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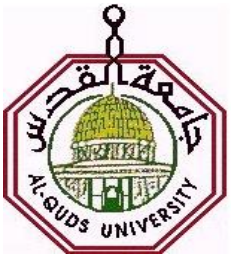

Assessment of the Status of the Non-Governmental Medical Supply Warehouses in Gaza Governorates

Submitted by

Mohammed Ismail Tabash

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Assessment of the Status of the Non-Governmental Medical Supply Warehouses in Gaza Governorates

Submitted by

Mohammed Ismail Tabash

B.Sc. Pharmacy, Al- Azhar University

Supervisor

Dr. Bassam Abu Hamad, Ph.D.

Assistant Professor-Al Quds University

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Assessment of the Status of the Non-Governmental Medical Supply Warehouses in Gaza Governorates

Prepared by: Mohammed Ismail Tabash
Registration No.: 20812764

Supervisor: Dr. Bassam Abu Hamad

Master thesis submitted and accepted.29/ 1 / 2011
The names of signatures of the examining committee members are as follows:

1. Dr. Bassam Abu Hamad	Head of committee	.....
2. Dr. Yehia Abed	Internal examiner	.....
3. Dr. Abed El-Naser Jaser	External examiner	.....

Jerusalem – Palestine
1432 / 2011

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 another universities or institutions.

Signed----------

Mohammed I. Tabash

29 January 2011.

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بسم الله الرحمن الرحيم

" فَأَمَّا الزَّبَدُ فَيَذْهَبُ جُفَاءً وَأَمَّا مَا يَنْفَعُ النَّاسَ فَيَمْكُثُ فِي الأَرْضِ كَذَلِكَ يَضْرِبُ اللَّهُ الأَمْثَالَ"(الرعد: 17)

Dedication

To My: Parents, Wife, Son, Daughters and Brothers

Mohammed Tabash

Acknowledgement

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ABSTRACT

Background: *Storage of medicine is one of the most important stages in the pharmaceutical and medical preparations management, which influences the quality and the effectiveness of these products.*

Aim: *To assess the storage system of the drugs, medical disposables and their management in the international, local NGOs and private warehouses in Gaza governorates in order to improve efficiency and effectiveness of the pharmaceuticals storage, management and subsequently its utilization.*

Methods: *The design of the study was descriptive, analytical, cross sectional one; the sample included all medical warehouses which belong to local and international NGOs and the private sector and all the employees working in these warehouses who had direct responsibilities in storage process. Data was collected through self-administered questionnaire completed by one hundred and five employees and checklist for fifty one warehouses. The response rate was 95% for employees and 98% for warehouses.*

Result: *Almost all warehouses had special areas for receiving and checking medical supplies and more than half of them had considered these areas as sufficient and 64% had no emergency doors; and 53% had no emergency alarm system. The study showed that 19% of employees had received training courses in store related work. More than 90% of employees had not written procedures for dealing with pharmaceuticals during emergency situation, 36% have antitheft security system, 41% of them kept controlled drugs in a separate storage space designated for this purpose. The majority of respondents (68%) reported that the medical supplies were always quarantined till the quality is checked. All employees in medical supply warehouses used first expire first out dispensing policy for medical supplies. Regarding environmental conditions, 58% of the warehouses had instruments to measure the temperature and 4% of the warehouses had an instrument to measure humidity. Computers were available in 82% of the surveyed warehouses and 29% of warehouses had a written regulation for receiving and distribution procedures. Of the surveyed warehouses, 77% had a vehicle to distribute drugs and disposables. Calculating the scores reflecting the favourable conditions and procedures indicate that international NGOs had elicited higher scores in all aspects pertaining to storage management cycle than local NGO and private warehouses and the differences between these warehouses were statistically significant , (p-value = 0.000). Also, the management cycle was better in warehouses that implemented training than those who haven't with statically significant differences (p-value = 0.015.*

Conclusion: *Warehouses need to pay attention to the commodity management cycle and to ensure the avalibility of safety measurements. Provision of training to employees dealing with the storage process is essential accompanied by monitoring and supervision.*

Table of content

List of Tables

List of Figures

Annexes

List of Abbreviation

CDS	Central Drug Store
FEFO	First Expire First Out
GDP	Good Distribution Practices
HVAC	Heating, Ventilation and Air-Conditioning
MAP	Medical Aid for Palestinians
MOH	Ministry of Health
MSF	Medecins Sans Frontiers
NGOs	Non-Governmental Organizations
INGO	International Non-Governmental Organization
PASSIA	Palestinian Academic Society for the Study of International Affairs
PCBS	Palestinian Central Bureau of Statistics
PNA	Palestinian National Authority
PNGO	Palestinian Non-governmental Organizations Network
PSF	Pharmaciens Sans Frontiers
PHC	Primary Health Care
OPT	Occupied Palestinian Territory
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNFPA	United Nations Populations Fund
UNRWA	United Nations Relief and Works Agency
WHO	World Health Organization

Chapter 1

1.1 Introduction

Maintaining appropriate storage conditions for health commodities is vital to ensuring its quality. Product quality are based on ideal storage conditions and protecting products' quality until their expiration date is important for serving customers and conserving resources (John Snow Inc., 2003). The central medical warehouse is an area where drugs and disposables are received, checked and stored, picked into orders for lower level depots and finally distributed (World Health Organization-WHO, 1993).

All buildings shall be maintained clean, large enough, constructed and located in a way to facilitate cleaning and maintenance of good storage conditions of drugs and drug products (Ahmed and Al Mansoori, 2005). All building shall be well-lighted and ventilated. All floors, walls, ceilings, tables and other fixtures shall be constructed of such materials that they may be easily cleaned (Siyoi, 2006). No litter, waste or refuse shall be allowed to accumulate in and around the building or yards. Waste shall be removed and disposed of in an approved manner (WHO, 2002).

Pharmacists or Pharmaceutical technologists bearing the responsibility for ensuring that products/materials are correctly handled, stored and distributed. They should have the education, training experience or combination of these elements that will allow them to effectively discharge this responsibility (Pharmaciens Sans Frontiers-PSF, 2003).

Controlled storage environments (deep freeze, refrigeration) should be monitored using suitable temperature recording devices and the records shall be filled and reviewed. Temperatures in other areas where goods requiring specific storage conditions are held should be monitored and the results tabulated and analyzed so as to demonstrate the suitability of these areas for their purposes (Siyoi, 2006).

Each medical warehouse should maintain a standard list of stock items that include all products they handle, with their specifications, including form, and quantity per package. The list should be regularly updated and distributed to sub-stores and units. Records of all stocks received, their sources, batch numbers, expiry dates and quantities received shall be maintained (WHO, 2004).

In this study, the researcher focuses on investigating the storage system of the drugs and medical disposables and their management in Non-governmental Organizations-NGO (other than the Ministry of Health-MOH) including International Nongovernmental Organizations (INGOs), local Palestinian NGOs, and Private Warehouses in Gaza Governorates. Finally the researcher will provide some suggestions to improve the process of commodity management.

1.2 Research Problem

Maintaining proper storage conditions for pharmaceutical products and paramedical is vital to ensure their quality, safety and efficacy. Successful store keeping is the ability to maintain the received drugs in the same quantity and quality until they are issued and to minimize stock holding costs while maintaining acceptable service level.

Since the start of Al-Aqsa Intifada in September 2000, the pharmaceutical sector has been suffering the consequences of the prevailing political situation, ranging from closure and siege imposed on the Palestinian people in Gaza Governorates to receiving huge amount of uncoordinated donations as what was happened during and subsequently after the war on Gaza. However the process of drugs and disposable storage at NGOs haven't been studied therefore it is necessary to investigate this issue in order to shed light on the current situation in NGOs warehouse storage system and the potential corrective measures.

1.3 Justification of the study

Three reasons can be given to explain why drugs stores need to be managed properly. Firstly, drugs are part of the link between the patient and health services. Consequently, their availability or absence will contribute to the positive or negative impact on health. Secondly, poor drug management, particularly in the public sector of developing countries, is a critical issue, but major improvements are possible that can save money and improve access. Finally, drugs are not only the responsibility of health workers; other players are important in this regard (Political, economic, financial and traditional considerations). Therefore, studying store status and systems is crucial for maintaining the appropriate functioning of any health system (WHO, 2004).

Non-governmental medical warehouses are considered a key component of the medical storage and delivery of pharmaceutical and medical preparation in Palestine (WHO, 2009). The level of quality should be maintained throughout the distribution network and medicinal products will reach general public in the appropriate place and time without any alteration of their properties and with minimum cost (Siyoi, 2006).

According to MOH in 2009 after the war on Gaza, large amount of drugs and disposable donations were received by the Central Drug Store (CDS) and many local and international NGOs. The donors did not always consider Palestinian guidelines and priority lists but provide what they had in their stocks. The majority of donations were delivered without any coordination with the Palestinian organizations. Many items were non-essential and the quantities of some items greatly exceeded the needs of Gaza. The control and coordination of the donations was further complicated by the fact that INGO and many local NGOs received drugs that did not pass through the CDS. Finally, although the CDS had a well-functioning stock-keeping program before the war on Gaza 2008, the large quantity of incoming donations exceeded their capacity to track them. In addition, many

challenges appeared for example unsuitability of some donations warehouses for drugs storage and inadequate qualified employees and absent of training program about good storage practice lead to damage of some drugs and disposables (MOH, 2009). Due to ineffective storage system, many of the donated items were damaged even before its use and it was impossible to effectively use all the donated items although the health system needs them; simply because of the bad storage conditions (WHO, 2009).

In 2004, the study of Al-Geeg was conducted in governmental central warehouse. So it was important to conduct this study to assess nongovernmental medical warehouse and to identify strength and weakness aspects in these medical warehouses.

1.4 Research objectives:

1.4.1 General objective

To assess the storage system of the drugs, medical disposables and their management in the international NGOs, local NGOs and Private warehouses in Gaza Governorates.

1.4.2 Specific objectives

- To assess the suitability of NGO's medical warehouses for drugs and medical supplies storing.
- To evaluate stock conditions and work systems at the investigated warehouses.
- To ascertain areas of strengths and weaknesses in the storage system.
- To examine variations in stock conditions and management systems in reference to the characteristics variables of the investigated warehouses and the staff working there.
- To provide recommendations to improve the process of storage.

1.5 Research questions:

- Are NGOs medical stores suitable for drug and medical supplies storage?
- Are the storage conditions in NGOs warehouse accepted according to the international standards?
- Are the stock control procedures in NGOs warehouse acceptable according to the international standards?
- Are there adequate safety measures in NGOs warehouse?
- Are there proper security systems in NGOs warehouse?
- Are the stock distributions system in NGOs warehouse accepted according to international standard?
- Are there differences between storage systems in NGOs?
- What are the main point of strengths and weaknesses in storage system?
- What are the recommendations and interventions needed to improve drug and medical supply storage process?

1.6 Context of the study

In order to understand the storage system in an appropriate way and to be aware of the settings of warehouses provided in the Gaza Strip, the researcher introduces the following characteristics that may influence medical supply storage system in general and drugs storage in particular.

1.6.1 Socio-demographic context

Palestine constitutes the southwestern part of huge geographical unity in the eastern part of the Arab World, which is Belad El Sham. In addition to Palestine, Belad El Sham contains Lebanon, Syria, and Jordan. So, Palestine has common borders with these countries, in

addition to Egypt. The entire area of Palestine is about 27000 sq. kilometers (Annex 1). Now, the remaining part of historical Palestine comprises two areas separated geographically: West Bank and Gaza Strip" (Palestinian Academic Society for the Study of International Affairs-PASSIA, 2009).

Although the Gaza Strip (Annex 2) is a narrow piece of land that is located on the coast of Mediterranean Sea, its position on the crossroad from Africa to Asia made it strategic for occupiers over centuries (PASSIA, 2009). By the end of 2010, about 4 million Palestinians were living in the Palestinian Territory, of them 2.5 million were in the West Bank and 1.5 million in the Gaza Strip (Palestinian Central Bureau of Statistics-PCBS, 2009). According to data available in 2009, the percentage of the refugee population in the Palestinian Territory is 45.0% of the total Palestinian population living in the Palestinian Territory, 18.8% in the West Bank and 26.2% in the Gaza Strip; the refugee population is distributed by the region at 30.2% in the West Bank and 69.2% in the Gaza Strip (United Nations Relief and Works Agency- UNRWA, 2008).

The Gaza Strip is a crowded place with area of 365 Sq. km. which constitute 6.1% of total area of Palestinian territory land and considered one of the most populated places on the earth (PASSIA, 2009).

After Oslo Accords, it was expected that the Palestinian economy will go through a period of steady and rapid growth (World Bank, 2002). Economic changes such as high levels of poverty and unemployment, accompanied by insufficient financial support that leads to many financial and administrative problems in the health sector (MOH, 2009). In 2006, the gross national product decreased by 4.8% while unemployment rose to around 22%. The poverty level was more than 65% (49% of the population in the West Bank and 79% in the Gaza Strip, of whom 47% suffer from extreme poverty) (World Bank, 2007). It is

very difficult for individuals to pay health expenses, laying yet another burden on the MOH, UNRWA and NGOs providing free services (MOH, 2009).

According to the education indicators in Palestine, we can conclude that Palestinian community is a well-educated one and that Palestinians have always highly appreciated education (MOH, 2005).

Israel's blockade of the Occupied Palestinian Territory-(OPT) was reinforced following the announcement of the results of the elections which took place in January 2006, and has been intensified once more in the Gaza Strip since June 2007. On 19 September 2007, the Israeli occupation government issued a decision by which it considered the Gaza Strip a hostile entity, and on 20 June 2007, the International Committee of the Red Cross announced that the Gaza Strip was facing a critical humanitarian crisis (WHO, 2009). The closure of the borders by the Israeli Occupation has caused many problems for procuring drugs, while shipments from Egyptian suppliers have been affected by drug registration requirements in Israel. Delays and the limited availability of local production means that they need to procure through Israeli middle agents and this adds to delaying and increasing costs (Mother Child Health and Nutrition Project- HANAN, 2005).

1.6.2 Health system and health status

Four main providers provide the residents of Gaza with health services: the MOH, UNRWA, local NGOs and the private sector. Health care is provided through a three-tier system, consisting of primary health care (PHC) clinics, secondary and tertiary health care facilities. MOH and UNRWA have a large network of PHC clinics (WHO, 2009). 59 clinics are run by MOH, 20 by UNRWA, and a few additional clinics are run by local NGOs (MOH, 2010). With regard to secondary and tertiary health care, Gaza has 24 hospitals with 2003 beds, 12 of which are MOH ones with 1587 beds, while 10 are NGO

owned with 382 beds and 2 are private with 34 beds (United Nations Development Programme-UNDP, 2010). MOH is the only health authority responsible of supervision, regulation, licensure, and control for all health services (MOH, 2005). Medical various local, international NGOs and the private for profit health sector are considered also an important provider of health services in Palestine (MOH, 2003).

PHC is one of the most important components of the Palestinian health care system. PHC centers provide accessible and affordable health services for all Palestinians, especially for children and other vulnerable groups (MOH, 2005). MOH is working with other health sectors in providing the primary health services, mainly NGOs organizations. It is worth mentioning that the private sector plays an important role in providing PHC services to the Palestinians (MOH, 2005). Hospitals and the other for mentioned components of Palestinian health care system are also of key importance for the effective and complementary performance of the Palestinian health care system (MOH, 2005).

Palestinians in the West Bank and the Gaza Strip receive one of the highest levels of aid in the world (World Bank, 2008). INGOs work with Palestinian National Authority (PNA) and local NGOs to support humanitarian assistance, critical needs and protect the lives of civilians in Gaza, in particular children and the essential infrastructure that supports them in accordance with international humanitarian law (Global Ministries, 2006). They provide health, treatment and precaution services in all the areas of Palestine. They execute programs of rehabilitation for the disabled persons, psychological programs for women and children and programs of enlightenment about the danger of drugs (Lawry, 2009). INGOs supervise a number of hospitals and clinics and offered free services for the poor people (NGO Global Network, 2010).

INGO such as UNRWA centers provides family based preventive and curative care to the registered refugee population. It has a well-functioning health information system covering

both disease surveillance and family records. UNRWA centers also tend to have a more reliable supply of drugs, including a good buffer stock of essential drugs (UNRWA, 2009). The provision of medicines INGO such as UNRWA's health centers is a high priority for 2010. An estimated $20 million is needed to purchase all the required medicines for the Agency's 137 healthcare facilities including 20 ones operating in Gaza (UNRWA, 2010). According to WHO (2009), many INGO are provide health services donations especially after the war on Gaza December 2008. The researcher included the INGOs that run warehouses such as:

- Médecins Sans Frontières (MSF) has donated drugs and medical material to all MOH hospitals in Gaza.
- Islamic Relief is donating drugs and medical supplies plus performing infrastructure and capacity building projects.
- Medical Aid for Palestinians (MAP) is working with community-based organizations and distributing emergency materials, nutritional supplementary kits, hygiene kits and other items. MAP has produced a situation report on the CDS in the Gaza Strip.
- United Nations Children's Fund-UNICEF) is focusing on children and mothers, donating medical and nutritional supplies to NGO partners and to the MOH in addition to advocacy, capacity building and technical assistance. Some of these INGOs have health facilities and medical warehouses, which have and receive huge amount of drugs and disposable donations that need to proper storage management to ensure their quality, safety and efficacy.

Local NGOs in the countries over the world provide various services. They work as direct providers of services in cooperation with the state or by contracting with them in some countries. Local NGOs provide the services in vulnerable areas where the governmental

services are weak. They provide health services and rehabilitation, whether preventive, therapeutic or promotional services (Akbar-Zaiddi, 1999).

Local NGOs work in high-risk conditions, and provide services to poor people, people who live in remote areas, rural communities, especially women and the disabled as a result of political conflicts (Barnes, 2000). In some countries, local NGOs does campaigns to influence on public policy and health policy, such as campaigns for safety on the roads and stop smoking, and reproductive health and AIDS prevention (Ellevset, 1999)

While others see local NGOs as a bridge between the donors and the external resources of INGOs on the one hand and national programs on the other hand (Lopes de Carbalho, 1998). Also, some local NGOs play an important role as provider of basic services, as services of PHC and rehabilitation based on community and mental health programs and health education (MAP, 2009).

Palestinian NGOs represent a main source in terms of policy and planning, coordination and exchange of information (Giacaman and Abdul Rahim, 2003). Local NGOs in the Gaza Strip provide various health services, whether through primary or secondary health care through 57 PHC and 10 hospitals that includes 399-bed which represents 19.4% of the total number of beds in hospitals in the Gaza Strip (MOH, 2008) .

A study of the Institute of Bissan indicates that local NGOs provide all the services provided by the MOH with the exception of vaccinations. NGOs' centers provide 7.1% of the total routine tests in the West Bank and the Gaza Strip, 8.2% of the emergency services, 10.4% of specialized services, 7.4% of maternity services, 20.7% of health education activities, 24.8% of mental health services, 19% of physical therapy services (Bisan and word bank, 2006).

According to the reports of the PCBS, the NGOs provide 3 % of family planning services; while UNRWA provides 50% and the MOH 17% and the private sector provide 30% of the service to users of family planning services (PCBS, 2007).

The study conducted by Yaghi (2009) about the role of Palestinian health NGOs in the Gaza Strip for health system promotion showed that the number of health local NGOs in the Gaza Strip are 42 organizations, but their distribution in the five governorates of Gaza was disproportionate to the percentage of the population in each governorate. Approximately 7% of NGOs works at the national level, 52% of them addresses women, and 62% of these NGOs providing PHC services, 16.7% provide services of secondary health care, through 49 center for PHC, 7 hospitals and 23 centers included a physiotherapy centers, centers for hearing and speech, rehabilitation centers, two centers for the blood bank and one Centre for patients affected with thalassemia. The total numbers of beds in these hospitals followed to NGOs are 287 beds (Yaghi, 2009).

Several local NGOs base their drug distribution activities on their own restricted drug list. For their drug supply they tend to rely on donations from INGOs and other organizations. However, when in need, they buy from local manufacturers and wholesalers. Local NGOs charges nominal fees for drugs. Reliable data on their drug expenditures are not available and are difficult to obtain, but they are estimated at around US$ 8 million a year (WHO, 2000).

The Palestinian Pharmacy Practice laws require that drug stores and community pharmacies to be owned and supervised by registered and certified pharmacists and that the certificate of the drug store, community pharmacy to be clearly visible (MOH, 2004).

Most community pharmacies in Palestine are private and the main medical supply through private drugs store (MOH, 2002). Private pharmacies purchase drugs and medical supplies directly from local pharmaceutical manufacturers and from many drug wholesalers

distributed in the Gaza Strip (EMRO, 2006). It is estimated that in 1995-1996, private pharmacies sold drugs and disposables totaling NIS 60 million (approximately US$ 20 million) (WHO, 2000).

There are seven drug factories in Palestine. Drug factories produce 1,006 medical products. The wholesalers charge a profit of 8-10% on the ex-factory price, Pharmacy charge 30%, and the client pay VAT of 14.5% on the whole sale price (EMRO, 2006).

There is inadequate national regulatory authority that inspect private drugs sector periodically (WHO, 2000). Local factories have to register their products in the MOH before selling to the market (MOH, 1998). There is no price control for generics in Palestine. All local medical products have a fix sale price from the factories. This arrangement is not related to MOH control (Jaradat and Sweileh, 2003).

MOH purchases the pharmaceuticals from private sector by national bidding following the regular bidding mechanisms. Agreement for purchasing is given by a special purchasing committee in the MOH. The drug committee in the ministry approves the requested types and amounts after studying all requests from PHC and Hospital departments. MOH gives the order for receiving samples from all to be tested and after the positive results of drug quality the MOH receives medicaments from the bidding winner to CDS in the West Bank and the Gaza Strip. The purchased drugs distributed in quarterly bases to the PHC and Hospital headquarters, to be finally distributed to the hospitals and PHC clinics (WHO, 2000).

However there is inadequate supervision, inspection and few databases regarding medical supply storage in private warehouses in Gaza Governorate. So it is necessary for investigation in order to shed light on the current situation in private warehouse storage system.

In Palestine, the crude death rate is 2.6 per 1000 population. The Infant Mortality Rate is 25.3 per 1000 live births (41 in Egypt and 22 in Jordan) (MOH, 2010). The leading causes of adult death are similar to developed countries including cardiovascular diseases and cancers with a high prevalence of stress and psychological trauma related diseases. On the other hand, diseases of poverty are still prevalent such as respiratory infections and diarrhea diseases that remain important causes of child mortality and morbidity (MOH, 2010). Thus, it could be said that despite the harsh difficulties facing Palestinians, their health status is relatively good compared with other countries at a similar level of economic development.

The quality of health care in Gaza has deteriorated over recent years because of the closure and political turmoil (UNDP, 2010). The shortages of functional medical equipment and supplies, lack of training and limited professional exposure to international standards are some of the factors causing the standards of storage to be lower than acceptable (WHO, 2008). During the last Israeli military strike in 2008, the quality of health care was further affected by structural damage to health facilities, disruption of public health services and exhaustion of the health staff and resources (WHO, 2009).

After the Oslo Accords, the PNA became responsible for the health system in OPT The MOH of the PNA received large amounts of donor funds, but it was unable to develop a coherent health policy and plan, partly because many donors were more interested in infrastructure projects than planning and management of the services (WHO, 2009). The Ministry's efforts were also hampered by the increasingly difficult economic situation, poor management and restrictions imposed by Israel. Lack of control over water, land, environment and movement between Gaza and west bank made a public health approach to health system development difficult (Giacaman, 2009). The blockade accelerated the degeneration of health system. While the main factor has been the closure of the border

crossings by Israel, the deteriorating economy, and a strike undertaken by Palestinian health workers from September to December 2008 also contributed. During this period, the maintenance of facilities and equipment and the supply of consumables have not met the needs, and the health personnel have not been able to keep up their skills and knowledge (WHO, 2008).

1.6.3 Drug supply and pharmaceuticals

The government drug warehouse in Gaza CDS is the key distribution point for drugs (WHO, 2008). Availability of medicines has shown constant shortages during 2008. In December, 2008 over 100 items on the list of 459 essential drugs and 236 consumable items were out of stock. The CDS has not been able to maintain a buffer stock of minimum six months supplies. The stocks will therefore be quickly depleted if there is an unusual increase in the demand (WHO, 2009).

After the end of Gaza war in January 2009 the MOH and donors responded rapidly by delivering large volumes of supplies within days to address immediate shortages. Further supplies were delivered, including large volumes of donations. The volume of donated supplies was so big that the CDS had to find 36 temporary warehouses to store them. In spite of the rapidly improving stock situation, the distribution of drugs to the hospitals was difficult because of lack of freedom of movement and insecurity (Palestinian Nongovernmental Network -PNGOs, 2009).

As so often in the case of a crisis, the donors did not always respect the donor guidelines and priority lists but supplied what they had in their stocks. The majority of donations were delivered without any coordination with the MOH. Many items were non-essential. The quantities of some items greatly exceeded the needs of Gaza (e.g. 50 % of the donated drugs were antibiotics). The problem was compounded by the fact that the MOH in

Ramallah and the de facto health authorities in Gaza sometimes had different priority lists (WHO, 2009). Some donors made direct contact with health care facilities and received yet another list of priorities. The control and coordination of the donations was further complicated by the fact that many NGOs organizations received drugs that did not pass through the CDS (United Nations Populations Fund UNFPA, 2009). Large quantity of incoming donations and the need to deliver large volumes of supplies very rapidly to the health care facilities exceeded their capacity to track them (WHO, 2009).

The CDS has 5,000 tons of drugs in its warehouse that have already expired or will expire before they can be used. Although the CDS has given some such items to the NGOs and private sector, lots of drugs will have to be disposed of, draining the resources of the CDS. Due to the limited capacity of the Al Shifa incinerator, these drugs will have to be encapsulated and dumped at a general landfill (MOH, 2010).

Currently Supplies of drugs and disposables have generally been allowed into Gaza. However, there are often shortages on the ground mainly because of shortfalls in deliveries (WHO, 2010).

1.7 Operational definitions

Medical warehouse: In this study, the researcher adopted and assessed the warehouse and refers here to a place where drugs and disposables are received, checked and inspected, stored, picked into orders for lower level depots and finally distributes (WHO, 1993).

Non-governmental organization (NGO) is profit or non-profit organizations, which are based on a local, national and/or international by laws. The researcher classified the NGOs for three main warehouses according to the owner; International NGOs, private and local NGOs-Palestinian.

An international nongovernmental organization (INGO) is an association of organizations or individuals that work worldwide. In this study, the research included all INGO provide health services and have medical supply warehouse in Gaza Governorates including UN related agencies and other benevolent, charity and other international organizations.

Local NGO is a Palestinian organization registered in the Ministry of interior as non-profit organizations-usually charity oriented, which are based on Gaza Governorates and provide health services and have medical supplies warehouse in Gaza Governorates.

Private: For profit organizations/companies which are prepared for the import of pharmaceutical and/or purchase of and/or storage and/or the distribution and/or the sale of medicines and materials, pharmaceuticals and assignments initial medical wholesale pharmacies and/or any other licensed for the circulation of medicines (MOH, 2006).

Medicines (Drugs): Any material acknowledged registered in the pharmacopeia, also any material used to diagnose, or cure, or treat or to help any human or animal disease, or any non-food material intended to impact the human body or an animal with respect to environment or vital functions of any of them (MOH, 2004).

Chapter 2: Literature review

2.1 Conceptual Framework

The researcher built up this conceptual framework that addresses the major aspects of this study after reviewing the available literature about the concept under investigation. The approach adopted by the researcher has been constructed around identifying all categories forming the dimensions of warehouses systems and conditions, which are approved by WHO and other international organization in order to increase efficiency and effectiveness of warehouses. These dimensions have considered all dimension affecting the receiving process, storage condition, ancillary area, safety and security, storage method, drugs position, instrument used, information system, stock control and arrangement.

This study will describe the situation of nongovernmental warehouse by reviewing these dimensions and the utilized management arrangement (Figure 2.1).

2.2 Component of the conceptual framework

Warehouse premises: Premises and other areas to be utilized for storage purposes should comply with the prescribed minimum standards. They should be located, constructed and maintained so as to protect the stored materials, from all potentially harmful influences such as undue variations of temperature and humidity and dust etc. these including things such as warehouse constructions, ancillary area, and warehouse area.

Personnel: Personnel who carry out supervision and/or controlling functions should possess the necessary integrity, knowledge, training, experience and qualification. Each store should employ sufficient staff of a quality and experience appropriate with their individual responsibilities and the operations carried out.

Safety and security: Safety and risk reduction measures, which must include procedures for the handling, transportation, usage and disposal of highly flammable liquids, toxic and corrosive materials. Including things such as inflammable drugs store, emergency doors, safety alarm and antitheft security system must comply with the appropriate guide to be safe working.

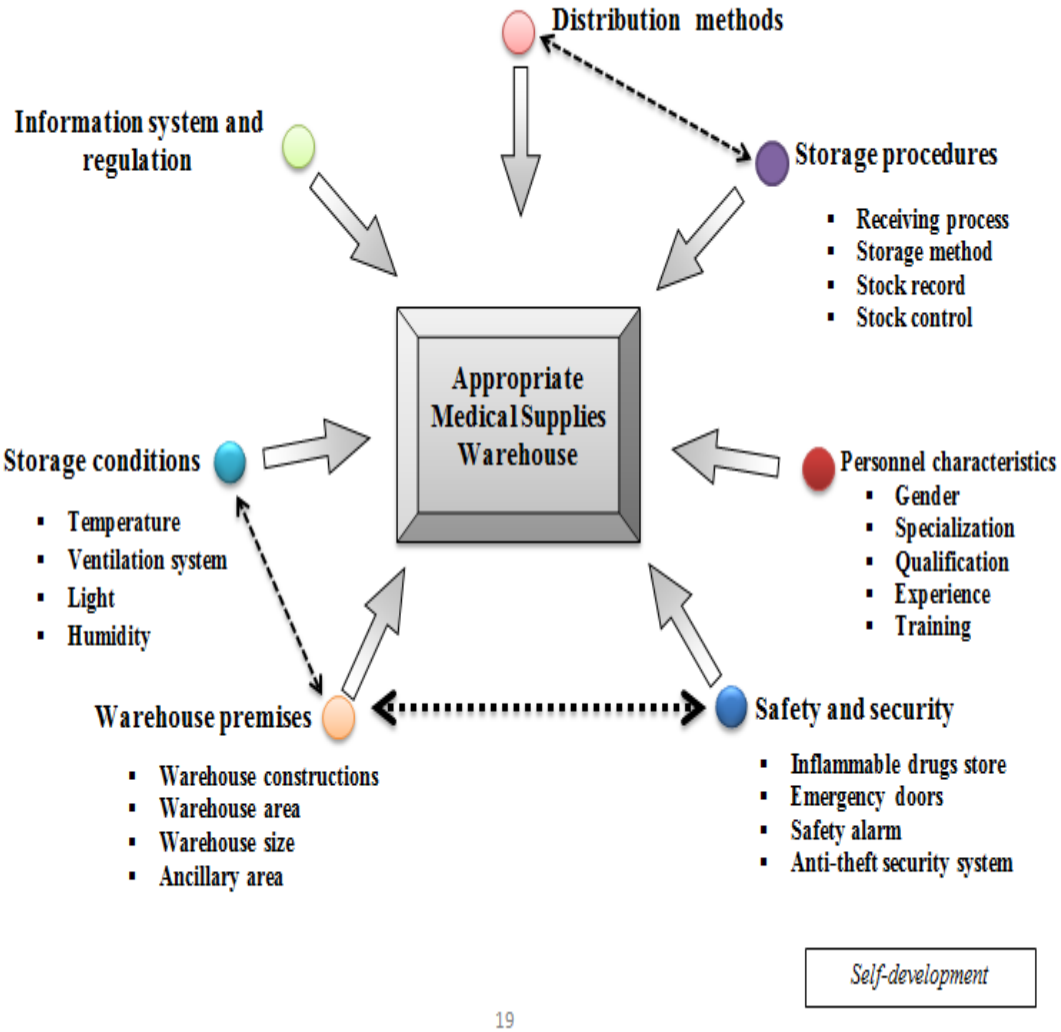
Storage procedures: Factors to be taken in consideration for proper storage, which including things such as receiving material, stock positions, and stock control. Upon receipt, each incoming delivery should be checked against the relevant documentation and physically verified by label description, type and quantity, against the relevant purchase order information.

Information system and Regulations: computerized system that facilitate the efficiency of procedures in pharmaceutical procurement and speed up complex tasks, increase accuracy and automate repetitive tasks, where regulations are controlling employee's performance by rules or restrictions. Regulation can take many forms: Legal restrictions promulgated by a government authority, self-regulation by an industry such as through a trade association and international regulations imported by international organization such as WHO, PSF etc.

Storage Conditions: The conditions specified for storing the product including thing like temperature, humidity etc.

Distribution process: The division and movement of pharmaceutical products from the premises of the manufacturer of such products, to the end user thereof, or to an intermediate point by means of various transport methods. Vehicles and equipment are used must be ensure the quality of the pharmaceutical product.

The study conceptual framework



19

The medical warehouse is an area where drugs and disposables are received, checked and inspected, stored, picked into orders for lower level depots and finally distributed (WHO, 1993).

Medical supplies storage is an important activity in the integrated supply-chain management of pharmaceutical products. Various people and entities are generally responsible for the storage and distribution of such products (Siyoi, 2006). Successful storage is the ability to maintain the received drugs in the same quantity until they are issued and to minimize stock holding costs while maintaining acceptable service level (Kareem and Taha, 2005).

2.3 Warehouse premises

2.3.1 Warehouse construction and location

Warehousing of pharmaceuticals should be carried out in buildings or parts of buildings that have been built for, or adapted to, this purpose. It must be located, designed, constructed, adapted, and maintained to suit drug and medical supply storage and should provide protection for the pharmaceuticals from contamination and deterioration, including protection from excessive local heating or undue exposure to direct sunlight. The pharmaceuticals received or dispatched at receiving areas or dispatch bays/ platforms should also be protected from dust, dirt and rain (WHO, 2003).

Pharmaceutical warehouse intended to enable the fastest and cheapest transport of drugs and medical equipment from suppliers to beneficiaries. Materials and pharmaceutical products should be stored off the floor and suitably spaced to permit cleaning and inspection and should be easily accessible, well situated, well laid out, tidy, clean and well secured (PSF.2003).

The store must be accessible to all suppliers and the health facilities or units to be served. Ideally, a medical store should be located by itself on a separate lot to enhance security, ensure road access for the largest vehicle that might ever need to come to or return from the store, if the construction of storage area is in an already established building, the storage area shall be selected to be separated from other areas. Build the store on a raised foundation to allow rainwater to drain away from the store (Siyoi, 2006). Storage facilities must have the capacity for both storage and handling. Ideally, space should be even divided between the two. When designing a new facility, do not underestimate the storage requirements. Plan the medical store with staging areas for preparing shipments (issuing) and unloading deliveries (receiving), separate the receiving and shipping areas to avoid confusion and to enhance efficiency and security (Kareem and Taha, 2005). A suitable site must satisfied all the requirement, be economical to build on, have convenient access for vehicles and staff, be in a secure place, be adequately served by utility and communications, and potential for future expansion (Quick, et al., 1997).

There is different type of warehouses layout, which leads to different effects, sometime improved accessibility, and some time capacity is expanded. So it is necessary to choice suitable layout that gives required extension whilst minimizing disturbance to the operations. However inward entrance should be differing from outward entrance to avoid disturbance between receiving and distribution process (WHO, 1993). There is study done in governmental warehouse showed that all medical supply was flown from the same entrance which increase accessibility but also increase disturbance in receiving and distribution process (AL-Geeg, 2004).

2.3.2 Warehouse size

The average takeoff of all clinical facilities for a given delivery interval will determine the volume to be delivered down through the system. Assume that 200 clinical facilities consume a total of 1,000 m3 during a three months interval, and that they are served by few district warehouses, each of these must be capable of holding an average of 250 m3 a piece plus room for safety stock; the central warehouse must hold at least 1,000 m3 plus safety stock (**Ebied et al., 2004).** The warehouse area must be more than 500 m2 to be sufficient for all storage practice (Good Distribution Practice-GDP Egypt, 2009).

The study done in governmental central warehouse showed that store size was insufficient to store the required stock. So some warehouses need to restructure building to compass all stocked drugs and disposable according to good storage practice (Al-Geeg, 2004).

2.3.3 Warehouse area and design

Storage areas should be of sufficient capacity to allow the orderly storage of the various categories of pharmaceutical products, namely bulk and finished products, products in quarantine, and released, rejected, re- turned or recalled products (WHO, 2006).

Drugs and disposables must be stored within each zone in the store so that they easily accessible, and protected from damage. There are four basic ways to store goods: shelves, floor pallets (pallet standing), pallet block stacking, and pallet racks. Direct storage of cartons on the warehouse floor should be avoided because their contents may be damaged by moisture (WHO, 1993).

For easy movement the warehouse should be used one-floor layouts with minimal interior partitioning to decrease limitations of stock arrangement and have the capacity for both storage and handling. Ideally, space should be evenly divided between the two (John Snow Inc., 2003).

Warehousing can be defined by three functions, the first is receiving goods from a source; the second is storing goods until they are needed by a customer (internal or external) and the third is retrieving the goods when requested. Storing material for an internal customer implies the need for work-in-process storage, whereas storing goods for an external customer may imply the need for finished products storage. However, the functions of warehousing remain the same and successful warehouse layouts must accomplish the following objectives, regardless of material being stored: maximize the use of space, maximize the use of equipment, maximize the use of labor, maximize accessibility to all items, and maximize protection of all items (Lambert, 2005).

When looking at a warehouse, consider the need for large aisles. It will be necessary to drive a forklift between aisles in order to move heavy equipment. A forklift must be able to move in and out of aisles; therefore, adequate space must be provided. The aisle space will be dependent on the size of the forklift and other equipment (Biron, 2000).

The walls and floors of a medical store should be permanent and smooth for easy cleaning. Walls preferably should be constructed of brick or concrete blocks. Perforated or bored bricks might be used for the upper portion of the wall to allow ventilation, but these should be screened to prevent the entry of rodents and other pests. Construct or treat floors of larger facilities to ensure they can withstand the frequent movement of heavy products and equipment and it should be done with the guidance of an engineer (John Snow Inc., 2003).

Governmental central warehouse had insufficient area for receiving items, assembly area, distribution area and unprotected receiving bay from weather (Al-Geeg, 2004).

2.3.4 Ancillary area

A well planned medical store should have ancillary area annexed to the main store. Adequate offices situated to permit good supervision of store, sufficient packing, receiving

and dispatch areas, and providing space for stock records and other administrative operations. Stores must include staff welfare space including adequate washrooms together with any other facilities that needed. Receiving and dispatch bays are needed, with adequate space for loading and unloading, and of a height suitable to height of vehicle to be used. Receiving and dispatch bays should protect materials from the weather (WHO, 2003).

An area adjacent to the receiving bay is used for checking, inspection, bulk breaking and palletizing goods for storage. An area is needed for assembly orders where the drugs have been picked can be packed for dispatch and for assembled orders to be kept. Also there must be space for storage for unused pallets, shelving component, waste packing and reusable or disposable delivery containers and for storage of charging battery powered handling equipment's (WHO, 1993). Receiving and dispatch bays are needed should be sufficient for all shipment and had adequate space for loading and unloading, and had suitable height to height of vehicle (PSF, 2003).

2.4 Personnel

Employees should receive initial and continuing training relevant to their tasks, and be assessed as applicable, in accordance with a written training program (MOH, 2009).

There should be a sufficient number of qualified and appropriately trained personnel for the activities performed. The number of staff members required depends on the number and complexity of the trials performed (Ebied et al, 2004).

As systems and equipment become more complex, greater skills are needed to operate a modern warehouse. Progressive warehousing organizations now train their staff at all levels in practical and organizational skills that will improve the efficient running of their business. Training may be offered externally or in-house (Siyoi, 2006).

The benefits of training are to improve health and safety to minimize accidents and increase cost of an organization in lost working time and compensation. Training in good warehouse practice and in safety measures can reduce the risk of accidents and avoid threats to health. All warehouse operations, physical and managerial, can be made more efficient through proper training. Greater efficiency will reduce costs (WHO, 2006).

Specific training in how to care for different types of stock will prevent deterioration due to poor storage and handling. Millions of dollars are wasted every year in lost stock and, because of the delays this causes, in interrupted production and lost sales (Siyoi, 2006).

Training is necessary because it should result in changes in work behavior that lead to an improved and efficient function system so we must shed light about the benefits of training program and initiate effective on job training and onsite training program (Quick et al., 1997).

2.5 Safety and security system

2.5.1 Inflammable drugs store

Products containing toxic and/or flammable substances should be stored and transported in suitably designed, separate and closed containers (WHO, 2006).

Products comprising highly active and radioactive materials, other dangerous medicines and substances presenting special risks of abuse, fire or explosion (e.g. combustible liquids, solids and pressurized gases) should be stored in safe, dedicated and secure areas, and transported in safe, dedicated and secure containers and vehicles (PSF, 2003).

Some flammable liquids commonly found in health facilities include acetone, anesthetic ether, alcohols (before dilution), and kerosene. Store large supplies of flammables in a separate location away from the main storeroom, preferably outside the main storeroom but on the premises and not less than 20 m away from the other buildings. Firefighting

equipment should be easily available. Large supplies of flammables should never be stored in the same areas as medicines (WHO, 2003).

A small stock of flammables may be kept in a steel cabinet in a well-ventilated area, away from open flames and electrical appliances. Mark the cabinets to indicate that they contain highly flammable liquids, and display the international hazard symbol. In addition, the shelves of the cabinet should be designed to contain and isolate spillage and store flammables in their original container (Siyoi, 2006).

Each flammable liquid have a flash point, which is the minimum temperature at which the liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. The flash point indicates the susceptibility to ignition for example Acetone and anesthetic ether have a flash point of –18°C., Undiluted alcohols have a flash point of 18° to 23°C., The flash point for kerosene is 23° to 61°C. It is not necessary to store flammables below their flash point, but it is very important to store them in the coolest location possible and never in direct sunlight. It is important to control the evaporation rate and avoid the build-up of pressure (John Snow Inc., 2003).

2.5.2 Emergency doors

Clearly mark emergency exits and check regularly to be sure they are not blocked or inaccessible (WHO, 2003)

Fire exits, corridors, walk-ways, doorways and other points requiring immediate access must be clearly defined and kept free from obstruction and litter. Regular fire evacuation drills must be carried out (Ebied et al., 2004).

2.5.3 Safety alarm

To prevent damage to products from fire make standard fire extinguishers available in every storage facility according to national regulations ,Visually inspect fire extinguishers every 2–3 months to ensure that pressures are maintained and the extinguisher is ready for use. Service fire extinguishers at least every 12 months, place smoke detectors throughout the storage facility and check them every 2–3 months to ensure that they are working properly and display fire precaution signs in appropriate places in the storage facility especially locations where flammables are stored (John Snow Inc., 2003).

For good storage practice and safety works, the trained staff should be selected to form a fire fighting team who are capable of using the equipment available effectively in the site. Safety and risk reduction measures, which must include procedures for the handling, transportation, usage and disposal of highly flammable liquids, toxic and corrosive materials, must comply with the appropriate guide to be safe working also comply written procedures, which deal with emergency status (Ebied et al, 2004).

2.5.4 Anti-theft security system

Sufficient security should be provided to prevent theft and other misappropriation of products. Steps should be taken to prevent unauthorized access to pharmaceutical products during transport. Pharmaceuticals are small, valuable, and therefore prone to theft. The store should be designed with security in mind. A strong security system can minimize shortage, minimize abuse or misuse, and contribute to accurate record keeping on drug consumption and disease prevalence (WHO, 2005).

The cost of security precautions should be related to the social environment in which the facility is situated and the value and nature of the goods used. Where large or significant

quantities of valuable materials are held or where theft is prevalent, 24 hour security coverage should be provided (Ebied et al, 2004).

2.6 Information system and regulations

The use of computers can facilitate, but not replace, efficient procedures in pharmaceutical procurement. When implemented appropriately, computerization will speed up complex tasks, increase accuracy and automate repetitive tasks. Staff must be trained adequately in the use of computerized systems. Many aspects of procurement are suitable for computerization, including planning of requirements, budget management, and financial analysis, preparation of documentation and reports and inventory control. Hard copies (printouts) should be produced as required to provide documented evidence of the activities. Where computer systems are not used, manual systems should provide documented evidence of the activities performed (WHO, 2006).

In the study done in governmental warehouse showed that no computer software was used in the warehouse (Al-Geeg, 2004).

Written instructions and records should be available which document all activities in the storage areas including the handling of expired stock. These should adequately describe the storage procedures and define the route of materials and pharmaceutical products and information through the organization in the event of a product recall being required (WHO, 2003)**.** Written procedures should be available describing the actions to be taken in the event of temperature excursions outside the labeled storage conditions. All excursions outside the labeled storage conditions must be appropriately investigated and the disposition of the stock in question must be evidence-based (Lambert, 2005).

Permanent records, written or electronic, should exist for each stored product indicating recommended storage conditions, any precautions to be observed and retest dates (Ebied et al, 2004).

Individual responsibilities should be clearly defined and understood by the individuals concerned and recorded as written job descriptions. Certain activities may require special attention such as the supervision of performance of activities, in accordance with local legislation (WHO, 2006).

2.7 Storage procedures

2.7.1 Receiving and checking area

Receiving and dispatch bays should protect products from the weather. Reception areas should be designed and equipped to allow incoming containers of pharmaceutical products to be cleaned, if necessary, before storage. Where quarantine status is ensured by storage in separate areas, these areas must be clearly marked and their access restricted to authorized personnel. Any system replacing physical quarantine should provide equivalent security. For example, computerized systems can be used, provided that they are validated to demonstrate security of access. Physical segregation should be provided for the storage of rejected, expired, recalled or returned products. The products and areas concerned should be appropriately identified. Adequate number of competent personnel (pharmacist) involved in all stages of the distribution of pharmaceutical products in order to ensure that the quality of the product is maintained (GDP Egypt, 2009).

Pharmaceutical products should be handled and stored in such a manner as to prevent contamination, mix-ups and cross-contamination (PSF, 2003).

A system should be in place to ensure that pharmaceutical products due to expire first are sold and/or distributed first (FEFO) Exceptions may be permitted as appropriate, provided

that adequate controls are in place to prevent the distribution of expired products. Rejected pharmaceutical products should be identified and controlled under a quarantine system designed to prevent their use until a final decision is taken on their fate. Broken or damaged items should be withdrawn from usable stock and stored separately (WHO, 2006). In warehouses where samples of the received goods should be drawn (Manufacturing sites warehouses and similar establishments), the sampling should be carried out by competent and trained personnel. Received consignments should be kept at the quarantine area until ensuring its compliance with all technical specifications required based on either quality control lab reports, an authorized official legal release or rejection is obtained. Effective measures should be in place to ensure that rejected; defected or expired materials and pharmaceutical products cannot be used or bypassed. They should be stored separately from other materials and pharmaceutical products while awaiting their disposal either by destruction or return to the supplier (Ahmed and Al Mansoori, 2005).

It is important to ensure there is sufficient storage space (before the shipment arrived). Complete and sign the delivery note and release the transporter (Medecins Sans Frontiers-MSF, 2006).

There should be a system for the recognition and prompt handling of drugs of addiction, of those products requiring specific temperature storage, of products that have a short shelf life and of any other products that require special care (Siyoi, 2006).

2.7.2 Storage methods

The choice of storage methods depends on the total quantity of products to be stored, the average volume of each product, internal height of the storage building, the form in which goods arrive and stored (WHO, 2004).

To enable correct storage and to avoid possible loss a systematic storage of the delivered goods usage of pallets (nothing should be stored on the floor) for better air circulation and for protection against rodents (rats) or against possible flooding. Leave a space of at least 50 cm between the rows of pallets and between the pallets and the warehouse's walls. This enables the airing of the warehouse, the cleaning of the premises and the checking of the condition of the products. Also make provision of spaces to allow people and/or Tran's pallets to circulate (John Snow Inc., 2003).

Storage on shelves is a simple and commonly used method which does not need mechanical handling equipment so provision of solid, stable and adjustable shelves to adjust the spaces between the shelves to the size of the goods to be stored, preferably metallic shelves in tropical countries where termites attack wood. On shelves as in stock, each product shall have one and only one specific place, this place is shown by a label bearing the specifications of the product. Medicines are identified by their International Non-proprietary Name (INN), their proportion and form (Ebied et al, 2004).

A sufficient space should be left for each pharmaceutical product to avoid mixings and possibly to incorporate new items that are not yet in stock. If a shelved product is also in stock, this shall be specified on the stock card of the product (color sticker) for every shelved item, the products with the furthest expiration dates will be store at the back of the shelves and the ones with nearest expiration dates will be shelved in the front. This enables the reduction of the risk related to the expiration of the product use-by date during storage; Boxes should be perfectly piled up while limiting the height to prevent collapses.it should be stored in such a manner so that their labels are easily visible and readable. All boxes in stock should be closed. For every shelved product, only one box should be opened for the distribution (PSF, 2003).

2.7.3 Stock rotation

Drug position system cited that the choice of storage methods depends on the total quantity of products to be stored, the average volume of each product, internal height of the storage building, the form in which goods arrive and stored (WHO, 2004).

There should be a system to ensure stock rotation with frequent regular checks that the system is operating correctly. Products beyond their expiry date or shelf-life should be removed from usable stock and it must be ensured that they are neither sold nor supplied (Siyoi, 2006).

Cost reduction in storage process achieved by reducing waste from expired products. Efforts to reduce waste in these areas should begin at drug selection and continue through end-use dispensing at a health facility. It is not uncommon for drugs to reach the end of their shelf-life or their expiration date before they are used for a variety of reasons (Lambert et al, 1998).

When issuing products, it is important to follow the First Expire First Out policy (FEFO), which minimizes wastage from product expiry, Always issue products that will expire first, ensuring they are not too close to or past their expiration date. The shelf life remaining must be sufficient for the product to be used before the expiry date. To facilitate FEFO, place products that will expire first in front of products with a later expiry date expiry dates should written on stock cards, so stocks can be sent to facilities at least 6 months before they expire. The order in which you received products is not necessarily the order in which they will expire. Products you received most recently may expire sooner than the products you received earlier. So, it is important to check the expiration dates and to make sure the dates are visible while the products are in storage (John Snow Inc., 2003). Pallets are used to store bulk items and larger cartons. They keep things off the floor and can be used with forklifts to move around groups of larger items. Pallets are generally

used only in larger facilities, because storing and moving pallets can be expensive. Smaller facilities might have a few pallets left in place to ensure air circulation and keep products off the floor (GDP Egypt, 2009).

2.7.4 Storage arrangement

Within warehouses and storerooms, drugs are arranged according to a specified organizational principle. Therapeutic/pharmacological class, clinical indication, alphabetic order, and level-of-use are commonly used. Within the warehouse itself as well as in clinical facilities, use of the therapeutic/pharmacological classification produces good results, perhaps because it provides a frame of reference within which workers can easily recognize individual products (Ebied et al., 2004).

Alphabetical order by generic name: Often seen in both large and small facilities. When using this system, the labeling must be changed when the Essential Medicines List is revised or updated.

Therapeutic or pharmacologic category: Most useful in small storerooms or dispensaries where the storekeeper is very knowledgeable about pharmacology. Dosage form: Medicines come in different forms, such as tablets, syrups, injectables, and external use products such as ointments and creams. In this system, medicines are categorized according to their dosage form. Within the area for each form, a fixed fluid, or semi-fluid system is used to store items. Any of the other methods of categorizing can be used to organize the items more precisely.

Frequency of use: Frequently used products that move quickly or often through the store should be placed in the front of the room or closest to the staging area. This system should be used in combination with another system (John Snow Inc., 2003).

2.7.5 Stock record

The stock card is the most important record for stock management. It shows that stock movement over time and gives an exact figure of the amount that is available for a certain item at a given point in time. Stock cards should be updated in the following cases firstly with every stock movement (entry/exit) secondly during every physical inventory. The physical quantity verified during the inventory should be filled out on the stock card. Every difference between physical quantity and recorded quantity should be explained under the 'Remarks' column in case of loss (expiration, waste, theft,) (WHO, 2003).

A physical inventory is very important to be applied in warehouse. A physical inventory helps us to ensure that the stock on hand balances recorded on stock keeping records match the quantities of products actually in the store. When conducting a physical inventory, count each product individually by generic name, dosage form, and strength (Mendis, 2008).

On the stock card, the following should be mentioned: the generic name, the form (tablet, ointment, etc.) and the strength of the product, all movements (entries, exits, origin, and destination, stock) and the dates (PSF, 2003).

In bigger stores products with different expiry dates should have separate stock cards; if stock cards are well kept, there will be no losses. Update stock cards after every movement is very important. Always use inerasable ink and never use a pencil. Every correction should be justified and reported to the supervisor and never throw away old stock cards (Ebied et al., 2004).

Most of the employees received the consignments, should be kept at the quarantine area until ensuring of compliance with all technical specifications required based on either quality control lab reports, an authorized official legal release or rejection is obtained. Effective measures should be in place to ensure that rejected; defected or expired materials

and pharmaceutical products cannot be used or by passed. They should be stored separately from other materials and pharmaceutical products, while awaiting their disposal either by destruction or return to the supplier (Ahmed and Al Mansoori, 2005).

In government central drugs store nearly all employees were checked the mount of received drugs and disposable by counting the box and item inside it, also all employees were quarantined content of shipment until they had been checked, especially physical check (Al-Geeg, 2004).

2.7.6 Controlled drugs

Some products need storage in an access-controlled environment these products (narcotics, psychotropic drugs) should be managed independently on the basis of management tools specific to these products and under the responsibility of a pharmacist. Narcotics and other controlled products will be stored separately, in a locking cabinet (or little room), which will be guarded by the Responsible pharmacist (PSF, 2003).

It is important to identify products that are at risk of theft or abuse or have the potential for addiction, and to provide increased security for those items. This includes products that are in high demand or have the potential for resale (black market value). Some of the medicines are controlled substances, which are medicines handled under international control. These medicines need greater attention. There are specific procedures in place for the procurement, reception, storage, dispensing, and administration of controlled substances and special ordering forms should be used (Belson, 2005).

Products that need increased security, must establish access-controlled storage. This will probably include storing the products in a separate locked room, cabinet, or safe, or a locked wire cage within the storage facility. Ideally a warning light or bell will be activated if the products are accessed improperly (WHO, 1993).

2.7.7 Expire date

To determine the expiration date (or use-by date) of a medicine, manufacturers perform accelerated degradation studies and real-time stability testing. It is set by the manufacturing laboratory to ensure a stable therapeutic effect up to that date (90% of the active ingredient shall be present and there shall be no substantial increase in toxicity). The expiration date applies to a drug in its original closed and undamaged package or container. It must appear on the package and/or on the product (WHO, 2004).

Periodic determination of expiration date (or use-by date) of a medicine set the expiry date at least one month in advance, if it is a very large warehouse, where a physical inventory can only be carried out twice or three times a year (PSF, 2003).

A drug product must retain its properties within specified limits in order to be useful. The time that a drug's stability is guaranteed is usually established by the manufacturer. In most countries, manufacturers are bound by law to have the stability of their products tested under standard conditions. They have to be able to ensure a minimum period of preservation. This period ends with the product's expiry date. The stability of a drug product depends on the active ingredient, which can be affected by its formulation and packaging (Prüss et al., 1999).

The management of outdated products must be the subject of standardized operational procedures in which the cost, the energy, the time and the human resources necessary to destroy the outdated drugs must not be underestimated. Indeed, if you could not avoid expiry, expired drugs shall be destroyed because of the risks related to their use. Firstly, the expired products shall be removed from the stock of products, placed in a reserved area of the store that can be locked (risks of theft). Secondly, these products are sorted by form to be destroyed in compliance with the law and the regulation in force in the country and with the guidelines for safe disposal of unwanted pharmaceuticals. According to these

principles, their destruction is compulsory to guarantee the protection of public health and the preservation of the environment (PSF, 2003)

2.7.8 Quality control

For receiving medical supplies and drugs, weather protected area designed close to the storage area and preferably linked to it by a covered walkway. When a drug shipment is received contents should be quarantined until they have been checked. The receiving clerks systematically check the boxes, and their contents against the supplier's invoice. It is inspected to be sure that it meets the specifications in the supply contract, and that the correct quantities are received. Discrepancies (variations and damage) are noted on the invoice. Inspection based on predefined criteria is essential to quality assurance. Quality assurance includes protocol for sample testing and sample records (WHO, 1997).

On receipt, each incoming delivery should be checked against the relevant purchase order and each container physically verified, e.g. by the label description, batch number, type of material or pharmaceutical product and quantity. The consignment should be examined for uniformity of the containers and, if necessary, should be subdivided according to the supplier's batch number should the delivery comprise more than one batch. Each container should be carefully inspected for possible contamination, tampering and damage, and any suspect containers or, if necessary, the entire delivery should be quarantined for further investigation. When required, samples should be taken only by appropriately trained and qualified personnel and in strict accordance with written sampling instructions. Containers from which samples have been taken should be labeled accordingly (WHO, 1993).

An appropriate formal stock control system which records the receipt, location and issue of materials facilitate proper stock rotation and reconciliation. The stock control procedure should ensure that materials with the shortest life are used first unless there is a conscious

decision that for a special reason an alternative priority has to be applied (Ebied et al., 2004).

Comprehensive records should be maintained showing all receipts and issues of materials according to batch number. Periodic stock reconciliations should be performed comparing the actual and recorded socks. In any event this should be performed when each batch is totally used up. All significant stock discrepancies should be subjected to investigation as a check against inadvertent mix-ups and wrong issues. Issues should normally observe the principle of stock rotation (first-in first-out) especially where expiry dated materials are concerned. Partly used containers of materials should be securely reclosed to prevent spoilage and/or contamination during subsequent storage. Damaged containers should not be issued but should be brought to the attention of the organization responsible for quality control (WHO, 2006).

Materials and products should be inspected at specified intervals to ensure that containers are properly closed, labeled, and that there is no evidence of serious damage or deterioration in the containers or their contents and that the stock rotation system is functioning correctly (Ebied et al., 2004).

Physical or other equivalent validated (e.g. electronic) segregation should be provided for the storage of rejected, expired, recalled or returned products. The products and areas concerned should be appropriately identified (WHO, 2006).

2.8 Storage conditions

Storage conditions for pharmaceutical products should be in compliance with the instructions on the label, which are based on the results of stability testing (WHO, 2006).

2.8.1 Temperature

Temperatures in other areas where goods requiring specific storage conditions are held should be monitored and the results tabulated and analyzed so as to demonstrate the suitability of these areas for their purposes (Siyoi, 2006).

Surrounding temperature of the store is not widely used due to significant variation in ambient temperatures. It means "room temperature" or normal storage conditions, which means storage in a dry, clean, well-ventilated area at room temperatures between 15° to 25°C (59°–77°F) or up to 30°C, depending on climatic conditions. Some products are very heat sensitive but must not be frozen. These are usually kept in the first and second part of the refrigerator (never the freezer). This temperature is appropriate for storing vaccines for a short period of time and Store at *2°–8°C (36°–46°F)* (John Snow Inc., 2003).

Many medicinal products require storage at controlled low temperature. Some of these such as vaccines, insulin, blood products and some products of biotechnology can be denatured by freezing and thus must be maintained within a narrow temperature range above freezing point (WHO, 2003).

The temperature in small refrigerators used to store medicines should be measured continuously and the maximum and minimum temperatures recorded daily (MSF, 2008). Sufficient space should be maintained to permit adequate air circulation. If the refrigerator is filled to capacity the effect on temperature distribution should be investigated. Refrigerators used for vaccines and other sensitive products should be capable of maintaining the temperature between 2◦C and 8◦C with the minimum of intervention. Temperature monitoring of these should be by electronic max/min thermometer, with an accuracy of ±0.5◦C, which should be readable from outside the unit. Refrigerators should not be sited in an environment where extremes of temperature (i.e. <10◦C or >32◦C) will affect their performance (GDP Egypt, 2009).

Cold Chain Maintained: Vaccines require special cold storage arrangements. Cold rooms, refrigerators, and freezers should be protected from power cuts by backup generators. Temperature conditions should be adjusted to suit the needs of the operators while wearing their protective clothing. (WHO, 2006)

The storage temperature conditions for antimicrobials at the warehouses of the manufacturers were between 22 and 27°C. and inappropriate storage conditions may alter the biopharmaceutical properties of some drugs .The stability of essential drugs was not affected during shipment to the tropics after being exposed to much higher temperatures and humidity than recommended by the manufacturer, with temperatures recorded within packs ranging from –3.5 to 42.4°C and humidity ranging from 20% to 88%. A controlled longitudinal study on the quality and stability of essential drugs in rural Zimbabwe showed that even under the most adverse tropical conditions, clinically relevant instability of these agents is rare (Mitema and Kikuvi, 2005).

Here are the storage temperatures as defined by the European Pharmacopoeia:

Place Temperature In freezer - 15°C - 0°C, In refrigerator 0°C - 8°C, In cool place + 8°C - 15°C and at room temperature + 15°C - 30°C (PSF, 2003).

2.8.2 Ventilation system and air conditions

Air conditioned store should be designed and cooling plant sized, so as to ensure that internal temperatures can reliably be maintained below 25 degree centigrade (WHO, 1997).

Heating, Ventilation and Air-Conditioning (HVAC) play an important role in ensuring the manufacture of quality pharmaceutical products. A well designed HVAC system will also provide comfortable conditions for operators (WHO, 2003).

Temperature, relative humidity and ventilation should be appropriate and should not adversely affect the quality of pharmaceutical products during their manufacture and storage, or the accurate functioning of equipment. Adequate ventilation should be in place to control temperature and relative humidity. Where special storage conditions are required (e.g. temperature and humidity) these should be provided, checked and monitored (Ebied et al., 2004).

2.8.3 Light

Effective lighting permitting all operations to be carried out accurately and safely (WHO, 2006)

Many active ingredients are light-sensitive, especially solutions that shall be kept in their packaging. No product shall be directly exposed to daylight (PSF, 2003)

2.8.4 Humidity

Temperature and relative humidity should be controlled, monitored and recorded, where relevant, to ensure compliance with requirements pertinent to the materials and products, and to provide a comfortable environment for the operator where necessary. Maximum and minimum room temperatures and relative humidity should be appropriate (WHO, 2006).

Extremes of humidity and temperature should be avoided. High humidity (>60% RH at 21° C to 24° C) produce more lasting effects on the capsule shell, since as moisture is absorbed, the capsules become softer, tackier and bloated. If temperature is increased the capsule shells may melt and fuse together. High temp > 40° in a dry place may cause cracking of the capsule shell. Therefore, capsules should be stored in an air-conditioned area in which the humidity does not exceed 45% RH at 21° C to 24° C (Ebied et al, 2004).

2.8.5 Power generator

Arrange for a solar panel generator or alternative supply of electricity for cold rooms and refrigerators if the main source of electricity is not reliable. If the generator is not solar-powered, maintain a stock of fuel sufficient to run the generator for at least a few days (see section on storing flammables). Run the generator on a regular basis (at least once a month) to ensure the system is working properly. Larger facilities may want to contract out the maintenance of the generator and electrical system (John Snow Inc., 2003).

2.9 Distribution

Vehicles and equipment used to distribute, store or handle pharmaceutical products should be suitable for their use and appropriately equipped to prevent exposure of the products to conditions that could affect their stability and packaging integrity, and prevent contamination of any kind. The design and use of vehicles and equipment must aim to minimize the risk of errors and permit effective cleaning and/or maintenance to avoid contamination, build-up of dust or dirt and/or any adverse effect on the quality of pharmaceutical products being distributed (Siyoi, 2006).

There were no vehicle to distribute drugs and disposables designed for the medical warehouse in governmental central drugs warehouse (Al-Geeg, 2004).

Dedicated vehicles and equipment should be used, where possible, when handling pharmaceutical products. Where non-dedicated vehicles and equipment are used, procedures must be in place to ensure that the quality of the pharmaceutical product will not be compromised. Appropriate cleaning should be performed, checked and recorded.

Defective vehicles and equipment should not be used, and should either be labeled as such or removed from service. There should be procedures in place for the operation and maintenance of all vehicles and equipment involved in the distribution process, including

cleaning and safety precautions. Vehicles, containers and equipment should be kept clean and dry and free from accumulated waste. A written cleaning program should be available, indicating the frequency of cleaning and the methods to be used (WHO, 2006).

Refrigerated vehicles/transportation containers should be mapped and monitored, if they provide the primary means for environmental control. However, this is not necessary if a qualified insulated container is used as the primary means of environmental control (Lambert, 2005).

Chapter: 3 Methodology

This chapter presents the study methodology; demonstrates the study design, study population and ethical issues that were considered. In addition, it presents the instrument, which was used in the study, its validity, data collection process, data process and analysis. Finally, it presents the limitations of the study.

3.1 Study design

The design of this study is a descriptive analytical cross sectional one. This study design is considered suitable in describing the variables, their distribution patterns, and examining the associations between them.

This type of study design is convenient for examining a network of association links, and it is fast and inexpensive; because the researcher is studying both the exposure and outcomes at the same time (Cherry, 2007).

3.2 Study population

The study population included fifty one medical warehouses and all the personnel working in INGO, local NGOs and Private medical warehouses and the total numbers were 105 employees.

3.3 Period of the study

The study was conducted in January 2010 through November 2010; the researcher prepared the proposal in March through April 2010. Then the researcher constructed the questionnaire in May, 2010. In June 2010, ethical approval from Helsinki Committee was obtained. Piloting and data collection was done in September, 2010 for three weeks. Then, one week for data entry and analysis. Writing the research results and discussion were done in October, 2010. Submission for defense was done in November, 2010.

3.4 Eligibility criteria

3.4.1 Inclusion criteria

The employees who were working at the pharmaceutical departments (Drug and Disposable) in the INGOs, local NGOs and Private medical warehouses in Gaza Governorates and have responsibilities in the storage procedures at the time of study.

3.4.2 Exclusion criteria

Any employee working at store who does not have direct responsibilities in the storage procedures, such as secretaries, cleaners etc.

3.5 Place of the study

The study carried out in the medical warehouse of the pharmaceutical departments at (5) INGOs warehouses including 10 employees, (16) local NGOs including 33 employee's and (29) Private warehouses including 57 employee's in Gaza governorates.

3.6 Ethical and administrative approvals

- An official letter of approval to conduct the study was obtained from Helsinki Committee (Annex 3).
- Approval from UNRWA to carry out the study was obtained (Annex 4).
- Approval of each private and other NGOs institution to carry out the study was obtained.

Every participant was provided with an explanatory letter about the study including the purpose of the study. Confidentiality of information insured. Consent form obtained from each participant in the study. Each participant's right to participate or not addressed in the study.

3.7 Pilot study

A pilot study was conducted prior to starting data collection for five warehouses and to test the suitability of the instruments. There was a need for introducing some modifications to the instruments.

3.8 Data collection

Two instruments were used to collect the data

- Questionnaire: Self-administered questionnaire filled by the warehouse staff members (manager/subordinates). The questionnaires were collected by the researcher. The researcher distributed the questionnaire in the INGOs warehouses firstly, then local NGOs and finally at private warehouses (Annex 6).
- Checklist: the researcher filled the checklist by himself. The checklist was done in the same day of conducting the questionnaire but after completion of the questionnaire for the entire staff of the warehouse (Annex 7).

3.8.1 Questionnaires

The questionnaire was designed in the Arabic Language and consisted of close-ended and open-ended questions. The questionnaire included the following categories of data:

- Personal and demographic data, which included questions about gender, qualifications, specialization, experience and training.
- Construction of the warehouse, which included questions about warehouse area, quarantined area, design and location.
- Receiving of drugs and disposables procedures, which included questions about receiving responsibility, shipment checking and inventory control.
- The storage procedure that included stock positions, stock arrangement, stock control, checking expiry date and the way of their management and storage conditions.
- Distributions process that include vehicle used and their requirements.

3.8.2 Checklist

The checklist conducted by the researcher himself

The checklist focused on three parts, these parts contained the following data:

Part one:

- Data about physical conditions of the warehouse including the status of building, cleaning, arrangement and instrument existence.

Part two:

- Data about the storage conditions that included temperature, humidity, documentation, ventilation and control drugs procedures.

Part three:

- Measurements that included Data about the temperatures of the stores, cold room and refrigerators.

3.9 Response rate

The response rate of the enrolled medical warehouses, 105 employees had participated and fifty one warehouses, five of employees and one of warehouses refused participations. The response rate for employees in this study was 95% and 98% for medical warehouses.

3.10 Reliability of the research

Reliability is the extent to which results are consistent over time and an accurate representation of the total population under study.

To increase the reliability in this research the following were done.

- Standardization of the tools
- Unifying the implementation procedures.
- Data collection was done by the researcher himself.

3.11 Validity

Validity determines whether the research truly measures that which it was intended to measure (Golafshani. 2003). In general, validity is an indication of how sound the research is. More specifically, validity applies to both the design and the methods of the research. In this study, the researcher used content validity. Content validity is defined as "the extent to which a test reflects the variable it seeks to measure" (Holm and Liewehyn 1986,). It is conducted before data collection by the help of experts to ensure relevancy, clarity and completeness. Content validity is a subjective estimates of measurement based on judgment rather than statistical analysis. In order to validate the instrument used, the designed questionnaire with a covering letter, title and objectives of the study were sent to 10 experts from different backgrounds including researchers, public health experts in environment field. The experts were asked to estimate the relevance, clarity and completeness of each item; some questions modified with the help of the supervisor if requested.

To increase the validity in this research the following was also done;

- Systemic checking and follow up of data collected.
- Data cleaning and checking

3.12 Data entry

Data entries were done by using data entry model using the computer Software Statistical Package for Social Sciences version 18 (SPSS) after coding the questionnaire. Data cleaning was done by checking out a random number of questionnaires and through frequency tables for all variables.

3.13 Data analysis

The data analysis performed by using the Statistical Package for the Social Sciences SPSS, version 18. Descriptive statistics (Frequencies and percentage) were used to describe the main features of a collection of data in quantitative terms and construct the needed tables to answer the research questions. And the researcher used deferential statistics t test and ANOVA to clarify potential differences between the study variables. P value was considered statistically significant when it is lower than 0.05.

In more details, firstly, the researcher did a descriptive analysis to the five components of the questionnaire that included population characteristic, warehouse constructions, receiving process, storage methods and distribution process. Secondly, descriptive analysis was done for checklist, which included physical conditions, storage process and measurements.

Descriptive statistics were used to describe the basic features of the data in the study. They provided simple summaries about the sample and the measures. Together with simple graphics analysis, they formed the basis of virtually every quantitative analysis of data and simplified describing what was or what the data showed about the characteristic of population (experience, qualifications, specifications, training). They also showed the status of warehouse construction, performance in receiving process, storage process, and distribution process.

To give a general picture about the warehouse in practical way, the researcher assign scores for some questions that reflected the warehouse requirement. These scores were calculated through many steps; firstly the researcher selects the relevant questions, and secondly the researcher recoded the selected questions and gave higher scores to the favorable conditions. After that, the researcher computed the total mean to recoded questions in order to get the required domains (the outcome of many questions).

After computing all the required domains, the researcher computed the total scores for all the domains.

The same steps were done to extrapolate domains from the checklist that included the physical conditions domain and the storage process domain).

Finally, the researcher used inferential statistics to make judgments of the probability that an observed difference between domains was existed according to the type of warehouse. One way ANOVA was used to determine if there is association between warehouse type and warehouse requirements domains regarding questionnaire domain (for independent variables with more than 2 categories). In analysis of checklist domains, independent t test was used to determine if there is an association between warehouse requirements and employees training (for independent variables with two categories).

Limitations of the study

- Hesitation of employees to answer some parts of the questionnaire because of the sensitivity of the subject. The researcher overcome this issue by introducing explanatory Letter that explain the main goal of the research, the study is carried out as a part of the requirements for the master degree and participation is voluntary, and they have the right to withdraw at any time during data collection. Their answers were kept confidential.
- Limited literature and resources like books and journals.
- The effect of political division.

Chapter 4 Results and discussion

Descriptive analysis

Self-administered questionnaires

4.1 Characteristics of the study population

Table 4.1: Distribution of participants by characteristic variables.

	Variable	No.	%
1-	**Gender**		
	Male	87	87
	Female	13	13
	Total	100	100
2-	**NGOs medical supplies warehouse type (according to employees work place)**		
	Private warehouses	57	57
	Local nongovernmental warehouses	33	33
	International nongovernmental warehouses	10	10
	Total	100	100
3-	**Employees work department**		
4-	Drug storage	56	56
	Disposable storage	3	3
	Drugs and disposable storage	41	41
	Total	100	100
5-	**Qualifications of employee**'s		
	Secondary school	1	1
	Diploma	31	31
	Bachelor	62	62
	Higher certificate	6	6
6-	Total	100	100
7-	**Specializations of employees**		
	Pharmacist	57	57
	pharmacist assistants	24	24
	Managers	2	2
	Accountants	8	8
	Other specialties	9	9
	Total	100	100
8-	**Actual experience worked years in warehouses**		
	Less than three years	43	43
	Between 4-10 years	42	42
	More than 10 years	15	15
	Total	100	100
9-	**Receiving training**		
	Yes	19	19
	No	81	81
	Total	100	100

In this study, male subjects were more than females. Males represented 87% of the study population, while females represented 13% as shown in (Figure 4.1). The revealed dominance of male workers in NGOs warehouses is inconsistent with the previous study on governmental central medical warehouse management system that shows that there were no obvious gender variations (Al-Geeg, 2004).

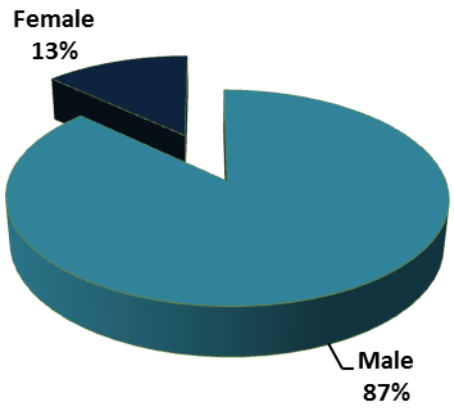


Figure 4.1: Percentage distribution of the study population by sex

The study results showed that the respondents from the private medical warehouses represented 57%, local non-governmental warehouses represented 33% and the international non-governmental medical warehouse represented 10% as shown in Table 4.1.

Table 4.1 showed that 62% of employees had a bachelor degree, 31% of employees were holding a diploma, and 6% were holding higher certificates. Regarding specializations, 57% were pharmacists, 24% were pharmacist assistants, 2% were management, 8% were accountant and 9% were other specializations (nurses, engineers or information technology). The guidelines of Ebied et al. indicated that the personnel who carry out supervision and/or controlling functions should possess the necessary integrity, knowledge, experience and qualification (Ebied et al, 2004). It is important to mention that there should be an adequate number of competent personnel involved in all the stages of the

distribution of pharmaceutical products in order to ensure that the quality of the product is maintained (GDP Egypt, 2009).

In this study, 56% of employees had worked in drugs storage, 3% of employees had worked in disposable storage and 41% had worked work in drugs and disposable storage as show in Table 4.1. This means most of employees were working in drugs storage that need high qualified and specialized employees to study the essential activity that followed to the responsible pharmacist in the management of stocks.

The employees who had general work experience (not necessarily in this job) less than 10 years represented 47%, while employees who had 10-19 years' experience represented 38%, 16% of the employees had experience from 20 to 29 years. Regarding the actual work experience in medical supply warehouse, 43% of employees had less than three years, 42% of employees had actual experience between 4-9 years and 15% had experience more than 10 years as shown in Table 4.1. This study shows that the experience years are relatively low, so they need to receive proper training on the good storage practice, regulations, safety procedures and good interpersonal and communications skills. The experience plays a crucial rule in carrying out supervision, controlling function and discharging responsibility effectively (WHO, 2005).

Progressive warehousing organizations now train their staff at all levels in practical and organizational skills that will improve the efficient running of their business (Siyoi, 2006).

Only 19% of the respondent employees in the warehouses had received training courses in store work and 81% of them didn’t receive training courses (Table 4.1). In this study, only 19 employees had received training courses so adequate training program is very necessary for the worker of the warehouse, because these programs increase the efficiency and effectiveness of work (Kareem and Taha, 2005). Employees should receive initial and

continuing training relevant to their tasks, and be assessed as applicable, in accordance with a written training program (MOH, 2009).

Proper training programs are essential to warehouse practice and in safety measures, particularly in reducing the risk of accidents and avoid threats to health. All warehouse operations, physical and managerial, can be made more efficiently through proper training. Greater efficiency will reduce costs (WHO, 2006).

Also Quick et al reported in 1997 that training is necessary because it should result in changes in work behavior that lead to an improved and efficient function system (Quick et al., 1997). So, we must shed light about the benefits of training program and initiate effective on-the-job training and onsite training program. Staff must be given specific authority, facilities and training to discharge their responsibilities effectively. One person could perform more than one function; however, the person responsible for quality assurance should be independent and report to the head of the organization only (GDP Egypt, 2009). All personal in NGOs medical warehouses should receive proper training in relation to good storage practices, regulations, procedures, safety and accountability.

4.2 Setting up of the medical warehouses

Table 4.2 Distribution of warehouses by construction related variables

	Variable	No.	%
1-	**Number and distribution of buildings constituting the warehouse**		
	One building	55	55
	Many buildings in the same place	18	18
	Many buildings in different places	15	15
	Many buildings in the same and different places	12	12
	Total	100	100
2-	**Store location**		
	First floor	87	87
	Second floor	5	5
	Both	8	8
	Total	100	100
3-	**The inward and outward flow of medical supply are from**		
	One entrance	71	71
	Two entrances on the same side of the building	14	14
	Two entrances on opposite sides of the building	3	3
	Two entrances on different sides of the building	12	12
	Total	100	100
4-	**Area of the warehouse** (based on reported response)		
	60-170 m2	45	45
	180- 300 m2	37	37
	310- 2000 m2	18	18
	Total	100	100
5-	**Availability of place for receiving and checking medical supply**		
	Yes	83	83
	No	17	17
	Total	100	100
6-	**Sufficiency of receiving and checking area**		
	Sufficient	52	52
	Acceptable	33	33
	Insufficient	10	10
	Not available	5	5
	Total	100	100
7-	**Sufficiency of distribution area**		
	Sufficient	56	56
	Acceptable	33	33
	Insufficient	6	6
	Not available	5	5
	Total	100	100
8-	**Sufficiency of assembly area**		
	Sufficient	55	55
	Acceptable	34	34
	Insufficient	10	10
	Not available	1	1
	Total	100	100

The study results showed that the warehouses were designed to be existed in one building were 55%, 18% were constructed in many buildings in the same place, while 15% were constructed in many buildings in different places and 12% were constructed in many buildings in the same place and different places. Most NGOs warehouses are located in first floor (87%), while 5% were located in second floor and the remaining storages sites were located in both first and second floor were (8%) (Table 4.2).

In this study, 94% of the respondent employees had considered the warehouse located in a secure place and 6% considered them existing in unsecure place. Also all employees said that it is easy to reach the warehouse.

The reported findings are consistence with other research studies that indicated that a pharmaceutical warehouse should be easily accessible, well-situated, well-laid out, tidy, clean and well secured (PSF, 2003). As mentions previously in the literature review the store must be accessible with adequate security system (Siyoi, 2006).

The results show that 71% of the inward and outward flow of medical supply are going through one entrance while 14% from two entrances on the same side of the building and 12% from two entrances on different sides of the building (Table 4.2). This result were inconsistence with the previous guideline by WHO, 1993 that shows inward entrance should be different from outward entrance to avoid disturbance between receiving and distribution processes which must be performed in all medical supply of NGOs warehouses (WHO, 1993). This study were consistent with the study done by Al- Geeg in governmental central warehouse that showed warehouse are found in a secure place and all medical supply were flown from the same entrance (Al-Geeg, 2004).

As shown in Table 4.2, 45% of NGOs warehouse's area were between 60-170m^2, 37% of them were between 180-300m^2 and 18% were between 300-2000m^2. The nature of warehouse area depends on the warehouse type and the volume of stock storage. Storage

area should be of sufficient capacity to allow the orderly storage of the various categories of pharmaceutical products, namely bulk and finished products, products in quarantine, and released, rejected, re- turned or recalled products (WHO, 2006). According to good storage practice in Egypt (2009), the warehouse area must be more than 500 m2 to be sufficient for all storage practice (GDP Egypt, 2009).

After Israel military operation on the Gaza Strip, the control and coordination with the donations were further complicated. INGOs and many local NGOs received drugs that did not pass through the central drugs store, so large quantity of incoming donations and the need to deliver large volumes of supplies very rapidly to the health care facilities exceeded their capacity to track them, so the area of their warehouses were insufficient (WHO, 2009). Over stocked items on shelves mean insufficient area for proper arrangement to avoid any disturbance in stock management and distribution process. This result is consistent with study done by Al-Geeg, 2004 in governmental central warehouse which showed that the store size was insufficient to store the required stock. So some warehouses need to restructure its building to compass all stocked drugs and disposable according to good storage practice. It is reported that inappropriate storage leads to disturbance in the management of supplies and could lead to under-utilization of resources (Al-Geeg, 2004).

Results show (Figure 4.2) that 95% of warehouses had special areas for receiving and checking medical supplies; 52% of these were perceived as sufficient, 33% of the perceived as acceptable and 10% of employee said, it is not sufficient . WHO guide in 2003 indicates that well planned medical store should have ancillary area to the warehouse, adequate offices situated to permit good supervision of store, sufficient packing and receiving area (WHO, 2003).

In Table 4.2 results showed that 56% of employees reported that the receiving area for medical supply is sufficient, 33% of them said, it is acceptable, while 6% of them

considered it as insufficient. Results show that the medical supply area and providing space for stock records and other administrative operations are sufficient which is consistent with the guideline of the WHO that indicates that stores must include staff welfare space including adequate store room space (WHO, 2003). In this study, 55% of reported employees had considered assembly area of medical warehouse sufficient, 34% of them considered it as acceptable, 10% of them said it is insufficient. Also, 66% of respondents reported employees in warehouses had considered the loading and unloading bay sufficient, 19% of them considered it acceptable, while 4% of them considered it as insufficient and 11% said that, it is not available. Also the results show that 93% of employees said that, the loading and uploading are protected from runny water and sunny weather, while 7% of them said, it is not protected (Table 4.2). This means that more than half of employee had considered assembly area and loading and unloading bay were sufficient and that is consistent with international standard for good storage practice.

Receiving and dispatching bays are needed should be sufficient for all shipment and had adequate space for loading and unloading bay, and had suitable height to the height of vehicle (PSF, 2003). The guideline of WHO reported that presented receiving and dispatch bays should protect materials and products from the weather (WHO, 2003).

The study done by Al-Geeg, 2004 in governmental central warehouse showed that no specific area for receiving, checking, and distribution. Also, there is no specific area to quarantine the received drugs until the quality control is completed and the loading and unloading bay is not protected from the weather conditions. This differs from the finding of this study results.

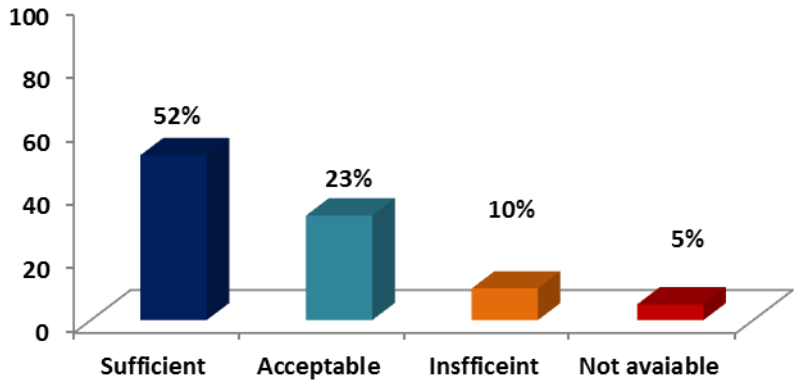


Figure 4.2: Distribution of warehouses by availability of receiving and checking area

4.3 Safety and security system

Table 4.3: Distribution of warehouse by the availability of security and safety measures.

	Variable	No.	%
1-	**Place of storage of inflammable material like alcohol**		
	In the same store with other drugs	11	11
	In a separate place in the same store	28	28
	Outside the warehouse	10	10
	Not-found	51	51
	Total	100	100
2-	**Availability and use of emergency door/s**		
	Yes and functioning	29	29
	Yes but not functioning	7	7
	Not available	64	64
	Total	100	100
3-	**Availability of emergency alarms**		
	Yes and functioning	41	41
	Yes but not functioning	6	6
	Not available	51	51
	Total	100	100
4-	**Availability of anti-theft security systems**		
	Yes and functioning	32	32
	Yes but not functioning	4	4
	Not available	64	64
	Total	100	100
5-	**Availability of fire extinguishers**		
	Yes	92	92
	No	8	8
	Total	100	100
6-	**Availability of written procedures which deal with an emergency status**		
	Yes	6	6
	No	94	94
	Total	100	100

As shown in Figure 4.3, 21.6% of respondents reported that inflammable drugs were stored in the same store with other drugs, 54.9% reported that inflammable drugs were stored in a separate place but in the same store, 19.5% of them reported that it is stored outside the warehouse, while 51% of them reported that such material were not found in their warehouses (Table 4.3). This result is consistent with the guidelines of PSF which indicated that products comprising highly active and radioactive materials, dangerous medicines and substances presenting special risks of abuse, fire or explosion (e.g. combustible liquids, solids and pressurized gases) should be stored in a separate, safe, dedicated and secure areas, and transported in safe, dedicated and secure containers and vehicles (PSF, 2003). The result showed that 22% of medical warehouses, which had inflammable drugs, stored them in the same store which, need more attention and stored properly in a separate and secure place to ensure safety.

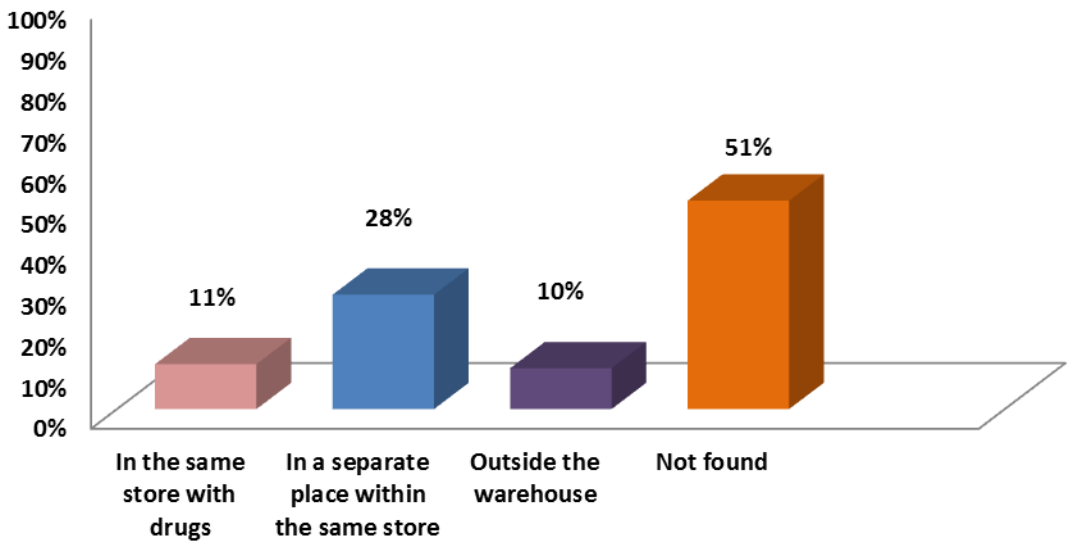


Figure 4.3: Distribution of inflammable drugs storage sites

The study results showed that 29% of the respondents reported that the warehouses had emergency doors and were well-functioning, 7% had emergency doors, but were not well-

functioning and 64% of warehouse had not emergency doors (Table 4.3). These findings showed that there were low safety measures in NGOs warehouses work place that requiring immediate emergency exit to ensure safety of employees. The international guidelines for safety reported clearly the mark of emergency exits and should be checked regularly to be sure, they are not blocked or inaccessible (WHO, 2003). Fire exits, corridors, walk-ways, doorways and other points requiring immediate access must be clearly defined and kept free from obstruction and litter. Regular fire evacuation drills must be carried out (Ebied et al., 2004).

In Table 4.3, 41% of warehouse had functioning emergency alarms, 6% of them had emergence alarms, but were not functioning, while 53% of warehouses don't have an emergency alarm. Also, 92% of warehouses had a fire extinguisher and the employees were trained on how to use it, 38% of them were not trained, while 8% of warehouses don't have a fire extinguisher. Half of employees were trained on how they can behave in the emergency status, while the others were not trained to use it. Only 6% of employees had written procedures, for dealing with emergency status.

These findings were inconsistent with the international guidelines that indicated "to prevent damage of products from fire make standard fire extinguishers available in every storage facility according to national regulations. For example, visually inspect fire extinguishers every 2–3 months to ensure that pressures are maintained and the extinguisher is ready for use, place smoke detectors throughout the storage facility and check them every 2–3 months to ensure that they are working properly and display fire precaution signs in appropriate places in the storage facility, especially locations where flammables are stored" (John Snow Inc., 2003).

For good storage practices trained staff should be selected to form a fire fighting team who are capable of using the equipment available effectively in the site. Safety and risk

reduction measures must include procedures for the handling, transportation, usage and disposal of highly flammable liquids, toxic and corrosive materials and must comply with the appropriate guidelines (Ebied et al., 2004).

As shown in Table 4.3, 32% of respondents reported that warehouses had an effective antitheft security system and functioning, 4% of warehouses had them, but they were not functioning, while 64% of warehouse had no antitheft security system.

The results showed that the anti-theft security system is not adequately applied in the warehouses which are not in line with the international standards. Actual procedures should be taken to prevent unauthorized access to pharmaceutical products during transport. The store should be designed with security in mind. A strong security system can minimize shortage, minimize abuse or misuse, and contribute to accurate record keeping on drug consumption and disease prevalence (WHO, 1998).

The cost of security precautions should be related to the social environment in which the facility is situated and the value and nature of the goods used. Where large or significant quantities of valuable materials are held or where theft is prevalent, 24 hour security coverage should be provided (Ebied et al., 2004). A study conducted in Lebanon by WHO showed that the central medicines warehouse has no security management system in place, no monitoring on entry and exit, no alarm system and no searching security system is used (WHO, 2009a). To conclude there is a need to maintain adequate security system to minimize shortage, minimize abuse and misuse at NGOs warehouses.

4.4 Stock procedures

The study showed that 62% of participants reported storing the controlled drugs and 41% of them reported keeping them in a separate controlled storage space (Table 4.4). The other respondents reported storing the controlled drugs on shelves with other drugs. According

to the international standards, these drugs require strong and secure store to increase security level for those items.

Some products need storage in an access-controlled environment. These products (narcotics, psychotropic drugs) should be managed independently on the basis of management policies specific to these products and under the responsibility of a pharmacist. Narcotics and other controlled products will be stored separately, in a locking cabinet (or little room), which will be guarded by the responsible pharmacist (PSF, 2003). The study of Chambers in 2006 showed that less than half of warehouses stored controlled drugs in a secure place to prevent misuse of drugs by following national regulations that define in great detail the type of cabinet or safe required. Controlled drugs must be stored in a double-locked cabinet, with or without a red light (Chambers et al., 2006).

As shown in table 4.4, 49% of respondents reported having a pharmacist who is responsible about the receiving process, 29% reported having pharmacist assistants, and 20% reported having other specialties (physician, accountant, manger, secondary certificate etc.) having this responsibility(Figure 4.4).

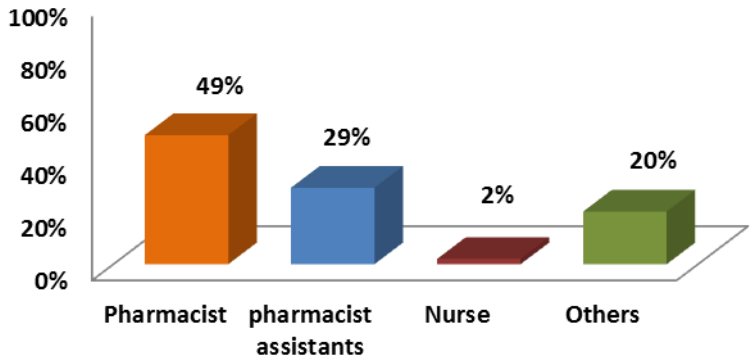


Figure 4.4: Percentage distribution about responsibility for receiving process

Only 2% of employees reported checking the amount of medical supply by counting boxes. Also, 8% of them counted the items inside the box, while 90% of them counted the box and item (Table 4.3). These results were consistence with the previous research studies and

official reports that showed adequate number of competent personnel (pharmacist) involved in all stages of the distribution of pharmaceutical products in order to ensure that the quality of the product is maintained (GDP Egypt, 2009). When a drug shipment received contents, should be quarantined until they have been checked. The receiving clerks systematically check the boxes, and their contents against the supplier's invoice. It is inspected to be sure that it meets the specifications in the supply contract and that the correct quantities are received (Ahmed and Al Mansoori, 2005). In 2004, study of Al-Geeg in governmental central warehouse were consistent with this result, which showed that nearly all employees were checked the mount of received drugs and disposable by counting the box and item inside it.

As shown in Table 4.4, 68% of respondents reported that medical supplies were always quarantined till the quality is checked, 23% of them reported sometimes doing that and 9% of them reported rarely doing that.

The majority of respondents (82%) reported that warehouses staff physically check all medical supply. Regarding recording, 10% of respondents reported that drugs and disposable were recorded manually by using a stock card, 46% through using the computer, while 44% through using both the computer and the manual recording (Table 4.4).

A physical inventory is very important to be applied in warehouse. A physical inventory helps us to ensure that the stock on hand balances recorded on stock keeping records matches the quantities of products actually in the store. When conducting a physical inventory, count each product individually by generic name, dosage form, and strength is essential (John Snow Inc., 2003). In addition, 91% of subjects reported recording notes in the receiving invoice (Table 4.4).

Table 4.4: distribution of warehouses by the receiving process related variables

	Variable	No.	%
1-	**The responsibility for the receiving process**		
	Pharmacist	49	49
	Pharmacist assistant	29	29
	Nurse	2	2
	Others	20	20
	Total	100	100
2-	**Availability of controlled drugs in the warehouse**		
	Yes	62	62
	No	38	38
	Total	100	100
3-	**Controlled drugs kept in a separate controlled storage space**		
	Yes	41	41
	No	59	59
	Total	100	100
4-	**Approach for checking medical supplies at the receiving stage**		
	Counting boxes	2	2
	Counting items inside the boxes	8	8
	Counting boxes and items inside the boxes	90	90
	Total	100	100
5-	**The drugs and disposable are quarantined till the quality checked**		
	Always	68	68
	Sometime	23	23
	Rarely	9	9
	Total	100	100
6-	**Physical check were done in the warehouse**		
	Yes	82	82
	No	18	82
	Total	100	100
7-	**Method of recording received drugs and disposables movement**		
	Manual by use stock card	10	10
	Computer	46	46
	Both	44	44
	Total	100	100
8-	**Notes are recorded in receiving invoice**		
	Yes	91	91
	No	9	9
	Total	100	100

Employees receiving the consignments, should kept it at the quarantine area until ensuring of compliance with all technical specifications required based on either quality control lab reports and an authorized official legal release or rejection is obtained. Effective measures should be in place to ensure that rejected; defected or expired materials and pharmaceutical products cannot be used or by passed. Stuff should be stored separately from other

materials and pharmaceutical products, while awaiting their disposal either by destruction or return to the supplier (Ahmed and Al Mansoori, 2005).

The report of WHO in 1997 showed that it is essential for stuff to be inspected in order to be sure that it meets the specifications in the supply contract, and that the correct quantities are received. Discrepancies, variations, and damage are noted on the invoice. Inspection based on predefined criteria is essential to quality assurance. Quality assurance includes protocol for sample testing and sample records (WHO, 1997). The study done by Al-Geeg in governmental central warehouse showed that nearly all employees reported quarantining the content of shipment until it had been checked, especially physical check. This study confirms the need for quarantining medical supplies and drugs till checking takes place especially drugs and supplies are exposed to harsh transportation processes due to the siege on Gaza.

Of the respondents 66% reported that the products had a definite location, 2% were stored at the available space and 32% reported using a combination of the two systems. More than half of them used shelves and pallets for storage (more than one category were available). The criteria of WHO concerning drug position system cited that the choice of storage methods depends on the total quantity of products to be stored, the average volume of each product, internal height of the storage building, the form in which goods arrive and stored (WHO, 2004). Guidelines of John Snow Inc. showed that the usage of shelves to store smaller products and adjust the shelves as needed to allow for packages of different sizes. Pallets are used to store bulk items and larger cartons. They keep things off the floor and can be used with forklifts to move around groups of larger items. Pallets are generally used only in larger facilities, because storing and moving pallets can be expensive. Smaller facilities might have a few pallets left in place to ensure air circulation and keep products off the floor (GDP Egypt, 2009).

Table 4.5: Distribution of employee's warehouses by storage process related variables

	Variable	No.	%
1-	**Shelves are used for storage**		
	Yes	98	98
	No	2	2
	Total	100	100
2-	**Pallets are used for storage**		
	Yes	70	70
	No	30	30
	Total	100	100
3-	**Arrangement of drugs according to expire date**		
	Yes	57	57
	No	43	43
	Total	100	100
4-	**Checking expiry date**		
	Yes	99	99
	No	1	1
	Total	100	100
5-	**Checking expire date every**		
	One week	23	23
	Three week	52	52
	Two month	6	6
	More than three month	19	19
	Total	100	100
6-	**Checking expire date by using computer record**		
	Yes	64	64
	No	36	36
	Total	100	100
7-	**Checking expire date by using the label of the item**		
	Yes	61	61
	No	39	39
	Total	100	100
8-	**There is a distinguish mark for medical supplies that have short expire date**		
	Yes	56	56
	No	44	44
	Total	100	100
9-	**There is disposable system for expired medical supplies**		
	Yes	79	79
	No	21	21
	Total	100	100
10-	**Possible that damage of some drugs and disposable items**		
	Yes	97	97
	No	3	3
	Total	100	100
11-	**Possible Damage of drugs and disposable occurred due to expire date**		
	Yes	95	95
	No	5	5
	Total	100	100
12-	**Possible Damage of drugs and disposable occurred due to ordering issue**		
	Yes	22	22
	No	88	88
	Total	100	100

Of the respondents, 45% reported that the stock is arranged according to alphabetical order, 38% reported that they arranged stuff according to pharmacological category, 21% according to level of use, 41% arranged them according to dosage form, 25% arranged according to Manufacture Company, 57% arranged according to expiry date, while, 24% arranged according to empty space (more than one category were available).

The study findings showed that storage arrangement adopted the global criteria. The global criteria reported that within warehouses and storerooms, drugs should be arranged according to specified organizational principles. Therapeutic/pharmacological class, clinical indication, alphabetic order, and level-of-use are commonly used principles. Within the warehouse itself as well as in clinical facilities, the use of the therapeutic/pharmacological classification produces good results; perhaps because, it provides a frame of reference within which workers can easily recognize individual products (Ebied et al., 2004). Always stuff should be arranged according to expiry date issue products that will expire first, ensuring they are not too close to or past their expiration date. The shelf life remaining must be sufficient for the product to be used before the expiry date that minimizes wastage from product expiry (John Snow Inc., 2003). This study showed that more than one way to arrange the drugs on shelves or pallet and this depends upon the type of warehouse and the volume of stock stored and results showed that there were more than 50% of them are arranged according to expire date which simplified follow up expiry date of medical supply and decrease wastage from product expire. The methods of arrangement is going with other study done in Lebanon by WHO in 2009 that shows there is systematic and orderly shelving of products in central medicines warehouse according to type of medicine (WHO, 2009a).

Approximately all employees in medical supply warehouses (99%) checked expiry date for all received substances. Of the respondents, 23% checked expire date in an interval less

than one week; 52% of them checked the expiry date every three weeks; 6% of them checked it every two month; while 19% of them checked the expire date in an interval of more than three month. So periodic determination of expiration date (or use-by date) of a medicine at least one month in advance is essential, if it is a very large warehouse, where a physical inventory can only be carried out twice or three times a year (PSF, 2003).

Of respondents, 64% used computerized recording, 61% reported using label on the item store in warehouses and 9% of them used stock record. Upon receipt of shipment once the products are stored on shelves; the quantity received should be recorded on the stock card of the corresponding product in the « incoming » column, along with the date, supplier's name and expiry date, and should be added to the previous stock in order to obtain a new stock level. It is also desirable to have a computer for data processing (spreadsheet, database, specific software) as a supplement to stock cards. Product movements will be recorded and, as a precaution, all computer data will be saved in several different ways (PSF, 2003).

Nearly half (56%) of respondents put a distinguish mark for drugs and disposable, which have short period expire date, while the other reported not doing that. Checking the time remaining before the expiration date against the time, covered by the quantities still in stock (the average monthly consumptions of the products must be known); making visible the products expiring within predefined time (for example in 6 months or in 9 months) by marking them and use the products marked first is important. So employees in NGOs warehouses should pay attention and put distinguished mark for drugs and disposable, which had short period expire date in order to manage it properly. They should start dispensing firstly, to ensure a minimum period of preservation.

Products received most recently may expire sooner than the products received earlier. So, it is extremely important to always check the expiration dates and to make sure the dates are visible while the products are in storage (John Snow Inc., 2003).

As shown in figure 4.5 before the disposable of expired medical supply, 55% of respondents put these products in a specific area in the store; 32% put it aside in the store, while 13 % reported putting the stuff in another place outside the store. All of outdate drugs must be put outside the store room.

WHO reported that the expired date should be set by the manufacturing laboratory to ensure a stable therapeutic effect up to that date (90% of the active ingredients shall be present and there shall be no substantial increase in toxicity). The expiration date must appear on the package and/or on the product (WHO, 2004).

The management of outdated products must follow a standardized operational procedure for the destruction of this expired stuff. Indeed, if we could not avoid expiry, expired drugs shall be destroyed because of the risks related to their usage so, firstly, the expired products shall be removed from the stock of products, placed in a reserved area of the store that can be locked (risks of theft). Secondly, these products are sorted by form to be destroyed in compliance with the law and the regulation in force in the country and with the guidelines for safe disposal of unwanted pharmaceuticals According to these principles, their destruction is compulsory to guarantee the protection of public health and the preservation of the environment (PSF, 2003).

The results of this study showed that it is possible that damage of some drugs and disposable items (97%) could occur. Most of the damage of drugs and supplies happens because of expiry date (95%). Of respondents 22% regarded the damage due to ordering issues (Table 4.5).

The result shows that the main reason of possible damage is expiry date which indicates problem in stock management and ordering or issuing problems the reasons behind theses problem the donation drugs and supply sometimes reach the store with short expire date and the long time it takes at the borders.

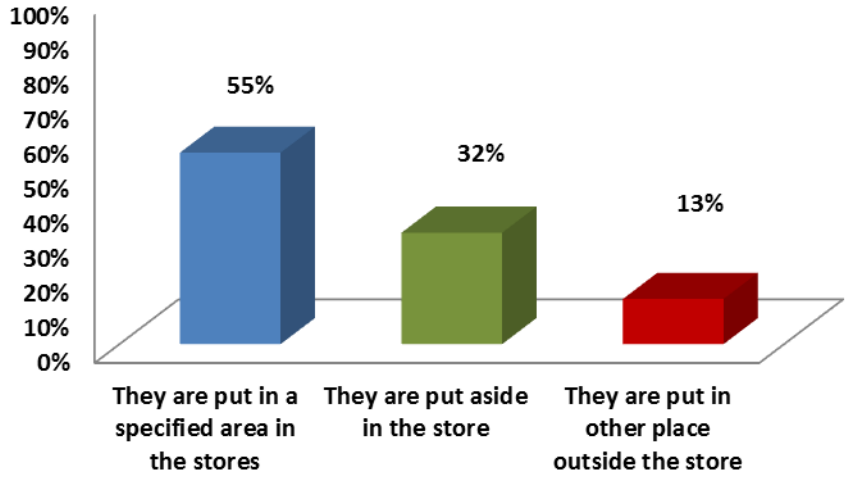


Figure 4.5: Distribution by the place of allocating outdate drugs and disposables

4.5 Storage conditions

Table 4.6: Distribution of warehouses by storage conditions related variables

	Variable	No.	%
1-	**The temperature of stores, refrigerator and freezers are measured**		
	Yes	58	52
	No	42	42
	Total	100	100
2-	**The temperature of stores, refrigerator and freezers are monitored**		
	Yes	78	78
	No	22	22
	Total	100	100
3-	**There is a good ventilation system for drugs and disposable**		
	Yes	94	94
	No	6	6
	Total	100	100
4-	**Availability of air conditions**		
	Yes	67	67
	No	33	33
	Total	100	100
5-	**There are humidity measurement instruments in the warehouse?**		
	Yes	2	2
	No	98	98
	Total	100	100
6-	**The cool instruments in the warehouse are calibrated**		
	Yes	53	53
	No	47	47
	Total	100	100
7-	**Performing maintenance of cool instruments**		
	Yes	60	60
	No	40	40
	Total	100	100
8-	**Availability of electricity generator**		
	Yes	93	93
	No	7	7
	Total	100	100

Nearly half of respondents reported that drugs and disposables warehouses do measure temperature. The results also showed that 19% of warehouses had a heat sensor in the store (Table 4.6). Of the respondent 78% reported that the temperature of the store, refrigerators and freezer were monitored (although not necessarily via using thermometers) and 30% of them reported that the temperature was continuously documented. Also, 53% of respondents reported that the refrigerator's instruments are calibrated where 60% of them said it was maintained regularly. The majority of respondents reported (93%) that

warehouses are equipped with energy generators to be used, if electricity was off (Table 4.6). This finding was supported by the guideline of John Snow Inc. when reported that arrange for a solar panel generator or alternative supply of electricity for cold rooms and refrigerators if the main source of electricity is not reliable (John Snow Inc., 2003).

In this study, the results showed that the temperature of the warehouse are not monitored adequately, which is not appropriate according to the international standard which stated that the room temperature should not exceed 25-30°C and must be controlled, measured and recorded on the appropriate sheet every day (PSF, 2003).

As mentioned previously in the literature review, the temperature in the warehouse where medical supply requiring specific storage conditions are held should be monitored and the results tabulated and analyzed so as to demonstrate the suitability of these areas for their purposes (WHO, 2003), (Mitema and Kikuvi, 2005).

As shown in Table 4.6, of respondents 94% reported that drugs and disposable warehouses had a good ventilation system and 67% of them reported that warehouses were equipped with sufficient air conditions, while 33% of the buildings were not equipped with enough air conditioners. The guideline of WHO in 1997 reported that air conditioned store should be designed and cooling plant sized, so as to ensure that internal temperatures can reliably be maintained below 25 degree centigrade (WHO, 1997). Heating, Ventilation and Air-Conditioning (HVAC) play an important role in ensuring the manufacture of quality pharmaceutical products. A well-designed HVAC system will also provide comfortable conditions for operators (WHO, 2003). The devices used to measure temperature must themselves be controlled, and possibly tested. They shall be placed in areas where temperature fluctuations are the widest that is to say near openings (WHO, 2003).

Only 2% of subjects reported that the warehouses had an instrument to measure humidity and 1% had instrument to control humidity (Table 4.6). This study showed that the severe

shortage for humidity measurement, which is not compliant with the international standards for good storage practices. Temperature and relative humidity should be controlled, monitored and recorded, where relevant to ensure compliance with requirements pertinent to the materials and products, and to provide a comfortable environment for the operator where necessary. Maximum and minimum room temperatures and relative humidity should be appropriate (WHO, 2006).

Table 4.7: Distributions of the warehouses by the availability of regulations for the distribution process

	Variable	N0	%
1-	**The method of dispensing the drugs and disposables that have expiry date**		
	First expired first out systems are used	100	100
2-	**Availability of written regulations for receiving and distribution procedures**		
	Yes	30	30
	No	70	70
	Total	100	100
3-	**Availability of software in the warehouse**		
	Yes	82	82
	No	18	18
	Total	100	100
4-	**Availability of a vehicle to distribute the drugs and disposables designated for medical warehouse use only**		
	Yes	77	77
	No	23	23
	Total	100	100
5-	**Availability of a vehicle to distribute the drugs that need special conditions**		
	Yes	52	52
	No	48	48
	Total	100	100

As reported by respondents, 82% of non-governmental medical supply warehouse used computer software in their work (Table 4.7). The use of computers can facilitate, but not replace efficient procedures in pharmaceutical procurement. When implemented appropriately, computerization will speed up complex tasks, increase accuracy and automate repetitive tasks. Staff must be trained adequately in the use of computerized systems. Many aspects of procurement are suitable for computerization, including planning of requirements, budget management, and financial analysis, preparation of documentation

and reports and inventory control. Hard copies (printouts) should be produced as required to provide documented evidence of the activities. Where computer systems are not used, manual systems should provide documented evidence of the activities performed (WHO, 2006). These results were inconsistence of Al-Geeg study that showed no computer software was used in the warehouse.

4.6 Availability of Regulations

Only 30% of participants reported having a written regulation for receiving and distribution procedures; 93.1% of them had special, clear and specific regulations. Only 30% of them were trained to use these regulations (Table 4.7). The researcher found that it is hard to get a copy of these regulations. Written instructions and records should be available to document all activities required in the storage areas including the handling of expired stock. These should adequately describe the storage procedures and define the route of materials and pharmaceutical products and information through the organization in the event of a product recall being required (WHO, 2003).

4.7 Distribution

All employees in medical supply warehouses reported using the first expire first out (FEFO) dispensing system for medical supply, which had an expire date (Table 4.7), while 94% of respondents reported using fist in first out system (FIFO) for medical supply which had no expire date. There should be a system to ensure stock rotation, with frequent regular checks that the system is operating correctly. Always issue products that will expire first, ensuring they are not too close to or past their expiration date. The shelf life remaining must be sufficient for the product to be used before the expiry date. Following FEFO minimizes wastage from product expiry. The study done in 2004 by Al-Geeg in

governmental central warehouse was inconsistence with this result, which showed more than half of employees, used first in first out (Al-Geeg, 2004)..

The study findings showed that 77% of respondents reported having a vehicle to distribute drugs and disposables designated for the medical warehouse. Nearly half of them (52%) had a proper vehicle to transport the drugs and disposables, which need special conditions (Table 4.7). The guideline of WHO reported that release instructions about distribution includes availability of a vehicle and equipment to be used to distribute, store or handle pharmaceutical products which should be suitable for their use and appropriately equipped to prevent exposure of the products to conditions that could affect their stability, packaging integrity, and prevent contamination of any kind (WHO, 2006).

The design and use of vehicles and equipment must aim to minimize the risk of errors and permit effective cleaning and/or maintenance to avoid contamination, build-up of dust or dirt and/or any adverse effect on the quality of pharmaceutical products being distributed. Dedicated vehicles and equipment should be used, where possible, when handling pharmaceutical products (Siyoi, 2006).

There should be procedures in place for the operation and maintenance of all vehicles and equipment involved in the distribution process, including cleaning and safety precautions. Vehicles, containers and equipment should be kept clean and dry and free from accumulated wastes. A written cleaning program should be available, indicating the frequency of cleaning and the methods to be used (WHO, 2006). Refrigerated vehicles/transportation containers should be mapped and monitored, if they provide the primary means for environmental control. However, this is not necessary if a qualified insulated container is used as the primary means of environmental control (Lambert, 2005). These results were inconsistence with Al-Geeg study that showed there were no vehicle to distribute drugs and disposables designed for the medical warehouse.

Checklist results

Physical conditions of warehouse

Table 4.8: Distribution of warehouses by physical conditions and storage process

(Total no. 50)

	Variable	N0	%
Physical conditions			
1-	**There were no cracks in the wales of warehouse**		
	Yes	49	98
	No	1	2
2-	**There were no signs of water drainage on the wales**		
	Yes	50	100
3-	**There were no signs of humidity on the wales**		
	Yes	48	96
	No	2	4
4-	**The store room were clean**		
	Yes	41	82
	No	9	18
5-	**There were instrument to measure temperature**		
	Yes	29	58
	No	21	42
6-	**There were instrument to measure humidity**		
	Yes	2	4
	No	48	96
7-	**There were enough light sources**		
	Yes	44	88
	No	6	12
	Total	50	100
8-	**There were good ventilations in the store room**		
	Yes	41	82
	No	9	18
Storage process			
9-	**There were over stocked items on the shelves**		
	Yes	21	42
	No	29	58
10-	**The temperature readings were documented**		
	Yes	4	8
	No	46	92
11-	**Control drugs were kept in a separate controlled storage space**		
	Yes	19	38
	No	31	62
12-	**There were poor quality items without labels, opened, or expired**		
	Yes	7	14
	No	43	86

The researcher used checklist to assess the physical conditions of all nongovernmental warehouses. The study results showed that there were no signs of water drainage and leakage. Almost all of the warehouses had no any cracks or signs of humidity on the walls; 82% of the storage rooms were clean. Additionally, 76% of shelves were clean and not dusty. This result means that almost all the storage places were in good condition. The walls and floors of the medical store should be smooth for easy cleaning (John Snow Inc., 2003). Store room should have a specific environmental control of particulate and microbial contamination, constructed and used in such a way as to reduce the introduction, generation and retention of contaminants within the area (WHO, 2006).

Also 58% of warehouses had instruments to measure the temperature, 8% of them documented the temperature. The room temperature in the warehouse must not exceed 25-30°C. It must be controlled, measured and recorded on the appropriate sheet every day so devices used to measure temperature must themselves be controlled, and possibly tested. Thermometers shall be placed in areas where temperature fluctuations are the widest that is to say near openings (PSF, 2003).

As mentioned in the literature review, if temperature deviates outside the relevant recommended conditions for an extended time, the temperature of the warehouse should be monitored to provide suitable storage conditions and to ensure stability of drugs (Mitema and Kikuvi, 2005) (John Snow Inc., 2003). This result means, nearly half of them don't measure warehouse temperature, which is an inappropriate practice that requires corrections according to the international standards.

Only 4% of them had instruments to measure relative humidity, 2% of them documented humidity. To reduce the effects of humidity, temperature and relative humidity should be controlled, monitored and recorded, where relevant, to ensure compliance with requirements pertinent to the materials and products, and to provide a comfortable

environment for the operator where necessary. Maximum and minimum room temperatures and relative humidity should be appropriate (WHO, 2006).

Extremes of humidity and temperature should be avoided. High humidity (>60% RH at 21° C to 24° C) produce more lasting effects on the drug component for example capsule shell, since as moisture is absorbed, the capsules become softer, tackier and bloated. If temperature is increased, the capsule shells may melt and fuse together. High temp > 40° in a dry place may cause cracking of the capsule shell. Therefore, capsules should be stored in an air-conditioned area in which the humidity does not exceed 45% RH at 21° C to 24° C (Ebied et al., 2004).

"What you cannot measure, you cannot managed" so proper instrument should be used to measure relative humidity in the warehouse with daily documentation to ensure relevant conditions according to international standards.

Checklist observations also showed that 88% of the warehouses had enough light. Effective lighting permits all operations to be carried out accurately and safely (WHO, 2006). Many active ingredients are light-sensitive, especially solutions that shall be kept in their packaging. No product shall be directly exposed to daylight (PSF, 2003).

Regarding ventilation system the checklist showed that 80% of warehouses had enough fans, air conditioner in the store. Air conditioned store designed with cooling plant sized ensure internal temperatures maintained below 25 degree centigrade to ensure the quality pharmaceutical products (WHO, 1997). Temperature, relative humidity and ventilation should be appropriate and should not adversely affect the quality of pharmaceutical products during their storage (Ebied et al., 2004).

Storage process in the warehouse

In Table 4.8, these results showed that 42% of store rooms had over stocked items on shelves, where more than half of them had stored drugs and disposable neatly on shelves and pallets. Around half of medical supply warehouses had boxes on the floor. The results showed that nearly half of store room had over socked items, which were inconsistent with the guidline of WHO in 1993 that showed a pharmaceutical product should be stored off the floor and suitably spaced to permit cleaning and inspection to enable correct storage and to avoid possible loss a systematic storage of the delivered goods used of pallets for better air circulation (WHO, 1993). Provision of spaces allows people and/or forklift pallets to circulate. A sufficient space should be left for each pharmaceutical product to avoid mixings and to incorporate new items that are not in stock yet. The products with the furthest expiration dates should be store at the back of the shelves and the ones with nearest expiration dates should be shelved in the front. This enables the reduction of the risk related to the expiration of the product use-by date during storage; Boxes should be perfectly piled up while limiting the height to prevent collapses.it should be stored in such a manner, so that their labels are easily visible and readable. All boxes in stock should be closed. For every shelved product, only one box should be opened for the distribution (PSF, 2003).

The results derived from the checklist showed that 38% of the controlled drugs are kept in a separate controlled storage space. This means more attention should be paid to this issue to prevent theft, assault, miss-use and lost. These products should be managed independently on the basis of management tools notably, to these products and under the responsibility of a pharmacist. Narcotics and other controlled products should be stored separately, in a locking cabinet (or little room), which should be guarded by the Responsible pharmacist (PSF, 2003).

The guideline of John Snow Inc. confirmed that there are specific procedures in place for the procurement, reception, storage, dispensing, and administration of controlled substances. Special ordering forms should be used to regulate storage process in the warehouse (John Snow Inc., 2003). On the other hand, control drugs must establish access-controlled storage; this will probably include storing the products in a separate locked room, cabinet, or safe, or a locked wire cage within the storage facility (WHO, 1993).

Checklist observation showed that 14% of store room had poor quality items, which means that drugs and/or disposable without label, opened and expired. So effective measures should be in place to ensure that rejected, and/or expired materials and pharmaceutical products cannot be used or bypassed. They should be stored separately from other materials and pharmaceutical products while awaiting their disposal either by destruction or return to the supplier (Ahmed and Al Mansoori, 2005).

Measurements

The checklist observations showed that in 58% of warehouses the measured temperature ranged between 18°C-29°C (Table 4.8). 12% of warehouses had a cold room and the temperature readings were between 4°C-16°C, which are consistence with the international standards of storeroom temperature in the warehouse (recommended, it should not exceed 25-30°C.

It must be controlled, measured and recorded on a specific sheet every day, so devices used to measure temperature must themselves be controlled, and validated. They shall be placed in areas where temperature fluctuations are the widest that is to say near openings (PSF, 2003).

Inferential statistics

Warehouse type and warehouse requirements

Table 4.9: Differences between warehouses type by the warehouses status and systems

Dependent variables "Warehouse status"	Independent variables (Warehouse type)	N	Mean	SD	F	P value
Domains extracted from the questionnaire						
Construction	Private	57	1.45	.538	5.74	.004
	Local NGOs	33	1.90	.721		
	International NGOs	10	1.58	.587		
Safety and security	Private	57	1.53	.215	6.99	.001
	Local NGOs	33	1.54	.220		
	International NGOs	10	1.79	.114		
Storage conditions	Private	57	1.50	.155	7.02	.001
	Local NGOs	33	1.57	.153		
	International NGOs	10	1.71	.269		
Distribution process	Private	57	1.52	.258	3.48	.035
	Local NGOs	33	1.47	.274		
	International NGOs	10	1.72	.213		
Overall	Private	57	1.50	.141	11.06	.000
	Local NGOs	33	1.62	.156		
	International NGOs	10	1.70	.210		
Domains extracted from the checklist						
Physical conditions	Private	29	1.77	.161	1.28	.287
	Local NGOs	16	1.73	.181		
	International NGOs	5	1.86	.152		
Storage process	Private	29	1.27	.089	.219	.804
	Local NGOs	16	1.29	.134		
	International NGOs	5	1.31	.165		
Overall	Private	29	1.52	.089	1.04	.360
	Local NGOs	16	1.51	.118		
	International NGOs	5	1.58	.150		

ANOVA test was used to compare the means of the four requirements/systems of warehouses in reference to warehouse type (Domains from the questionnaire) (Table 4.9). The results showed that there were statistically significant differences between the warehouse type and warehouses constructions (*p*-value = 0.004), with higher mean score (1.90) for local NGOs warehouses than the INGOs warehouses (1.58) and the private warehouses (1.45) according to post hoc test (Scheffee test). These results showed that the private warehouses need more attention to improve the requirements of their warehouses

and the provision of supervision. Also maintained of current performance as local and International NGOs warehouses to achieve best conditions for storage according to international standard of good storage practice.

Also the result showed there were statistically significant differences between warehouse type and warehouses safety and security (*p*-value = 0.001), with higher mean scores (1.79) for INGO warehouses than the local NGOs warehouses (1.54) and the private warehouses (1.53). So, buildings should have sufficient security to prevent pilferage of the pharmaceuticals. Safety procedures relating to all relevant aspects including, for example the safety of personnel and property, environmental protection and product integrity should be in place. These results are consistent with the study conducted in Lebanon by WHO, which showed that the central medicines warehouse had no security management system in place, no monitoring on entry and exit, no alarm system and no security system is used (WHO, 2009a).

Regarding storage conditions the result showed that there were statistically significant differences between the warehouse type and the warehouses storage conditions (*p*-value = 0.001), with higher mean scores (1.71) for INGOs warehouses than the local NGOs warehouses (1.56) and the private warehouses (1.52). This means that the international warehouse had better storage conditions than the local NGOs and the private warehouses which need more attention to improve warehouse conditions according to the international standards to ensure high quality of stored stock.

Also the results showed that there were statistically significant differences between the warehouse type and the warehouses distribution process (*p*-value = 0.035), with higher mean scores (1.72) for INGOs warehouses than the private warehouses (1.52) and the local NGOs warehouses (1.47). From the results it could be concluded that, local NGOs need to improve their distributions performance that included vehicles and equipment with the aim

of minimizing the risk of errors and permitting effective cleaning and/or maintenance to avoid contamination and to ensure the quality of pharmaceutical products being distributed.

The results show that there were statistically significant variations in reference to warehouse type and warehouse systems/requirements (*p*-value = .000), with higher mean score (1.70) for INGOs warehouses than the local NGOs warehouses (1.62) and the private warehouses (1.50). This means that the best performance was in international warehouses. Other warehouses could benchmark and learn from the experience of the INGOs.

Regarding results obtained from the checklist, ANOVA test was also used to compare the means of two requirements of warehouses in reference to warehouse type (Table 4.9).

Regarding physical conditions and warehouse type, the results showed that no statistically significant variations were noticed among the different warehouses (p-value = 0.287).Also there were no statistically significant differences between warehouse type and warehouses storage process (p-value = 0.804).

Warehouse requirements and employees training course

Table 4.10: Differences in warehouse status according to receiving training

Warehouse	Receiving training	N	Mean	SD	t	P value
Safety and security	Yes	19	1.67	.253	2.58	.011
	No	81	1.53	.206		
Storage conditions	Yes	19	1.61	.227	1.41	.171
	No	81	1.53	.163		
Distribution process	Yes	19	1.65	.266	2.34	.021
	No	81	1.49	.259		
Overall	Yes	19	1.64	.117	2.48	.015
	No	81	1.54	.172		

An in-dependent t-test was used to compare the means of three requirements/systems of warehouses in reference to whether the employees received training or not (Table 4.10).

The results showed that there were statistically significant differences in reference to receiving training and warehouses safety and security requirements (*p*-value = 0.011). Those who received training had elicited higher scores than those who didn't.

Regarding the distribution process, the results showed that there were statistically significant differences in the distribution process at the warehouses in reference to receiving training or not(*p*-value = 0.021). Those who received training had elicited higher scores than those who didn't.

Overall, the status of the warehouse was better in the ones that has employees who received training than the ones who didn't receive with statistically significant differences between the two groups (p-value = .015).

Table 4.11: Differences in warehouse status according to receiving training

Warehouse	Training courses	N	Mean	SD	t	P value
Physical conditions	Yes	14	1.85	.109	2.89	.022
	No	36	1.73	.175		
Storage process	Yes	14	1.29	.137	.071	.944
	No	36	1.28	.101		
Total domain	Yes	14	1.57	.099	1.90	.063
	No	36	1.51	.103		

An independent t-test was also used to compare the means of two requirements of warehouses in reference to employees receiving training courses (Table 4.11). The result showed that there were statistically significant differences between employees training and warehouses physical conditions (*p*-value = 0.022). Regarding the storage process of warehouse, the results showed that there were no significant relationships between employees receiving training and warehouses storage process (*p*-value = 0.944).

The differences in performances of employees could be attributed to training. The study of Siyoi showed that poor training program among different warehouses leads to a difference

in the quality of performance of employees. Pharmacists or Pharmaceutical technologists should hold the responsibility for ensuring that products/materials are correctly handled, stored and distributed, should have the education, training experience or combination of these elements that will allow them to effectively discharge this responsibility. Operating personnel should be trained to perform assigned duties and functions at an acceptable level (Siyoi, 2006). The study results reflect the effect of the training program in the warehouse regarding good storage practice, which needs to intensify the efforts for developing training program to increase efficiency and ensure accountability for employees.

Chapter 5

Conclusions and recommendations

5.1 Conclusions

Non-governmental medical warehouses are considered key component of the medical storage and delivery of pharmaceuticals and medical preparation in Gaza governorates. The purpose of this study was to assist the status of the drugs and disposables stored in INGOs, local NGOs and Private sector.

More than half of employees who had the responsibility for storage procedures were high qualified pharmacists, also nearly half of them had actual experience years more than three years, on the other hand, only 19% of the employees working in the warehouses had received training courses about medical supplies storage.

Most of NGOs medical warehouses were located in secure places and they were easy to reach by employees. Also, more than half of warehouses were constructed in one building and the size of some of the warehouses was not large enough to accommodate all the stock especially when there where high volume of the received stock. There were specific areas for quarantine, receiving, checking and distributing medical supplies in the most of the warehouses. Also the loading and unloading pays were sufficient and protected from weather conditions.

NGOs warehouses had inadequate safety and security system; there were no adequate fire alarms, emergency exit and security alarms in the medical warehouses to ensure safety of employees and stock storage. More than half of the NGOs warehouses can't manage controlled drugs properly according to the international standards, which could expose these drugs for assault or abuse and misuse.

Receiving processes were done mainly under the responsibility of pharmacists. Drugs are quarantined till its checking for quality control and the received shipment is recorded in the

stock card and the computer program and practice is consistent with the international standards. Approximately all in all medical supplies warehouses the expiry date of the received substances is checked; which is followed by periodic checking.

There were reported damage for some of the stocked drugs and the main reason of that is expiry date. The main reason behind having expired drugs is receiving huge amounts of donations with short expire date and the long time it took at the Israel borders. Nongovernmental medical supply warehouse used computer software in their work for recording and registration.

The structures of the NGOs warehouses were good in reference to their general conditions (no crack, no signs of water drainage or humidity on the wales). Some of the storage places were not adequately ventilated or air conditioned also some of them didn't have adequate light. Most of the NGOs warehouses don't have instruments for temperature and humidity measurement; even when they have, they don't do the needed documentation in this regard. High percent of warehouses don't do calibration and maintenance of the cool instruments (refrigerators and freezers) in the warehouses.

There were no written regulations in most of NGOs medical warehouses that regulate receiving and distribution processes. Half of warehouses don't have a vehicle, which is designated for distributing drugs and disposables and nearly half of these vehicles were not well-prepared to distribute drugs which need special conditions.

5.2 Recommendations

1- Implementing training programs for the warehouse teams concerned with the stock management cycle and procedures.

2- Effective safety measurements should be maintained including;

- Products presenting special risks of fire or explosion should be stored in a separate safe area.
- Emergency alarms should be used to early detect any fire and ensure safety of employees and stock in the store.
- Emergency exit should be made available to ensure safety of employees at emergencies.

3- Temperature and humidity need to be measured, monitored and documented daily in all the store areas.

4- Controlled drugs (narcotics) should be stored in a well-secure place, which need restricted and documented access.

Chapter: 6

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Annexes

Annex 1

Map of Palestine

Source: MOH, 2000

Annex 2

Map of Gaza Strip

Source: www. Islamonline.net

Annex 3

(8)

Palestinian National Authority
Ministry of Health
Helsinki Committee

السلطة الوطنية الفلسطينية
وزارة الصحة
لجنة هلسنكي

التاريخ7/6/2010

Name:

الاسم: محمد إسماعيل طبش

I would like to inform you that the committee has discussed your application about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:-

Assessment of the status of the non-governmental medical supply warehouses in Gaza Governorates.

In its meeting on June 2010

و ذلك في جلستها المنعقدة لشهر 6 2010

and decided the Following:-

و قد قررت ما يلي:-

To approve the above mention research study.

الموافقة على البحث المذكور عاليه.

Signature
توقيع

Member
عضو

Member
عضو

Chairperson

Conditions:-

- Valid for 2 years from the date of approval to start.
- It is necessary to notify the committee in any change in the admitted study protocol.
- The committee appreciate receiving one copy of your final research when it is completed.

Annex 4

Jul 2010 8:41 UNRWA-HEALTH 7934 p.1

File

united nations relief and works agency for palestine refugees in the near east

gaza field office
po box 61 gaza city gaza

t +970 8288 7351
f +970 8 288 7934

www.unrwa.org

HMG/M/204

July 14, 2010

الدكتور / بسام أبو حمد
منسق عام برامج الصحة العامة
جامعة القدس

الموضوع : **مساعدة الطالب محمد إسماعيل طبش**

بالإشارة إلى رسالتكم الموجه للسيد مدير برنامج الصحة بوكالة الغوث الدولية بتاريخ ٢٠١٠/٧/١١ نحيط سيادتكم علماً أنه لا مانع لدينا من مساعدة الطالب / **محمد اسماعيل طبش** في جمع البيانات اللازمة من مخازن الأدوية التابعة لوكالة الغوث

وتفضلوا بقبول فائق الاحترام ،

د. محمد المقادمة
مدير برنامج الصحة بوكالة الغوث الدولية

Cc: FP

nb/Research

وكالة الأمم المتحدة
لإغاثة وتشغيل اللاجئين
في الشرق الأدنى

Annex 5

موافقة لاجراء بحث

المشارك / والمشاركة ..... المحترم/ة

اقوم بدراسة حول تقييم وضع مستودعات الادوية الغير حكومية في محافظات قطاع غزة والتي تهدف الى تحسين نوعية الخدمة المقدمة. مع العلم أن هذه الدراسة هي متطلب للحصول على درجة الماجستير في الصحة العامة من جامعة القدس _ ابو ديس.

اتطلع لمشاركتكم في اتمام هذه الدراسة الغير ممولة من أي جهة كانت ولن يترتب على مشاركتكم فيها أي التزامات أكثر من الوقت اللازم لتعبئة الاستبيان.

وأود إعلامكم انه في حال موافقتكم على تعبئة الاستبيان من حقكم عدم اجابة اي سؤال لا تريدون الاجابة عنه و ستكون جميع المعلومات سرية ولن يذكر اسم اي مستودع لان الاهتمام فقط من الناحية البحثية فقط.

شاكرا لكم حسن تعاونكم

الباحث
محمد اسماعيل طبش
0599702670
medical11@yahoo.com

Annex 6

Self-Administered Questionnaire (Arabic Copy)

تقييم وضع مستودعات الادوية الغير حكومية في محافظات قطاع غزة

رقم الاستمارة		التاريخ	/ /2010م
تاريخ الميلاد			
المسمى الوظيفي			
الجنس	ذكر	انثى	
اسم المستودع			
نوع المستودع	1- خاص 2- منظمة اهلية محلية 3- منظمة اهلية عالمية		
المؤهل العلمي	1- دبلوم 3-شهادة عليا 2- بكالوريوس 4- اخرى, حدد.....		
التخصص	1- صيدلى 4- محاسب 2- مساعد صيدلي 5-اخرى..... 3- اداري		
مكان العمل	1- الادوية 2- اللوازم الطبية 3- مزدوج		
اجمالي سنوات الخبرة			
سنوات الخبرة في المستودعات			

هل حصلت على دورات تدريبية في مجال تخزين الادوية والمستلزمات الطبية او العمل في المستودعات	نعم	لا
اذا كانت الاجابة (نعم)		
فما هي نوعية هذة الدورة		
تاريخ اخر دورة تدريبية		
مدة هذه الدورة		

موقع المستودع وبناؤه

1-	هل المستودع موجود في 1- وحدة بنائية واحدة 2- مقسم الى اكثر من وحدة في نفس المكان 3- مقسم الى اكثر من وحدة في اماكن مختلفة 4- (3+2)
2-	مكان تخزين الادوية واللوازم الطبية موجود في 1- الدور الارضي 3- مزدوج 2- طابق علوي
3-	نوع المستودع 1- الي 3- مزدوج 2- يدوي

-4	الية دخول وخروج الادوية واللوازم الطبية يكون 1- من مدخل واحد 2- من مدخلين في نفس جهة المبنى 3- من مدخلين في جهتين متقابلتين من المبنى 4- من مدخلين في جهتين مختلفتين من المبنى		
5-	ماهي مساحة المخزن تقريبا بالمتر المربع؟		
6-	ما هو حجم المواد الكلي المراد تخزينها تقريبا بالمتر المكعب؟.....		
7-	هل يوجد مكان مخصص لاستلام الادوية والمستلزمات الطبية؟	نعم	لا
8-	مكان الفحص والاستلام الموجود في المستودع 1- كافي 2- وسط 3- غيركافي 4- لا يوجد		
-9	مكان الصرف الموجود في المستودع 1- كافي 2- متوسط 3- غيركافي 4- لا يوجد		
10-	مكان تجميع الادوية والمستلزمات الطبية المطلوب صرفها الموجود في المستودع 1- كافي 2- وسط 3- غيركافي 4- لا يوجد		
11-	رصيف التنزيل والتحميل الموجود في المستودع 1- كافي 2- متوسط 3- غيركافي 4- لا يوجد		
12-	اين توضع المواد سريعة الاشتعال كالكحول والايثر؟ 1- في نفس مكان تخزين الادوية 2- في مكان منفصل داخل المستودع 3- خارج المستودعات 4- لا توجد		
13-	هل يوجد في المستودع مخرج للطوارئ؟ 1- يوجد ومستخدم 2- يوجد وغير مستخدم 3- لا يوجد		
14-	هل يوجد في المخزن اجهزة انذار لاكتشاف الدخان والحريق؟ 1- توجد ومستخدمة 2- توجد وغير مستخدمة 3- لا توجد		

15-	هل يوجد في المستودع نظام حماية من السرقات؟ 1- توجد ومستخدمة 3- لا توجد 2- توجد وغير مستخدمة		
16-	هل توجد صيانة مستمرة لاجهزة الانذار بوجود حريق؟	نعم	لا
17-	هل يتم تدوين تاريخ الصيانة لهذه الاجهزة؟	نعم	لا
18-	هل توجد صيانة مستمرة لاجهزة انذار الحماية من السرقات؟	نعم	لا
19-	هل يتم تدوين تاريخ الصيانة لهذه الاجهزة؟	نعم	لا
20-	هل توجد اجهزة اطفاء للحريق؟	نعم	لا
21-	هل توجد صيانة مستمرة لاجهزة اطفاء الحريق؟	نعم	لا
22-	هل يتم تدوين تاريخ الصيانة لاجهزة اطفاء الحريق؟	نعم	لا
23-	هل يتم تدريب العاملين على استخدام اجهزة الحريق؟	نعم	لا
24-	هل المستودع في منطقة امنة؟	نعم	لا
25-	هل من السهل الوصول الى المستودع؟	نعم	لا
26-	هل مكان الاستلام محمي من الظروف الجوية (كالمطراوالشمس)؟	نعم	لا
27-	هل تم تدريب العاملين في المستودع على كيفية التصرف وقت الطوارئ؟	نعم	لا
28-	هل توجد الية مكتوبة توضح كيفية التصرف وقت الطوارئ؟	نعم	لا
29-	اذا كانت الاجابة (نعم) فهل شوهدت من قبل الباحث؟	نعم	لا
30-	هل توجد ادوية مراقية في المستودع؟	نعم	لا
اذا كانت الاجابة (نعم) فاجب السؤال رقم (31)			
31-	هل تحفظ الادوية المراقبة في مكان مغلق باحكام؟	نعم	لا
عملية الاســـــتلام			
32-	تتم عملية الاستلام بواسطة 1- الموظف المسؤول 2- لجنة خاصة بالاستلام 3- 2+1 4- اخرى, حدد		
33-	الشخص المسؤول عن عملية الاستلام 1- صيدلي 2- مساعد صيدلي 3- طبيب 4- ممرض 5- اخرى, حدد		
34-	عند استلام الادوية او اللوازم الطبية الواردة للمستودعات،هل يتم التأكد من الكميةعن طريق. 1- عد الطرود فقط 2- عد العبوات الداخلية في الطرود 3- الاتنان معا		
35-	هل تحجز الشحنة حتى يتم التأكد من مواصفات الدواء والمستلزمات الطبية؟ 1- دائما 2- احيانا 3- نادرا		
36-	هل يتم التاكد من جودة الدواء(معاينة فيزيائية) او اللوازم الطبية الواردة؟	نعم	لا

37-	هل يتم اخذ عينات لغرض التحليل والتاكد من جودتها؟	نعم	لا
اذا كانت الاجابة (نعم) اجب سؤال رقم (38)			
38-	هل يتم فحص الجودة 1- في مختبرات داخلية 3- الاثنان معا. 2- في مختبرات خارجية		
39-	يتم تسجيل حركة الادوية او اللوازم الطبية الواردة للمخزن عبر 1- يدوية عن طريق كارت خاص بالواردات 2- جهاز الحاسوب 3- الاثنان معا 4- اخرى ، حدد.....		
40-	عند استلام الادوية او اللوازم الطبية هل تدون الملاحظات في محضر الاستلام؟	نعم	لا
عمليـــة التخـــزين			
41-	الطريقة المتبعة في التخزين هي		

	نعم	لا
1- ارفف		
2- قاعدة خشبية على الارض		
3- قواعد خشبية فوق الارض		

42-	الالية المتبعة لوضع الادوية واللوازم الطبية داخل المستودعات هي 1- يوضع الصنف في مكان ثابت خاص به 2- يوضع الصنف في اي مكان حسب القراغ 3- يستعمل نظام مختلط		
43-	يتم ترتيب المواد المخزنة في اماكنها حسب		

	نعم	لا
الترتيب الابجدي للاسم		
الترتيب في مجموعات حس الاستعمال الدوائي		
الترتيب حسب حركة الصنف		
الترتيب حسب الشكل الصيدلاني		
الترتيب حسب الشركة المصنعة		
الترتيب حسب تاريخ الانتهاء		
الترتيب حسب المكان الخالي		

44-	هل يتم التاكد من من تاريخ صلاحية كل المواد التي يتم استلامها؟	نعم	لا
45-	ما هي الفترة التي يتم فيها مراجعة تاريخ صلاحية الادوية واللوازم الطبية المخزنة؟ 1- ..... اسبوع 2- ..... شهر		
46-	يتم التعرف على انتهاء صلاحية بعض الادوية واللوازم الطبية المستهلكة المخزنة عن طريق 1- البحث الدوري في الاوراق والمستندات الخاصة بصلاحية المواد 2- البحث عن طريق الحاسوب في تواريخ الصلاحية 3- المعاينة المباشرة للمواد المخزنة 4- اخرى حدد.....		
47-	هل يتم اللجوء لوضع علامة مميزة على بعض الاصناف يشير الى اقتراب انتهاء الصلاحية؟	نعم	لا
48-	هل سبق ان تلفت بعض المواد المخزنة؟	نعم	لا

49-	اذا كانت الإجابة (نعم) فإن السبب الأساسي لتلفها هو 1- ظروف التخزين 2- انتهاء تاريخ صلاحيتها 3- خطأ الموظف المسؤل 4- مشكلة في عملية الطلب والصرف 5- أخرى، حدد.....			
50-	قبل اتلاف بعض الأدوية و اللوازم الطبية التي انتهى تاريخ صلاحيتها فانه يتم 1- وضعها في مكان داخل المستودع خاص بالادوية منتهية الصلاحية 2- وضعها جانبا في المستودع 3- اخراجها من المستودع إلى مكان اخر 4- ابقائها في مكانها			
51-	هل يوجد نظام متبع لإتلاف الأدوية؟	نعم		لا
52-	هل يتم مراقبة درجة الحرارة في المستودع والثلاجات والغرف المبردة؟	نعم		لا
53-	هل يتم تسجيل الحرارة بطريقة مستمرة؟	نعم		لا
54-	هل يوجد أجهزة تحكم حساسة لدرجة الحرارة في كل مكان؟	نعم		لا
55-	هل يوجد نظام تهوية جيد للأدوية أو اللوازم الطبية المخزنة؟	نعم		لا
56-	هل المستودع مزود بمكيفات كافية لتغطية المساحة التي تحتاج ظرف تخزين خاصة؟	نعم		لا
57-	هل يوجد مولدات كهرباء كافية تستخدم في حال انقطاع التيار الكهربائي؟	نعم		لا
58-	هل يوجد جهاز للتحكم في رطوبة المكان؟	نعم		لا
عملية الصرف				
59-	عند صرف الأدوية واللوازم المستهلكة(ذات تاريخ صلاحية محدود) من المخزن للاستخدام فإنه يتم مراعاة: 1- تسليم المواد الواردة أولا 2- تسليم المواد الواردة اخيرا 3- تسليم المواد التي ينتهي تاريخ صلاحيتها أولا 4- اخرى، حدد.....			
60-	عند صرف الأدوية واللوازم الطبية المستهلكة التى ليس لها تاريخ صلاحية محدد من المخزن للاستخدام فانه يتم مراعاة: 1- تسليم المواد الواردة أولا 2- تسليم المواد الواردة اخيرا 3- أخرى، حدد.....			
61-	هل يوجد أي تعليمات او الية مكتوبة تنظم عملية الصرف والإستلام؟	نعم		لا
62-	اذا كانت الاجابة (نعم) فهل شوهدت من قبل الباحث؟	نعم		لا
اذا كانت الإجابة (نعم) اجب عن الأسئلة من 63-66 أما اذا كانت الأجابة (لا) انتقل مباشرة للسؤال رقم 67				
63-	ما مصدر هذه التعليمات؟ 1- مركزي من وزارة الصحة 2- محلي وخاص بالمؤسسة 3- أخرى، حدد.....			
64-	هل يتم تطبيق التعليمات؟	الى حد ما	نعم	لا
65-	هل يتم تدريب العاملين على استخدامها؟		نعم	لا
66-	هل هذه التعليمات واضحة وسهلة الإستخدام؟		نعم	لا
67-	هل ترتبط المستودعات بوزارة الصحة أو الإدارات ذات العلاقة بشبكة حاسوب؟		نعم	لا

68-	هل يتم استخدام برمجيات خاصة بالمستودعات؟	نعم	لا
69-	هل يوجد وسيلة نقل تستعمل لنقل الأدوية خاصة بالمستودع؟	نعم	لا
70-	هل وسيلة النقل التي تستعمل لنقل الادويةمجهزة لنفل الادوية المبردة؟	نعم	لا
71-	هل توجد مشكلة في توفير وسيلة النقل؟	نعم	لا
72-	هل يتم معايرة الأجهزة المستخدمة في عملية التبريد؟	نعم	لا
73-	هل توجد صيانة دورية للأجهزة لاجهزة التبريد؟	نعم	لا
اذا كانت الاجابة (نعم) فاجب الاسئلة التالية			
74-	الصيانة الدورية للاجهزة تتم 1- ..... شهر 2- ..... سنة		
75-	هل تتم عملية تدوين لعملية الصيانة لهذه الاجهزة؟	نعم	لا

Annex 7

Checklist (Arabic Copy)

تقييم وضع مستودعات الادوية الغير حكومية في محافظات قطاع غزة

	توفر الشروط الصحية في البناء		نعم	لا
1-	لا يوجد شقوق او فتحات			
2-	لا وجود لتسرب مياه			
3-	لا وجود لاثار رطوبة على الجدران			
4-	المكان مرتب			
5-	المكان نظيف والأرفف خالية من الأتربة.			
6-	توجد اجهزة لقياس درجة الحرارة.			
7-	توجد اجهزة لقياس الرطوبة.			
8-	تتوفر الإضاءة الكافية.			
9-	توجد مراوح اومكيفات هوائية كافية.			
10-	المكيفات والمراوح صالحة للاستعمال وتعمل بكفائة.			
	طريقة التخزين		نعم	لا
11-	يوجد تكدس في الأصناف على الرف.			
12-	يوجد سجلات توثيق درجة الحرارة .			
13-	يوجد سجلات توثيق درجة الرطوبة.			
14-	يوجد مكان خاص مغلق بإحكام لحفظ الأدوية المراقبة.			
15-	يوجد ادوية بحالة سيئة (لا يوجد عليها لاصقة، مفتوحة، منتهية الصلاحية).			
16-	الأدوية مخزنة بطريقة منظمة على الأرفف .			
17-	الأدوية مخزنة بطريقة منظمة على على قاعدة خشبية.			
18-	يوجد أدوية (تحتاج الحفظ في الثلاجة) خارج الثلاجة.			
19-	يوجد ادوية تتاثر بالحرارة خارج غرفة التبريد.			
20-	يوجد صناديق على الأرض بدون قاعدة خشبية.			
21-	يوجد أدوية لم يتم التاكد من جودتها على الرف في منطقة الصرف.			
	القياسات			
			نعم	لا
22-	درجة الحرارة في المستودع.			
23-	درجة حرارة الثلاجة.			
24-	درجة حرارة الغرفة المبردة.			
25-	درجة الرطوبة النسبية.			
26-	درجة حرارة الفريزر.			

Annex 8

Explanatory Letter

Self-administered Questionnaire

Dear Participant

Thank you for your participation in this research; you were selected because you met the selection criteria of participation.

This study is carried out as a part of the requirements for the master degree in Public Health/Health Management at Al Quds University-Palestine.

This study aims to assess the storage system of the drugs, medical disposables and their management in international NGOs, local NGOs and Private warehouses in Gaza Governorates.

Your participation is voluntary, and you have the right to withdraw at any time during data collection. Your answers will be kept confidential and only it is requested from you to answer the questionnaire that may not take more than15 minutes of your time.

If you have any inquiry about the questionnaire, don't hesitate to call (0599702670).

Researcher: Mohammed Tabash

Annex 9

Questionnaire (English copy)

No.			/ /2010	
Age				
Gender	Male	female		
Warehouse name				
Warehouse type	1-private 2-local NGOs 3-international NGOs			
Qualification	1- Diploma 2- Bachelor 3- graduate certificate 5- Other ……			
Specialization	1- Physician 2- Pharmacist 3- Pharmacist assistant 4- Nurse 5- Others, specify…….			
Department	1-Drugs 2- disposable 3- all			
Experience	…… years			
Actual work experience in the warehouse environment				
Did you have any training courses in store works?			Yes	No
If answer is yes answer the following questions				
Type of training course ……...,				
Last date training of course ……..				
Duration of training course (days)……...				
Storage structure:				

1-	the warehouse is constructed on 1- One building 2- Many building in the same place 3- Many building in different places 4- (2+3)
2-	the store is located in 1- First floor 2- Second floor 3- both
3-	The warehouse is 1-Mechanized 2-Manual 3-Both
4-	The inward and outward flow of the drugs and supplies are from 1- One entrance 2- Two entrances on the same side of the building 3- Two entrances on opposite sides of the building 4- Two entrances on different sides of the building

5-	How many square meters is the area of the store?		
6-	What is the total volume of stored items?		
7-	Are there special area for receiving and check drugs and disposables	Yes	No
8-	The receiving and checking area of drugs and disposable is 1- Sufficient 2- acceptable 3- insufficient 4- Not available		
9-	The area of drugs and supplies distribution is 1- Sufficient 2- acceptable 3- insufficient 4- Not available		
10-	Assembly area is 1- Sufficient 2- acceptable 3- insufficient 4- Not available		
11-	The loading and unloading bay is 1- Sufficient 2- acceptable 3- insufficient 4- Not available		
12-	Where inflammable drugs such as alcohols or ether are stored? 1- In the same store with drugs 2- In a separate place within the same store 3- Outside the warehouse 4- Not available		
13-	Are there emergency doors in the warehouse? 1- Yes and used 2- Yes but not used 3- No		
14-	Are there smoke alarms in the warehouse? 1- Yes and used 2- Yes but not used 3- No		
15-	Are there anti-thief security systems in the warehouse? 4- Yes and used 5- Yes but not used 6- No		
16-	Is there maintenance for smoke alarms in the warehouse?	Yes	No

17-	Is there documentation for maintenance of smoke alarms in the warehouse?	Yes	No
18-	Is there maintenance for anti-thief security systems in the warehouse?	Yes	No
19-	Is there documentation for maintenance for anti-thief security systems in the warehouse?	Yes	No
20-	Is there fire extinguisher in the warehouse?	Yes	No
21-	Is there periodic maintenance for fire extinguisher in the warehouse?	Yes	No
22-	Is there documentation of date for maintenance for fire extinguisher in the warehouse?	Yes	No
23-	Are employees trained how to use fire extinguisher	Yes	No
24-	Is the warehouse in a secure place?	Yes	No
25-	Is it easy to reach the warehouse?	Yes	No
26-	Is the receiving bay protected from rainy and sunny weathers?	Yes	No
27-	Is the staff trained to meet the emergency status?	Yes	No
28-	Is there a written procedure which deals with an emergency status?	Yes	No
29-	Is written procedure which deals with an emergency status seen by researcher?	Yes	No
30-	Are there controlled drugs in the warehouse?	Yes	No
If yes answer question 31			
31-	Are the controlled drugs kept in a separate controlled storage space?	Yes	No

Receiving process

32-	receiving process are performed by 1- responsible employee 2- special committee 3- 1+2 4- Other specify
33-	Who is responsible for receiving process? 1- Pharmacist 2- Pharmacist assistant 3- Physician 4- Nurse 5- Others
34-	The amount of the received drugs and supplies are checked through 1- Counting of boxes 2- Counting of items inside the boxes 3- (1+2)
35-	Are the drugs and supplies quarantined till the quality is checked? 1- Always 2- Some time

	3- Rarely		
36-	Are the quality control procedures done in the warehouse?	Yes	No
37-	Are they taking sample to check and ensure quality?	Yes	No
	If the answer is yes, answer question number 38		
38-	The quality is checked in 1- Internal Laboratories 2- External laboratories 3- all		
39-	The received drugs and disposables movement are recorded through. 1- Stock card 2- Computer 3- Both 4- Others, Specify…….		
40-	When receiving drugs and disposables, are notes recorded in the receiving invoice?	Yes	No

Storage process

41- The used storage method is:

	Yes	No
Shelves		
Pallets		
Pallet racking		

42- The drug positioning system used in the stores is:

1- Each product has a definite location
2- The items are placed wherever space is available
3- Combination of the two systems is used

43- The products are arranged according to:

	Yes	No
Alphabetical order		
Therapeutic or pharmacological category		
Level of use		
Dosage form		
Manufactured company		
expire date		
Empty space		

44-	Is expire date of all received drugs and disposable expiry date checked?	Yes	No
	If yes		
45-	The expire date of the drugs or disposable is checked every 1- …….. week 2- ……..month.		

46-	The expire date of the drugs or disposable is checked by revising 1- The stocks record 2- The computer record 3- The label of the item 4- Others, specify ……		
47-	Is there distinguish mark for drugs and disposable which have short period expire date?	Yes	No
48-	Is there frequent damage for drugs and disposable?	Yes	No
49-	The main reason of their damage is? 1- Storage conditions 2- Expiry date 3- Employee accident 4- Ordering or issuing problems 5- Others, specify ……		
50-	When the drugs or disposables get expired before their disposal 1- They are put in a specified area in the stores 2- They are put aside in the store 3- They are put in other place outside the store 4- Remain in their place on the shelves		
51-	Is there a disposal system for the expired drugs and disposables?	Yes	No
52-	The temperature of the stores, refrigerators and freezers monitored?	Yes	No
53-	Is the temperature continuously documented?	Yes	No
54-	Are there heat sensors in the stores?	Yes	No
55-	Is there a good ventilation system for drugs and disposables?	Yes	No
56-	Are the stores equipped with sufficient air conditions?	Yes	No
57-	Is there stand-by energy generator?	Yes	No
58-	Are there humidity control instruments?	Yes	No

Distribution process

59-	When dispensing the drugs or disposables that have expiry date to health facilities 1- First-in First-out system is used 2- First- out First in system is used 3- First-expired First-out system is used 4- Others, specify ……..
60-	When the drugs or disposables that have not expiry date are dispensed to health facilities 1- First-in First-out system is used 2- First- out First in system is used 3- First-expired First-out system is used 4- Others, specify……..

	61-	Are there any written regulations for receiving and distribution procedures?	Yes	No	
	62-	Is the written procedure which deals with regulations of receiving and distribution seen by researcher?	Yes	No	
	If the answer is yes, go to question 63-66, and if it is no, go directly to question number 67.				
	63-	What is the source of these regulations? 1- MOH 2- special for organization 3- Others, Specify……..			
	64-	Are these regulations in use currently?	Yes	No	
	65-	Are the staffs trained to use these regulations?	Yes	No	
	66-	Are these regulations clear and easy to use?	Yes	No	
	67-	Is the warehouse has integrated computer system with MOH and key departments?	Yes	No	
	68-	Is there any software used in the warehouse?	Yes	No	
	69-	Is there is a vehicle to distribute the drugs and disposables is designated for the medical warehouse use only?	Yes	No	
	70-	Is the vehicle used to distribute drugs and disposables proper for?	Yes	No	
	71-	Is there a problem in getting a vehicle?	Yes	No	
	72-	Are the instruments in the warehouse calibrated?	Yes	No	
	73-	Are the instruments and equipment's regularly maintained?	Yes	No	
	If the answer is yes, answer question number 77				
	74	The regular maintenance is done every 1- …….. Month. 2- ……...year.			
	75	Are the regular maintenance is documented?	Yes	No	

Annex 10 **check list**

Physical condition of the store		**Yes**	**No**
1-	no cracks		
2-	no signs of water damage		
3-	no signs of humidity on Wales		
4-	The store is clean		
5=	there is no dust on shelves		
6=	There are instruments to measure the temperature.		
7=	There are instruments to measure the humidity. .		
8-	There is enough lighting.		
9-	There is good ventilation in the store.		
10=	fans and air conditions are enough and in a good condition.		
Storage process		**Yes**	**No**
11-	There are over stocked items on the shelves.		
12-	The temperatures are documented.		
13-	The humidity are documented		
14-	Controlled drugs are kept in a separate controlled storage space.		
15-	There are poor quality items (without label, opened, or expired).		
16-	Supplies are stored neatly on shelves.		
17-	Supplies are stored neatly on pallets		
18-	There are drugs that need to be stored in refrigerator found outside the refrigerator.		
19-	Heat sensitive drugs are stored outside the cold room.		
20=	There are boxes on the floor.		
21-	There are drugs on the shelves or in the assembly area that has not been released from quality control.		
Measurement			
		Yes	No	℃
22-	The temperature of the store			
23-	The temperature of the refrigerator.			
24-	The temperature of the cold room.			
25-	Humidity in the store.			%
26-	The temperature of the freezer.			

Annex 11

Names of experts

- Dr. Abed El-Naser Abu Jaser.
- Dr. Ibraheim AL-Basyouni.
- Dr. Jehad AL-Hisi.
- Dr. Mazen AL-Saqa.
- Dr. Mohamad Al-Najaar.
- Dr. Mohammad El-Zimeely.
- Dr. Mohammed Ouda.
- Dr. Mokhlis Al-Adham.
- Dr. Sulaiman AL-Jubour.
- Dr. Zakary Abu Gamar.

Annex 12

ملخص الدراسة

تعتبر عملية تخزين الادوية في المتستودعات من اهم المراحل للمحافظة على جودة الادوية والمستلزمات الطبية , وتعتبر المستوعات الغير حكومية دورا اساسيا في عملية التخزين, ومن ثم توزيعها على العيادات, والمستشفيات الخاصة بها او الصيدليات العامة, كما هو الحال بالنسبة للمستودعات الخاصة. وهدف الدراسة تقييم, ووصف نظام تخزين الادوية, واللوازم الطبية, وادارة المخزون في المستودعات الطبية غير الحكومية لتحسين نوعية الخدمة المقدمة.

اهداف الدراسة الخاصة:

- ❖ إختبار مدى ملائمة المستودعات لتخزين الأدوية واللوازم الطبية المستهلكة.
- ❖ إختبار الية العمل في المستودعات الطبية الغير حكومية.
- ❖ تقييم ظروف التخزين في المستودعات.
- ❖ تحديد نفاط القوة والضعف في نظام التخزين.
- ❖ تقديم توصيات من اجل تحسين نوعية الخدمة المقدمة.

منهجية الدراسة:

لقد استخدمت الدراسة الوصفية المقطعية التحليلية في المستودعات الطبية غير الحكومية في محافظات قطاع غزة, وقد شملت الدراسة كل المستودعات و العاملين فيها, وكان اجمالي عددها 51 مستودع, و105 عاملا فيها ممن لهم علاقة مباشرة في عملية التخزين, و قد كانت نسبة الاستجابة 95% للعاملين و98% للمستودعات. وتم جمع المعلومات باستخدام استبانة يتم تعبئتها من قبل العاملين في المستودع, بالاضافة الي قائمة شطب يتم تعبئتها من قبل الباحث بعد استكمال تعبئة الاستبانة, بعد ان تم فحصها من الناحية العلمية من قبل محكمين, بالاضافة لاجراء دراسة تجريبية قبل البدء في البحث. وتم تحليل الاستبان وقائمة الشطب من قبل الباحث باستخدام البرنامج الاحصائي SPSS version 18 .

وتمت الدراسة في شهر نوفمبر لعام 2011م .

نتائج الدراسة:

اظهرت النتائج ان نصف العاملين في المستودعات هم صيادلة, وان 43% لديهم خبرة عملية في المستودع تقل عن ثلاث سنوات, وان 19% منهم تلقو تدريب حول عمليات التخزين وادرارة المستودعات .

كما اظهرت الدراسة ان مساحة بعض المستودعات غير كافية للتخزين, وانه يوجد تكدس في الاصناف في العديد من اماكن التخزين, وانه يوجد مكان مخصص لاستلام الادوية, وفحصها, وكذلك مكان التسليم وتجميع الادوية المراد صرفها في معظم هذه المستودعات.

وقد اظهرت الدراسة ان (22%) المستودعات الطبية الغير حكومية لا تتبع معايير السلامة طبقا للمعايير العالمية المتبعة, حيث ان المواد سريعة الاشتعال مثل الكحول والاستون يتم تخزينها في نفس مكان التخزين, وان 64% من المستودعات لا يوجد فيها مخرج للطوارئ, 51% منها لا توجد فيها اجهزة انذار للحريق, 64% منها لا يوجد فيها اجهزة حماية من السرقات, كما ان 94% منها لا توجد فيها تعليمات مكتوبة توضح كيفية التصرف وقت الطوارئ.

كما اظهرت الدراسة ان 90% من العاملين في المستودعات يتاكدون من المواد المستلمة عن طريق عد الصناديق والعبوات التي بداخلها, وان 68% يحجزون هذه الادوية حتى يتم التاكد من جودتها, وان 10% منهم يستخدمون كارت الصنف في تسجيل حركة الادوية والمستلزمات, كما ان 46% من يسجلونها عن طريق الحاسوب, وان 44% من يسجلونها عن طريق الحاسوب وكرت الصنف.

اما بالنسبة للادوية المراقبة (الادوية المخدرة) فان النتائج اظهرت ان هناك قصور كبير في طريقة تخزينها حسب المعايير العالمية, فقد اظهرت الدراسة ان 62% من المستودعات لا تقوم بتخزين مثل هذه الادوية وان 59% منهم يقوم بتخزين هذه الادوية على الارفف مع الادوية الاخرى مما قد يعرضها للسرقة او الاستخدام الغير مناسب .

بالنسبة لترتيب الادوية والمستلزمات الطبية, فقد اظهرت الدراسة ان كل مستودع يستخدم الطريقة المناسبة والخاصة به من اجل الوصول للادوية بسرعة وتسهيل عملية مراقبة تاريخ الانتهاء او عملية الصرف, مع العلم ان اكثر من نصفهم يرتبها حسب التاريخ , فمثلا 66% منهم يخزن الادوية في مكان ثابت, 2% حسب المكان الخالي, 32% يستخدم نظام مختلط, كما ان 99% منهم يتفحص تاريخ الانتهاء دائما, وان 32% يراجعونها كل ثلاث اسابيع, وان اكثر من نصفهم يراجعونها عن طريق الحاسوب او اللاصقة على العبوات.

وقد اظرت النتائج ان 97% من المستودعات يحصل فيها تلف لبعض الادوية, وان 95% ذكر ان السبب وراء ذلك هو انتهاء تاريخها, وان 8% منهم عزى ذلك الى ادوية التبرعات التي تصل الي المستودع, والتي تصل اما منتهية الصلاحية او ذات تاريخ قريب, وبكميات كبيرة, تفوق حاجة المستودع. كما ان اكثر من النصف يضع هذه الادوية المنتهية الصلاحية جانبا في المستودع حتى يتم التخلص منها.

اما بالنسبة لظروف التخزين, فقد اظهرت النتائج ان 50% من المستودعات, لا يوجد بها جهاز لقياس الحرارة, وان الغالبية من هذه المستودعات لاتقوم بعملية توثيق درجة الحرارة في المستودع, او في الثلاجات او الفريزر كما ان معظم المستودعات(96%) لا يوجد بها جهاز لقياس او التحكم في درجة الرطوبة النسبية, كما اظهرت الدراسة ان 94% من المستودعات فيها نظام تهوية جيد ومناسب, وان اغلبها تتوفر فيها اضائة جيدة.

كما اظهرت النتائج ان كل المستودعات تتبع نظام صرف الادوية التي ينتهي تاريخها اولا, وان 29% من المستودعات لا يوجد فيها تعليمات خاصة تنظم عملية الصرف والاستلام.

بالنبسبة لوسيلة النقل فان 77% من المستودعات لديها وسيلة نقل خاصة بالمستودع, 52% من هذه الوسائل مجهزة لنقل الادوية التي تحتاج الى ظروف خاصة.

التوصيات:

1. ضرورة توسيع وتطوير بعض المستودعات لتتسع لكل المواد المراد تخزينها.
2. ضرورة عمل ورشات و برنامج للتدريب على الطرق المثالية للتخزين.
3. ضرورة تطوير وانشاء وسائل الحماية في المستودعات.
4. ضرورة قياس ومراقبة درجة الحرارة والرطوبة النسبية في جميع اماكن التخزين.
5. اهمية اتباع دليل منظمة الصحة العالمية لممارسة التخزين.