An-Najah National University

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Assessment of Data Quality for Maternal and Child Health Department at Primary Health Care Directorate-Tulkarm

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الاهداء

بسـم الله والحمد لله على نعمه والصلاة والسلام على سيدنا محمد وعلى اله وصحبه اجمعين .

أما بعد ،أبدأ رسالتي بكلمة اهداء بسيطه من كل قلبي الى كل من همه ويهمه أمري،

الى منبع الوجود ومعناه ،إلى كلمة السر لهذه الحياة وتلك ،ومفتاح قلب الرحمان . . .الى من علمتني كيف

اقف امامكـم يـ لحظه تتسابق فيها الدموع لمقلتي . . .اليك أمي

إلى من أعادوا ترتيب حروفلأمفصار تأملا . .الى من اجتمعوا معي على دفء موقد الشتاء وتقاسمنا معا ظلمه

ليله واحدة بحلوها ومرها . . .اليكـم اخوتي

إلى عبقاليا سمينوالريحان . . . إلى فيئيفيتمونرساديقرعناء ومدفأتيفيكانونحنون "البشر" . . . إلى رفيق

درربي وعنوان ابتسامتي . . .هويتي . . .اليك زروجي

الى من له كل عطائي . .الى من وهبني الحياة الف مرة بكلمه

"أمي" . . .إلى المعى الساميفيعالمتهافتتفيها المعاني . . . إلى صخرتي ،مائيوهوائي ،ومنبهولهينبضالفؤاد ...قرة

عيني ..."يحيى"

الى أساتذتي الذين اعانوني يـ توسيع مداركي وتحديد أهداي يـ واتمام رسالتي بكافة جوانبها

اليكـم جميعا أهدي رسالتي وكل امتناني .

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الإقرار

أنا الموقعة أدناه مقدمة الرسالة التي تحمل العنوان:

تقدير معايير جودة المعلومات المتعلقة بصحة الام و الطفل لدى مراكز الرعاية الصحية الاولية في مديرية صحة طولكرم

أقر بأن ما اشتملت عليه هذه الرسالة إنما هو نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه حيثما ورد و أن هذه الرسالة ككل أو أيجزء منها لم يقدم من قبل لنيل أية درجة علمية أو بحث علمي أو بحثي لدى أية مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's name: اسم الطالبة: تمارا سمير عواد

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Date: التاريخ:

Table of Contents

VIII

List of Tables

List of figures

List of Abbreviations:

MCH	Maternal and Child health
WHO	World Health Organization
MDG	Millennium Development Goals
ANC	Antenatal Care
LMI	Low and Middle Income
HIS	Health Information System
MOH	Ministry of Health
PHIC	Palestinian Health Information Center
PHC	Primary Health Care
NGO	Nongovernmental Organization
UNRWA	United Nations Relief and Works Agency
IMCI	Integrated Management of Childhood Illnesses
HMIS	Health Management Information System
ANU	Al-Najah National University
IRB	Institutional Review Board
HCWs	Health Care Workers
DSB	Daily Statistic Book
EBF	Exclusive Breast Feeding
Hb	Haemoglobin Concentration
IT	Information Technology
AIDS	Acquired Immune Deficiency Syndrome
HIV	Human Immunodeficiency Virus
hRHR	Harmonized Reproductive Health Registry
DHIS	District Health Information System
BP	Blood Pressure
PMTCT	Prevention of Mother-To-Child Transmission
SPSS	Statistical Package of Social Sciences
TB	Tuberculosis
PMRS	Palestinian Medical Relief Society
PRCS	Palestinian Red Crescent Society

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Abstract

Introduction: The information associated to maternal and child health (MCH) is an important pointer for health communities and outlines the situation of the health of generations. Perhaps more importantly, this information must be accurate, timely, and consistent for enabling communities in managing their health systems effectively.

Objectives: The study aimed to provide an assessment for the quality of MCH information at Primary Health Care (PHC) Directorate in Tulkarm, Palestine. This was achieved by observing the performance of PHC staff (nurses and midwives) for MCH data collection protocol in PHC, checking completeness of protocol components in MCH files and assessing the completeness, timeliness and accuracy of monthly MCH reports for 2014.

Methods: This assessment was carried out from December 2014 to January 2015 at 10Antenatal care (ANC) and child care clinics in the Tulkarm district: *Northern, Shwiekeh, Anabta, Beet Lied, Ateel, Sida, Baqa Sharqia, Nazlet Esa, Kofr Jammal and Kofr Sour*. A cross-sectional study was conducted within a health facility context. We observed the performance of 25 nurses within the data collection process for 476 cases (mothers and children) in 40 days. We compiled a systematic random sample of MCH files in 2014 and assessed it for their completeness and documentations

(338 files). Also all MCH monthly reports (240) in 2014 were assessed for their completeness, accuracy and timeliness. Data was collected using checklists. A pilot study was conducted in October 2014 in *Beet Foreek clinic at Nablus Health Directorate*.

Results: Data was collected using manually filled formats. Overall performance for nurses' tasks was very good, ranging from 91% to 99% in ANC and child care clinics, except filling registration book; only 23% of ANC clinics, and 89% of child care clinics were found complete) and daily statistic book (DSB) where 35% of ANC clinics and 86% of child care clinics were found complete. The level of privacy in MCH and ANC clinics was unacceptable (31%, 54% respectively). Some of those low percentages significantly associated with workload (p value ≤0.001 or =0.01), also with the total number of nurses and clients in the observation days (p value < 0.001, 0.003, or 0.043). A good level of documentations (98% to100%) was achieved for ANC and child files in 2014, except some items like general data (66%) and doctors' note (87%) in ANC files, as well as hemoglobin level (49%) and supplements given (67%) in children files. Some of those items are significantly associated with some of clinics characteristics that we have studied; doctor attendance, midwives existence, nurse attendance per month, days of nurse attendance in 2014 and number of clients in 2014(p value 0.01, 0.029, 0.002 or <0.001). For ANC clinics, only Baqa Sharqiya clinic had one incomplete report. Baqa Sharqiya and Kofr Jammal clinics have one unmatched reports. At Anabta clinic, DSB for the year of 2014 wasn't found so we couldn't assess their

reports. In contrast, there were one to five uncompleted and unmatched reports per every child clinic. Unfortunately, we were unable to assess the timeliness of all reports.

Conclusion: This assessment gives us an obvious idea about the MCH information system in Tulkarm, which reinforces the need for improvements and additional monitoring. Applying routinely assessment for MCH information in PHC clinics with MOH direct supervision is recommended so as to make an effective and evidence based decision-making.

Chapter One

Introduction

1.1 Overview on MCH information system

Maternal and child health (MCH) refers to the health of mothers, infants, and children. The World Health Organization (WHO) defines it as the "health of women during pregnancy, childbirth, and the postpartum period" (1). Child health is defined as "the physical, mental, emotional, and social well-being of children from infancy through adolescence" (2). The information that is related to MCH is considered an important indicator for the current status of community health. It also determines the health of the next generation and can help predict future public health challenges for families, communities, and the medical care system as a whole. They are organized and structured under the umbrella of a specific surveillance system (MCH surveillance system) which utilizes the process of data collection, reporting, analysis, dissemination and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services (3).

The Health Information System (HIS) for MCH is considered one of the public health approaches to solve problems, assess the effectiveness of interventions and to be used for program management, planning and evaluation purposes in order to make a difference in the lives of women and children so as to accelerate progress toward achieving the fourth and fifth Millennium Development Goals (MDGs) by the target year 2015.

Many countries are still in the process of establishing the foundations of a sound HIS. Few countries have put in place goals and independent data quality-assurance mechanisms or open systems for data sharing and dissemination (4). However, HIS in low-income countries is generally known as weak and continue to be plagued by data quality problems (5). According to the 2nd series of health papers in Palestine declared; "There is inadequacy of the MCH information system in Palestine: that means effective maternal and child health interventions are difficult to plan based on prevalence of diseases and outcomes, delivery mechanisms, and health behaviors specific to this context. Rates of pregnancy-related admissions, intra-partum complications, and maternal and neonatal readmission after birth; they are not available" (6).

MCH information is considered one of health facilities data that should be reported to the national HIS on regular (mostly likely monthly) basis. Data on health outcomes provided by health facilities like PHC clinics are used by decision-makers from the facility to the national level for better, more evidence-based decision-making (5).

In this role, a health facility is also a clinical information system in itself: (individual) health information, for example, laboratory results or a patient file in the case of a referral, is essential for the delivery of healthcare. Its quality has therefore a huge impact on the service delivery as a whole. The clinical information system has to guarantee appropriate capacities to store, transmit, and process patient data in an appropriate way (7).

The health facility holds a key position in the national HIS, so not only it must be available but also it should exist with a good quality that enables higher level to make an effective decision for improvements and investments.

Whether data is collected manually or via computer, it is important to ensure that the information is correct at the point of entry since the point of data entry has huge consequences for the data quality of the whole system. If quality of data is hampered from the start, it cannot be restored later on. (7)

1.2 Data assessment at health facility level

To ensure data quality at health facility level, two key principles are considered very important; data accuracy and data validity. To communicate effectively, data must be valid and conform to an expected range of values. In general terms quality, as defined by Donabedian in 1988, is: *"The ability to achieve desirable objectives using legitimate means"* (8) .Quality data represents what was intended or defined by its official source, an objective, unbiased entry, submitted with a known standard that includes:

- **Accuracy** and validity of the original source data; the original data must be accurate in order to be useful. If data is not accurate, then wrong impressions and information are being conveyed to the user (9). Documentation should reflect the event as it actually happened.

- **Reliability**: Data should yield the same results on repeated collection, processing, storing and display of information; that is, data should be consistent.

- **Completeness:** All required data should be present, recorded, and the medical/health record should contain all pertinent documents with complete and appropriate documentation.

- **Legibility**: Data is readable.

- **Currency**: Data is recorded at the time of observation; Information, especially clinical information, should be documented as an event occurs, treatment is performed or results noted. Delaying documentation could cause information to be omitted and errors recorded.

- **Timeliness**: The period between data collection and its availability to a higher level, or its publication. Timeliness is highly desirable since information that is presented timely is generally more relevant to users while conversely, delay in provision of information tends to render it less relevant to the decision making needs of the users.

- **Accessibility**: Data is available to authorized persons when and where needed(10).

Clinical data standards should also be developed to ensure that data collected is uniform in all facilities, allowing for comparisons between health facilities. Standards in place, procedures relating to data collection and monitoring data quality should be carried out on a routine basis. Two monitoring procedures for inpatients have been undertaken for many years

in some countries are quantitative and qualitative analysis of medical records (11). In a quantitative analysis, medical records should be reviewed to check that all documentation has been included (12). In a qualitative analysis of medical records, the information pertaining to patient care is reviewed for accuracy, validity and timeliness (13). In order to be an effective tool in data quality, a qualitative analysis should be performed at three- to four-month intervals through a random sample of patient records, it could be on 5-30% of records of discharged patients, or on a specific diagnosis or procedure performed (11).

In a manual system, steps to check data entry in medical/health records should be taken at the point of entry. There are needs to be a review of general data collection by clerical staff in the admission office, emergency department and outpatient department reception, and health center and clinic reception/ registration area prior to the provision of health care services. The accuracy of this data is crucial for the identification of the patient during the visit at that time, as well as their admission in the future within respective health care services. From other hand, pressure in the workplace often causes people to make errors or to not collect all the data required, so it may affects the accuracy of this data (11).

The continual monitoring of data collection is therefore vital. Checks on the quality of abstracted data for most inpatient health care services are important. This abstracted data resulted from the extraction of information from a document to create a summary that is prepared at the end of a patient's hospital stay by the attending doctor. It is necessary to ensure the

quality of the abstracted information, for accuracy, validity, completeness and timeliness. A staff member, other than the initial clerk, should routinely check the abstracts. To do this, the patient's record is retrieved from the database, or manually if a non-computerized record system is maintained, and the data elements are verified. In most cases, random samples are undertaken, noted errors are corrected and documented, and the staff member responsible for the original abstract is re-trained (11).

1.3 MCH surveillance system at health facility level in Palestine (PHC clinics)

In Palestine, PHC clinics have provided health care to all Palestinian people, especially for children and other venerable groups. In the last five years and after the Second Intifada, PHC clinics have been developed in a dynamic way to face the instability of the Palestinian situation, specifically its isolated geographical areas due to the Israeli occupation. Meanwhile, PHC clinics try to offer accessible and affordable health services for all Palestinians regardless of their geographical location. They offer different health services according to the clinic level. For example: daily care, family planning, as well as dental and mental health services (14).

MOH is considered the main provider for services with 62% from the total PHC clinics in Palestine, followed by Non-Governmental Organization (NGOs) with 30%, then the United Nations Relief and Works Agency (UNRWA) with 8%. It is worth mentioning that the private sector plays an important role in providing PHC services to Palestinian people, but there is

limited information about this role (15). The average ratio of persons per PHC clinic that related to MOH was 5599 person per clinic in 2014, which in Tulkarm district (where we have our study) was almost 4158 person per clinic (16).

The Palestinian MOH offers their MCH services in 390 PHC clinics throughout all West Bank districts. Services are directed to pregnant women, mothers, menopausal women and children from birth to 5 years of age (17).

Those services include: Premarital Care, Preconception Care, ANC & post-natal care, family planning, child care, menopause and woman care. In addition, clinics offer a number of specific health programs, such as: Breast Cancer screening, Cervical Cancer screening, management of other obstetrical and gynecological problems, growth monitoring and development, iron and vitamin supplementation, breast feeding promotion counseling and support, Integrated Management of Childhood Illnesses (IMCI), and Immunization (18).

To standardize the information of MCH in Palestine that is originated from different sources, MOH adopted national unified guidelines & protocols for MCH surveillance system through coordination with NGOs & UNRWA in 2012 (19).This system is organized by several steps of data handling based on WHO standards: data collection, insertion of monthly reports into a unified database, data validation, data analysis and data dissemination (18).

MCH Data flow in PHC clinics

Workplace walkthrough was done by researchers in November 2012 as an entry point to PHC clinics. Observations were carried out in different study-sites like PHC clinics, the Palestinian Health Information Center (PHIC), PHC clinics and the Public Health Directorate's Community Health Department. Initially, data was collected in MCH clinics within PHC clinics mainly by nurses in a private registration room through manual or computerized approaches for each case.

Every mother or child must have a MCH booklet that is reviewed and updated by nurses for specific information like: personal information (past and present), family history, medical and surgical history, obstetric history, and menstrual history. Also, the booklet includes information such as body weight, height, risk assessment of pregnancy, fetal pulse, previous pregnancies and lab test results, supplements, delivery and after delivery information, notes of doctors and nurses, and finally, setting a date for the next visit. Other information related to children is also included: head circumference, hemoglobin test for one year old child, growth chart and vaccinations. This booklet is kept with individual mothers and, according to protocol; she is responsible to bring it with her to each visit to the PHC clinics. The above mentioned information is also recorded in a file kept by the PHC as a reference for mother or child health situation. In addition, we found that in every clinic either ANC or child care clinics: other specific information like: *names, age, diagnosis, treatment, and lab result…*are registered in an additional document that is called registration book. At the

end of the work day, nurses will create a daily statistical abstract for all cases and fill them in the DSB.

At the end of every month, the head nurse makes monthly reports from those statistical books: ANC reports and child care reports. These reports must be accurate, filled on time (up to the fifth of every month). However, according to the MOH protocol: patients' files, the registration book, DSB and reports must be kept up-to-date (they were stored for a minimum of two years). The reports from all PHC clinics will be inserted into a unified database at a determined time (at the beginning of month); this database is connected with the Department of PHC clinics and the Public Health Directorate's Community Health Department in Ramallah, which is responsible of data validation and report testing. So there were a separation between data generation and data entry in the PHIS, this separation is important for the application of data validation, data analysis and utilisation at the clinic (20). This separation is also existed in HIS at health district level in South Africa (21).

After validation, we can analyze data so as to be used for decision-making, generating evidence, setting health priorities and putting out policies. Data analysis and dissemination is performed by PHIC, which is responsible for the management of HIS in Palestine, which exists in Nablus. The head of PHIC described this center as: "*Our center has MCH department that is responsible for collecting data on women and children's health and are classified out properly to be ready for use by decision-makers and stakeholders…*"(22)

1.4 Significance of study

Information about MCH must be available in a good quality in order to be used for program management, planning and evaluation purposes, so as to accelerate progress on MDGs 4 and 5.Data quality, in terms of completeness, timeliness, and accuracy of reporting is often problematic in over 74 countries throughout the world (4).

In Palestine, where roughly 40% of the population consists of women in their reproductive age and children younger than 5 years old (23), the national HIS is devised, but data collection, analysis, and reporting still needs further development. Throughout workplace walkthrough, it was found that the process of data validation requires improvement; there are no documented national procedures that guide the process of assessment across the MOH and other stakeholders; their assessment doesn't apply regularly and doesn't exist at any level of data handlings or even data quality dimensions like: completeness, accuracy, timeliness, usability, relevance, consistency and feedback. Additionallt, the Director of Women's Health Department, restates the need for quality assessment: *"MCH surveillance system doesn't have any kind of assessment"*. For example, we were unable to to compute the percentages women with gestational diabetes within the 2012 MOH yearly report, vague numbers are not sufficient and don't give us an indication of anything (22).

So there is a need for an investment in programs relating to health facility data recording systems. That kind of assessment enables us to make recommendations based on data analysis and results that may affect the

validation way of MCH information in MOH, so as to make more effective evidence based decision-making and a more efficient use of resources. Although the importance of health facilities as the entry points of HISs is widely accredited, little research on the heterogeneous clinical information systems and data quality at facility level in low-income countries has been conducted and published to date(24,25). While many of the publications on data quality in low-income countries focus on the higher levels of HIS, the less-investigated lower levels are of particular importance(7).

According to 2014 MOH annual report, Tulkarm district recorded one of the highest clients to PHC clinics ratio which was 4158 person per clinic (slightly higher than the national ratio of West bank which was 4196 person per clinic), also the highest average visits for doctor by one person was 1.5 visits per person (more than the average doctors' visits per person in West Bank which was 1.1) (16).

1.5 Aim and Objectives

The aim of this study is to assess the quality of data for the Maternal and Child Health Department at the PHC directorate in Tulkarm, Palestine. The assessment focuses on multiple dimensions of data quality, including: completeness, timeliness and accuracy. Those dimensions were tested on different levels of data handling; data collection process files and reports.

Specific objectives:

1. To observe the performance of PHC staff (nurses and midwives), for MCH data collection protocol in PHC clinics in Tulkarm district using a checklist for the main components.

2. To check the completeness and documentation process of protocol components in MCH files of PHC clinics in Tulkarm district for the year 2014.

3. To assess the completeness, timeliness and accuracy of monthly ANC and child care reports of PHC clinics in Tulkarm district for the year2014.

Chapter Two

Literature Review

Many studies have conducted assessments of data quality, but few discuss assessments of MCH data at the PHC level.

2.1 Data assessment at ANC clinics

In 2012, a multiple case study was carried out in Kenya at the ANC clinics of two private and one public hospital to describe HIS and assess the quality of its information. Multiple methods were used: workplace walkthroughs aimed at making a selection of study sites, followed by conducting structured and in-depth interviews with staff members to cover the more subjective dimensions of data quality in the facilities.

A score for data quality was developed out of the five dimensions of data quality: accuracy, timeliness, comparability, usability, and relevance (26). Views of staff and managers on the quality of employed information systems, data quality, suggestions for the improvement of data quality and other influencing factors were captured qualitatively. In addition, a quantitative assessment of data quality for its completeness and accuracy (accurate transmission of clinical information and reports of ANC at the record level) was conducted.

This study shows that staff rated the quality of information higher in the private hospitals employing computers than in the public hospital which relies on paper forms. Also, several potential threats to data quality were reported. For example, HCW complained about delayed laboratory results,

the low awareness of data quality and that the errors in the transmission of laboratory results were simply not known and therefore not addressed.

Limitations in data quality were common at all study sites including wrong test results, missing registers, and inconsistencies in reports. In addition, feedback about the content obtainedwas seldom and data usage beyond individual patient care was low.

The researchers of this assessment study argue that the limited data quality has to be seen in the broader perspective of the information systems where it is produced and used. As a conclusion, to improve the effectiveness and capabilities of the information systems, combined measures are needed which include technical, organizational aspects and individual skills. (7)

2.2 Data assessment at hospital level

Another study in Tanzania in 2014 conducted an in-depth, descriptive and exploratory assessment of the functionality of MTUHA (the national HIS that exists in Tanzania at hospital level). This assessment was both cross-sectional and descriptive in nature. The objectives were to assess how well the data collection, data analysis/reporting and use of information processes worked within the hospital and where challenges occurred. A mix of methodologies was used to assess these three stages of data handling in HIS.

The methods were comprised of key informant interviews, staff interviews, observations for staff and a retrospective document review of the hospital's 2010 reporting books. This study revealed that whilst data collection for

routine services functioned reasonably well, utilizations of data tools was unsatisfactory, and internal inconsistencies between the different types of data tools were found.

Sixteen out of the total 72 forms (22.2%) that make up one of secondary data books could not be completed with the information collected in the primary data books. Moreover, the hospital made no use of any secondary data.

In conclusion, this HIS is very extensive and must be simplified. Furthermore, additional comprehensive and managerial aspects must be sharpened within the system at all health institutions. (25)

2.3 Data assessment at district level-PHC clinics

At the PHC level, a study conducted in 2009 in Jimma Zone, located in Southwest Ethiopia, where HIS quality and usability were weak, particularly at PHC clinics. It sought to assess the utilization of HISs through a cross-sectional study conducted in its health facilities. Data was collected using structured questionnaires, checklists, observations and interviews. In this study, data quality was determined by completeness, timeliness and feedbacks.

The results of this study indicated that data and information that generated at PHC's district level come from routine reports and vertical programs/activities. This data was collected using manually filled formats and only hard copies were sent to the next professional levels in data handling.

The study confirmed that there were poorly coordinated processes, no capacity building activities on HIS, absence of supplies like guidelines, and lack of interaction with private, NGOs and other sectors. In addition, data production, documentation, and transfer were not fully supported by IT. The study also identified that data was generated at lower levels of the health system, but it was most often analyzed at the top/central levels. This practice is paradoxical in the context of decentralization which increases the demand of data for decision-making at the districts and facilities.

As a result of those findings, this study suggests possible solutions. For example, in-service training and updating of staff involved in HIS at its district level included strengthening its HIS inputs, as well as timely and concrete feedbacks for data. (27)

2.4 HIS in the Northern West Bank

A 2012 master's thesis from Al-Najah National University in Palestine described the health reporting system regarding mortality of neonates and infants in the Northern districts of the West Bank.

A case-control design was adopted. Cases were obtained from all available officially reported cases of neonatal deaths reported within 28 days after delivery in the Northern West Bank in the year 2012. Control data was obtained through interviews and questionnaires of mothers of live neonates born in 2012.

This study discovered defects in the health reporting system regarding neonatal mortality in different aspects. A lack of communication between

PHC clinics and the HIS was found, as well as the absence of a health information database for the analysis and interpretation of reported cases. This study emphasized that the major step in developing focused and evidence-based interventions to prevent neonatal deaths in Palestine is to strengthen the HIS, especially the death certificate reports. (28)

Chapter Three

Material and Methodology

In this study we combined different methods to capture an inclusive picture of the MCH data quality, so as we assessed an aspects of the information system.

3.1 Study setting

The data assessment was conducted in Tulkarm district, a Palestinian region in the West Bank, which has 31 governmental PHC clinics according to the 2014 annual report of Palestinian MOH (17).

Ten MCH units from those clinics were chosen according to their geographical distribution and their number of clients. The PHCs in Tulkarm are distributed in four geographical regions: **Midtown Tulkarm, Wadi Sheer, Sha'rawia,** and **Kafriyat.**

We selected 2, 3, or 4 clinics from each region and took into consideration to include one of those clinics that have a small number of clients. As it appears in Figure 1: We choose from the midtown of Tulkarm: **Southern and Shwiekeh;** from Wadi Alsheer**: Anabta and Beet Lied;** from Sha'rawia**: Ateel, Sida, Baqa Sharqia, and Nazlet Esa** *(this is the largest region in Tulkarm)***;**from Kafriyat**: Kofr Jammal and Kofr Sour**. Our data was collected from the ANC and child care clinics in those centers.
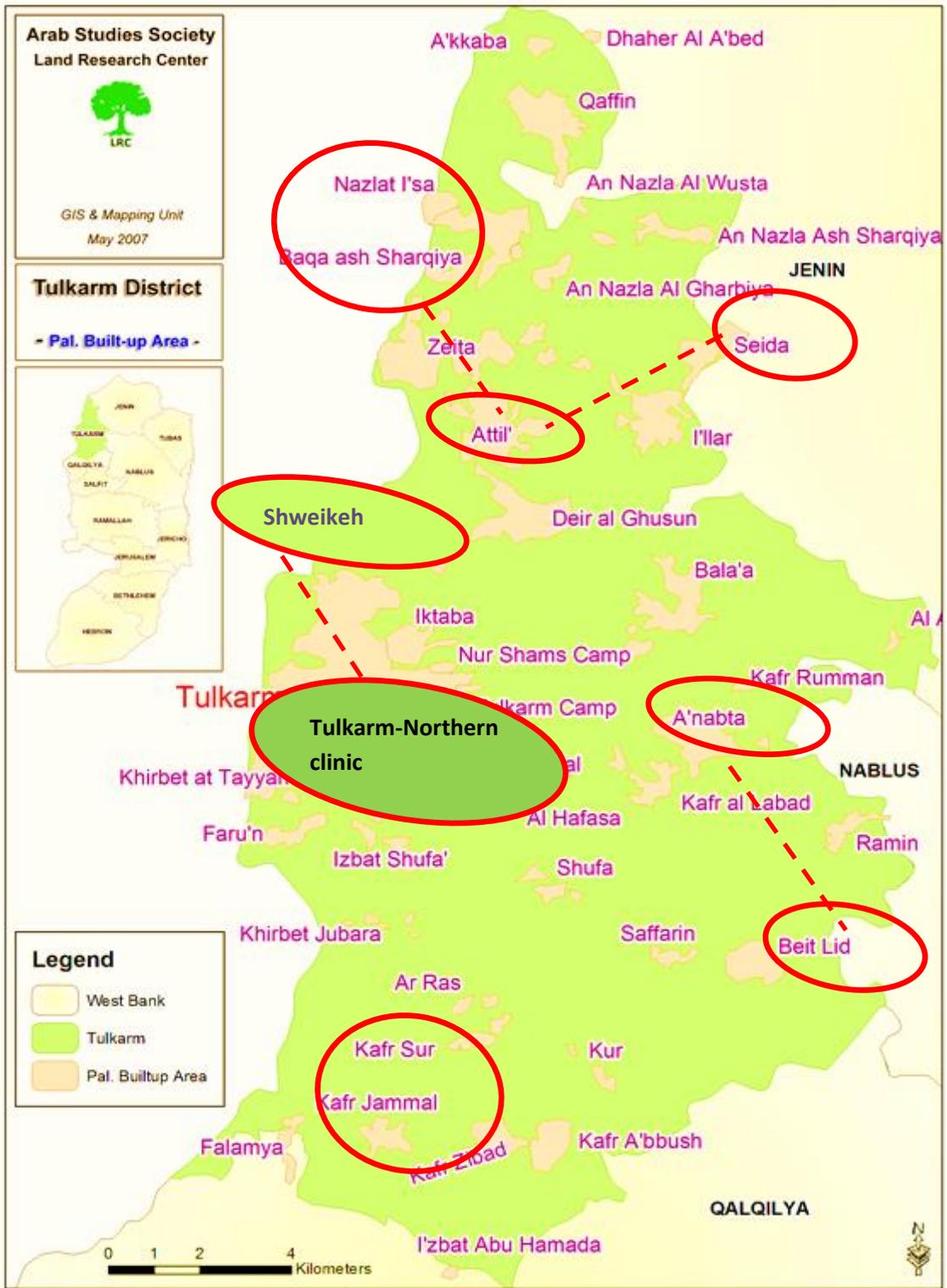
Figure 1: Distribution of PHC clinics in Tulkarm District

3.2 Study design

- For the 1st objective (staff performance): observation was carried out to assess the adherence of staff with the protocol of MCH data collection.

- For the 2nd objective: a cross sectional study was conducted to check the completeness and documentation methods of protocol components in mother (ANC) and child files of the MCH units for the year 2014.

- For the 3rd objective: a retrospective analysis was conducted to assess the completeness, accuracy & timeliness of ANC and child care reports of those clinics for the year 2014.

3.3 Study population and sample size

The population of the study was:

❖ Database of MCH monthly reports and information from the registration book, DSB and MCH files that exist in PHC clinics in Tulkarm district.

❖ Midwives and nurses responsible for MCH data collection and reporting in PHC clinics in Tulkarm district.

Exclusion criteria: PHC clinics that don't offer maternal and child health services were excluded (only one out of the thirty-one clinics in Tulkarm).

The sample was conducted as follow:

- All midwives and nurses who is responsible of collecting MCH data at PHC clinics (that were chosen by researcher) in Tulkarm district were observed applying specific items of data collection protocol for 2 days in ANC clinics and another 2 days in child care clinics. In total, 40

observation days were conducted in December 2014 and January 2015; 239 observations for mothers and other 237 ones for children. We believe 40 days of observation was sufficient to achieve our objectives, as the time period was similar to most of the previous studies that used observations as a tool in their methods (29).

- Systematic random sampling of mother and child files from the MCH units in PHC clinics was used to select 10% of the MCH files in each PHC clinic for the year of 2014 (started from the 10th report in every clinic); there were 179 files for mothers and 159 ones for children in total. This percentage (10%) was decided based on the literature where it is indicated a minimum sample of 5% from all medical records is enough (11).

- All ANC and child care monthly reports for the year 2014 were included in the study. (Twelve reports in every clinic; 120 reports for mothers and 120 reports for children in total). They were evaluated for completeness of items, timeliness and the accuracy for specific indicators. We chose as an indicator for accuracy of ANC report: the number of clients that completed the 4th antenatal visit, as it has practical relevance as a measure of completion of the WHO-suggested ANC course.(7,30). Also, we chose the number of children which are under Exclusive Breast Feeding (EBF) as an indicator for child care report.

3.4 Study variables

Independent Variables

- The type of HIS at those clinics: categorical: computerized vs. manual.

- Number of nursing staff /midwife in the observation day at MCH clinics (categorical: one nurse vs. more than one nurse).

- Number of mothers or children in the observation day (categorical: less or 20 vs. more than 20).

- Workload for nurses during observation days either in ANC or child clinics (categorical: less than 10 clients per day vs. more or 10).

- Number of clients for ANC and child clinics in 2014 (categorical: less than 500, 500-1000, and more than 1000 clients per day).

- Number of days per month for MCH services done by doctors (categorical: daily vs. not daily).

- Number of days per month for MCH services done by nurses (categorical: less or 100 vs. more than 100 days).

- Number of days per month for MCH services done by midwives in ANC clinics (categorical: midwives existed vs. nurses existed)

- Number of days for MCH services done by nurses in 2014 (categorical: less or 100 vs. more than 100 days).

- Workload for nurses in 2014 in ANC clinics (categorical: less or 9 vs. more than 9).

- Workload for nurses in 2014 in child clinics (categorical: less or 7 vs. more than 7).

- Gender for children in files from child clinics (categorical: male or female).

Dependent Variables

- Performance of Health Care Workers (HCWs) for the data collection protocol actions was observed using a checklist (categorical: complete vs. incomplete).

- Completeness of file record (categorical: complete vs. incomplete).

- Total completeness and accuracy scores of reports. (0-12: one score was given for a whole complete monthly report in each clinic for 2014; data was considered inaccurate if indicators in monthly reports for each clinic in 2014 were missing or differed from the DSB).

3.5 Data collection tools

A checklist contains items from the MCH data collection protocol that relates to the Palestinian MOH (Appendix 1 and 2) was designed to be used in observation of HCWs' performance regarding the data collection procedure in ANC and child care clinics.

In order to evaluate patients' records, a systematic random sample of MCH files was collected from each PHC clinic and reviewed to check their completeness and documentation of MCH protocol components (Appendix 3 and 4).

The items from the previous checklist for observations and files were extracted by the researcher from the training manual for nursing related to PHC and public health in the Palestinian MOH (31).

Another checklist was used to check three data quality levels for reports: completeness, timeliness and accuracy (12). Each level in 2014 ANC and child care reports was given a score (Appendix 5 and 6). In determining completeness, all the items of the report must be filled to receive a high score in accordance to the MCH protocol. On the other hand, accuracy was determined by two important indicators: '**number of mothers that completed the 4th antenatal visit**' for ANC reports and '**number of Exclusive Breast Feeding (EBF) children**' for child care reports. If we compare the value of those items in reports with those in the DSB, they should be the same according to the MCH protocol. Finally, timeliness was determined according to the report's delivery date; according to the MCH protocol, it must be within the first five days of the month.

3.6 Pilot study

A pilot study was carried out to identify potential problems of the study tools and to revise the methods of data collection before starting the actual field work. It was conducted in October 2014 at the Beet Forek clinic in Nablus district, which has both ANC and child care clinics. Twenty two observations of mothers and 30 of children were conducted in four days; there were 2 nurses for child care but only one nurse for ANC clinics. In addition 16 child files and 10 ANC files for the year of 2014 were reviewed.

Finally all 2014 ANC and child care reports were assessed for completeness and accuracy. We were unable to assess the timeliness of

those reports because there was no date reported either in it or in other documents, therefore we modified our tools according to this result.

We made other changes in the checklist of files (follow up sections in appendix 3 & 4); they were approved by the Research Committee of the Faculty of Graduated Students at Al-Najah National University in Palestine. The sample used in the pilot study was excluded from the study.

3.7 Data collection procedure

The researcher was trained on assessment and data collection procedures by an expert nurse in PHC clinics at Nablus district. This required the knowledge of all the details related to the MOH Protocol concerning MCH from the beginning of the information collection from mothers through recorded Ministry reports.

A pilot study was conducted in another PHC clinic in Nablus using the same methods and tools, so as to determine potential challenges in data collection or making any modifications in methods and tools. The researcher visited the supervisor of nurses in the PHC clinics in Tulkarm to determine the days of MCH services in those 10 clinics in order to prepare the data collection plan in-line with the work flow.

In data collection, firstly, nurses and midwives whom collect important information from mothers and their children in PHC clinics in Tulkarm district were observed to assess their performance regarding MCH data collection protocol; hidden observation was considered a useful tool for assessing HCWs' performance (29), a checklist contains the main points to

be considered in the observation methods that were utilized. Post-observation, the researcher selected a sample of MCH files for the year 2014 using a systematic random sampling technique in order to check for completeness and documentations, according to MCH protocol. All 2014 monthly reports of child care and ANC in the selected clinics were evaluated for completeness, timeliness and accuracy.

3.8 Quality control measures

The procedures and steps of this assessment were performed according to previous studies that related to primary health care data quality (12,11).

The observations and files checklists were prepared according to the actions listed in the MOH training protocol for nurses in Palestine. The Arabic version of this manual was prepared by PHC nurses at MOH according to the unified protocols of reproductive health that was constructed with coordination with NGOs & the UNRWA (31).

The researcher was trained on assessment and data collection procedures by an expert nurse in a PHC clinic in Nablus city before starting data collection.

3.9 Data Analysis Plan

The Statistical Package of Social Sciences (SPSS) version 19 was used for data entry and in statistical analysis. Frequencies and percentages for the performance of HCWs for the data collection protocol actions were summarized; also completeness of the file record had the same analysis.

Scores of completeness and accuracy of ANC and child care reports were calculated. Any possible relation between the independent variables, items of observations, and completeness of files was explored using Chi square or Fisher Exact test (when sample size less than 5). Additionally, T- test was used to examine if there was a relationship between scores of MCH reports and some independent variables. A significance level of 0.05 was considered in this study.

3.10 Ethical considerations

Official permissions from the Institutional Review Board (IRB) at Al-Najah National University (ANU) and from the MOH were obtained before performing the study (Appendix 7 and 8). Observation of HCWs' performance was conducted in agreement with the head of departments. Participants were not aware of the assessment and no names were used. Data was collected anonymously and kept confidential; all collected data was used for research purposes.

Chapter Four

Results

The purpose of this chapter is to present the results of data assessment. Results will be arranged into two main parts. **The first part** presents the result of observations for PHC nurses and midwives' performance for MCH data collection protocol in the MOH. **The second part** presents two sections: the first section shows the completeness percentages of protocol components in MCH files in those PHC clinics and the second section shows the completeness and accuracy scores of monthly MCH reports in PHC clinics.

4.1 Performance of PHC nurses for MCH data collection protocol

This portion of the thesis aims to present the observation results for nurses and midwives performance in the MCH clinics. Observations were carried out by the researcher in 10 PHC clinics in Tulkarm district: Northern (the largest one), Shwiekeh, Anabta, Beet Lied, Ateel, Sida, Baqa Sharqia, Nazlet Esa, Kofr Jammal and Kofr Sour. Through visiting those clinics and observing the performance of nurses and midwives in the data collection procedures, the researcher recorded results via a specific checklist. The observation lasted for 40 days: from December 2014 to January 2015. Four days were assigned to each clinic: two days for ANC section and an additional two days for the child care section as shown in Table 1 below. It the end, a total of 239 mothers and 237 children were observed for their

data collection by nurses distributed through the selected ANC and child care clinics.

Table 1: Characteristics of the selected MCH clinics

Name of clinics	ANC clinics		Child care clinics	
	Number of nurses during the ODs*	Number of mothers observed	Number of nurses during the ODs*	Number of children observed
Northern	**2**	**49**	**3**	**100**
Ateel	1	25	1	22
Anabta	1	**50**	1	17
Shweikeh	**2**	20	1	22
Beit Lied	1	30	1	21
Baqa Sharqiya	1	14	1	15
Sida	1	24	1	14
Kofr Jammal	**2**	10	1	10
Nazlet Esa	1	8	1	12
Kofr Sour	1	10	1	6
Total	**13**	**239**	**12**	**237**

*observation days

4.1.1 Workload in MCH clinics during the observation days

From the information listed in Table 1, we were able to calculate the daily workload for nurses in PHC clinics which is defined as: "*The average daily number of patients (mothers or child) attended to by a professional nurse in PHC facility*" (32). This was calculated by dividing the number of mothers or children observed in those clinics by the number of nurses working in the same clinics in that day.

Figure 2 below shows the workload in the 1st and 2nd observation days in ANC clinics. We noticed that in the two observation days the highest workload existed in Anabta clinic that had a ratio of 25 mothers per nurse;

and the lowest one existed in the Kofr Jammal clinic that was 2.3 mothers per nurse on the 1st and 2nd day, respectively. The mean workload in the 1st and 2nd observation day was 10.7, 9.5 mothers per nurse, respectively.
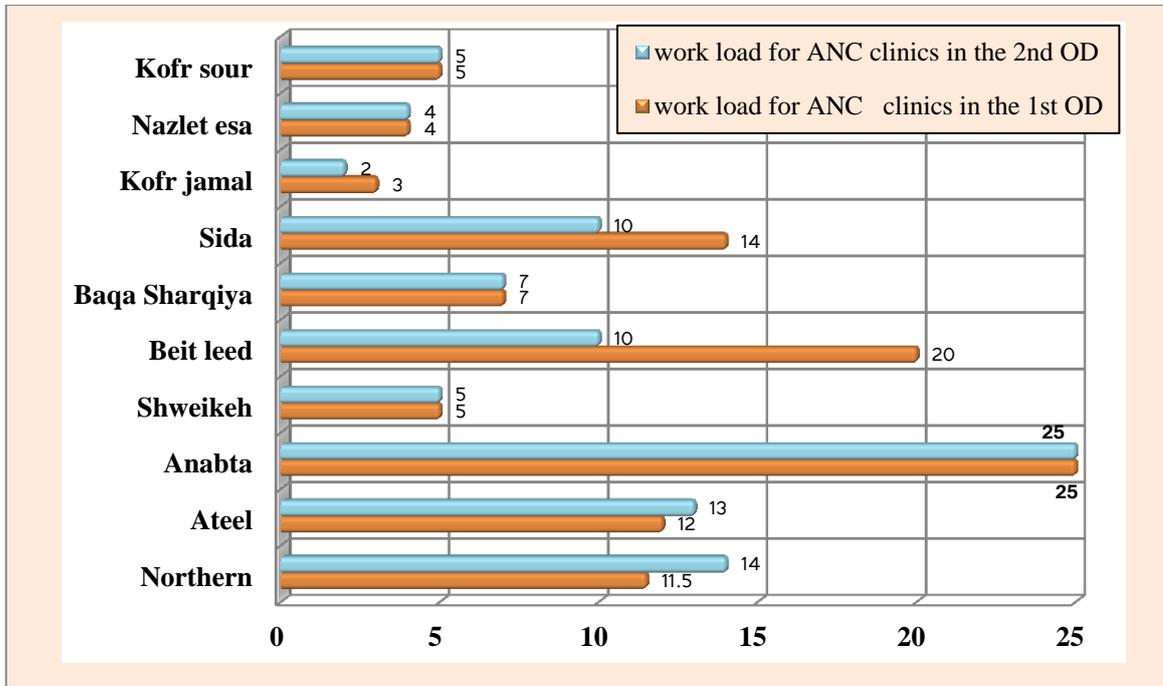
Figure 2: Workload during observation in the ANC clinics

For the child care clinics, the highest workload was in Northern clinic (18.6 and 14.6 children per nurse in the 1st day and 2nd day respectively), and the lowest was in the Kofr Sour clinic (4 and 2 children per nurse in the 1st and 2nd day, respectively), as shown in Figure 3. The mean of workload in the 1st and 2nd observation day was 9.2 and 8.1children per nurse, respectively.
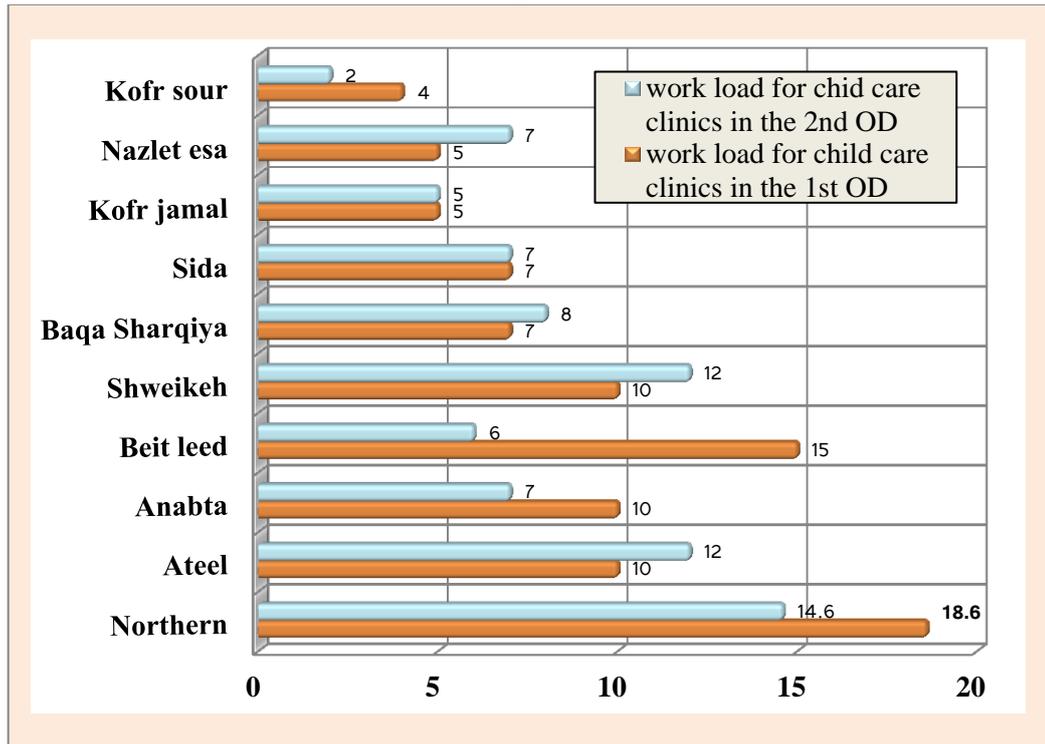
Figure 3: Workload during observation in the child care clinics

4.1.2 Nurses' data collection performance at the MCH clinics

The nurses' data collection performance at the MCH clinics in Tulkarm was observed for specific items determined based on MOH protocols as aforementioned in the introduction. To begin basic data collection, nurses gather information from mother or her child in a private registration room using a manual approach for data collection, as we noted in our observations. Secondly, nurses review and update their MCH Booklet. Thirdly, nurses fill the registration book for every case. Then, they fill out the patient's files by recording weight, blood pressure (BP), height, laboratory tests, nutritional supplements and drugs…etc. Finally, nurses provide the mother an additional appointment for her or for her child and record it in her file, the MCH Booklet, and in the registration book.

ANC clinics: Most of the observed mothers (42%) were from Northern and Anabta clinics, whereas the lowest percentages of observed mothers (3%) were from Nazlet Esa clinic. (Figure 4)
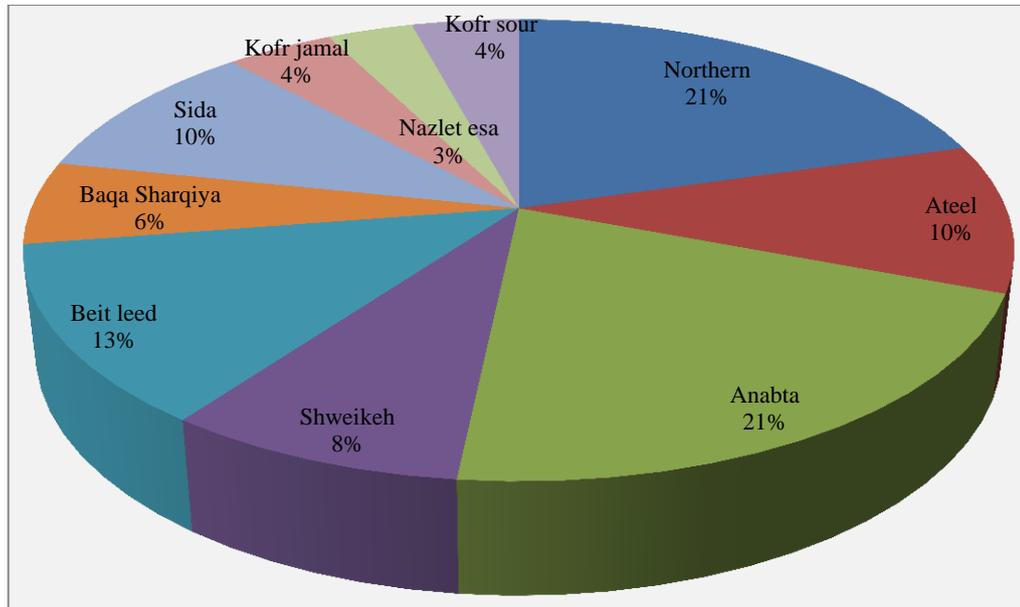
Figure 4: Distribution of observations for nurses' performance in data collection at ANC clinics

The majority of the observed items for nurses' performance were very good, ranging from 91% to 99%; like reviewing and updating MCH Booklet, filling the registration book and mother files for every case, recording weight, blood pressure, and height...etc. On the contrary, they have poor performance for other items, such as completely and accurately filling in the registration book, as well as assuring privacy (23%, 31% respectively) as shown in Table 2.

Table 2: Distribution of nurse's performance in data collection at ANC clinics (239 observations)

Action	Frequency	(%)
Recording mother's weight, BP, and height accurately	240	99
Recording mother's laboratory tests, nutritional supplements or drugs on patient files (Haemoglobin test, vitamins, iron, folic acid…etc.)	240	99
Review of MCH Booklet to be sure of name, age, vaccines…etc.	240	99
Filling mothers and child booklet completely	240	99
Filling mothers and child booklet accurately	240	99
Filling patient file completely	240	99
Filling patient file accurately	240	99
Finding patients files easily and quickly	231	95
Telling mother about the next appointment and recording it in her file, MCH Booklet and also in the registration book	221	91
Ensure privacy	75	**31**
Filling registration book completely	56	**23**
Filling registration book accurately	56	**23**

Child care clinic: Most of the observed children (42%) were from Northern clinic, while the lowest percentage of observed mothers (3%) was from the Kofr Sour clinic. (Figure 5)
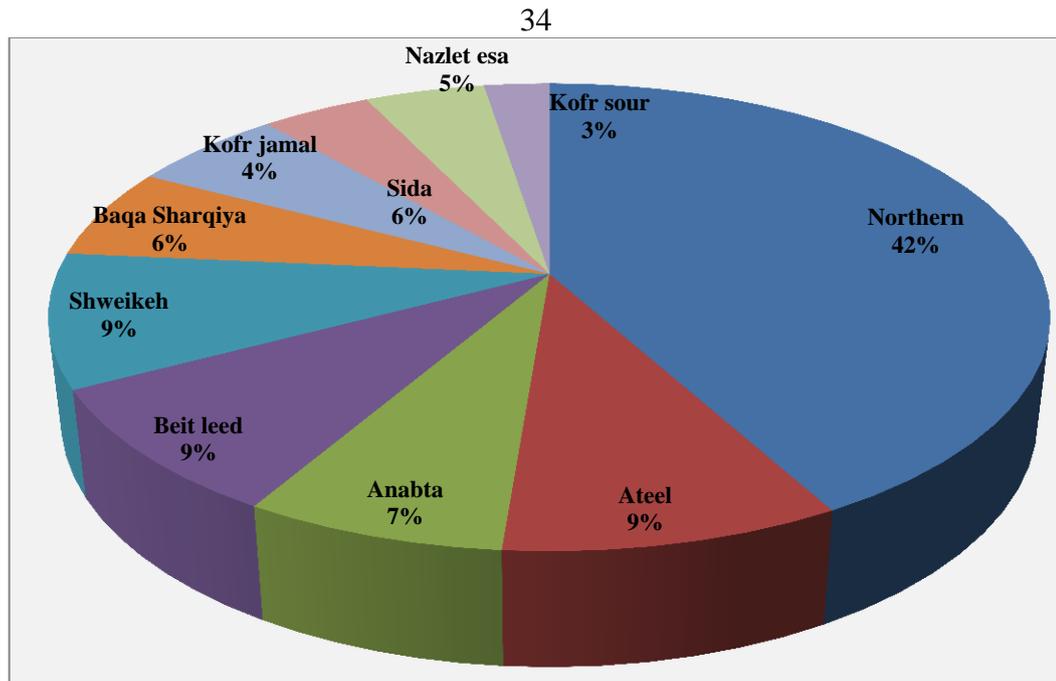
Figure 5: Distribution of observations for nurses' performance in data collection at child care clinics

Similar to the results of the ANC clinics, the majority of the observed items for nurses' performance were very good, ranging from 93% to 98%; such as reviewing and updating the MCH Booklet, filling the registration book and child files…etc., as indicated in Table 3.

In contrast, they have poor performance for some items like assuring privacy and filling in the registration book completely and accurately (54% and 89%, respectively), as seen in Table 3.

Table 3: Distribution of nurses' performance in data collection at children clinics (237 observations)

Action	Frequency	(%)
Recording child's weight, head circumference, and height accurately	236	99
Recording child's laboratory tests, nutritional supplements or drugs on patient files (Haemoglobin test, vitamins, iron, folic acid…etc.)	236	99
Finding patients files easily and quickly	234	98
Filling patient file completely	234	98
Filling patient file accurately	234	98
Filling mothers and child booklet completely	234	98
Filling mothers and child booklet accurately	234	98
Review of MCH Booklet to be sure of name, age, vaccines…etc.	232	97
Telling mother about the next appointment and recording it in her child file, MCH Booklet and the registration book	222	93
Filling registration book completely	212	**89**
Filling registration book accurately	212	**89**
Ensure privacy	128	**54**

4.1.3 Nurses' performance in filling daily statistic book

At the end of each work day, nurses create daily statistical abstracts from mothers or children information and fill them in the DSB. Remarkably, filling the DSB completely and accurately (the same value from the registration book) at the end of the observation day in ANC clinics occurred seven out of 20 days was 35% (the total sum of observation days at ANC clinics), and the accuracy of those recordings was 86%, as it appears in Table 4.

Table 4: Frequency of filling DSB by ANC clinic nurse

Item	Frequency (days)	(%)
Filling DSB*completely* **at the end of observation day**	7/20	**35**
Filling DSB*accurately* at the end of observation day	6/7	**86**

*DSB: daily statistic book

An improvement in comparison to the ANC clinics, filling the DSB completely and accurately in child clinics occurred 17 out of 20 days was 85%% (the total sum of observation days at child care clinics), and the accuracy of those recordings was 100%, as it appears in Table 5.

Table 5: Frequency of filling DSB by the child care clinic nurse

Item	Frequency (days)	(%)
FillingDSB*completely* at the end of observation day	17/20	**85**
FillingDSB*accurately* at the end of observation day	17/17	100

*DSB: daily statistic book

4.1.4 MCH clinics characteristics' in relation with nurses' performance in data collections

For the purpose of assessing the **poor performance** of nurses in ANC clinics, a univariate analysis was conducted to assess the relation between nurse's performance and MCH clinics characteristics, such as number of observed nurses, clients and workload by using the Chi square test and fisher exact test.

Regarding **privacy**, it was assured in higher percentage (64%) when two nurses were present versus just one nurse (36%), and when more than 20 pregnant women were (70%) present on the observation day. These differences were statistically significant (p value <0.001 for both).

Similarly, other items like **filling registration book** completely and accurately, as well as **informing mothers about the next appointment** have a very high percentage (99% for all) when two nurses were present and when there were more than 20 pregnant women (99%, 99 and 45% respectively). Additionally, statistics improved when workload was < 10 pregnant women per day (100%, 100%, and 90 % respectively). These differences are statistically significant (p value <0.009 or < 0.001), as indicated in Table 6.

Unlike previous results, **filling the DSB** lacked significant differences with respect to the number of pregnant women or workload during observations. It is only related to the numbers of nurses during observations (p value 0.043). Furthermore, it was mostly complete (71%) and accurate (71%) when one nurse was present, as indicated in Table 6.

Table 6: Nurses' performance in data collection in relation with ANC clinics' characteristics (n= 239 observations)

Characteristic	Number of staff in OD**		Number of pregnant in OD**		Workload (pregnant/OD**)	
	One nurse	More than one nurse	Less or 20	More 20	Less than10	More or 10
Privacy assured						
Yes Freq. (%)	26(36)	47(64)	22(30)	51(70)	60(82)	13(18)
P value	**<0.001ˆ**		**<0.001ˆ**		0.324ˆ	
Registration book complete						
Yes Freq. (%)	7(1)	47(99)	7(1)	47(99)	54(100)	0(0)
P value	**<0.001***		**<0.001***		**<0.001***	
Registration book accurate						
Yes Freq. (%)	7(1)	47(99)	7(1)	47(99)	54(100)	0(0)
P value	**<0.001***		**<0.001***		**<0.001***	
Mothers informed about the next appointment						
Yes Freq. (%)	172(79)	47(21)	121(55)	98(45)	197(90)	22(10)
P value	**0.009ˆ**		**<0.001ˆ**		**<0.001ˆ**	
DSB complete in 20 days						
Yes Freq. (%)	5(71)	2(29)	5(71)	2(29)	5(71)	2(29)
P value	**0.043***		0.17*		0.791*	
DSB accurate in 20 days						
Yes Freq. (%)	5(71)	2(29)	5(71)	2(29)	5(71)	2(29)
P value	**0.043***		0.17*		0.791*	

ˆChi square test was used, * Fisher exact test was used, **observation day

Table 7 demonstrates the child care clinics' characteristics in relations to nurses' poor performed tasks. The **privacy** was assured in higher percentage (60%) when one nurse was present in comparison to three nurses (40%). The same percentage (60%) was present when ≤20 children existed. These differences were not statistically significant (p value<0.427). On the other hand, privacy was assured when workload was ≥ 10 children

per day (81%) (≈mean of workload during observations in child care clinics), but this difference was statistically significant (p value 0.001), as indicated in Table 7.

Other tasks like **filling registration book** completely, accurately and **informing mothers about the next appointment** were performed better when one nurse is present with ≤ 20 children (53%, 53% and 62% respectively), also when workload was restricted to ≥10 children per day (75%, 75% and 69 %, respectively). These differences were statistically significant (p value ≤0.001), as indicated in Table 7.

Finally, most of **DSB fillings** were done when one nurse is present and in with less or 20 children (88%, 88%, respectively), also when workload was restricted to less than 10 children per day (59%). These differences are statistically significant (p value =0.003 or =0.01), as indicated in Table 7.

Table 7: Nurses' performance of data collection in relation to children care clinics' characteristics (n= 237 observations)

Characteristic	Number of staff in OD**		Number of Children in OD**		Workload (child/OD**)	
	One nurse	More than one nurse	Less or 20	More 20	Less than10	More or 10
Privacy assured						
Yes Freq. (%)	77(60)	51(40)	77(60)	51(40)	24(19)	104(81)
P value	0.427ˆ		0.427ˆ		**0.001ˆ**	
Registration book complete						
Yes Freq. (%)	113(53)	99(47)	113(53)	99(47)	54(25)	158(75)
P value	**<0.001***		**<0.001***		**<0.001 ˆ**	
Registration book accurate						
Yes Freq. (%)	113(53)	99(47)	113(53)	99(47)	54(25)	158(75)
P value	**<0.001***		**<0.001***		**<0.001 ˆ**	
Mothers informed about the next appointment						
Yes Freq. (%)	137(62)	85(38)	137(62)	85(38)	69(31)	153(69)
P value	**<0.001***		**<0.001***		**<0.001***	
DSB complete in 20 days						
Yes Freq. (%)	15(88)	2(12)	15(88)	2(12)	10(59)	7(41)
P value	**0.003***		**0.003***		**0.01***	
DSB accurate in 20 days						
Yes Freq. (%)	15(88)	2(12)	15(88)	2(12)	10(59)	7(41)
P value	**0.003***		**0.003***		**0.01***	

ˆChi square test was used, * Fisher exact test was used, **observation day

4.2 Assessment of MCH files and reports in 2014

This section represents the completeness of MCH files and the completeness and accuracy scores of 2014 MCH reports. As shown in Tables 8 and 9, we explored the characteristic of the selected MCH clinics for the year 2014. We noticed that the average number of days the doctors attend ANC clinics was 2.9 days per clinic per month, and for nurses'

attendance was 13 days per clinic per month. Also only Northern and Ateel clinics have midwives in their clinics. On the other hand, the average number of days the doctors attend the child clinics is higher compared to ANC clinics (12.2 days per clinic per month) but is lower for nurses' attendance, which was 15.8 days per clinic per month.

Northern, Ateel, Anabta, Shweikeh, and Kofr Jammal have the highest frequency of those attendances either for ANC or child clinics. Most of clinics either ANC or child care clinics, have more than 500 nurses' clients in 2014. The mean number of clients in ANC and child clinics was 748 and 1707, respectively; the Northern clinic has the highest frequency of nurses' visits. While Kofr Sour clinic has the smallest frequency of nurses' visits. We noticed that the number of clients in child clinics is more than in ANC clinics in 2014, as indicated in Tables 8 and 9.

In addition, the number of nurses' working days for child clinics is more than the number in ANC clinics for the year 2014. The mean of nurses' work days in ANC and child clinics was 168 and 190, respectively, as indicated in Tables 8 and 9.

Table 8: General characteristic of ANC clinics

Name of clinic	Number of nurses' client for ANC clinics in 2014	Number of days for ANC services done by nurses in 2014	Number of nurses	Number of days per month for ANCs' services in 2014		
				doctor	Mid wife	Nurse
Northern	**2485**	**240**	**2**	16	**20**	**20**
Ateel	997	**240**	1	2	**20**	**20**
Anabta	703	192	1	2	0	16
Shweikeh	703	**240**	**2**	2	0	20
Beit leed	613	192	1	2	0	16
Baqa Sharqiya	595	48	1	1	0	4
Sida	526	48	1	1	0	4
Kofr jammal	384	**240**	**2**	2	0	20
Nazlet esa	326	24	1	1	0	2
Kofr sour	143	216	1	1	0	8

Table 9: General characteristic of child care clinics

Name of clinic	Number of nurses' clients for child clinics in 2014	Number of days for children services done by nurses in 2014	Number of nurses	Number of days per month for children services in 2014	
				doctor	Nurse
Northern	**6116**	**240**	**3**	**20**	**20**
Ateel	2095	**240**	1	**20**	**20**
Anabta	1777	**240**	1	**20**	**20**
Shweikeh	1731	**240**	1	8	**20**
Beit leed	1507	96	1	16	8
Baqa Sharqiya	1151	**240**	1	8	**20**
Sida	1067	144	1	12	12
Kofr jammal	642	192	1	16	16
Nazlet esa	588	**240**	1	12	**20**
Kofr sour	394	24	1	2	2

Figure 6 below shows the workload pattern in the selected MCH clinics in 2014. For the ANC clinics, the mean workload was 5.7 mothers/ day. That is less than the mean in child clinics (8 children per day). The highest workload for ANC clinics was observed in Nazlet esa clinic (14 mothers per day), and in Shweikeh and Kofr Sour clinic for child care sections, which was 16 children per day. The lowest load was in Kofr Sour and Kofr Jammal clinics within its ANC section (one mother per day) and in Nazlet esa clinic for child care section (2 children per day).
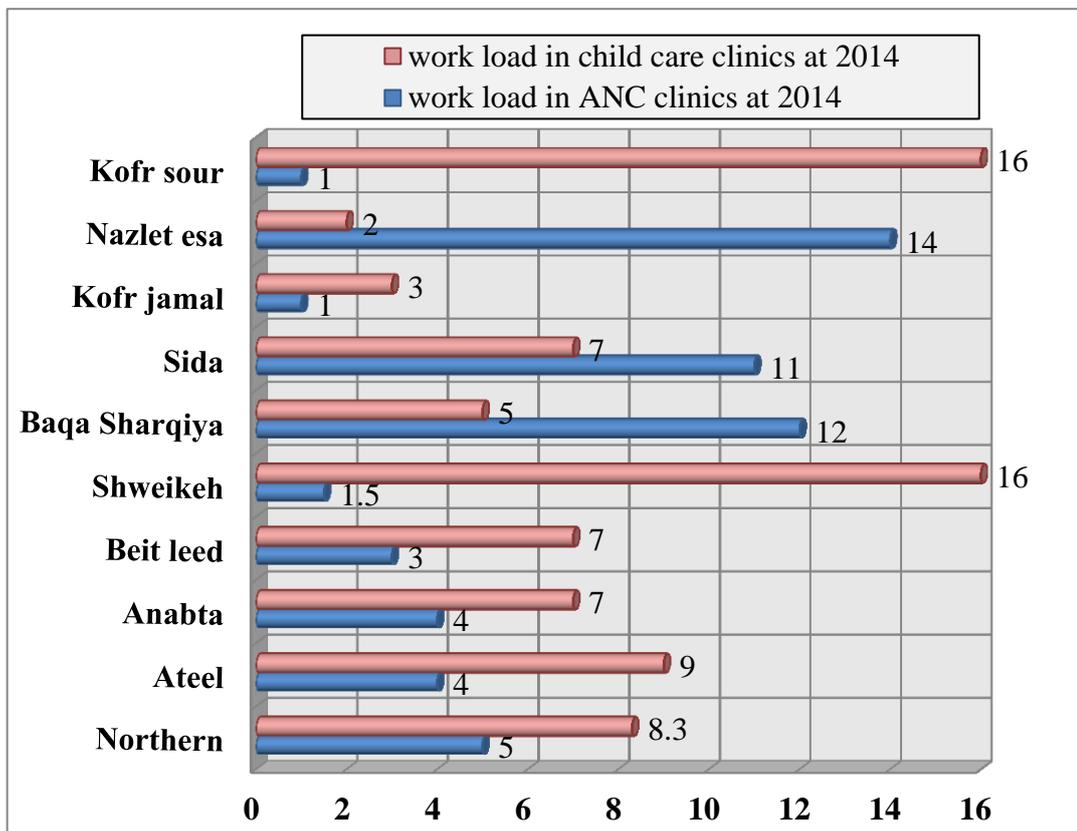
Figure 6: Workload in MCH clinics at Tulkarm district in 2014

4.2.1 Completeness of MCH files

At the point of data entry in MCH clinics, nurses should manually fill patient files with specific information, such as: personal history, family

history, medical history menstrual cycle history, anthropometric measurements for the mother and the child, BP, risk assessment of pregnancy, fetal pulse, previous pregnancies and lab test results (urine, blood group, Hemoglobin test for mothers and 6 or 12 months old child), supplements, vaccinations, delivery and after delivery information, notes of doctors and nurses, and finally the recorded date for the next visit. For this study, the researcher prepared a specific checklist containing the key items of those files' information, and then took a sample of 10% from all files in the MCH clinics for the year 2014 to be included in this assessment.**ANC files**: Figure 7 shows the percentage of mothers' files from each PHC clinic. In total, there were 152 files; most of them were from the Northern clinic (26%) and the fewest were from Kofr Sour (3%).
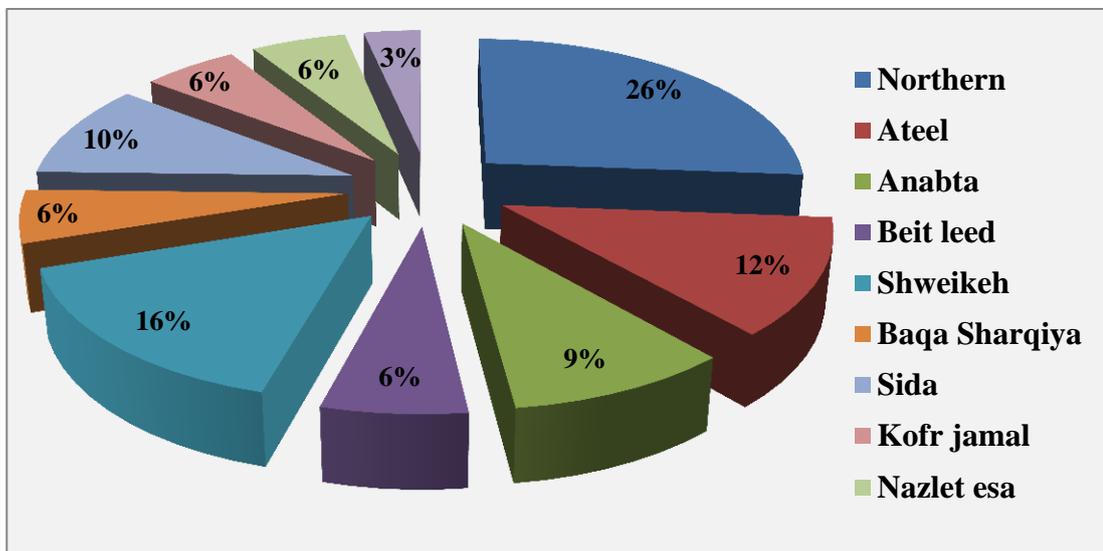
Figure 7: Percentage of mothers' files from every PHC clinic.

Table 10 shows the distribution of recorded items in mothers' files. The lowest percentage was for the completeness of general data for pregnant

women, which was 66%. The next item was doctors' examination notes, which was 87%.

Table 10: Distribution for recorded item on mothers files (152 files)

Items	Frequency	(%)
Number of file	152	100
Current pregnancy	152	100
Previous pregnancy	152	100
Weight	152	100
BP	152	100
Fetal pulse	152	100
Supplements	152	100
Risk assessment	151	99
Primary lab test (urine, blood group, Hb*)	151	99
Notes of doctor examination	133	**87**
General data	101	**66**

* Haemoglobin concentration.

The completeness of the lowest recorded items of ANC files (general data, notes of doctor examinations) were studied in relation to the clinics' characteristics as it is revealed in Table 11.Recording mothers' general data was found to be significantly associated with attending HCWs' (p value 0.029) and was mostly incomplete, with a percentage 74%, when no midwife existed. On the contrary, notes of doctor examinations are significantly associated with all ANC characteristics that we have studied; doctor attendance, midwives existence , nurse attendance per month, days of nurse attendance in 2014 and number of clients in 2014 (p value 0.01 or <0.001). Its recording was mostly incomplete when doctors not daily existed, when nurse existed (not midwives), when nurse existed > 8 days per month or >100 days in 2014, when the number of clients was< 500 in 2014 and when work burden > 5 pregnant/day, as visualized in Table 11.

Table 11: Mothers' files completeness in relation with ANC clinics' characteristics (n= 152)

Characteristics of the ANC clinics	General data			Notes of doctor examinations		
	Complete	Incomplete	P value	Complete	Incomplete	P value
Doctor attendance (day/month)						
Daily	91(71)	41(82)	0.084^	118(74)	14(74)	**0.018^**
Not daily	38(30)	9(18)		42(26)	5(26)	
Attending Health care worker (midwives existence)						
Midwife existed	56 (81.6)	13(18.4)	**0.029^**	62(39)	7(37)	**0.018^**
Nurse existed	73(66.6)	37(33.4)		98(62)	12(63)	
Nurse attendance (day/month)						
Less or 8	74(57)	28(56)	0.277^	93(58)	9(47)	**0.012^**
More 8	55(43)	22(44)		67(42)	10(53)	
Number of clients in 2014						
Less than 500	16(12)	10(20)	0.12^	16(10)	10(53)	**<0.001***
500-1000	75(58)	31(62)		102(64)	4(21)	
More than 1000	38(30)	9(18)		42(26)	5(26)	
Nurse attendance in 2014 (days)						
Less or 100	53(41)	19(38)	0.261^	65(41)	7(37)	**0.017^**
More than 100	76(59)	31(62)		95(59)	12(63)	
Work burden in 2014 (pregnant/day of nurse)						
Less or 5	67(52)	29(57)	0.551^	89(56)	7(35)	0.08^
More than 5	62(48)	22(43)		71(44)	13(65)	

^Chi square test was used, *Fisher exact test was used.

Children files: Figure 8 shows the percentages of children's files from every PHC clinic. There were 159 files in total, distributed nearly equally between female (49%) and male (51%); most of these files were from Northern clinic (31%).
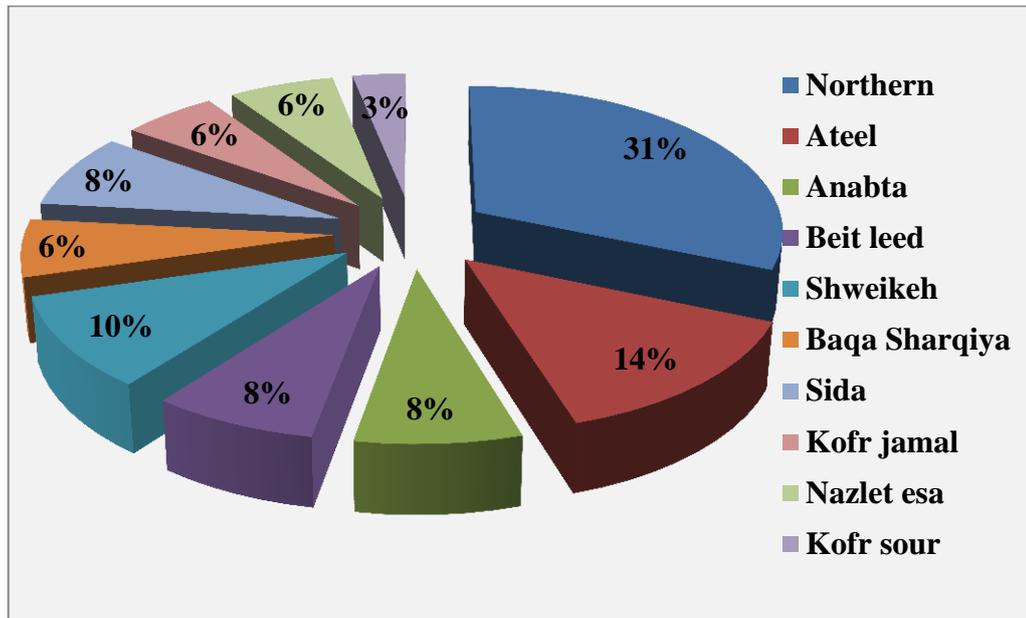
Figure 8: Percentage of child files from every PHC clinics.

Table 12 shows that most items in children's files have been almost entirely completed. The lowest percentage of completeness was the registration of Hemoglobin level for one year old children, which was 49%, followed by documentation of supplements that were taken by children (67%).

Table 12: Distribution for recorded items on children files (159 files)

Items	Frequency	%
Number of file	157	99
General data for child	157	99
General data for family	158	98
Medical history	158	98
Development	158	98
Height	158	98
Weight	158	98
Head circumference	158	98
Nutrition	158	98
Growth chart	158	98
Notes of doctor examination	157	98
Vaccinations	158	98
Supplements	**107**	**67**
Hemoglobin test for one year old child	**78**	**49**

The completeness of the lowest recorded items of children files (supplements and Haemoglobin test) were studied in relation to their clinics' characteristics as it can be seen in Table 13. Recording of children's supplements in their files was found to be significantly associated with clinics characteristics (p value 0.002, <0.001 and0.01), except the doctor attendance per month and Work burden in 2014 (p value 0.1 or 0.056). Its recording was mostly incomplete when nurses attended > 8 days per month or >100 days, when the number of clients was >1000, and when workload ≤ 9 pregnant women/day and when file was related to male children.

On the other hand, recording the results of Hemoglobin tests for 6/12 months child in their file is significantly associated with doctor attendance and children's gender (p value <0.001). Its recording was mostly

incomplete when doctors daily attended, when nurses attended >100 days in 2014 and when patients were female children, as demonstrated in Table 13.

Table 13: Child files completeness in relation with their clinics characteristic (n=159)

Characteristics of child clinics	Supplements			Haemoglobin test for 6/12 months		
	Complete	Incomplete	P value	Complete	Incomplete	P value
Doctor attendance (day/month)						
Daily	72(67)	28(54)	0.1^	35(45)	65(80)	**<0.001^**
Not daily	35(33)	24(46)		43(55)	16(20)	
Nurse attendance (day/month)						
Less or 8	5(5)	12(23)	**0.002^**	12(15)	5(6)	0.169^
More than8	102(95)	40(77)		66(85)	76(94)	
Nurse attendance in 2014 (days)						
Less or 100	5(5)	12(23)	**<0.001***	12(15)	5(6)	0.06^
More than 100	102(95)	40(77)		66(85)	76(94)	
Number of clients in 2014						
Less than 500	1(1)	4(8)	**0.01***	3(4)	2(2)	0.354*
500-1000	9(8)	10(19)		12(15)	7(9)	
More than 1000	97(91)	38(73)		63(81)	72(89)	
Work burden in 2014 (child/day of nurse)						
Less or 9	106(99)	48(92)	0.056*	75(96)	79(98)	0.577*
More than9	1(1)	4(8)		3(4)	2(2)	
Gender						
Male	57(53)	29(56)	**<0.001^**	45(58)	35(43)	**<0.001^**
Female	50(47)	23(44)		33(42)	46(57)	

^Chi square test was used, * Fisher exact test was used

4.2.2 Completeness and accuracy scores of MCH reports

At the end of every month in PHC clinics, nurses and midwives were supposed to transfer patients' information from the ANC and child registers to the national integrated reports for reproductive health; ANC reports and child care reports. They also use the manual approach here. These reports must be accurate and filled on-time (up to the fifth of every month). However, according to the MOH protocol, patients' files, the registration book, DSB and reports must be kept up-to-date (stored for at least two years).

In our assessment, all reports from January to December of 2014 related to ANC and child care were assessed for completeness of their items and given a score from 12 points.

Important items from the ANC and child care reports were matched with their original value in the DSB that exists in every clinic. Twelve reports were assessed from each clinic, a total of 120 reports for mothers and an additional 120 reports for children.

ANC reports

As shown in Figure 9, most clinics have completed reports for the whole year of 2014. Only the Baqa Sharqiya clinic had one incomplete report. Unfortunately, we couldn't assess the completeness and accuracy score for the Anabta clinic because their ANC reports and documents didn't exist at all.

The accuracy scores for ANC reports were related to the number of mothers which had completed their 4th antenatal visit in that month for

every clinic.Only Baqa Sharqiya and Kofr Jammal clinics had one report out of twelve that did not match their original value accurately in the DSB, as indicated in Figure 9.
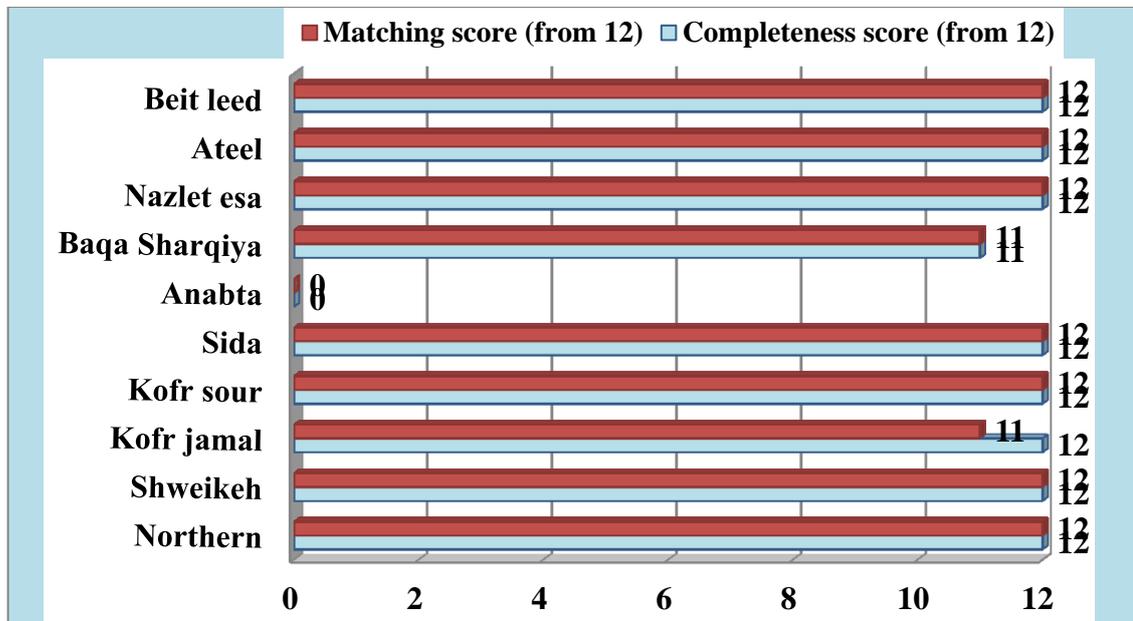
Figure 9: Scores of completeness and accuracy of ANC reports

Table 14 shows the relations between characteristics' of ANC clinics in 2014 and the completeness and accuracy scores of their mothers' reports. We used t-test to explore the differences between completeness and accuracy scores for ANC reports and their clinics' characteristic of midwife presence, number of attended days by nurses, number of pregnant women and overall work burden. None of these differences were statistically significant, as it appears in Table 14.

Table 14: Accuracy and completeness of ANC reports in relation with their clinics characteristics

Characteristics of ANC clinics N (10)	Completeness scores of reports (p value*)	Accuracy scores for Number of mothers completed 4th Antenatal visit' (p value*)
Midwives existence	0.616	0.586
Number of clients in 2014	0.739	0.718
Nurse attendance in 2014(days)	0.625	0.587
Work burden in 2014	0.505	0.461

*T- test was used

Children reports:

Differ from ANC clinics, figure 10 shows that most child clinics had incomplete reports for the whole year of 2014. Their completeness scores ranged from 7 to 11 completed reports per one clinic. Accuracy scores for child reports also ranged from 7 to 11, which means one to five unmatched or uncompleted reports per one clinic existed.

Only Sida clinic had twelve completed child reports. It was also the only clinic that its entire numbers of EBF children in its reports matched accurately with the original value in the DSB, as demonstrated in Figure 10.
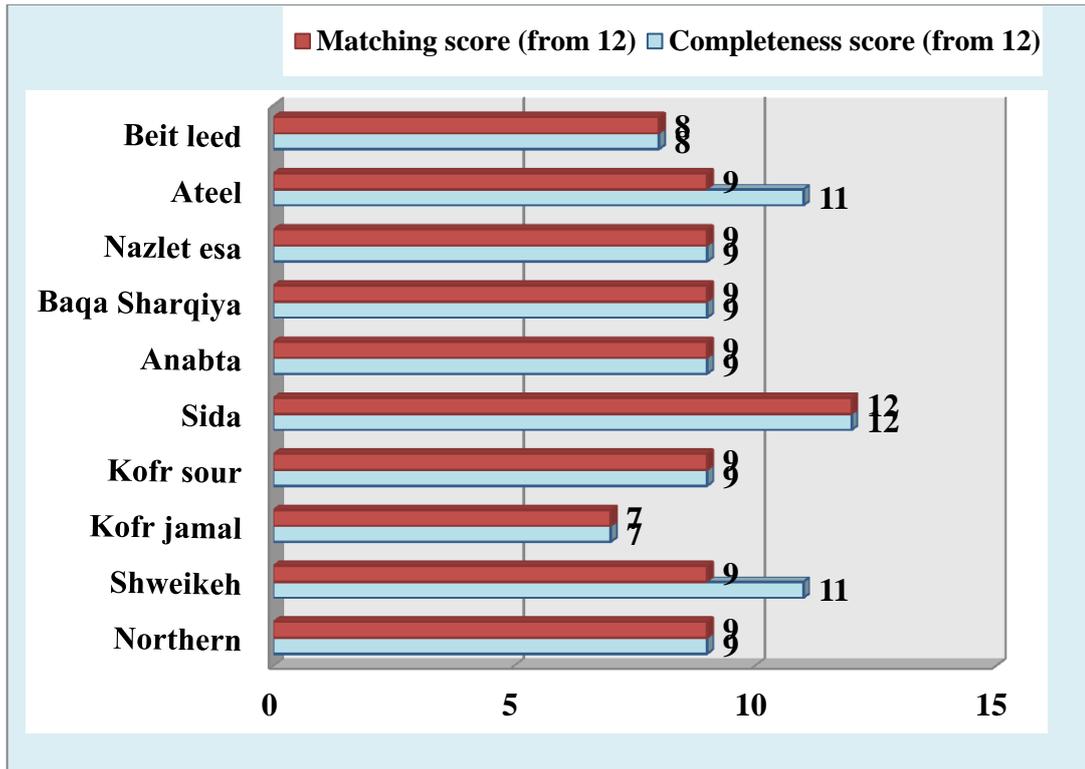
Figure 10: Scores of completeness and accuracy of child care reports

Table 15 shows the relations between characteristics of child care clinics, as well as the completeness and accuracy of children reports. We used t-test to explore differences between completeness and accuracy scores for child care reports and their clinics' characteristics as number of attended days by nurses, number of children and overall work burden. None of those differences were statistically significant, as it appears in Table 15.

Table 15: Accuracy and completeness of child reports in relation with their clinics characteristics

Characteristics of child clinics N (10)	Completeness scores of reports (P value*)	Accuracy scores for Number of EBF children in reports (P value*)
Number of clients in 2014	0.152	0.294
Nurse attendance in 2014 (days)	0.798	1.0
Work burden in 2014	0.814	0.634

* T-test was used, EBF: Exclusive Breast Feedings.

Chapter Five

Discussion

Well-working HIS are considered vital with the quality of health related data for decision-making at patient level or even at policy levels. In particular, health facilities play an important role, since they are not only the entry point for the national HIS but also used to document health data for patient care. Therefore, we must have confidence of data quality prior to using it as the basis for decision-making.

This study is an assessment for the quality of data for antenatal and child care clinics at health facility level in Tulkarm district in 2014. We assessed the data collection process, files and reports' completeness for that purpose. The result of this study will be discussed from different perspectives; Firstly, the performance of PHC nurses and midwives for MCH data collection protocol. Secondly, completeness and documentation of protocol components in MCH files in 2014 will be presented. Thirdly, the data quality of MCH reports of PHC clinics for 2014 will be analysed.

5.1 Nurses' performance in MCH data collection process

This assessment was conducted in 10 PHC clinics within Tulkarm district: Northern, Shwiekeh, Anabta, Beet Lied, Ateel, Sida, Baqa Sharqia, Nazlet Esa, Kofr Jammal and Kofr Sour. The observation of nurses' performance was continued for 40 days; twenty days for ANC sections and another twenty days for child care sections.

The mean of ANC clinics' workload for data collection in the 1st and 2nd observation day was 10.7 and 9.5 pregnant women per nurse respectively. For the child clinics, it was 9.2, 8.1 children per nurse in the 1st and 2nd observation day, respectively. This resulted in having more numbers of clients in ANC clinics than it did in child clinics during our observations; most child clinics have only one nurse as shown in Table 1. The heaviest workload for ANC clinics was in Anabta clinic, in which there was only one nurse per 25 women; and the lightest was in Kofr Jammal clinic, in which there was more than one nurse per 4 or 6 women. (See Table 1 and Figure 2) For child clinics, the heaviest workload occurred in the Northern clinic, in which there was a large number of clients, despite the presence of 3 nurses, the lowest occurring in the Kofr Sour clinic, in which there was a small number of clients (Table 1 and Figure 3).

This workload may affect the quality of collected data, as illustrated in Tables 6 and 7. Significant differences between higher workloads and nurses' poor performance in data collection process in both ANC and child care clinics were noted. For example, completeness and accuracy of the registration book and the act of informing patients on their upcoming appointments were affected by the intensity of nurses' workload (p value $\leq$ 0.001) in ANC and child care clinics (Tables 6 and7). Other items related to child care clinics, such as assuring privacy, as well as the completeness and accuracy of DSB were particularly affected by the intensity of workload (p value $\leq$ 0.001 or 0.01) (Table 7). Those differences could be explained by the fact that information-related duties are often perceived to

carry a heavy work burden, as it appeared in an evaluation of the District HIS in rural South Africa(20). Also in Botswana study,data related activities are often sacrificed because of the high time commitment, as well as competing priorities(33).

Our observation showed that all the data in Tulkarm district was collected manually and only hard copies were sent to the higher levels (bureaucratic processes). The same mechanism is still used in some developing countries(34). For countries and programs using the electronic system, it was shown that the documentation and analysis of data was well understood and easily performed by the staff (25). The availability of a centralized electronic database facilitates the cross-referencing of data among programmes, promotes adherence to standard definitions and methods, and helps to reduce redundant and overlapping data collection. It also provides an environment to examine and understand data inconsistencies and to facilitate the understanding of data reported through different systems (35). In addition, computerized HIS have the potential to dramatically reduce the data collection burden by automating data aggregation and reporting(36), and would also allow for timely access to data (37). Furthermore, Information Technology (IT) has demonstrated positive effects on data quality and even quality of care in a number of research settings within low-income countries (38,39).

On the other hand, there are studies demonstrating the disadvantages of the computerized HIS. A study in Botswana revealed that respondents from facility to national-level reported data loss due to computer crashes,

viruses, and misfiled electronic data (33). Additionally, electronic systems often increase the workload of HCWs due to unreliable internet services, insufficient IT support, and the lack of computer skills among HCWs (33). Therefore, computer-based approaches do not eliminate the need for paper-based forms, but rather exist in parallel. These findings support the concerns of many researchers whom argue that a mere technical approach toward data quality is insufficient for improvements (5,40). In addressing some technological gaps, we noted that mobile phones (collecting data through nurses' calls) are successfully used as part of data collection systems in Tulkarm; using mobiles was also present in the above-mentioned Botswana study (33). However, this approach requires further practical investment and maintenance (41).

Our observations revealed that the performance of PHC staff in MCH data collection process has a good percentages for most of our observation checklist items which ranged from 91% to 99%: reviewing and updating MCH Booklet, filling the registration book and files for every case, recording weight, BP, height, laboratory tests, nutritional supplements and drugs, informing the patient about the next appointment and recording it in her file, in the MCH Booklet and the registration book (Tables 2 and 3). These results may be attributed to the improvements that had been achieved within reproductive health in Palestine during recent years (in coordination with WHO and other health partners). For example, there were several workshops and trainings for nurses on the data collection process, as indicated by the head nurse in Tulkarm.

In 2014, an assessment conducted in Tanzania showed that the primary collection of routine service data at the hospital had acceptable levels of both accuracy and completeness. This was especially so within the maternity and childhood departments (25). An evaluation for District Health Information System (DHIS) in rural South Africa in 2008 concluded that there were encouraging gains in information collection at the primary care level and added that standard data items were collected with generally high reliability and timeliness. However, data quality was poor and staff members were unable to make effective use of it (20).

Our analysis of filling items in the MCH Booklet completely (99%) is very close to the results of completeness percentages of the MCH Booklet for ANC nurse data within a 2013 Kenyan study which was 95.8% to 100% successful completion (7).

One of the observed items that have a low percentage of completeness and accuracy is the filling of the registration book in ANC and child clinics (23% and 89%, respectively). During our observation period, a new form was introduced to nurses and midwives to replace a former version related to the registration books. This changed created a lot of confusion and disruption for nurses. Nurses also noted that the new ANC registration book was much different than the former document, while that for child clinics held less differences. That may explain the low percentage of filling the registration book in ANC clinics.

While standard tools were generally available at 2014 Botswana study, staff at the district and facility level reported that the tools frequently

change, ensuring that using forms' up to-date version was reported to be challenge in data collection (33). While in 2013, one health facility in Kenya recorded a percentage of 97% for filling the ANC registration book completely. The accuracy of those recordings reached 85%. In contrast, another facility featured in the study held no register book been altogether (7) The completeness and accuracy of filling the registration book in ANC clinics was significantly higher (p value < 0.001) when more than one nurse existed, which indicate the effect of number of health staff on data quality. This result is consistent with a 2008 study conducted in Malawi which assessed the quality of data aggregated by antiretroviral treatment clinics. The study recommended having adequate numbers of skilled human resources for collecting and maintaining data in order to ensure quality of data (42).

The completeness and accuracy of filling the registration book was also significantly higher when more than 20 pregnant women were present (p value < 0.001); nurses did not completely fill registration books unless they received a large number of clients. Again, it was significantly higher (p value < 0.001) when workload consisted of < 10 pregnant women per day; having more than one nurse in some ANC clinics facilitates filling registration book also helped to distribute the workload. (See Table 6)

In contrast to child clinics, The completeness and accuracy of filling the registration book was significantly higher (p value < 0.001) when one nurse was present; especially noteworthy due to the majority of clinics having only one nurse, except the Northern clinic. It was also significantly higher

when there were ≤ 20 children present (p value < 0.001), as nurses may forget or bypass filling in information when they received a large number of children. Additionally, it was significantly higher when workload was ≥ 10 children per day (p value < 0.001), this is due to most of those completing forms were in the Northern clinic (the only clinic that has its workload distributed between three nurses). (See Table 7).

Patient examinations must be conducted in a private room according to the protocol, but this assessment showed low percentages of privacy in data collection in ANC and child clinics (31% and 54%, respectively). A regulation which may affect the reliability of those collected data. Our findings revealed that this item in ANC clinics was significantly associated with the number of nurses and pregnant women present (p value < 0.001) but not necessarily with workload during observations, as it is appears in Table 6. Furthermore, privacy was achieved more successfully when there were more than one nurse and more than 20 mothers present. Pregnant women tended to close the door when they entered a room, and nurses did that when there were a greater number of pregnant women present, so as to facilitate their work versus an attention to privacy, as noted by the observer. Another issue that may hinder accuracy of information is that patients may keep information from medical staff, as a midwife explained in the Kenyan study: "*A mother told me that she had forgotten the Booklet, but after the delivery I saw the Booklet in her bag. When I checked it, I found her to be HIV patient..., She was afraid that I would not conduct the delivery.*" (7)

On the contrary, in child clinics, privacy was significantly (p value= 0.001) associated exclusively with workload (Table 7), and it was achieved at higher rates when there were > 10 children per day. When there was one nurse, she tended to close the door to attending rooms when they receive large numbers of children.

At the end of an observation day, nurses filled DSB which was found to be incomplete in 35% of the files at the ANC clinics compared to 86% of the files at the child clinics. Nurses usually use the registration book to fill DSB, so those results may be due to the use of new registration books, as mentioned above. The filled information was accurate in 86% of DSB in ANC clinics and 100% in child clinics. (See Tables 4 and 5)

Surprisingly, the completeness and accuracy of DSB was only associated with number of nurses in ANC clinics and it was higher when one nurse was present (p value 0.043), that may be because the two nurses depend on each other to fill out the information. For the child clinics, completeness and accuracy of DSB was higher when one nurse is present and when ≤ 20 of children were present that day. All these differences were statistically significant (p value =0.003). Completing the forms is not simple, in the sense that it requires time and concentration. Therefore, nurses may postpone completing information to the end of their workweek or even reporting deadlines (end of month), as noted by observer.

At the end of each visit, nurses inform mothers on the next appointment for her child. This task was performed for about 92% of the clients, but the observer noted that nurses were more interested in vaccination

appointments than child care, which affected mothers' interests. Some mothers will come to the clinic only for her child's vaccination without visiting the child care department. This may explain the association with number of nurses, number of children and workload, as demonstrated in Table 7.

While in Anabta ANC clinic, the observer noted that nurses asked mothers for suitable appointments according to her schedule, encouraging them to comply with the next appointment. Those findings may explained the high number of nurses' clients (50 pregnant women as showed in Figure 4) and the highest workload (25 pregnant women per nurse) in the 1st and 2nd of our observation days in Anabta clinic, as shown in Figure 2.

In ANC clinics as a whole, telling mothers about their next appointment was significantly higher (p value 0.009) when more than one nurse existed and when more than 20 pregnant women visited the clinic.

5.2 Completeness of protocol components in MCH files:

MCH files in Tulkarm district are considered an important reference in PHC clinics, especially in the case of losing a MCH Booklet. We found that the percentage of MCH files retrieved easily and quickly was highly satisfactory, scoring 95% for mothers' files and 98% for children's files. This issue has been addressed in some studies. In a 2013 study conducted in Kenya, HCWs found it challenging to retrieve former clients' files and found that there was no backup system for a lost MCH Booklet; if a patient

used the MCH Booklet as proposed, the health facility was left without any record within its facilities(7).

Most of the items in the MCH files (like file number, weight, BP, height for mothers and child, current and previous pregnancies, risk assessment in pregnancy, child nutrition, child growth chart, and vaccinations) have a very good percentage of completeness; ranging from 98 to100%. As indicated earlier, this could be attributed to the importance given to the reproductive health during the past years in Palestine.

These circumstances are similar to those in other countries, such as in Kenya, in which the completeness of items in the ANC file was 86%. In other studies, such as the 2007-2008 Ethiopian study in which 71% of the data was documented in the form of hard copy, 24% was not well documented while 5% had data in both hard and soft versions (34). According to a study conducted in Tanzania and Mozambique, it was reported that 93% of the data registers were not available all the time (43). The North Gondar study in the year 2005-2006 showed that 28% of the data was not available, 58% was not well documented and 13.2% was well documented (44).

Although general data in child files have good percentages of completeness (99%), the same cannot be said for mothers' files; only 66% of them have complete general data, as demonstrated in Table 10. This low percentage is due to missing information about the first fetal movement. This movement is supposed to be recorded within the first 3 or 4 months of pregnancy, which is the period in which most mothers do not frequently visit ANC

clinics. Therefore, it is not filled out by nurses. Also, according to our results, recording mothers' general data was found to be significantly (p value 0.029) associated with the attending HCWs' and was more incomplete when a nurse is attending (33.4%) rather than a midwife (18.4%) (See Table 11); nurses may not have asked about or been aware of this item, so it is so important for there to be at least one midwife in each ANC clinic or training the nurse to ask about.

While documentation of doctor notes in children's files are good (98%), the completion within mothers' files was only 87%, as demonstrated in Table 10. During our observations, we noted that mothers frequently refused to be examined by a doctor because they either received follow-ups in private clinics or due to their religious beliefs. Doctors' notes on examinations are significantly associated with some of ANC characteristics that we have studied, including: doctor attendance, midwife presence, nurse attendance per month, days of nurse attendance in 2014 and number of clients in 2014(p value 0.01 or <0.001).

Our results indicate that most incomplete doctor notes (63%) happened when nurse existed (not midwives) in ANC clinics. This means that there are a percentage of clients who were not seen by midwives or doctors, as negative occurrence according to the WHO recommendation which indicated mothers must be seen by skilled health personnel, including midwives or doctors through their ANC visits (45).

Although mothers' lab tests have a high percentage (99%) of completeness in mothers' files, the lowest percentage for items in child files was for

filling the results of Hemoglobin test for one year old children that equals 49%, this percentage is low taking into consideration WHO recommendations (46). Sometimes, the results of blood test was received from another facility or lab since laboratories / lab technicians do not exist at all or are very limited in some clinics. For example, in 2014 at the Sida clinic lab activities occurred only once per month. In the Baqa Sharqia clinic, lab activities occurred only three days per month. Due to this issue, in some clinics, laboratory results can also be delayed for a week and fail to be recorded in children's files. At all the study sites in the 2012 Kenyan study, HCWs also complained about delayed laboratory results; up to 24 hours and longer. That delay occurred because patients forgot their MCH Booklet, or sometimes Hemoglobin level was rarely copied into the ANC register (85% successfully copied at one of study sites and only 42% copied in another site). In general, that awareness of data quality was generally low and the errors in the transmission of laboratory results were simply unknown and therefore, unaddressed, while at the same time, data quality was rated good or very well (7). On the other hand, our results indicated that recording Hemoglobin test for 6/12 months child in their files is significantly associated only with doctor attendance and the child's gender (p value <0.001). Its recording was mostly incomplete when doctors daily attended and when file was related to female children, as shown in Table 13.

While documentation of mothers' supplements (folic acid & iron) in mothers' files has a good percentage of completeness (100% from Table

10), the average supplement exchange was a 3.7 unit of iron and a 0.7 unit of folic acid for every pregnant woman in Tulkarm, which is more than the national average in Palestine according to MOH annual report (47). On the other hand, we noted in our observation that mothers' and children's supplements have a good percentage (99%) of documentation during data collection as showed in Table 3, but it was only 67% for children's supplements (Vitamin A+D & iron) documentation in their files, as shown in Table 12. The average supplement exchange was 2.7 units of iron and 5.1 units of vitamins for every child in Tulkarm, less or close to the national average in Palestine according to MOH annual report (47). This item was found to be significantly associated with some characteristics (p value 0.002, <0.001 or0.01), except work burden in 2014 and the doctor attendance per month(p value 0.1 or 0.056). This logic is relevant because nurses are responsible for supplements exchange, rather than doctors. Its recording was mostly incomplete when nurses attended > 8 days per month or >100 days in 2014, when the number of clients was >1000 in 2014, and when the work burden was ≤ 9 pregnant women/day and when it was related to male children. (Table 13)

5.3 Quality of MCH reports

One of the major challenges in using data for decision-making is its timeliness. According to the Head nurse in Tulkarm: *"These reports must be completed accurately and filled on-time by the fifth of every month"*. There were no obvious and written rules in MOH protocol that determine

the timeline in filling out reports or sending reports to the next level. As a result, those reports did not commonly contain information regarding the time or date of reporting or even the time of sending, which makes us unable to assess the timeliness of those reports. Also nurses who are in charge of data collection at PHC clinics are responsible to prepare the monthly reports manually. They found reporting a very time-consuming process as it is noticed during our observations. The head nurse only reviews those reports and matches them with DSB as the Palestinian MOH protocol indicates (31). In a South African study, data validation was limited to ensuring that submitted data was complete, and occasionally checking that it was correct. Clinic staff and supervisors reported that even if the data did not look correct, checking it was rarely done due to lack of time (20).However, WHO guidelines showed that reporting and recording must be conducted by nurse who hasn't any kind of duties rather than data reporting (48).

So having an adequate number of staff to cover all responsibilities was reported to improve data quality. For example, one community health nurse at the district level in Botswana stated: "....*Really, it [timeliness] was being affected by the fact that there was a shortage [of nurses] at the clinics"*(33).In addition, when electronic communication facilities are available, which isn't the case in Tulkarm district, data is immediately entered to provide reporting to all levels. Manual processing might be a reason for the reduced accuracy of reports, as shown in the Kenyan study (7).From other point of view, if feedback on the reports didn't exist, this

can have a negative impact on HCWs' motivation to take part in the reporting processes (40). That was pointed out within a Kenyan study: '*People are not aware what data is needed for, so reporting seems a bit useless and more insight would raise the level of motivation*' (7). Not much is known about the motivation of HCWs, while single interventions like incentives for higher data quality have shown positive effects (42).

ANC clinics: At ANC clinics, only the Baqa Sharqiya clinic had one incomplete report. Only Baqa Sharqiya and Kofr Jammal clinics have one report out of twelve in which the number of clients whose completed 4th antenatal visit didn't match accurately with the original value in the DSB, as shown in Figure 9. These results are relatively successful in terms of completeness and accuracy for ANC reports, which may return for high care pointed for this reports because they are the only document that was submitted for upper level in PMOH. In contrast with other studies such as the Kenyan study, the completeness of reports ranged from poor (60%) to good (90%). Also, the average monthly discrepancies of number of clients which completed the 4th antenatal visit reached up to 53.1% at one hospital featured in the Kenyan study(7). ANC reports' assessment in Tanzania showed that all examined reports had limited completeness, accuracy, and even continuity. The percentage of accuracy of the reported figures was low in their different health facilities (5.3% or 14.8% accurately reports) (25). In 2012, data quality intervention for a program of Prevention of Mother-to-Child transmission (PMTCT) of the Human Immunodeficiency Virus (HIV) was conducted in ANC clinics throughout South Africa. Some

researchers assessed their reports after the intervention; their results revealed that the level of completeness for specific data elements in their reports was 64%. Similarly, the proportion of accurate data was 65% (49).Inaccurate reports in ANC clinics might be attributed to the misunderstandings, as observer noticed. Some HCWs seemed to report the number of mothers completing a course of four ANC visits only; others reported the number of mothers with four or more visits. As Lafond pointed out, the capability of the clinical information systems is also greatly influenced by the individual skills and behavior of the staff(40). Furthermore, HCWs rather prioritize patient care instead of data management and reporting duties (40).

Unfortunately, we couldn't assess the completeness and accuracy score for Anabta clinic because their ANC reports and documents did not exist. According to what the head nurse in Tulkarm said:"*MCH documents, files and registers shouldn't be damaged or lost until 3 years of its release*", there were no obvious and written protocol for maintaining and storing documents. There was no reported

government policy on how long data should be stored or how often it should be backed up to protect against data loss. This situation is similar to what was been observed in another study in Botswana; For those who indicated that they were routinely backing up their data, a variety of methods were reported, including compact discs and thumb drives/memory sticks. As one participant said "As soon as I finish with a report, I put it in a [memory] stick".(33).

Child care clinics: Different from ANC clinics, child reports' assessment showed that most child clinics had incomplete reports for the whole year of 2014; they ranged from 7 to 11 complete reports per one clinic, as shown in Figure 10.Accuracy for matching the number of EBF children with DSB also ranged from 7 to 11 reports, as shown in Figure 10. These results of completeness and accuracy might be due to confusion regarding the EBF indicator especially within the first 3 months of 2014. Some HCWs reported the number of EBF children in general instead of reporting the number of children who were only breastfeeding for 6 months old, as aforementioned regarding the 4th antenatal visit indicator in ANC clinics (16).

Report assessments in the Tanzania study generally showed that the accuracy of the monthly summaries was poor. Two inconsistencies between the hospital data statistic book and the hospital report were observed by reason of two main problems: firstly, diagnoses were documented inconsistently and secondly, mistakes were frequently found when entries had been totaled (25).

5.4 Limitations

Data production for the national health information system starts with patient-provider interactions at the facility level. Investigating the quality of information systems at the facilities was found to be challenging, since a clear definition is missing and very different aspects had to be included. Such an assessment is complex, as overall system performance depends

upon multiple determinants – technical, social, organizational and cultural (35). Assessment therefore needs to be comprehensive in nature and to cover the many subsystems of a national MCH surveillance system, including public and private sources of health-related data, NGOs (UNRWA, Palestinian Medical Relief Society (PMRS) and Palestinian Red Crescent Society (PRCS),…etc.), but in our workforce walkthrough, we found that the health information resembles each other and that they give their MCH information to PHIC.

The data that was assessed was restricted to 2014 and to only one district, which cannot give any indication of what happens at other districts or during other time periods. The timing of the assessment might have been a limitation, especially for the participant observation. The weather in Palestine at the time of data collection (rainy season) may affected the number of MCH clients who attended the clinics, so that might have affected the observation process. Timing is also might have been a limitation in Tanzania study 2014 (25).

One of the potential weaknesses of observational method is the so-called observer effect which refers to the way in which the presence of an observer in some way influences the behaviour of those being observed (50). In order to avoid or minimise this, the observer in this assessment hid her presence in observation by entering the field as a trainer in PHC clinics. In addition, observation method is susceptible to observer bias, thus undermining the reliability of the data gathered. This can be because the observer records not what actually happened, but what they either wanted

to see, expected to see, or merely thought they saw (50). So to minimize this effect, it was only one observer who was trained on data collection process in another clinic. The existence of one observer also reduced the effect of inter-observer (or between) reliability that is defined by the degree to which measurements taken by different observers are similar. Where as the intra-observer (or within) reliability is defined by the degree to which measurements taken by the same observer are consistent (51). In order to minimize variations between observations when reporting more than once on the same material, the observer used a specific checklist with specific items for every participant.

The manual approach of MCH surveillance in Tulkarm created a significant challenge in this study. It took a lot of time and work that could have been avoided. From other hand, data collection and reporting protocol is related to WHO standards; therefore, it facilitates the standards of our assessment process.

Unavailability of some reports did not enable the researcher to have a whole picture of data quality (completeness and accuracy) in Tulkarm's ANC clinics. Finally and most importantly, the delay in the release of the MOH annual report of 2014 until May 2015 forced the researcher to await results in order to compare with our assessment results.

5.5 Conclusions and Recommendations

In view of the results, it can be concluded that:

- The performance of nurses in data collection process at MCH department in PHC clinics was acceptable, except for some variables such as filling the registration book for every child or pregnant and filling the DSB daily without pending.

- The level of privacy in data collection in MCH clinics was unacceptable, both in ANC and child care clinics.

- A good level of documentation was achieved for ANC and child files in 2014, which are considered an important reference of information for pregnant women and children, with the exception of some items like hemoglobin level for child and supplements given which lacked documentation in most of children's files.

- Although most ANC reports in 2014 for Tulkarm district had a good level of completeness and accuracy, child reports did not achieve the same level.

Based upon this assessment, practical steps for the improvement and strengthening of HIS, related to MCH in Palestine are proposed below.

Recommendation for decision makers in the Palestinian MOH

- Improve the monitoring of MCH surveillance system in MOH, specifically for data validation sections. The attention it receives during supportive supervision from the higher level should be increased.

- An establishment of a routine data assessment system (stakeholders may decide to repeat the comprehensive assessment exercise at appropriate intervals) is needed, this can be achieved by conducting evaluation studies for all levels of HIS and help in designing a special database and monthly form for this evaluation.

- Design a separate section for MCH surveillance system that has its own management to accelerate information exchange.

- Increase human resources (health staff) at MCH clinics to support data-related duties. Also, there is a need for in-service training and updating of staff involved in HIS at district level especially for ANC clinics at MOH. Task-shifting has also been shown to be a cost effective strategy for distributing duties within the health sector (52,53[)] Another practice like monitoring and evaluation workshops for district-level staff. For example, the quarterly meetings were reported by the national Tuberculosis (TB) program in Botswana (33[)] In addition, a dedicated information assistant in each clinic with responsibility for data collection and validation would improve data quality and free up time for clinical staff to discuss, interpret and take action on the basis of the improved data; properly presented as indicators (20[)]

- Further work should also be done to ensure that there are laws that address the secure data exchange and guarantee the privacy of MCH data.

- Promote a culture of evidence-based decision-making at all levels of health-care planning and provision through hands-on training and intensive follow-up and supervision, and by increasing the awareness of data quality at all levels of data handling.

- Ensure a mechanism of feedback for data collectors in order to help in understanding the purpose of data collection, then it will facilitate this process and give it the soul.

- To improve the MOH Annual report writing (either English or Arabic version) and releasing it at the beginning of each year, as its results are needed for a lot of studies and research.

- Documenting the date of reporting or the time of sending in MCH reports so as to determine the timeliness of those reports that will give an indication for data quality.

Recommendation for further research:

1. Holding an assessment or evaluation studies for other levels of MCH surveillance system (that we couldn't assess in this study) like data analysis and disseminations.

2. While documenting and quantifying data quality is important, there is also a need to examine the underlying factors within the health system that influence data quality in order to establish best practices and implement simple interventions for improving data quality which can be done through studies based on scientific and specific principles.

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Appendices:

1. Observation Checklist for ANC clinics:

PHC name / position/clinic: Date of visit:

	Action / stage of pregnancy									
1	Keeping on privacy when taking information									
2	Review of mothers and child Booklet to be sure of name, age, vaccines,...and others									
3	Finding patients files easily and quickly									
4	Filling patient file completely									
5	Filling patient file accurately									
6	Filling mothers and child Booklet completely									
7	Filling mothers and child Booklet accurately									
8	Filling daily work book completely									
9	Filling daily work book accurately									
12	Recording mothers weight, BP, and height accurately									
13	Recording mothers laboratory tests or Nutritional supplements or drugs on patient files (Hemoglobin test, vitamins, iron , folic acid…others)									
14	Telling mother about the next appointment and recording it in her file and the registration book									

Filling the daily statistic book completely at the end of observation day:

Filling the daily statistic book accurately at the end of observation day:

Total: …………..

2. Observation Checklist for child care clinics:

PHC name / position/clinic: Date of visit:

	Action / age					
1	Keeping on privacy when taking information					
2	Review of mothers and child Booklet to be sure of name, age, vaccines,...and others					
3	Finding patients files easily and quickly					
4	Filling patient file completely					
5	Filling patient file accurately					
6	Filling mothers and child Booklet completely					
7	Filling mothers and child Booklet accurately					
8	Filling daily work book completely					
9	Filling daily work book accurately					
10	Recording child weigh, height and head circumference accurately					
11	Recording child laboratory tests or Nutritional supplements or drugs on patient files (Hemoglobin test, vitamins, iron , folic acid…others)					
12	Telling mother about the next appointment and recording it in her file and the registration book					

Filling the daily statistic book completely at the end of observation day:

Filling the daily statistic book accurately at the end of observation day:

TOTAL: ………

3. Checklist for ANC files:

PHC name / position/clinic: number of files in 2014:

Number of our sample:

Did file contain documentation of/ stage of pregnancy:									
File number									
General data									
Current pregnancy									
Risk assessment									
Previous pregnancy									
ANC follow up:									
Primary lab test(urine, blood group, Hemoglobin)									
Weight									
Blood pressure									
Urine test									
Fetal pulse									
Supplements									
Notes of doctor examination									

TOTAL: …………………..

4. Checklist for Child care files:

PHC name: number of files in 2014:   number of our sample:

Did file contain documentation of/ age								
File number								
General data for child								
General data for family								
Medical history								
Nurses follow up:								
Development								
Height								
Weight								
Head circumference								
Nutrition								
Hemoglobin test for one year old child								
Growth chart								
Supplements								
Vaccinations								
Notes of doctor examination								

5. Assessment of ANC monthly reports

PHC name / position/clinic: Date of visit:

ANC report/month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Completeness													
Matching Number of mothers completed 4th Antenatal visit'													

6. Assessment of child monthly reports

PHC name / position/clinic: Date of visit:

Child report/month	1	2	3	4	5	6	7	8	9	10	11	12	Total
Completeness													
Matching Number of EBF Children													

7. Official permission from the Institutional Review Board

An - Najah
National University

Faculty of Medicine & Health Sciences
Department of Graduate Studies

بسم الله الرحمن الرحيم

جامعة النجاح
الوطنية
كليــة الطب وعلــوم الصــحة
دائرة الدراسات العليا

IRB Approval letter

Study title:
Assessment of Data Quality for maternal and child health department at primary health care directorate-Tulkarm

Submitted by:
Tamara Sameer Rafiq Awwad

Date Reviewed:
Nov 2, 2014

Date approved:
Nov 11, 2014

Your study titled: "Assessment of Data Quality for maternal and child health department at primary health care directorate-Tulkarm" with archived number 229/Nov/2014 , Was reviewed by An-Najah National University IRB committee & approved on Nov 11, 2014

Samar Musmar,MD, FAAFP
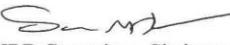
IRB Committee Chairman,
An-Najah National University

8. Official permission from the Ministry of Health

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Department of Graduate Studies

بسم الله الرحمن الرحيم

امعة النجاح
الوطنية
لية الطب وعلوم الصحة
دائرة الدراسات العليا

التاريخ: 2014/10/29

حضرة الدكتور أسعد رملاوي مديردائرة الرعاية الصحية الاولية المحترم ،،،

تحية طيبة وبعد ،،،

الموضوع:تسهيل مهمة طالب/ة

نحيطكم علما بان الطالبة تمارا عواد , طالبة دراسات عليا بكلية الطب وعلوم الصحة في جامعة النجاح الوطنية,ستقوم باجراء دراسة تتعلق برسالتها التي تحمل عنوان:

(تقييم جودة البيانات المتعلقة بصحة الأم والطفل في الرعاية الصحية الأولية في مديرية طولكرم)

حيث يتطلب هذا البحث تتبع سير عمليه جمع المعلومات في عدد من مراكز رعاية الام والطفل في طولكرم من حيث جمع المعلومات وعمل التقارير وتعبئه الملفات، لذلك فهي بحاجة ايضا الى التدريب العملي بهذه البنود وعمل دراسه تجريبية اوليه مصغرة في مراكز الرعاية التابعة لمديرية نابلس، لذلك يرجى مساعدتها في ذلك.

شاكرين لكم تعاونكم ،،،

د.سمر غزال مسمار
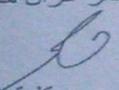
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جامعة النجاح الوطنية

كليه الدراسات العليا

تقدير معايير جودة المعلومات المتعلقة بصحة الام والطفل لدى مراكز الرعاية الصحية الاولية في مديرية طولكرم

إعداد

تمارا سمير عواد

إشراف

د. زاهر نزال

ب

تقدير معايير جودة المعلومات المتعلقة بصحة الام والطفل لدى مراكز الرعاية الصحية الاولية في مديرية طولكرم

إعداد

تمارا سمير رفيق عواد

إشراف

د. زاهر نزال

الملخص

مقدمة: يعتبر نظام المعلومات الصحية المتعلق بصحة الام والطفل متطلبا لا يمكن الاستغناء عنه للمضي قدما لتحسين وضعهم الصحي. كما ان المعلومات المكتملة و الدقيقه والمحررة في الوقت المناسب تعزز اتخاذ القرارات الفعالة القائمة على الادلة والتي بدورها تؤدي الى تحسين الخدمات الصحية والوضع الصحي لكل من الام والطفل.

هدف الدراسة: لذلك كان اجراء تقييم للمعلومات الصحية المتعلقة بالأم والطفل من حيث جمعها و ودقتها وتحريرها في الوقت المناسب الهدف الاساسي لهذه الدراسة، والذي شمل عدة محاور في مراكز الرعاية الصحية الاولية في محافظه طولكرم لسنه 2014: الكادر الصحي المخول له مسؤولية جمع المعلومات وأيضا الملفات والتقارير المتعلقة بصحة الأم والطفل.

طريقه البحث: تم اختيار عشرة عيادات تقدم خدمات الام والطفل من مختلف المناطق في طولكرم وحسب عدد المراجعين أيضا ومن ثم ملاحظه اداء العاملين فيها اثناء عمليه جمع المعلومات الصحية المتعلقة بالأم او الطفل لمدة اربعين يوماً بعد ذلك تم اختيار عينه عشوائية منتظمة من الملفات الصحية لسنه 2014 وتقييم طريقه تعبئتها و اكتمالها بالاضافه لتقييم التقارير المتعلقة بهم خلال نفس السنه من حيث اكتمالها ودقتها وتحريرها في الوقت المناسب.

نتائج الدراسة: أظهرت هذه الدراسة بان عمليه جمع المعلومات المتعلقة بالأم والطفل في طولكرم تتم يدويا وليس الكترونيا. كما بينت الدراسة بان مستوى اداء الممرضات في عيادات الام والطفل اثناء عمليه جمع البيانات كان جيدا لكن كانت هنالك بنود تحتاج للمزيد من الاهتمام مثل تعبئه كتاب التسجيل و سجل الاحصاء السنوي. ايضا مستوى السريه اثناء جمع المعلومات لم يكن مقبولا بتاتا. كما لاحظنا ان هذه البنود تتأثر احصائيا بعدد الممرضات والمراجعين وبضغط العمل ايضا. اظهرت هذه الدراسة مستوى جيدا في توثيق ملفات الام والطفل لسنه 2014 باستثناء بعض البنود

كبعض البيانات وملاحظات الطبيب في ملفات الامهات، ومستوى الهيموغلوبين وإعطاء المقويات في ملفات الاطفال. هذه البنود ايضا تتأثر احصائيا بوجود الطبيب في العيادة الصحية او وجود القابله الصحية او عدد ايام دوام الممرضات في الشهر او لسنه 2014، اوعدد المراجعين في 2014 او ضغط العمل في 2014. اما فيما يتعلق بالتقارير الشهرية اوضحت هذه الدراسة بان تقارير الأمهات أفضل من تقارير الأطفال من حيث اكتمالها ودقتها في 2014، لكن للأسف هذه الدراسة لم تستطع التحقق من تحرير هذه التقارير في الوقت المناسب خلال 2014 لعدم وجود بيانات توضح ذلك.

الخلاصة: اظهرت نتائج التقييم بان المستوى العام لجوده المعلومات المتعلقة بالأم والطفل جيدة، لكن بحاجة الي تطوير وتحسين في امور معينة تزيد من جودتها وترفع من نوعيتها لتساهم في اعطاء قرارات صحية اكثر فعاليه. أوصت هذه الدراسة بتطبيق تقييم روتيني لهذه المعلومات في مراكز الرعاية الصحية الاولية وبإشراف مباشر من وزارة الصحة الفلسطينية.