Knowledge and Practices of Poultry Workers about Avian Flu in Fayoum Governorate, Egypt

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Abstract:

Background: Egypt has H5N1 outbreaks in poultry infecting resulting in disposing from slaughtering of more than million and culling of more than 36 million birds. Egypt has used prevention and control measures such as culling and vaccination since 2006 and more than one billion birds have been vaccinated, but there are no sign that the infection is under control and the government considers the disease to be endemic in the country. **Study' aimed** at evaluating knowledge and practices of poultry workers about Avian Flu in Fayoum Governorate, Egypt. **Subjects and Methods:** The study was conducted at El-Fayoum governorate {4 reproductive Poultry Centers in 4 Villages; El- Ameria, El-Ajaband, Karvas and El-Beada and 25 chicken shops for the sale and Slaughter at El-Fayoum city}, our sample comprised 600 male poultry workers, who accepted to participate in the study and working at the selected settings and available during the period of the study. From May 2008 to December 2009, data collection used were structured interviewing questionnaire sheet, the language of structured interviewing questionnaire was a colloquial Arabic; it was in the form of multiple choice questions (MCQ). **Results:** More than three quarters of the sample (76.3%) aged between 25:↓55 years. Forty seven percent of the participants were representative of urban and more than half (53.0%) of rural areas, 43.1% of workers believe that birds get infected from contacting diseased birds. 13.0% of poultry workers believes that AI can be transmitted through air while 35.7% didn't know the actual mode of virus transmission among birds. All of them have experienced at least an injury, through occupational time, regarding attending any institutional training programs for work safety, health education or first aid measures, all the worker reported that the institute did not organize such programs to attend. Also, all the workers confirmed that they have not received vaccinations against any of the possible job-related infections. **Conclusion:** Lack of knowledge among poultry workers about AI, and preventive measures used during and after dealing with Poultry and more than half of them have inadequate practices about AI and preventive measures. **Recommendations**: Establish health education programs to poultry workers about importance of using personal protective equipment (PPE) such as; outer garments (aprons or coveralls), gloves, disposable foot protection, disposable head protection that can be reused after disinfection. All rural health units should provide health education to poultry workers about how protect themselves and their families from bird flow and used suitable media such as; TV, posters, and prints materials (Q & A booklets, magazine....etc)

Keywords: Knowledge, Practices**,** Poultry Workers, Avian Flu**,** Fayoum Governorate, Egypt"

Introduction:

Influenza is an ancient disease that has infected humans at irregular intervals throughout recorded history **(Webster R., et al., 2006)**. The term "influenza" originally referred to epidemics of acute, rapidly spreading catarrhal fevers of humans caused by viruses in the family orthomyxoviridae. Today, orthomyxo viruses are recognized as the cause of significant numbers of

natural infections and diseases, usually of the upper respiratory tract, in humans, horses, domestic pigs and various bird species and sporadic cases of naturally occurring disease in mink and a variety of marine mammals **(Swayne & Halvorson, 2003)**.

In Egypt, a large number of confirmed human cases acquired infection during the dealing, slaughtering and subsequent handling of diseased or dead birds **(Hayden & Shindo, 2008)**. Egypt is the most country infected with AI outside of Asia, despite control measures. It pointed out that among the 63 confirmed cases recorded in Egypt between March 2006 and March 2009, there were 23 serious infections. The report used the term "epidemic curve" when it addressed the evolution of the disease in Egypt, where the number jumped from 18 cases in 2006 to 25 cases in 2007 and 32 in 2009 **(World Health Organization, [WHO] 2009)**. It ranked Egypt the third in the global infection rate with a 14% infection rates as registered by World Health Organization (WHO) in March. Indonesia is ranked first with 34% and Vietnam 2nd with 26% (**El-Hawari, 2009).**

There are sex phases of spread the virus:(1st phase): Risk of human infection is low and there are no new subtypes of influenza viruses in humans and no human to human spread, (2nd phase): Risk of human infection is substantial but there are no new subtypes of influenza viruses in humans and no human to human spread, (3rd phase): This is the "current phase", risk of human infection is substantial and there are new subtypes of influenza viruses in humans and rare instances of human to human spread, (4th phase): Risk of human infection is substantial and there are new subtypes of influenza viruses in humans and highly localized instances of human to human spread, (5th phase): Risk of human infection is substantial and there are new subtypes of influenza viruses in humans and localized large instances of human to human spread, and (6th phase): This is the "pandemic phase". Risk of human infection is substantial and there are new subtypes of influenza viruses in humans and sustained transmission of the virus in the general population **(Barrett, 2008).**

Avian Influenza (AI) can spread easily and quickly among infected birds that spread virus through secretions and droppings, which shed virus in their saliva, nasal secretions, and feces (fecal and could – nasal discharges). Susceptible birds become infected when they have contact with contaminated secretions, excretions, contaminated surfaces with virus (dirt or cages) and contaminated materials (water or feed). Some species as domestic poultry (chickens and turkeys) are more likely to become severely ill and die when infected **(Jacob et al., 2009).**

In an agricultural setting, animal manure, fluids and feathers containing influenza virus can contaminate dust and soil, causing infection when the contaminated dust is inhaled. Contaminated farm equipment, feed, cages, or shoes can carry the virus from farm to farm. And also, transport birds from one place to another. The virus can also be carried on the bodies and feet of animals, such as rodents. In a food handling/preparation setting, there is also some concern that AI could be transmitted from uncooked infected birds or contaminated fresh/frozen meat and contaminated bird products as eggs from infected poultry could also be contaminated with the virus

(Rice, 2007).

Most patients have initial symptoms of high fever (typically a temperature of more than 38°C and typically fever beings to decline on the 2nd or 3rd day of the illness. Influenza-like symptoms (sometimes it confuses with the common cold), body aches, chills, dry cough, headache, sore throat, stuffy nose, lower respiratory disease with breathlessness and signs of pneumonia (in more serious cases influenza causes pneumonia which can be fatal particularly in young children and the elderly). Patients with AI have conjunctivitis, diarrhea (watery diarrhea without blood or inflammatory changes appears to be more common than in influenza), nausea, vomiting (can be produced especially in children), (abdominal, chest, Plevritis) pain, bleeding from the nose and gums has also been reported early in the course of illness in some patients **(Chotpitayasunondh T. et al 2005)**. It have many complications such as otitis media, primary influenza pneumonia, secondary bacterial bronchitis, encephalitis (rare) and worsening or destabilization of pre existing diseases, such as cardiac failure and diabetes **(Centers for Disease Control and Prevention [CDC] 2007 & National Institute of Allergy and Infectious Diseases [NIAID] , 2008).**

When Poultry Workers handling make sure they are protected (Specific Considerations for Poultry Workers) try to avoid generating dust by spraying or sprinkling water to dampen the area when burying dead birds or their faces, bury bird carcasses and faces at a depth of at least one meter, remove all organic matter from the chicken pens and thoroughly clean with detergent and water. As outdoor areas used by infected poultry can be difficult to disinfect, new poultry should be excluded from these areas for a minimum of 42 days to allow natural ultraviolet radiation to destroy any residual virus. The period of exclusion should be longer in cold weather **(World Health Organization, [WHO] 2006.)**

Personal Protective Equipment (PPE) which is a routine practice will reduce the chances of carrying the AI virus off the contaminated premises**,** PPE includes; outer garments (aprons or coveralls), gloves, disposable foot protection (boots or boot covers), disposable head protection (head cover or hair cover) that can be reused after disinfection. Choose disposable, impermeable, and lightweight protective clothing. Wear disposable, lightweight, waterproof gloves 8 to 12 mil nitrile or vinyl, or heavy duty, 18-mil rubber gloves that are reusable after disinfection **(National Institute for Occupational Safety and Health [NIOSH] 2008)**. Eye protection will reduce direct exposure of the eyes to contaminated dust and aerosols and help keep workers from touching their eyes with contaminated fingers or gloves. To prevent the mucous membranes of the eyes from being exposed to the AI, poultry workers should wear safety goggles or particulate disposable respirators (N-95, N-99, and N-100) **(Centers for Disease Control and Prevention [CDC], 2006)**.

Must remove all protective materials and wash hands with soap and water. Wash clothes in warm soap water and hang in the sun to dry. Put used gloves and other disposable materials in a plastic bag for safe disposal. Clean all reusable items such as rubber boots and glasses, goggles with water and detergent but always remember to wash hands after handling these items. Items that cannot be cleaned properly should be destroyed.

Shower, wash body use soap and water. Wash hair. Most importantly, wash your hands every time after handling any contaminated items **(World Health Organization [WHO] 2004).**

Poultry Workers especially those workers involved in AI disease control and eradication activity, should receive the current season's influenza vaccine to reduce the possibility of dual infection with avian and human influenza viruses, and the possibility of the virus changing and becoming more contagious or capable of causing a more serious form of AI. Employers must inform workers about antiviral recommended by public health officials and should ensure that workers receive any recommended antiviral drugs**.** Currently public health officials recommend antiviral drugs during the entire period of exposure to AI (during an outbreak) and for at least one week after the last exposure, for a maximum duration of eight weeks. Poultry workers should be aware of signs of disease in poultry, so when necessary they can take immediate steps to protect themselves and other workers, quarantine the farm to prevent spread of disease and report the disease to the responsible animal health authorities. In the event of an AI outbreak, workers who will be involved in disease control and remediation activities should consult their healthcare provider about the advisability of taking antiviral medications for influenza. Monitor of any of the symptoms of AI 10 days of possible exposure, seek medical care provider prior to their arrival that they may have been exposed to AI. Laboratory tests can be used to confirm if the infection is due to the AI virus. Avoid persons at high risk for severe complications of influenza (immuno-compromised, people over 60 years old, or people with known chronic heart or lung disease) should avoid working with affected chickens **(Rice, 2007)** and **(Safety and Health Information Bulletin [SHIB], 2004.)**

Significance of the study:

Poultry Workers are at risk of becoming infected with Avian Influenza viruses because they are exposed to infected birds, poultry products or virus-contaminated materials or environments have an occupational risk of exposure to these viruses, therefore evaluating knowledge and practices of poultry workers about Avian Influenza is important to protect them from occupational health risk as well as their families, communities, and the public health **(MacMahon et al., 2008).**

Aim of the Study:

The study aimed to evaluating knowledge and practices of poultry workers about Avian Flu in Fayoum Governorate, Egypt.

Research questions:

- Do poultry workers' have knowledge regarding Avian Influenza and preventive measures?
- What poultry workers' practices and preventive measures are used during and after dealing with Poultry?
- Do poultry workers' receive any training programs about safety measures or first aid?

Subjects & Methods:

Research Design:

A descriptive correlation design was used in conducting the study.

Setting:

The study was conducted at El-Fayoum governorate in 4 centers for reproductive poultry from 4 villages in

the five centers that founded in El-Fayoum governorate these villages was chosen because it is contains centers of reproductive poultry. These villages are named: {El- Ameria, El-Ajaband, Karvas and El-Beada} and 25 chicken shops chosen randomly of these five centers from each center 5 chicken shops chosen randomly from chicken shops for the sale and Slaughter of poultry was found in every center at El-Fayoum city.

Subjects:

The sample comprised 600 male poultry workers who accepted to participate in the study and who working at these settings (labs and centers reproductive Poultry and chicken shops for sale and slaughter) and available during the period of the study.

Tools:

The data collections used were structured interviewing questionnaire sheet, the language of structured interviewing questionnaire was a colloquial Arabic, and it was in the form of multiple choice questions (MCQ). It consisted of the following parts:

- Personal characteristics: age, marital status, residence, level of education and occupation.
- Knowledge of poultry workers about AI (Knowledge[1]); such as mode of transmission, signs and symptoms…etc.
- Knowledge of poultry workers regarding preventive measures are used during and after birds/eggs preparation for consumption (Knowledge[2]);
- Knowledge of male poultry workers regarding their practices and preventive measures are used during and after dealing with Poultry (Knowledge[3]);

The responses of the participants to 23 questions were scored 1 for a correct answer and zero for incorrect answer or I don't know answer (scores ranged from 0 to 23, with a median of 6). A cut–off score was calculated based on the median value. Participants scoring above the median value of the total score were classified as having an acceptable practice, while those having a total score at or less than the median value were considered as having an unacceptable practice.

Pilot study:

A pilot study has been carried out before starting data collection on 10 % of the total of studied sample (60 male poultry workers) and was excluded from the study sample to test the feasibility of the study and the clarity and applicability of the tools. Content validity of the tools were ascertained by a panel of three experts in Community Health Nursing who revised the tools for clarity, relevance, applicability, comprehensiveness, and ease for implementation according modifications were applied.

Field work:

After formal permission was obtained, the researchers visited the Centers of reproductive Poultry and chicken shops however; the purpose and nature of the study was explained to the all participants. Male poultry worker who agreed to participate in the study were interviewed individually by the researchers to fill out the interview form. The time needed to fill out the sheet ranged between 15-30 minutes. Every day ranged between 3-4 male poultry workers. Two days per week, 600 male poultry worker in 20 months (from May 2008 to December 2009). At the end of the interviewing, the opportunity was given to male poultry

worker to ask questions related to the most suitable interventions about AI, and the researchers provided guide media and guides notes lot of explanations and information about AI and prevention methods (**guide media and guides notes Ministry of Health and Population).**

Administrative and Ethical Consideration:

A written permission has been taken from the director of the Centers of reproductive Poultry and chicken shops chosen in this study. The agreement for participation of male poultry workers was taken orally after the aim of the study explained to them, they were given an opportunity to refuse to participated, they were notified that could withdraw at any time of the research, also they were assured that the information would renowned confidential and used for the research purpose only.

Statistical analysis:

Data entry and statistical analysis has been done by using software package for social science (SPSS) 12.0. Data were presented also by using descriptive statistics as mean ± SD, frequencies and percentages for qualitative variables. One-way ANOVA test and student t-test been used to compare the different qualitative variables. Statistically significant has been applied at ($P < 0.05$).

Results:

Table 1 (A & B) shows that the personal characteristics of the studied sample, around more than three quarters of them (76.3%) aged between 25:↓55 years and the mean age of the studied sample was 29.0 ± 1.193 years. 47.2% were representative of urban and 52.8 % of rural areas. Regarding the educational status, it was observed that the majority (41.8%) were illiterate while the rest of them could read and write or whether had primary, preparatory, secondary, and university education (14.0%, 8.0%, 6.0%19.7% and 10.5%) respectively. The table **1-B** also revealed that the workers who had highest poor knowledge belonged to age group 25-35 years and came from rural area and illiterate (14.2%, 28.2% & 25.3% respectively)

Table (2) clears the distribution of the studied sample regarding their knowledge about definition and nature of the AI, male poultry workers correctly defined AI as an infectious agent (74.2%), and caused by a virus (47.0%) that infects birds, human and animals (11.7%). While more than half of them (50.8%) reported that virus infects birds and human only. Most of the studied sample (43.1%) believes that birds get infected from contacting with diseased birds. 13.0% of male poultry workers believes that AI can be transmitted through air while 35.7% didn't know the actual mode of virus transmission among birds. 37.7% of the studied sample showed correct knowledge about the mode of transmission of virus from birds to human. 5.5%, 4.3% and 3.5% respectively believes that people get infected from eating infected poultry, eating normal poultry during the outbreak or through air and 38.5% didn't know mode of transmission. While 4.7% of poultry workers are sure that AI can be transmitted from human to human in rare cases.

Table (3) shows that there are statistical significant differences in the knowledge of studied sample about AI regarding preventive measures are used during/after birds/eggs preparation for consumption and preventive measures are used during/after dealing with poultry regarding their education ($P < 0.05$).

There are statistical significance differences in concerns of the studied sample about AI and their education ($P < 0.05$).

Table (4) illustrates that 35.2% of poultry workers didn't know signs and symptoms of the disease on infected birds and 60.5% didn't know the signs and symptoms of the disease in infected human, while 3.2% of poultry workers believes that there are "no signs" in infected birds and 8.5% believes that "no signs or symptoms" in infected human. Regarding the perception of the studied sample on the seriousness of the disease, 33.5% and 46.2% of them didn't know the seriousness of the disease on birds and human respectively. This table also, illustrates that 46.1% and 74.3 % respectively didn't know seasonal prevalence and places of exposure to virus.

Table (5) shows that 3.5% and 28.8% of the studied sample respectively didn't know most people at risk of becoming infected and age susceptibility. While 52.8%, 42.7% and 42.2 % of male poultry workers respectively didn't know investigations to detect the disease, the possibility of recovering birds and human. More than three quarters 84.7% and 7.7% of the study sample reported that veterinarian consultancies for birds and care facilities for human are not available in their residential areas.

Table (6) displays the practices of male poultry workers regarding protective measures during preparation birds for consumption. All poultry workers didn't wear gloves during slaughtering or cleaning process and didn't use antiseptic solution for either cleaning tools or disinfecting area, and hand washing. Most of them (77.7%) used water and soap during hand washing, this table reveals that inadequate practices about preventive measures which used in preparing birds for consumption.

Table (7) demonstrates the practices of male poultry workers in disposing products after poultry slaughter. No one of the studied sample collect slaughtered poultry waste in closed bag and give to sweeper. While 19.3 %, 2.2 % and 4.2 % respectively use viscera of slaughtered birds as feeding to poultry, cats, dogs and human.

Table (8) reveals that more than three quarters (77.7%) and 56.5% of participants didn't separate home appliances away from poultry appliances and use the same appliances for poultry and animals together respectively. The same table also, demonstrates the practice of male poultry workers regarding dealing with remnant water and solid waste from domestic poultry, all studied sample is disposing from remnant water and solid waste in canal/street...., except 12.3% collect solid waste in closed bag and give to sweeper. Fourteen percent of the studied sample reusing solid waste and no one reported that "added antiseptic solution" before disposing.

Table (9) illustrates the practices of male poultry workers in case of the appearance of sickness or dead poultry among their birds; no one will report action to the authorities or bury the carcass of bird in a deep hole or pour water and chlorine and put the carcass in the rubbish in sturdy bags. All poultry workers vaccinate the birds to protect it and 29.7 % of them didn't know the preventive measures that protect their birds. While 14.5% assured that there is no way to protect poultry in case of outbreak.

Figure (1) Illustrated that more than half (54.9%) of male poultry workers had a poor level of knowledge about Avian Influenza, while 45.1% of

them had good level of knowledge about Avian Influenza.

It clears from **Figure (2)** that more than half (51.3%) of male poultry workers have inadequate practices about Avian Influenza and preventive measures, while 48.7% of them have adequate practices about Avian Influenza and preventive measures.

Table (10) reveals that the majority of the respondents (97.5%) prefer television in the first priority. Neighbors, friends, newspapers, health workers, radio and pamphlets for getting information are located second priority. More than half (63.3%) of male poultry workers confirm that knowledge disseminated by media is insufficient. According knowledge of the studied sample regarding protective measures, 19.8% were afraid and didn't trust in vaccine and 27.4% refused vaccine while twenty percent of the sample didn't know how to protect themselves from AI virus; the same percentage of sample didn't suggest anything to face the disease.

Table (11) clarifies that all studied subjects reported that they didn't attend any program about safety measures or first aid. Also, no one received any kind of vaccination as protective measures.

Discussion:

The present study was conducted on 600 male poultry workers; the majority of participants' with age between 25:↓55 years and more than half of them from rural areas. Illiterate Poultry Workers represented about half of study sample, while the minority had a university education **table (1-A).**

The current study revealed that poor knowledge level among poultry workers regarding their practice and preventive measures they used during and after dealing with poultry. Also poor knowledge scores about AI were obtained, this may be related to insufficient general information on modes of transmission, basic preventive measures, hygiene, signs/symptoms of disease on infected birds/human and seriousness of the diseases on infected birds and human as in **table (1-B, 2 & 4).** There are statistical significant differences in the knowledge regarding AI and education of poultry workers ($P < 0.05$) **(table 3).** These findings agree with results of **Toby et al., (2008)** and **Mohammad (2008**) who found a relatively low level of knowledge about AI in their studies whereas knowledge was greater in persons with more education in Afghanistan and Iran respectively.

The present study showed that the majority of studied subjects didn't know if the virus is transmitted from human to human while the minority stated that the virus transmitted between humans occurred in rare cases **(table 2). WHO (2008)** reported that no doubt that H5N1 human to human transmission was observed in very restricted manner.

The current study showed that more than half of the studied sample stated that people who contact with birds are mostly at risk of becoming infected with the virus **(table 5).** These results comes in agreement with **MacMahon et al., (2008)** who mentioned that Poultry workers are at risk of becoming infected with Avian Influenza viruses because they are exposed to infected birds, poultry products or virus-contaminated materials or environments have an occupational risk of exposure to these viruses. On the other hand; **Sonja (2005**) reported that rural people are at greatest risk, and **Jennifer (2008)** found risk of contact with AI infected wildlife birds was eight times higher for the recreational group (waterfowl hunters) compared to the occupational

group (wildlife biologist, wildlife hospital workers and veterinarians) or the casual group (general public), ($P < 0.0001$). Moreover, other studies illustrated that exposure risk is higher among lower socioeconomic groups **(Sonja et al., 2005, Jennifer et al., 2008 &Toby et al., 2008).**

The findings of this study revealed poor knowledge regarding behavior of the studied sample in dealing with sick/dead poultry that appears among their domestic birds or their residential areas whereas they stated that they may throw it in the street alive, slaughter and throw it in near or into water canal. No one of them stated that they will inform the authorities or try burying the carcass deeply in the earth after pouring water and chlorine on it or putting the carcass in the rubbish in sturdy bags. On the other hand, when sick or dead poultry appears in the same residential area, quarter of the study sample reported that they will hide away their birds from the authorities' persons, while very low percentage of them will slaughter their birds and get rid of them in canal **(table 9)**. All of the above mentioned answers could be attributed to lack of knowledge due to the clear disconnection, lack of communication between the state and the public people which may lead to major and serious problems regarding environmental and water pollution. **NIOSH (2008)** report; disposal of dead or culled birds as a result of outbreaks of HPAI poses a great threat to environmental integrity and must be approached with a great deal of caution**, while** this study are different than **UNICEF (2006)** which found that one third of housewives isolate sick poultry, less than one quarter reported to authorities, out of those who raise poultry; about half of sample said if they found dead poultry they would bury the carcass, above one third would report it to the authorities, the minority would burn it. The finding of the present study was in the same line with **UNICEF (2006)** which reported that less than one quarter on their study on Georgia throw the infected bird in garbage and other minority would throw it into river. Opposite to the present study, a study conducted by **Swoth (2007)** in rural Cambodia reported that the study participants are taking dead poultry out of the backyard and prepare it for household consumption. Also, **INFOSAN (2005)** stated that the majority of the human HSN, infections have been linked to close contact with infected domestic bird while, engaging cleaning places of bird which lead to increase the risk of AI by inhalation of infectious droplet.

According to the present study nearly half of the studied poultry workers reported that the disease is serious in birds and human respectively while, less than half of the studied poultry workers who didn't perceive the seriousness of disease on birds and human are limited (**table 4),** the findings of this study agree with **MOHP, (2006)** which stated that more than one third of workers said that the disease was risky, the minority said the disease has no effect on human health as it is a disease of birds only. While **Gomez (2006**); in current study; nearly two third of people said the disease is serious, the minority disagreed and saying that influenza is not a serious disease and about one quarter had no opinion and any reported person can die from influenza. Also, **UNICEF (2006)** found that the majority reported that the disease is very serious and the minority didn't perceive the seriousness of human infection. On the other hand, **Fatiregun** and **Saani (2008)** reported; more than half of poultry workers believed that AI is a serious but preventable disease.

All studied sample have received their information about AI from the Egyptian's television which constitutes the most attractive, trustful media and represents the first popular media for the different socio-economic Egyptian peoples and the only source for health information and news about the outbreak of AI virus **table (10**). The findings in the present research agree with **UNICEF (2006)**, **MOHP, (2006**), **Fatiregun** and **Saani (2008),** and **Mohammad, (2008**) who named TV as the most preferred source of population information's about AI. Also, all sample in the present study mentioned that they didn't attend any safety or health programs, first aid training programs and never received any vaccinations as protective measures for job risk **table (11).**

Conclusion:

we can concluded that; Lack of awareness among Poultry Workers regarding their knowledge about AI, and preventive measures used during and after dealing with Poultry and more than half of them have inadequate practices about AI and preventive measures.

Recommendations:

Based on the findings of the study, the following recommendations are suggested:

1. Protecting poultry workers by good hygiene during work practices, personal protective clothing and equipment, vaccination forseasonal influenza viruses, antiviral medication, and medical surveillance.
2. Poultry workers should receive training on the proper use, care, and maintenance of personal protective equipment (PPE), including cleaning, inspection, and storage.
3. Health education programs to poultry workers about importance of using personal protective equipment (PPE) such as; outer garments (aprons or coveralls), gloves, disposable foot protection (boots or boot covers), disposable head protection (head cover or hair cover) that can be reused after disinfection. Choose disposable, impermeable, and lightweight protective clothing.
4. Poultry workers should wear mask because AI viruses may be transmitted by breathing contaminated dusts, droplets, or aerosols. Air-purifying respirator with a particulate filter whenever they are working in poultry barns or may be exposed to infected poultry or virus-contaminated materials or environments.
5. Continuous follow up to birds' stations by heath authorities to early discover outbreak and treat case.
6. All rural health units should provide health education to poultry workers about how protect themselves and their families from bird flow and used suitable media such as; TV, posters, and prints materials (Q & A booklets, magazine....etc).

Table (1-A): Socio-demographic characteristics to Poultry Workers (n=600).

Socio-demographic characteristics	No. 600	Percent (%)
Age (years):		
14-	79	13.2
25-	158	26.3
35-	168	28.0
45-	132	22.0
55+	63	10.5
Mean ± SD	**29.0 ± 1.193**	
Residence:		
Rural	317	52.8
Urban	283	47.2
Educational Status:		
Illiterate	251	41.8
Read & Write	84	14.0
Primary education	48	8.0
Preparatory education	36	6.0
Secondary education	118	19.7
University education	63	10.5

Table (1-B): Comparison between Poultry Workers' knowledge about AI and their characteristics

Level of knowledge / Personal Characteristics	Poor Knowledge		Good Knowledge		Total	
	No.	%	No.	%	No. 600	%
Age (years):						
14-	42	7.0	37	6.2	79	13.2
25-	85	14.2	73	12.1	158	26.3
35-	81	13.5	87	14.5	168	28.0
45-	76	12.6	56	9.4	132	22.0
55+	45	7.5	18	3.0	63	10.5
Residence:						
Rural	169	28.2	148	24.7	317	52.8
Urban	160	26.6	123	20.5	283	47.2
Educational Status:						
Illiterate	152	25.3	99	16.5	251	41.8
Read & Write	51	8.5	33	5.5	84	14.0
Primary education	20	3.3	28	4.7	48	8.0
Preparatory education	15	2.5	21	3.5	36	6.0
Secondary education	53	8.9	65	10.8	118	19.7
University education	38	6.3	25	4.2	63	10.5

Table (2): Knowledge of poultry workers' regarding Avian Influenza (definition, causes and mode of transmission).

Items	No. 600	%
Avian Influenza is infectious		
Yes	445	74.2
No	41	6.8
I don't know	114	19.0
Avian Influenza is caused by a virus		
Yes	282	47.0
No	16	2.7
I don't know	302	50.3
Susceptibility of infection between		
Birds, human and animals	70	11.7
Birds and human only	305	50.8
Birds only	153	25.5
Human only	29	4.8
I don't know	43	7.2
Transmission of the virus among birds		
From the infected birds	259	43.1
Through air	78	13.0
From contaminated surfaces with the virus	49	8.2
I don't know	214	35.7
Transmission of the virus from birds to human		
Direct dealing with infected birds	226	37.7
From contaminated surfaces with the virus	63	10.5
Eating infected poultry	33	5.5
Eating poultry (normal birds during outbreak)	26	4.3
Through air	21	3.5
Direct dealing with infected birds remnant	0	0.0
I don't know	231	38.5
Transmission of the virus from human to human		
Sure, in rare cases	28	4.7
Not Sure	118	19.7
I don't know	454	75.6
No	0	0.0

Table (3): Comparison between Poultry Workers' knowledge and their educational status

Variables		Sum of squares	Mean square	Df	F	Sig.
Knowledge[1]	Between Groups	90.323	18.065	5	3.297	0.006*
	Within Groups	3254.262	5.479	594		
Knowledge[2]	Between Groups	32.298	6.460	5	4.863	0.000*
	Within Groups	789.035	1.328	594		

Knowledge[1]: Knowledge among male poultry workers about AI (No= 600)

Knowledge[2]: Knowledge among male poultry workers about preventive measures are used during and after birds and egg preparation for consumption (No= 600)

(*) statistically significant at (P < 0.05)

Table (4): Knowledge of Poultry Workers' regarding seriousness of the disease in poultry, human, seasonal prevalence and places of exposure

Items	No. 600	%
Signs of the disease on infected birds		
No signs	19	3.2
Spinning and sudden death	80	13.3
Ruffled feathers	43	7.2
Reduced egg production	93	15.5
Head goes down	50	8.3
Secretion from nose and mouth	36	6.0
Looks weak	13	2.2
Don't eat	31	5.1
Cyanosis of comb and wattle	0	0.0
Swelling of the head	0	0.0
Diarrhea	0	0.0
I don't know	211	35.2
More than answer	24	4.0
Signs and symptoms of the disease on infected human as ordinary flu Yes	186	31.0
No	51	8.5
I don't know	363	60.5
Seriousness of the disease on birds Not serious	98	16.3
Serious	301	50.2
I don't know	201	33.5
Seriousness of the disease on human		
Not serious	33	5.5
Serious	290	48.3
I don't know	277	46.2
Seasonal prevalence Seasonal	184	30.7
Not seasonal	139	23.2
I don't know	277	46.1
Places of exposure the virus		
Bird places (fresh markets slaughter, home slaughter, poultry farms	154	25.7
I don't know	446	74.3

Table (5): Knowledge of Poultry Workers' regarding risk people of the disease and care facilities

Items	No. 600	%
Most people at risk of becoming infected with virus		
People who contact birds	413	68.8
Anyone	166	27.7
I don't know	21	3.5
Age susceptibility		
Children are more susceptible	80	13.3
All ages are susceptible	347	57.9
I don't know	173	28.8
Investigations to detect the disease		
Yes	63	10.5
No	220	36.7
I don't know	317	52.8
The possibility of recovery birds		
Yes	111	18.5
No	233	38.8
I don't know	256	42.7
The possibility of recovered human		
Yes	226	37.6
No	121	20.2
I don't know	253	42.2
Veterinarian consultancies for birds near your home		
Yes	92	15.3
No	508	84.7
Care facilities for human near your home		
Yes	554	92.3
No	46	7.7

Table (6): preventive measures practice by poultry worker during preparation of bird for consumption.

Items	No. 600	%
Wearing gloves when slaughtering or de-fathering birds:	600	100.0
No		
Yes	0	0.0
Wash hands, face and legs after dealing with poultry:		
Frequently wash my hands	510	85.0
Sometimes wash my hands only	90	15.0
Clean hands with:		
Water only	134	22.3
With water and soap	466	77.7
With water, soap and antiseptic solution	0	0.0
Clean instruments and area after processing birds by		
Water only	24	4.0
Water and soap	576	96.0
Water, soap and antiseptic solution	0	0.0

Table (7): Practices of Poultry Workers' in disposing products after Poultry slaughter.

Items	No. 600	%
Dealing with waste (feathers…..) after poultry slaughtering:		
Throw into canal	63	10.5
Throw into street	46	7.7
Collected with home rubbish	155	25.8
Collected in closed bag and give to sweeper	0	0.0
Bought slaughtered poultry and ready to cook	336	56.0
Dealing with internal organs (viscera….) of slaughtered birds:		
Throw into a canal	5	0.8
Throw in a street	15	2.5
Feed to poultry (raw)	116	19.3
Feed to poultry (cooked)	0	0.0
Feed to cats, dogs (raw)	13	2.2
Feed to cats, dogs (cooked)	0	0.0
Eaten	25	4.2
Collected with home rubbish	90	15.0
Collected in closed bag and give to sweeper	0	0.0
Bought slaughtered poultry without it	336	56.0
In controlled nest.	0	0.0
Flooring		
Soil	421	70.2
Cement	155	25.8
Tiles	24	4.0

Table (8): Distribution of the studied sample according to their knowledge regarding protective measures during and after dealing with Poultry and remnant waste from domestic poultry.

Items	No. 600	%
Separate home appliances away from poultry appliances		
No	472	77.7
Yes	128	22.3
Use the same instruments for poultry at home :	339	56.5
Yes		
No	261	43.5
Dealing with remnant water from domestic poultry:		
Throw into canal	64	10.7
Throw into street	135	22.5
Throw in poultry place	218	36.4
Throw in home yard	116	19.3
Throw in home toilet	67	11.1
Added antiseptic solution before disposing	0	0.0
Dealing with remnant solid from domestic poultry:		
Throw into a canal	49	8.2
Throw in a street	114	19.0
Kept to use	84	14.0
Collected with home rubbish	279	46.5
Collected them in closed bag and give it to the sweeper	74	12.3
Added antiseptic solution before disposing	0	0.0

Table (9): Practices of Poultry Workers' in case of appearance the disease among birds and protective measures taken to prevent AI in their birds.

Items	No. 600	%
Dealing with sick poultry appears among your birds:		
Slaughter and throw it into canal	38	6.4
Throw it in street alive	396	66.0
Slaughter and throw it in street	166	27.6
Report authorities	0	0.0
Dealing with carcass of dead poultry among your birds:		
Throw into a canal	135	22.5
Throw into street	305	50.8
Throw in home rubbish	160	26.7
Vaccinate your birds:		
Yes	600	100.0
No	0	0.0
Ways to protect your poultry from AI virus:		
Vaccinate them only	216	36.0
Keep poultry and their water and feed in an enclosed space	94	15.5
There is no way to protect poultry	87	14.5
Vaccinate and keep them enclose area	25	4.3
I don't know	178	29.7

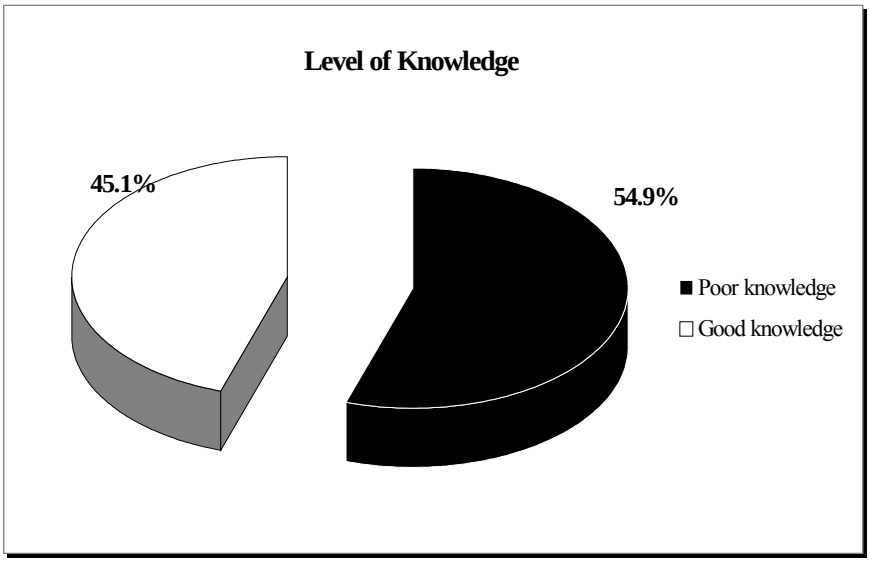

Figure (1): Distribution of the studied sample by their knowledge about Avian Influenza.

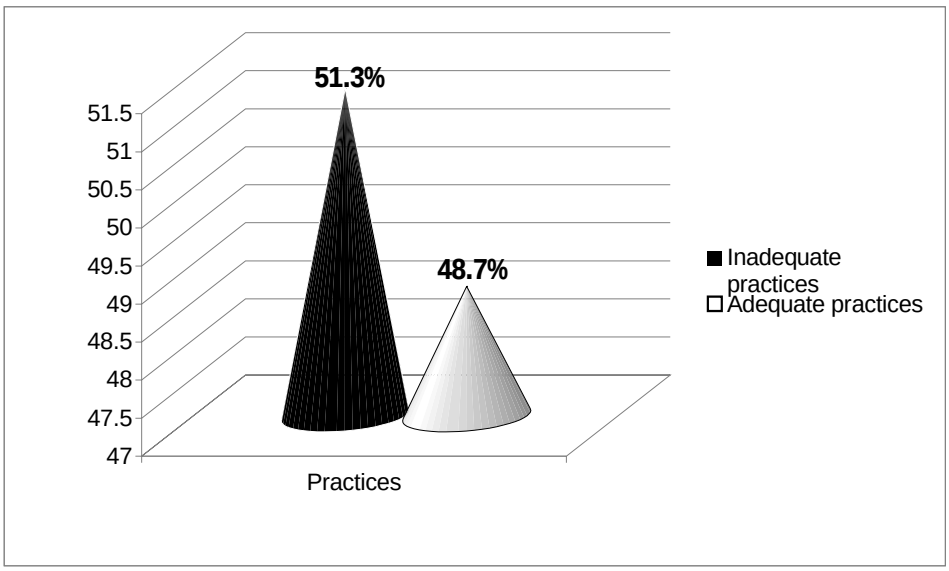

Figure (2): Distribution of the studied sample by their practices about Avian Influenza.

Table (10): Distribution of the studied sample according to their interest regarding preference and accessibility of information dissemination and protective measures.

Variables	No. 600	%
Preferred source of your information from		
Television only	585	97.5
Television and others	15	2.5
Information disseminated by media is sufficient		
Yes	170	28.3
No	380	63.3
I don't know	50	8.4
Interest to search of new trend about the disease		
I depend on short health enlightenment TV programs	510	85.0
Pay attention if an information said to me	90	15.0
I don't care at all	0	0.0
Hesitate to receive vaccine if is available		
No	164	27.4
No, if free	249	41.5
Yes, not afraid of AI	68	11.3
Yes, afraid of vaccine, I don't trust	119	19.8
Ways to protect yourself from AI virus		
Get rid of my poultry	153	25.5
Don't eat poultry	129	21.5
Stay away from people who have the flu only	21	3.5
Stay away from people	51	8.5
Stay away from birds	92	15.3
There is no way to protect myself	34	5.7
I don't know	120	20.0
I follow strict precautions	0	0.0
Your suggestion to face the disease		
Get rid of infected birds	138	23.0
Increase educational awareness in TV	222	37.0
Increase health enlightenment in our residential areas	51	8.5
Increase health enlightenment our work places	43	7.2
Vaccinate healthy human, birds	26	4.3
No suggestions	120	20.0

Table (11): Questions related to health hazards and its prevention among Poultry Workers

Received training programs about:	No. 600	%
Safety methods and promotion health		
• Received	0	0.0
• Never attended safety or health programs	600	100.0
Training programs for first aid measures (about injury & wound)		
• Received	0	0.0
• Never attended first aid training programs	600	100.0
Vaccinations against job infectious hazards		
1. Received	0	0.0
2. Never received any vaccinations by job	600	100.0

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