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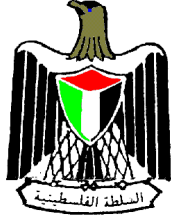
**Prevalence of Salmonella in Poultry Meat in Gaza City,
2005**

Mahmoud Ahmed Humaid

M.P.H Thesis

Jerusalem - Palestine

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**Prevalence of Salmonella in Poultry Meat in Gaza City,
2005**

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**B.Sc. in Food Science Agricultural Faculty
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**A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Public Health Al- Quds University**

Supervisor

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April – 2006

**Al -Quds University
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Thesis Approval

Prevalence of Salmonella in Poultry Meat in Gaza City, 2005

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Master thesis submitted and accepted Date: 22/6/2006

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3-External Examiner Dr. Abed El-Razek Salama Signature-----

Jerusalem-Palestine

April / 2006

Dedication

To my late father and to my dearest mother, brothers and sisters.

To my beloved wife, and my children.

To my friends.

To my colleagues.

Mahmoud Ahmed Humaid

Declaration

I certify that this thesis submitted for the degree of master is the result of my own research, except where otherwise acknowledged, and that this thesis has not been submitted for a higher degree to any other university or institution.

Signature:

Mahmoud Ahmed Humaid

Date: 01-04-2006

Acknowledgments

This work could not have come to light in its presented shape without the generous help and continuous encouragement and support of: MOH for giving me time and scholarship.

Dr. Yehia Abed, for his extraordinary supervision and his meticulous revision. Dr. Abed El-Jabar El-Tibi for his guidance, and support. Dr. Ali Quader, Director General of Primary Health Care, for his support. Also, I am grateful to Dr. Suzanne Shasha'a for her guidance, support, and her valuable comments. My deep gratitude and acknowledgement are due to Dr. Abed El-Razek Salama. I also should acknowledge the support of Dr. Sami Abu El-Maati. My thanks go to Dr. Randa El Khodary, Director of Laboratory Department and Blood Bank in Gaza, and also to Mr. Ahmed Abu El-Nasser, Mr. Hashem Arafa and all other persons of Public Health Lab, for their help and carrying of Laboratory tests. I am also indebted to Dr. Fayez El Bahtity, Dr. Fouad El-Jamassi, Eng. Hosny El-Naggar from Food Control Department. I am particularly grateful to Dr. Akram Habeeb for editing the research. I do also acknowledge the support of the professors and all personnel of the School of Public Health, especially Mr. Sha'aban Mortaja and Mr. Sa'adi Abu Awad. For all of them I cannot but express my thanks and gratefulness.

Mahmoud Ahmed Humaid

- *Definitions:*
- *Bacteria: Living single-cell organisms. Water, wind, insects, plants, animals and humans can carry bacteria, which can thrive on skin, clothes and in human hair, as well as in scabs, scars, the mouth, nose, throat, intestines, and room-temperature foods (PAHO and WHO, 2001^a).*
- *Carcass: Means the whole of a bird after stunning, bleeding, plucking and eviscerating. However, removal of the kidneys, of the legs at the tarsus, or of the head is optional (Codex, 1976).*
- *Carrier: Person or animal having a specific infectious agent with no clinical signs of disease but capable of transmitting the agent (PAHO and WHO, 2001^b).*
- *Cleaning: The removal of soil, food residue, dirt, grease or other objectionable matter (Codex, 2003^a).*
- *Codex Alimentarius Commission: The Codex Alimentarius Commission was created in 1962 in a Joint FAO and WHO conference about food regulations with the objective of establishing a combined FAO/WHO program based on those regulations. Currently, the Commission has more than 153 member countries that represent almost 97% of the world's population. The Codex Alimentarius create food rules, and guidelines to be followed by the international community as established, with the purpose of protecting consumers' health and ensuring uniform international trade practices (PAHO and WHO, 2001^a).*
- *Contaminant: Any biological or chemical agent, foreign matter, or other substances not intentionally added to food, which may compromise food safety or suitability (Codex, 2003^a).*

- *Control Measure: Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level (Codex, 2003^a).*
- *Critical Control Point (CCP): A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level (Codex, 2003^a).*
- *Critical Limit: A criterion which separates acceptability from unacceptability (Codex, 2003^a).*
- *Cross-Contamination: Is the transmission of a biological, chemical, of physical hazard to a food through dirt, cleaning cloths, contact with other raw products, dirt, or the hands of food handlers (PAHO and WHO, 2001^b).*
- *Food Handler: Any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements (Codex, 2003^a).*
- *Food Safety: Assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (Codex, 2003^a).*
- *Food: Any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes beverages, chewing gum and any substance which has been used in the manufacture, preparation or treatment of "food" but does not include cosmetics or tobacco or substances used only as drugs (PAHO and WHO, 2001^a).*
- *Food-borne Outbreak: The occurrence of two or more people experiencing the same illness after eating the same food (PAHO and WHO, 2001^a).*

- *Giblets: Means the liver from which the gall bladder has been removed, the heart with or without the pericardial sac and the gizzard from which the lining and contents have been removed and any other material considered as edible by the consuming country, provided that all such material has been properly trimmed and washed (Codex, 1976).*
- *Good Agricultural Practice in the Use of Pesticides (GAP): Includes the nationally authorized safe uses of pesticides under actual conditions necessary for effective and reliable pest control. It encompasses a range of levels of pesticide applications up to the highest authorized use, applied in a manner that leaves a residue that is the smallest amount practicable. Authorized safe uses are determined at the national level and include nationally registered or recommended uses, which take into account public and occupational health and environmental safety considerations (HACCP). "Actual conditions" include any stage in the production, storage, transport, distribution and processing of food commodities and animal feed (PAHO and WHO, 2001^a).*
- *Good Manufacturing Practices: Pre-requisites program proceedings, including the, hygienic and sanitary basis needed to implement an adequate HACCP system (PAHO and WHO, 2001^a).*
- *HACCP: Hazard Analysis Critical Control Points is a system, which identifies, evaluates, and controls hazards, which are significant for food safety (Codex, 2003^a).*

- *Hazard Analysis: The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan (Codex, 2003^a).*
- *Hazard: A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect (Codex, 2003^a).*

Inspection: Is the examination of food or systems for control of food, raw materials, processing and distribution, including in process and finished product testing, in order to verify that they conform to requirements (Codex, 2003^b).

- *Inspector: Means a properly trained officer appointed by the controlling authority of a country for the purpose of inspection of meat and meat products and supervision of meat hygiene (Codex, 1985).*
- *Meat: the flesh of animals used as food including the dressed flesh of cattle, swine, sheep, or goats and other edible animals, except fish, poultry, and wild game animals (PAHO and WHO, 2001^a).*
- *Microorganism: A form of life that can be seen only with a microscope; including bacteria, viruses, yeast, and single-celled animals (PAHO and WHO, 2001^a).*
- *Pathogen: A microorganism (bacteria, parasites, viruses, or fungi) that is infectious and causes disease (PAHO and WHO, 2001^a).*
- *Personal Hygiene: Individual cleanliness and habits (PAHO and WHO, 2001^a).*
- *Poultry: in general means any domesticated bird including chickens, turkeys, ducks, geese, guinea fowls, or pigeons (Codex, 1976).*
- *Prevalence: Number of people suffering from a disease in a specific period of time (PAHO and WHO, 2001^b).*

- *Preventive Measure: any action or activity that can be used to prevent, eliminate or reduce a hazard to the health of the consumer. Preventive measures refers to sources and factors that interfere with hazards such as the introduction, survival and/or multiplication of biological agents and the introduction and permanence of chemical and physical agents (PAHO and WHO, 2001^a).*

Risk Analysis: A process consisting of three components: risk assessment, risk management and risk communication (Codex, 2003^b).

Risk Assessment: A scientifically based process consisting of the following steps: (1) hazard identification; (2) hazard characterization; (3) exposure assessment; and (4) risk characterization (Codex, 2003^b)

- *Salmonella: A bacteria belong to the family of Enterobacteriaceae. Rod-shaped, Gram-negative and non-spore-forming, Main sources of Salmonella are intestinal tracts of domestic animals, and humans (Adams et al 1999, Chin, 2000 and, PAHO and WHO 2001^b).*
- *Salmonellosis: An illness of humans caused by Salmonellae other than S. Typhi and S. Paratyphi and it is one of most common and widely distributed food-borne diseases. All human pathogens would be regarded as serovars within subspecies S. enterica. All people may contract Salmonella, but vulnerable groups of the population include infant, young children, elderly and immunosuppressed, where most deaths occurrence in those people (Chin, 2000).*
- *Standard Operating Procedure (SOP): A written method of controlling a practice in accordance with predetermined specifications to obtain a desired outcome (PAHO and WHO, 2001^a).*

- *Surveillance: The systematic recollection, verification and analysis of data and the dissemination of the information to those who need to know it in order to take actions (PAHO and WHO, 2001^b).*
- *Virus: A protein-wrapped genetic material that is the smallest and simplest life-form known, such as hepatitis A (PAHO and WHO, 2001^a).*

Zoonosis: Infection or disease which can be transmitted under natural conditions from vertebrates to man (PAHO and WHO, 2001^b).

Abstract

- *Salmonella is considered as one of the food-borne diseases, and poultry is the main source of Salmonella. This research is a cross sectional design study conducted to identify Salmonella prevalence in fresh, chilled, and frozen poultry (chicken and turkey). It included only worksites licensed by Gaza Municipality that were 32 small-scale places, only one semi automated slaughterhouse in Gaza and two companies dealing with poultry imported from Israel. Data was collected through direct interview and structured questionnaire, prepared by the researcher as well as testing 183 poultry samples. The questionnaire was scrutinized and validated by academic and specialists, and applied on pilot study and samples were examined in Public Health Laboratory of MOH in Gaza.*
- *The study showed that fresh, chilled and frozen poultry were contaminated with Salmonella, 19.2%, 18.8%, and 0.0% respectively, with a mean average of 16.4%. Fresh, chilled and frozen poultry that had total plate count exceeding level accepted by PS were 2.4%, 21.9%, and 3.8 respectively with average of 5.5%. The study also showed there was no statistically significant relationship between presence of Salmonella and total plate count, but there was a statistically significant relationship between Salmonella and Staphylococcus aureus and E. coli. In addition, it found there was a statistically significant relationship between Salmonella and location of workplaces where Sheikh Rodwan and Shati Camp areas were found to be the highest regarding Salmonella contamination (36.1%). Chicken were of higher contamination(19.1%) than Turkey(3.2%), which reached level statistical significance. The study demonstrated a statistically significant relationship between poultry contaminated with Salmonella, Staphylococcus aureus, or E. coli and type of workplaces where the semi automated slaughterhouse had lower contamination(4.2%) than small scale places (20.7%), but the difference was not a statistically significant with TPC. The study showed there was a statistically significant relationship between Salmonella in poultry and out door environment where workplaces with good out door environment had less Salmonella (5.6%). The study revealed also that there was a statistically significant relationship between Salmonella and methods used for pests control. It showed that places using chemicals for pest control had more contamination (27.7%) than places without any method for pests control (11.4%). Moreover, the study showed there is a statistically significant relationship between Salmonella and type of detergents used in cleaning equipments as liquid detergents reduced contamination. Finally, the study showed no statistical significance relation between Salmonella and worker's knowledge and characteristics or poultry breeding places. Places controlled by official organizations MOH and MONE, isolating sick poultry, providing with adequate amounts of water, and selling frozen and chilled poultry had less bacterial contamination.*
- *Based upon results, it can be recommended to establish central automated poultry slaughterhouses. As long as that goal will not be achieved in the near future, so it can be recommended to raise awareness of persons dealing with poultry processing for adopting good hygienic practices and improving outdoor*

environment. Imposing and enacting laws and regulations regarding inspection and surveillance of poultry carcasses and other food items for food-borne pathogens particularly Salmonella. For research purposes, it is recommended to carry out a larger and national wide similar studies to have registered national data about Salmonella, its serotypes and its prevalence in food items.

ملخص الدراسة

مدى انتشار السالمونيلا في لحوم الدواجن في مدينة غزة لسنة 2005

تعتبر السالمونيلا من أهم الميكروبات المرضية المنقولة للإنسان بالغذاء كما تعتبر الدواجن أهم مصادرها. هذه دراسة مقطعية أجريت بغرض التعرف على مدى انتشار السالمونيلا في لحوم الدواجن (الدجاج والحبس) الطازجة والمبردة والمجمدة وأحشائها، التي يتم إنتاجها في مرافق ذبح الدواجن سارية الترخيص أو سبق ترخيصها من قبل بلدية غزة سواءاً الصغيرة وعددها 32 والمذبح الكبير الوحيد وكذلك التجار اللذين يقومون باستيراد البضاعة من إسرائيل وتسويقها في قطاع غزة وعددهم 2. تم جمع المعلومات باستخدام استبيان منظم أعده الباحث وأجرى له التحكيم من قبل أكاديمي ن ومتخصصين بالإضافة إلى تطبيقه على عينة استطلاعية قبل بدء البحث. شملت الدراسة 183 عينة دواجن من مجتمع الدراسة وتم فحصها في مختبر الصحة العامة الخاص بوزارة الصحة بغزة. أظهرت نتائج الدراسة أن لحوم الدواجن الطازجة والمبردة وكذلك المجمدة ملوثة بالسالمونيلا بنسبة 19.2% و 18.8% و 0.0% على التوالي وبمتوسط إجمالي قدره 16.4%. كانت نسبة العينات المخالفة لارتفاع العدد الكلي للبكتريا فيها وفقاً للمواصفات الفلسطينية بنسبة 2.4% و 21.9% و 3.8% على التوالي وبمتوسط قدره 5.5%. أفادت الدراسة أنه لا توجد علاقة ذات دلالة إحصائية بين تلوث الدواجن بالسالمونيلا وزيادة العدد الكلي للبكتريا ولكن هناك علاقة ذات دلالة إحصائية إيجابية بين وجود السالمونيلا وعدد بكتريا ستاف أورييس وعدد اشريشيا كولاي. أوضحت الدراسة وجود علاقة ذات دلالة إحصائية بين وجود السالمونيلا وموقع محلات التجهيز والبيع حيث كانت مناطق الشيخ رضوان والشاطئ أعلى المناطق تلوثاً (36.1%) وكذلك بين تلوث الدواجن بالسالمونيلا ونوع الدواجن حيث كان الدجاج أكثر تلوثاً (19.1%) من الحبس (3.2%). أظهرت الدراسة أن هناك علاقة ذات دلالة إحصائية بين وجود ميكروبات السالمونيلا والستاف أورييس و الأشريشيا كولاي ونوعية مذابح الدواجن حيث كان المذبح الآلي أقل تلوثاً (4.2%) من المحلات الصغيرة (20.7%) بينما لا توجد علاقة بين العدد الكلي للبكتريا ونوعية المذابح. أظهرت الدراسة أن العلاقة بين تلوث الدواجن بالسالمونيلا والبيئة خارج محلات الإنتاج ذات دلالة إحصائية حيث كانت الأماكن ذات البيئة الجيدة أقل تلوثاً (5.6%) كما كانت العلاقة بين تلوث الدواجن بالسالمونيلا والإغلاق الجيد للمحلات ضد الآفات ذات دلالة إحصائية حيث الأماكن المغلقة أكثر تلوثاً (37.5%).