time, what this means for the future of health in Egypt and the preventive practices of avian influenza. [(14)]

The present study was conducted to study the avian flu preventive practices among home poultry breeders in El- Beheira and to highlight about the importance and significance practices among Egyptian rural society hoping to help them in improving the preventive strategy of avian influenza. Age distribution of the studied sample ranged from 17 up to 76 years old. It may be attributed to; the government of Egypt in recent years has accorded even greater priority in improving the education system. In 2009, Egypt aims to increase access in early childhood care and education and also responsible for offering free education at all levels. So, before age of 17 the offspring especially girls had compelled with education. Also, the present study revealed that, around three quarters of them ranged between 35-55 years, with means of 40.48±10.5 years. It may be attributed to women in this age finished their reproduction and they were perform their daily activities at home or in their own

neighborhoods like breeding of poultry especially in rural areas in developing countries.

Poultry breeding is a popular activity among rural women in most countries. It can provide meat and eggs for the family, often women also control the marketing of poultry and poultry products, with the resulting income to use.[6] In the present study and as usual **all of sample was females**, in which the common performance of backyard farming in Egypt managed by females. This result goes with study done in Thailand [15] in which nearly three quarter of respondents was females.

In the present study, concerning **socio economic conditions**, it was found that around one third of the studied sample was illiterate and the majority of them not working while nearly a quarter were working either as an employee or in craft and no craft work. It may be attributed to, unemployed women had enough time during day to care about the poultry and they try to perform good preventive practices regarding avoidance of infection. Furthermore, the present study shows that, around half of sample earned **income** ranged from 250 L.E. to less than 500L.E. This also explains why they breeding of poultry at their homes although exposing them to greatest risk of acquiring the disease through contact with backyard poultry, thus to improve their income. Backyard poultry keeping is practiced by majority of the poor and rural households all over the developing countries.

The present study shows that, crowding index was three to five in more than half of sample. There was significant negative correlation between crowding index and score of knowledge. It may be attributed to; the presence of large family size at same house may be interrupt access to knowledge in addition to there was no enough time for transmitting knowledge through different generations.

The human health can be directly threatened in many ways by home environment. The polluted indoor air, contaminated water and lack of adequate sanitation are all important risk factors for individuals well –being and it also expose them to hazards and spread of diseases.[16] Regarding **home characteristics**, almost all studied houses used tap water as safe water source. It is worth mentioning that infection can occur by water contamination with waste/manure from infected farms or from wild birds. [14] Water supply to poultry houses should be potable according to the World Health Organization (WHO) or to the relevant national standard, and microbiological quality should be monitored if there is any reason to suspect contamination. Also the water delivery system should be disinfected between flocks when the poultry house is empty. [16]

There are many contamination sources from kitchen hygiene and environment. Therefore, the kitchen floor should be taken into consideration, it should be easily cleaned, and drainage covers are recommended for easy removal of cleaning. Furthermore, kitchen walls must have smooth surfaces that can easily and properly be cleaned. Additionally, the ventilation should be adequate and provided for each part of the kitchen, where screen are necessary, light should be adequate within the kitchen. [9] No discrepancy of this, the present study shows that, more than three quarter of sample had separate kitchen and even though, the majority of the studied sample had use modern stove oven in cooking. Despite the low socioeconomic standard in rural area, there is a big concern for the cooking facilities like stove ovens in houses. By test of correlation, it was observed that there was significant correlation between observed practices and kitchen place, kitchen ventilation and used of kitchen appliance. It may be attributed to, separated kitchen room, well ventilated kitchen and use of modern stove appliance in cooking practices may be accompanied with good level of observed practices.

In rural Egypt, nearly a third of the population own poultry. [17] Ducks have been shown to carry the avian influenza virus for longer periods without visible symptoms (called disease carrier) than other birds. Consequently, World Health Organization (WHO) was recommended that households owning ducks as well as other poultry or birds keep the ducks in locations separate from the locations in which they keep their other birds.[2] As regards to **birds residence**, the present study shows that almost all females in studied houses breed mixed types of poultry and ducks. Around half of the sample separates each type of birds. There was a positive significant correlation between separation of different types of birds and score of knowledge. It may be attributed to; increase in level of knowledge may enhance the follow of correct ways in breeding birds which include separation between different types. This is agreeing with the Egyptian Demographic and Health Survey **EDHS** [18] which revealed the same result, around forty percent of the households who owned any poultry or birds, reported that they owned both ducks and other birds. Among these households, thirty-one percent kept the ducks in the same location as other poultry or birds they owned.

Poultry farms and small backyards vary in function, size, layout and degree of mechanization. Lighting needs vary with production type and task. The amount and length of time light is required by the birds is different from what the worker requirements. Provides a lighting guide for poultry production, for light levels and photoperiod

requirements directly associated with production. A properly designed, energy efficient light system will enhance productivity, and save maintenance and electrical operating costs. So review the lighting in poultry backyard and consider if changes are needed for better energy efficiency, cost savings and also, for better cleanliness and preventive practices inside the shed. [14] Regarding **illumination inside the poultry shed**, the present study demonstrated that, more than half of the poultry shed had insufficient lighting. It may be attributed to lack of awareness regarding importance of lighting for eggs production.

During 2005, an additional and significant source of international spread of the virus in birds became apparent for the first time, but remains poorly understood. Scientists are increasingly convinced that at least some migratory waterfowl are now carrying the H5N1 virus in its highly pathogenic form, sometimes over long distances, and introducing the virus to poultry flocks in areas that lie along their migratory routes. This new role of migratory birds be scientifically confirmed, it will mark a change in a long-standing stable relationship between the H5N1 virus and its natural wild-bird reservoir.[4,9] So, the present study demonstrated that, the vast majority of studied houses had poultry shed with ceiling. It reflects increased awareness of them regarding importance of ceiling for protection of poultry from dangers of migratory birds.

Homemade poultry cages make it possible to place birds in a structure. It puts the breeders in complete control of flock's diet, a factor essential to peak health and production. It is also ensures that eggs produced not lost, stolen or soiled by litter. Additionally, the common problem of wild or stray animal attacks is eliminated. Finally, the spread of diseases and soiling of footwear is reduced markedly. [19]

Regarding **poultry cages**, the present study revealed that about three quarter of the studied houses are keeping birds inside closed covered cages. There is agreement with the Egyptian Health Communication Survey **(EHCS)** [20] who stated that twenty- two percent of their sample never cages their birds. This result is controversy to the finding of Egyptian demographic and health survey [18] which stated that only 46% of sample keeps their poultry in cages all the time. Also, this difference may be due to the disparity in sample size between this study which cover only three centers in El-Beheira governorate and Egyptian Demographic and Health Survey (EDHS) in which it covers all Egypt governorates.

Regarding the **knowledge** of the studied sample of avian influenza virus and certain measures for prevention, it was found that almost all the participants had poor and fair score. This finding goes with several national and international studies, in Egypt [21], Egypt Demographic and Health Survey **(EDHS)** [18], Nigeria (2009). [22] These results highlight the need for intensified health education programs in urban and rural community in order to deal with this serious and threatening public health problem.

Avian influenza is receiving high media attention all over the world. However, because it is a "new" disease, there is much misinformation and subsequently misunderstanding about the virus and its nature. [12] **The main source of knowledge** in the present study as reported by participants was mass media followed by family members or relatives. This result is supported with studies done in Italy [23], and Saudi Arabia [24]. These studies revealed that the majority of participants depended on mass media as a main source of knowledge. It may be attributed to the major target of population who achieve better knowledge from T.V or radio as they help them to modify and adapt certain behaviors during an outbreak.

The fact that perceived severity of avian influenza appears to be high and remains so over time offers a good point of departure for more specific risk communications to promote precautionary actions. Such communications should aim at improving knowledge about the disease and preventive actions and focus on perceived personal vulnerability and self efficacy in taking preventive measures. [3,4] In the present study, the preventive practices observed by the researcher, they include monitoring one of the procedures of participant when dealing with poultry as shed cleaning, dealing with eggs, dealing with dead birds, slaughtering and cooking. Regarding **observed practices** of the studied houses, the present study shows that more than half of the studied houses had fair score followed by good with mean 62.9± 16.8. There was significant positive correlation between total observed practices score and knowledge score.

Reducing risk by encouraging behavior change is particularly challenging and can take years. However, change is possible. To prevent avian influenza, changing the behavior with the highest risk should be attempted through public education and reinforced through behavioral counseling. This massage must reach children because they account for more than half of cases of avian influenza worldwide. If complete avoidance of sick or dead poultry is impossible, messages should include information on proper hand protection, wearing disposable gloves or using a plastic bag, and disposal methods. [25]

To end with, the results of this study illustrated that despite being given information, because the data

collection process completed at the time of increased the infection with more advertising and propaganda regarding disease, respondents had no detailed understanding of avian influenza, had a great perceived risk of experiencing avian influenza and had a low compliance with precautions behaviors. These observations raise concerns about a clear need to find the optimal way of correcting these deficiencies by developing and implementing public health policy regarding priorities for tailored educational and promotion strategies and in particular more attention should be given on using preventive approach in these population. Nevertheless, it is important to consider that dissemination and widespread adoption of preventive measures require education. Therefore, designing and implementing avian influenza educational programs and measuring their effectiveness should be priorities to incentive the population to take more active role**.**

Conclusion

It could be concluded that highly pathogenic avian influenza (HAPI) caused by virus sub- type H5N1 is a serious disease in poultry which is considered one of the biggest source of income for poor people living in rural areas. Emerging of epidemic influenza presents a major threat to life, economy, and security in an increasingly globalized world. The impact of disease has increased dramatically as the world becomes ever more interconnected. Additionally, trade, commerce and financial markets are increasingly interrelated. Epidemics and pandemics can place sudden and intense demands on health systems. They weaken these systems and increase morbidity and mortality rates resulting in disrupting the economic activity and development.

Recommendations:

Based on the finding of the study:

The following recommendations are suggested:

1. Enhance the role of IEC (information-education and communication) in increase awareness about avian influenza to prevent transmission of infection**.**
2. Special attention should be given to health screening and early detection programs of the high risk groups especially in rural and remote area.
3. Improvement and training of all health care professionals for early detection and full assessment to every case of human avian influenza infection.
4. Conduct community mobilization campaigns in order to raise community awareness regarding avian influenza infection especially in rural population.
5. Establishing health education programs for avian influenza at the school health program and school health curriculum
6. Nurses should play an active role in providing health services education and counseling for population on important aspects related to preventing transmission of infections. And participating in health education campaign in order to raise community's awareness especially among the poultry breeders
7. Further comparative studies should be carried out with rural population in different governorates with emphasis on qualitative researches using focus group discussion

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