Risk Factors Associated with Chronic Diseases among Families Registered in a Family Medicine Center, Egypt

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Abstract:

Background: Egypt's Ministry of Health and Population (MOHP) has 5364 Family Medicine Facilities (FMF) encompassing family folders (FF) with detailed medical information about family members. However, there is no health information system at the facility level to provide community morbidity statistics, especially about chronic communicable and non-communicable diseases (NCD). **Objectives:** Develop statistical module centering on the risk factors associated with chronic diseases among families encompassed in family center folders. **Methods**: The study was done in a Family Medicine Center (FMC) in Giza. A sample of **2169** FFs forming 54% of the total available FFs in this center was selected by systematic random sampling technique. A software excel program was designed to include 8 sheets to integrate the data registered in 16 forms distributed in 32 pages with subsequent analysis of these data on chronic diseases**. Results:** The collected data were about 10477 individuals in 2169 FFs. The proportions of individuals diagnosed with chronic diseases were as follows: 51.9% diagnosed with diabetes mellitus, 26.2% with hypertension, 6% with cardiac diseases, 3.7% with renal diseases, 3.4% with psychological disorders, 2.1% with epilepsy, 1.3% with neurological disorders, 1.2% with liver diseases, 1.1% with blood diseases, 0.9% with asthma, 0.3% with bone diseases, 0.2% with skin diseases, and 1.8% with tuberculosis. There were statistically significant differences ($p < 0.01$) between the proportion of cases in terms of crowding index, age, sex, education, work status, and habits. **Conclusion:** The study provided a module of 8 forms including data from 32 pages of the family folders. This module allows the statistical analysis of the risk factors associated with chronic diseases among families registered in the FMF. Scaling up of this module across FMFs could guide service providers to support the at-risk families.

Keywords: Computer Program, Family Folders, Family Medicine Facilities, Non-communicable Diseases, Tuberculosis.

Introduction:

The Health Sector Reform mandate included scaling up of family medicine services across all of Egypt primary health care facilities as an initial step for the national coverage of health services and health insurance system.[1]

The family medicine facilities (FMF) provide comprehensive health services that ensure the integration of fragmented vertical health programs and include early detection and management of non-communicable diseases (NCD).[2] Continuity of care is guaranteed by FMFs through using family folders (FF).

These folders include data about socio-demographic characteristics of the family, findings of initial clinical visits, and follow-up of all family members and prepared by professional medical specialists. FMFs are considered as sentinel sites for institutionalized clinical and statistical

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data.[3]   Capitalizing on the extensive channels of family medicine facilities is one of the strategies to initiate a surveillance system for the risk factors of chronic communicable and non-communicable diseases.[4]

These data help in planning and setting strategies and resources to reduce the incidence and prevalence of chronic diseases, especially NCDs, such as cardiovascular diseases (CVD), diabetes mellitus (DM), respiratory diseases, and cancer. [5]

The prevalence of NCDs is increasing sharply nowadays.[6] There is an epidemiological transition from infectious to chronic non-infectious causes of mortality.[7] This situation could be attributed to the alterations in social and economic conditions that can bring on rapid shifts in risky behaviors in addition to the environmental changes contributing to the increase of NCDs.[8,9]

These diseases are the cause of morbidity and premature mortality worldwide, especially in low- and middle-income countries.[10] According to the United Nations, the global burden and threat of NCDs are considered one of the major challenges for development in the 21st century.[11]

This can undermine the social and economic development across the world [12] and threaten the achievement of the internationally agreed development goals. [13]

Across all Egypt, there are 5364 FM units and FM centers affiliated to MOHP. These FMFs have folders for families within the catchment areas. Each family folder (FF) includes 16 forms distributed in 32 pages.

Although FFs have complete clinical data on the family members, there is no computerization system at the facility level to facilitate access to important indicators that measure morbidity statistics for the served community, especially for chronic diseases.

Objectives: Develop a module of computer software program to allow data entry and analysis at the facility level and provide a module presenting indicators about chronic diseases (CD) and risk factors at individual and family levels within the catchment area of health facilities.

Policy and programmatic implications:

Demographic and medical data are available in the FFs at FMFs. Exploiting these data through having proper database and designed specific indicators could guide service providers in having community-based evidence information

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about the magnitude of health problems and associated risk factors.

Even though the information will present the situation regarding only the families having folders, escalating coverage of health services and health insurance will escalate the number of FFs. Consequently, monitoring the profile and trend in different health problems such as chronic diseases could facilitate setting strategies for prevention and control of such problems.

Methods:

Study setting: Talbia Family Medicine Center (TFMC) - Giza Governorate. TFMC is one of the Ministry of Health and Population centers of excellence for family medicine. It is a model for providing comprehensive and integrated quality services. There is Memorandum of Understanding between the Public Health Department, Cairo University and Ministry of Health and Population that delineates working with the TFHC staff to improve performance.

Study hypothesis: Revising FF formats and designing a computer software program will facilitate data entry and analysis for providing socioeconomic and medical information at family and individual levels regarding chronic diseases.

Study design: An operations research intervention study concerned with the process of improving health information systems at FMFs to provide health statistics for chronic diseases for the registered families.

Sample size and sampling technique: The total FFs available at Talbia FMC were about 4000 folders. The sample size was determined to be 50% of the total FFs in the center. Systematic random sample technique was used and the sample was estimated to be 2169 folders. This large sample was intended to provide information about rare chronic diseases with no previous survey studies on the family level at national and international levels.

Designing computer format for database: The designed formats included the same variables as the original format: 16 sheets distributed in 32 pages. The new format is composed of spreadsheets; 8 forms linked together by a family code number with data on each family member entered in one row in the excel sheet.

The 8 forms were: Form 1: Family socio-demographic and living environment, Form 2: Family members by findings of comprehensive clinical examination, Form 3: Family members' visits to FMC by reason and referral, Form 4: Maternal care, Form 5: Family planning, Form 6: Child care, Form 7: Diabetic patients, and Form 8: Hypertension patients.

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Data Management: Nurses in the FHC were trained to the systematic retrieval of FFs according to the sampling technique where they enter data from the original hard copy form to the new computer forms (module).

The data entered into excel sheets were exported to SPSS program version 21 for data analysis by researchers.

Limitations:

The recoded data represent FFs for only the families having folders, not all families within the FHC catchment area. Therefore, the study presents a module to generalize the methodology across FMFs.

The currently available FFs are vertical program and disease-oriented FFs, not family member-oriented. Therefore, there is a limitation in data analysis to identify the individuals who have more than one disease condition. For example, a case with initial diagnosis such as hypertension is recorded in FFs in the hypertension form even if the case is diabetic as well.

Thus, it was difficult to build family member-oriented format of FFs to have the number of individuals who have more than one non-communicable disease.

Results:

Table (1) illustrates the registered 2169 families according to having one or more family members with chronic diseases and according to the crowding index as well. Less than half of the families (45%) had high crowding index (≥4 persons per bedroom).

Out of the total 13 chronic diseases registered in FFs, more than half of the families (52.7%) had one or more member having diabetes mellitus (DM) and 24.6% had one or more member having hypertension. Families with high crowding index (CI) had 4 times probability to have renal diseases among their members (p=0.00, OR=4.2 CI=2.4;7.4). Families with low CI had high tendency to have members with DM (OR=3.8), liver diseases (OR=3.1), and cardiac diseases (OR=2.1).

Figure (1) illustrates socio-demographic characteristics of family members (n= 10477) as recorded in the FFs. Females formed 38% of the total members. Members of age 40 years old and above formed 46% of the studied sample. Members with secondary education level and above formed 56% of the studied sample. Family members working for cash formed 40% of the total family members. These figures represent the situation for all family members irrespective to their age category.

Figure (2) demonstrates the rank order of the proportion of family members diagnosed by family medicine specialists

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such as chronic diseases. It is obvious that more than half of the family members (53%) had diabetes mellitus, 25% had hypertension, and 6% had cardiac diseases. These figures represent the situation for all family members irrespective to their age category.

Table (2) shows the percent of family members for 2196 families according to age at the time of registration in FFs and diagnosis of the chronic diseases. The average number of members per family was 4.8, with a total of 10477 individuals. More than half of the family members (54%) were less than 40 years old.

There were significant differences in the proportion of cases diagnosed with chronic diseases and age categories (p<0.01). The diseases diagnosed with higher proportion among members of age < 40 years versus those of age 40 years and above were asthma (OR=5.6), psychological disorders (OR=3.8), blood diseases (OR=3.2), renal diseases (OR=3), tuberculosis (OR=3), and DM (OR=1.2).

The diseases diagnosed with higher proportion among the members of age 40 years and above versus those of age < 40 years were neurological disorders (OR=2.3), epilepsy (OR=2.3), hypertension (OR=1.9), and cardiac diseases (OR=1.3).

Table (3) highlights that 62.3% of the family members were males. A significantly 3 diagnosed chronic diseases were reported to be of higher proportion among females than males (p=0.00): psychological disorders (OR=7.2), renal diseases (OR=1.8), and DM (OR=1.1). Two diagnosed chronic diseases were reported to be significantly of higher proportion among males than females (p=0.00): cardiac diseases (OR= 1.6) and hypertension (OR=1.3).

Table (4) demonstrates that 56% of the family members were highly educated (secondary level and above). The proportion of less-educated members registered as having TB were 2.2% versus 1.2% for the high-educated group (p=0.01). Significant proportion of less-educated members (1.8%) had asthma versus 0.2% of high- educated members (p= 0.00 OR= 8.2 CI= 4.6; 14.7).

High-educated members had significantly high proportion of the following diseases: hypertension, cardiac diseases, psychological disorders, epilepsy, blood diseases, and liver diseases (p=0.00). Less-educated members had significantly high proportion of DM and neurological disorders (p=0.00).

It is important to mention that the proportions were calculated to all individuals irrespective to their age category. Therefore, less-educated members

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could include the individuals of age less than 18 years old who formed 11.7% (the figure is not presented in the table).

Table (5) shows that 56% of the family members were children, students, not working for cash adults. Significantly high proportion of these individuals had the following diseases compared to those working for cash: TB, DM, asthma, epilepsy (p=0.00). However, significantly high proportion of the members working for cash had the following diseases: neurological disorders, blood diseases, and liver diseases (p=0.00).

Table (6) shows that 60% of family members had bad habits (51% were smokers, 8% were using Shisha, and 1.1% were addicts (Figures were not presented in the table). The members with bad habits included significantly high proportion of DM and cardiac cases (p=0.00). However, among the members with no bad habits, there was a significantly high proportion of hypertension and renal disease cases (p=0.00).

Table (7) illustrates a summary of information about the chronic diseases and associated risk factors among family members derived from the data in Talbia Family Health Center FFs.

It is clear from the table that renal diseases are associated with high crowding index, family members less than 40 years, females, and those working for cash. Both TB and asthma are associated with young age, less education, and non-working individuals.

Discussion:

The current study is addressing issues related to health information system (HIM) which guides health policies, planning, monitoring, and evaluation. It has provided a module for processing institutionalized medical and demographic data within the FMFs to provide integrated information about the served community. The study provoked a critical situation analysis related to HIS.

At the local facility level, the study setting was a FMC which is a center of excellence defined as a center having exceptionally high resources in addition to expertize medical staff who provide quality services and affording different benefits to service providers and populations [14].

However, there was no computerization of family records or data analysis that can guide in determining the needs for medications and other resources as well as the decision making regarding at-risk families in different health problems.

The governmental support to FM was great at the national level. Egypt Health Sector Reform Program (HSRP) started in

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1997 and aimed at promoting Family Health Model (FHM) as the new system of family-based primary health care [15].

The medical schools introduced the postgraduate specialty to satisfy the needs of MOHP in family medicine (FM) professionals. However, FM information system (FMIS) was mistreated to highlight the efforts done in FMFs. Consequently, data of vertical programs related to family planning and maternal and child health are reported to their Management Information System. Furthermore, chronic diseases including NCDs were not considered in FMIS.

The FMC depended on FFs for continuity of care. However, according to Talbia FMC statistics, the FM program started at late nineties and included 58% of the families within the catchment area. Talbia FMC could not cope with the rapid progress of population size.

In 2015, there were 62682 families within the catchment area but the number of FFs was only 4000, meaning that only 6.4% of families had FFs. This raises the issue of having a national strategy of "covering population with FHM as an important step of national health insurance" with a good start and rapid decline of activities.

The current study illustrated a lot of efforts conducted by specialists to identify

13 chronic diseases at the family level and across different age groups. The model implemented in the current study could use the integrated information derived from the data in 8 forms such as the data about breast feeding among mothers having chronic diseases, socio-demographic data, and family morbidity background among children having malnutrition problems, etc.,

Despite having 5364 FMFs across the country, there was a shortage in energies to capitalize on these facilities through continuing the upgrade of FFs for all Egyptian families and support health database for Egyptians.

Instead of supporting FM information system, the government of Egypt started a series of surveys and initiatives that could be described as once and for all events. Egypt conducted a national STEPS survey in collaboration with WHO in 2005, 2011-2012, and 2017 for chronic diseases including NCDs. [16]

In 2019, Egypt adopted the national initiative of "100 Million Health" as an evidence of the country's commitment towards eradicating the "silent epidemic" of Hepatitis C and raising awareness regarding controlling the spread of NCDs such as high blood pressure, diabetes, and obesity. However, such initiative does not fulfill the requirements of sustainability such as

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institutionalized activity for continuum of health care.[17]

Such initiatives and national surveys present important figures to policy makers and guide for prompt achievement of results such as referral of cases for medical treatment. However, institutionalized services as FMFs had comprehensive approach for prevention and control of communicable and non-communicable diseases.

The rising global burden of NCDs necessitates the institutionalization of effective surveillance systems to track trends, monitor, and evaluate the interventions. [18,19] This can be achieved in a well-functioning health system.[20]

Disease surveillance is considered as a scientifically and legally established assurance of population health. [21] The goal of disease surveillance is systematically collecting, interpreting, and disseminating data in order to target and monitor the interventions to reduce disease morbidity and mortality. [22]

The core process of a health system is the primary health care which is considered the first point of care.[23-25] Family Medicine Program (FMP) is introduced in most primary health care facilities as a part of health system reform with the shift from vertical programs to integrated horizontal programs. FM is based on allocating families (within the catchment area of the facility) per family medicine physician/clinic within the FM facility. Each family has a special file/folder. [26]

The current study upraised the notion that the extent at which the findings derived from the study could be approved by researchers and policy makers such as proportion of cases with tuberculosis, hypertension, diabetes, renal diseases, and psychological disorders.

The incidence of TB in the developing countries is 13% for adults and it is expected to increase with the increase of HIV. [2] The current study showed that 1.8% of families had members with TB. The proportion of individuals with TB was 1.8%, with significantly high proportion among members less than 40 years (2.6% p=0.00), less-educated members (2.2% p=0.01), students, and those working but not for cash (1.9 % p=0.00).

The prevalence of hypertension among adults in 2010 was 28.5% in high-income countries and 31.5% in low- and middle-income countries.[27] The current study showed that 24.6% of families had members with hypertension. The proportion of individuals with hypertension was 26.2%.

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This low proportion among registered cases is due to the family-oriented nature of the study as it included all family members from zero to more than 60 years old. The proportion of cases with hypertension was significantly higher among members of age 40 years and above (32.8% p= 0.00), males (27.9% p=0.00), and highly-educated members (28% p=0.00).

The prevalence of DM type 2 is increasing and reached to about 20% among Arab countries including Egypt. [28] The current study showed that 53% of families had members with DM. The proportion of individuals with DM was 52%.

This high prevalence among registered cases is due to the inclusion of all family members; both juvenile and type 2 DM. The proportion of cases with DM was significantly higher among members of age < 40 years (54% p= 0.00), females (53.3% p=0.02), less-educated members (58% p=0.00), non-working groups including students (55% p=0.00), and those having bad habits such as smoking and addition (55% p=0.00).

The current study was conducted in one district in Assuit/Egypt estimating the prevalence of bronchial asthma to be 6.2% among preparatory school children. [29] The current study showed that 1% of families had members with asthma. The proportion of individuals with asthma was 0.9%. Proportion of cases with asthma was significantly higher among members of age less than 40 years (1.5% p= 0.00), less-educated members (1.8% p=0.00), students, and non-working groups (1.4 p=0.00).

Cardiac diseases include a wide range of diseases which vary by etiology and age groups. It is difficult to find national or international figures for the prevalence of cardiac diseases. However, the current study showed that 6% of families had members with cardiac diseases.

The proportion of individuals with cardiac diseases was 6%. The proportion of cases with cardiac diseases was significantly higher among members of age 40 years and above (6.8% p= 0.00), males (7% p=0.00), highly-educated members (8% p=0.00), working groups (8% p=0.00), in addition to smokers and addicts (6.5% p= 0.00).

Previous studies on renal diseases are scarce and focused on renal dialysis cases and other hospital-based studies. The current study showed that 4% of families had members with renal diseases, especially in families with high crowding index (7.3%).

The proportion of individuals with renal disease was 3.7%. Proportion of cases of renal diseases was significantly higher

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among members of age less than 40 years (5.3% p= 0.00), females (5.1% p=0.00), and working groups (5.1% p=0.00).

A study conducted among students in Fayoum University to study the proportion of cases of mental disorders such as anxiety and depression estimated the prevalence of these disorders to be 60%. [30] The current study showed that 3.7% of families had members with psychological disorders.

The proportion of individuals with psychological disorders was 3.7%. Proportion of cases with psychological disorders was significantly higher among members of age less than 40 years (5% p= 0.00), females (7.2% p=0.00), and highly-educated individuals (4.2% p=0.00).

In addition to the above mentioned diseases and their integration with other variables in the 8 sheets including family information, the current study provided information that are difficult to be reached to through surveys e.g. prevalence of addiction (unhealthy habits reported by 6309 individuals with 84% had the habit of smoking, 13% using shisha, and 1.8% were addicts and alcohol users).

Additionally, it is difficult to conduct survey studies for asthma (0.9%), cardiac diseases (6%), renal diseases (3.7%), epilepsy (2.1%), skin diseases (0.2%), psychological disorders (0.4%), neurological diseases (1.3%), blood diseases (0.3%), and liver diseases (1.2%).

Strengths of the study:

The study presented collaborative efforts between the Public Health Department, Cairo University and Ministry of Health and Population (MOHP). Working in the Family Health Center of Excellence (FCoE) supports the institutional sustainability of research activities in the family health center. The present study was concerned with family medicine system, especially the information system dealing with FFs.

The study is an operations research that provoked electronic system for data management as data entry and analysis to issue a report answering two research questions related to registered families and individuals in the FCoE; what are the proportions of chronic diseases among individuals and what are the risk factors associated with each chronic disease.

The present study succeeded in developing 8 spreadsheets that could include data recorded and displayed in 32 pages of the family folder. Involvement of nurses in the study through training and conduction of data entry supports the concept of involving service providers in operations research.

The study included data and indicators for 2196 families with a total of 10477

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individuals. It covered 13 chronic diseases which were diagnosed and recorded by FM specialists. The study worked on 6 independent socio-demographic parameters as risk factors for chronic diseases: household crowding index, age, sex, education, work status, and habits. The study included statistical analysis using Chi Square test to measure the association between risk factors and chronic diseases.

The study outcome was a simple message of ten points to be directed to health services providers in Talbia Family Health Center: Out of 100 family members registered in family folders, 52 members had diabetes and 26 members had hypertension.

Families with high crowding index (CI) had 4 times probability to have renal diseases among their members. The family members whose age ranges from less than one year to less than 40 years had the probability of having tuberculosis (OR=3), diabetes mellitus (OR=1.2), bronchial asthma (OR= 5.6), renal diseases (OR=3), psychological disorders (OR=3.8), and blood diseases (OR=3.2) compared to those of age 40 years and above.

The family members whose age was 40 years old and above had the probability of having hypertension (OR=1.9), cardiac diseases (OR=1.3), epilepsy (OR=1.9), and

neurological diseases (OR= 2.3) compared with those of age from less than one year to less than 40 years old.

The male family members had more tendency to have hypertension (OR=1.3) and cardiac diseases (OR=1.6) compared to female family members. The female family members had more tendency to have diabetes (OR=1.1), renal diseases (OR=1.8), and psychological diseases (OR=7.2) compared to male family members.

The family members whose education status less than secondary level had higher probability to have tuberculosis (OR=1.5), diabetes mellitus (OR=1.6), bronchial asthma (OR=8.2), and neurological diseases compared to those with secondary education level and above.

The working family members but not for cash including children, students, and housewives had more tendency to have tuberculosis, (OR=1.&), diabetes (OR=1.3), bronchial asthma (OR=5), and epilepsy (OR=4.2) compared with those working for cash.

The family members working for cash had more tendency of having cardiac diseases (OR=1.9), renal diseases (OR= 1.9), neurological diseases (OR= 2.8), blood diseases (OR=4.9), and liver diseases (OR= 5.1) compared with those working

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but not for cash. The family members having unfavorable habits such as smoking has more tendency to have diabetes and cardiac diseases (OR=1.4) compared with those who do not have bad habits.

The current study provided prototype of formats for FM services designed by the researchers and allow for registration of wider package of health services to families according to the resources and capacity of the FMF. Such package could include different types of cancer, HCV, malnutrition by type, and other chronic diseases.

All diseases needed to be included in the surveillance system could be included in the information system to help in decision making according to magnitude of the problem, place, and well-defined risk factors as derived from FMF statistics.

However, covering all families with family medicine system is crucial to have national, governorate, district, and health facilities sentinel sites for monitoring and evaluation of preventive and curative health services to different health problems.

Limitations of the study:

The current study is not an epidemiological study i.e. cohort or case control study for risk assessment; it is an operations research dealing with the process component of health services delivery, specifically the information management system.

The researchers worked on the available family folders to develop simple comprehensive forms for database development and subsequently giving out specific indicators. Therefore, the researchers worked on the available variables in the available family folders.

This situation resulted in the limited use of statistics as multivariate analysis to generalize risk factors. Therefore, the current study worked on the available data on risk factors which were limited to environmental and socio-demographic parameters.

Accordingly, the methodology has to be generalized as it improves FF data management by designing formats, data entry, statistical analysis, and issuing reports on FHC specific health problems among families.

Conclusion:

The present study provided a module of 8 forms that included data from 32 pages of the family folders. Such module allows for statistical analysis for risk factors associated with chronic diseases among families registered in the FMF. Scaling up of this module across FMFs could guide service providers to support the at-risk families.

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Abbreviations:

TFMC: Talbia Family Medicine Center

FF: Family Folders

FMF: Family Medicine Facility

FMC: Family Medicine Center

FHC: Family Health Center

Declaration:

Ethics approval and consent to participate: The study protocol was approved by the ethical committee for research in the Public Health Department, Cairo University. The selected FMC is one of the FHCs included in the Memorandum of Understanding between Public Health Department and MOHP for training of students and conduction of operations research.

The data were entered into computer forms with family code number by nurses who usually complete the hard copies for FM.

Consent for publication: All authors are consenting to publish the article in the Journal of the Egyptian Public Health Association

Availability of data and material: not applicable

Competing interests: No

References:

1- Lavergne MR, Scott I, Mitra G, et. al., Grudniewicz A, Ahuja MA, Marshall EG. Regional differences in where and how family medicine residents intend to practise: a cross-sectional survey analysis. CMAJ open. 2019 Jan; 7(1): E124.

2- Mitra G, Gowans M, Wright B, et al. Predictors of rural family medicine practice in Canada. Canadian Family Physician. 2018 Aug 1; 64(8): 588-596.

3- Armstrong-Hough M, Kishore SP, Byakika S, et al. Disparities in availability of essential medicines to treat non-communicable diseases in Uganda: A Poisson analysis using the Service Availability and Readiness Assessment. PloS one. 2018 Feb 8; 13(2): e0192332.

4- Cundale K, Wroe E, Matanje-Mwagomba BL, et al. Reframing noncommunicable diseases and injuries for the poorest Malawians: the Malawi National NCDI Poverty Commission.

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Malawi medical journal. 2017 Aug 23; 29(2): 194-197.

5- Yeates K, Lohfeld L, Sleeth J, et al. A global perspective on cardiovascular disease in vulnerable populations. Canadian Journal of Cardiology. 2015 Sep 1; 31(9): 1081-1093.

6- Siddharthan T, Ramaiya K, Yonga G, et al. Non-communicable diseases in East Africa: assessing the gaps in care and identifying opportunities for improvement. Health Affairs. 2015 Sep 1; 34(9): 1506-1513.

7- Peykari N, Hashemi H, Asghari G, et al. Scientometric study on non-communicable diseases in Iran: a review article. Iranian Journal of Public Health. 2018 Jul; 47(7): 936.

8- Wesonga R, Guwatudde D, Bahendeka SK. Et al. Burden of cumulative risk factors associated with non-communicable diseases among adults in Uganda: evidence from a national baseline survey. International journal for equity in health. 2016 Dec; 15(1):1-10. Available from file:///C:/Users/dell/Downloads/Burden_of_cumulative_risk_factors_associated_with_.pdf

9- Rogers HE, Akiteng AR, Mutungi G, et al. Capacity of Ugandan public sector health facilities to prevent and control non-communicable diseases: an assessment based upon WHO-PEN standards. BMC health services research. 2018 Dec; 18(1): 1-3.

10- Ellis JA. Leveraging mobile phones for monitoring risks for non-communicable diseases in the future. Journal of medical Internet research. 2017; 19(5): e137.

11- Rheeder P, Morris-Paxton AA, Ewing RM, et al. The non-communicable disease outcomes of primary healthcare screening in two rural sub-districts of the Eastern Cape Province, South Africa. African journal of primary health care & family medicine. 2017; 9(1): 1-7.

12- Wickramasinghe K, Wilkins E, Foster C, et al. The development of national multi-sectorial action plans for the prevention and control of non-communicable diseases: experiences of national-level stakeholders in four countries. Global health action. 2018 Jan 1; 11(1): 1532632.

13- Ralston J. New global target on non-communicable diseases: a call to action for the global cardiovascular disease community. Cardiovascular journal of Africa. 2012 Jun 1; 23(5): 241-242.

14- Elrod JK, Fortenberry JL. Centers of excellence in healthcare institutions: what they are and how to assemble

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them. BMC health services research. 2017 Jul; 17(1): 15-24.

15- Al-Zanaty and Associates. Reproductive health impact of family health model pilots in Egypt. MOHP and UNFPA (2008).

16- World Health Organization. WHO STEPS surveillance manual: The WHO STEP wise approach to chronic disease risk factor surveillance. World Health Organization; 2005.

17- Mahmoud M, Kurdi S. "100 Million Health". Initiative and the double burden of malnutrition in Egypt. Available at : https://egyptssp.ifpri.info/2019/03/13/news-100-million-health-initiative-and-the-double-burden-of-malnutrition-in-egypt.https://doi.org/10.5144/0256-4947.1997.154

18- Khodayari-Zarnaq R, Tarinajad Z, Gholipour K, et al. Barriers and Challenges of Health Workers Performance Evaluation in the Hypertension and Diabetes Screening Program: Qualitative Content Analysis. Depiction of Health. 2020 Jun 21; 11(2): 149-158.

19- Mikkelsen B, Williams J, Rakovac I, et al. Life course approach to prevention and control of non-communicable diseases. Bmj. 2019 Jan 28; 364.

20- Ojo, T., Hawley, N., Desai, M., Guwatudde, D. and Schwartz, J., 2017. Exploring Knowledge and Attitudes toward Non-Communicable Diseases among Village Health Teams in Eastern Uganda: A Cross-sectional Mixed Methods Study. Annals of Global Health, 83(1), p.180. DOI: http://doi.org/10.1016/j.aogh.2017.03.408

21- Phillips-Howard PA, Laserson KF, Amek N, et al. Deaths ascribed to non-communicable diseases among rural Kenyan adults are proportionately increasing: evidence from a health and demographic surveillance system, 2003–2010. PLoS One. 2014 Nov 26; 9(11): e114010.

22- Bawah A, Houle B, Alam N, Razzaque A, et al. The evolving demographic and health transition in four low-and middle-income countries: evidence from four sites in the INDEPTH network of longitudinal health and demographic surveillance systems. PloS one. 2016 Jun 15; 11(6): e0157281.

23- Datta BK, Husain MJ, Fatehin S, et al. Consumption displacement in households with non-communicable diseases in Bangladesh. PloS one. 2018 Dec 13; 13(12): e0208504.

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24- Tuangratananon T, Wangmo S, Widanapathirana N, et al. Implementation of national action plans on non-communicable diseases, Bhutan, Cambodia, Indonesia, Philippines, Sri Lanka, Thailand and Viet Nam. Bulletin of the World Health Organization. 2019 Feb 1;97(2):129.

25- Allen LN, Fox N, Ambrose A. Quantifying research output on poverty and non-communicable disease behavioral risk factors in low-income and lower middle-income countries: a bibliometric analysis. BMJ open. 2017 Nov 1; 7(11): e014715.

26- Wekesah FM, Nyanjau L, Kibachio J, et al. Individual and household level factors associated with presence of multiple non-communicable disease risk factors in Kenyan adults. BMC Public Health. 2018;18(Suppl 3):1220. Published 2018 Nov 7. doi:10.1186/s12889-018-6055-8

27- Bermejo A, Veeken H, Berra A. Tuberculosis incidence in developing countries with high prevalence of HIV infection. AIDS (London, England). 1992 Oct 1; 6(10): 1203-1206.

28- Mills KT, Bundy JD, Kelly TN, et al. Global disparities of hypertension prevalence and control: a systematic analysis of population-based studies from 90 countries. Circulation. 2016 Aug 9; 134(6): 441-450.

29- Alzaid AA. Time to declare war on diabetes.Editorial. Annal of Saudi Medicine. Available at : https://doi.org/10.5144/0256-4947.1997.154

30- Abdallah AM, Sanusy KA, Said WS, et al. Epidemiology of bronchial asthma among preparatory school children in Assiut district. Egypt J Pediatr Allergy Immunol 2012; 10(2): 109-117. Available from file:///C:/Users/dell/Downloads/108268-Article%20Text-295943-1-10-20140927.pdf

31- Wahed WY, Hassan SK. Prevalence and associated factors of stress, anxiety and depression among medical Fayoum University students. Alexandria Journal of medicine. 2017; 53(1): 77-84.

Table (1): Percent of families by crowding index and presence of one or more family member with chronic diseases

Crowding Index	<4 /Bed Room		4+/Bed Room		Total	% of Families	P	OR	CI
Chronic Diseases	No.	%	No.	%					
▪ Tuberculosis	14	1.2%	29	2.9%	43	2.0%	0.1		
▪ Hypertension	260	22.0%	273	27.7%	553	24.6%	0.08		
▪ Diabetes Mellitus	690	58.3%	452	45.8%	1142	52.7%	0.000	3.8	3.2; 4.5
▪ Asthma	13	1.1%	8	0.8%	21	1.0%	0.1		
▪ Cardiac Diseases	82	6.9%	50	5.1%	132	6.1%	0.00	2.1	1.4; 2.9
▪ Renal Diseases	15	1.3%	72	7.3%	87	4.0%	0.00	4.2	2.4 ;7.4
▪ Psychological Diseases	32	2.7%	48	4.9%	80	3.7%	0.4		
▪ Epilepsy	20	1.7%	24	2.4%	44	2.0%	0.8		
▪ Skin Diseases	2	0.2%	2	0.2%	4	0.2%	0.7		
▪ Neurological Diseases	17	1.4%	10	1.0%	27	1.2%	0.1		
▪ Blood Diseases	16	1.4%	8	0.8%	24	1.1%	0.058		
▪ Bone Diseases	4	0.3%	3	0.3%	7	0.3%	0.8		
▪ Liver Diseases	18	1.5%	7	0.7%	25	1.2%	0.01	3.1	1.3; 7.5
▪ Total Families	1183	100.0%	986	100.0%	2169	100.0%			
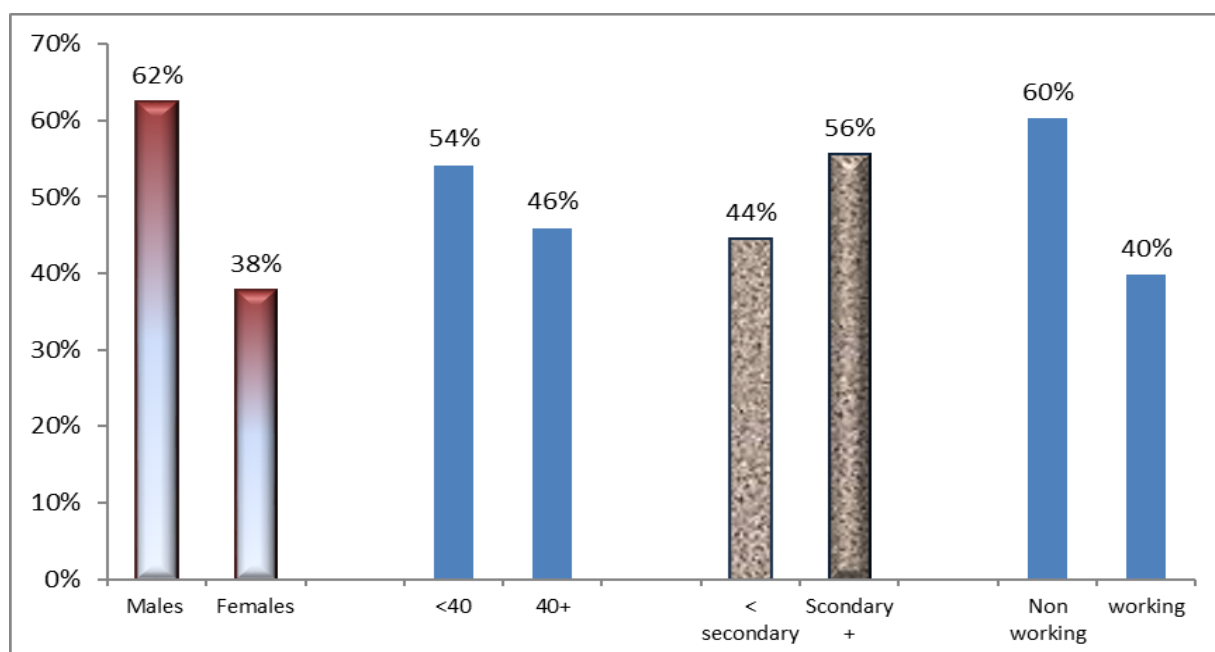
Figure (1): Percent of family members by socio-demographic characteristics: Talbia Family Health Center – Giza 2017

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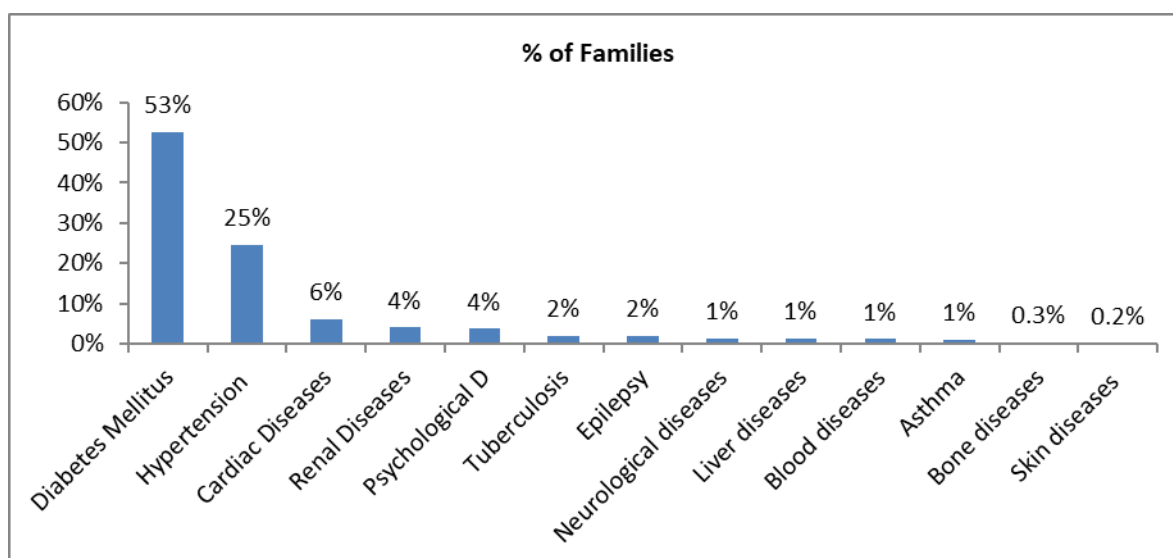
Figure (2): Percent distribution of families according to having one or more members with chronic diseases, Talbia Family Health Center, Giza 2017

Table (2): Percent of family members by age and chronic diseases

Age	<40		40+		Total		P	OR	CI
Chronic Diseases	**No**	**%**	**No**	**%**	**No**	**%**			
▪ Tuberculosis	150	2.6%	43	0.9%	193	1.8%	0.00	3.0	2.1; 4.2
▪ Hypertension	1166	20.6%	1579	32.8%	2745	26.2%	0.00	1.9	1.7; 2.1
▪ Diabetes Mellitus	3070	54.2%	2363	49.1%	5433	51.9%	0.00	1.2	1.1; 1.3
▪ Asthma	84	1.5%	13	0.3%	97	0.9%	0.00	5.6	3.1; 9.9
▪ Cardiac Diseases	301	5.3%	325	6.8%	626	6.0%	0.00	1.3	1.1; 1.5
▪ Renal Diseases	301	5.3%	89	1.8%	390	3.7%	0.00	3.0	2.3; 3.8
▪ Psychological Diseases	285	5.0%	67	1.4%	352	3.4%	0.00	3.8	2.9; 4.9
▪ Epilepsy	85	1.5%	135	2.8%	220	2.1%	0.00	1.9	1.4; 2.5
▪ Skin Diseases	8	0.1%	10	0.2%	18	0.2%	0.50		
▪ Neurological Diseases	45	0.8%	87	1.8%	132	1.3%	0.00	2.3	1.6; 3.3
▪ Blood Diseases	92	1.6%	25	0.5%	117	1.1%	0.00	3.2	2.0; 4.9
▪ Bone Diseases	22	0.4%	10	0.2%	32	0.3%	0.13		
▪ Liver Diseases	57	1.0%	65	1.4%	122	1.2%	0.12		
▪ Total individuals	5666	100.0%	4811	100.0%	10477				

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Table (3): Percent of family members by sex and chronic diseases

Gender	Males		Females		Total		P	OR	CI
▪ Chronic Diseases	No	%	No	%	No	%			
▪ Tuberculosis	123	1.9%	70	1.8%	193	1.8%	0.70		
▪ Hypertension	1820	27.9%	925	23.4%	2745	26.2%	0.00	1.3	1.2;1.4
▪ Diabetes Mellitus	3329	51.0%	2104	53.3%	5433	51.9%	0.02	1.1	1.0;1.2
▪ Asthma	58	0.9%	39	1.0%	97	0.9%	0.70		
▪ Cardiac Diseases	454	7.0%	172	4.4%	626	6.0%	0.00	1.6	1.4;1.9
▪ Renal Diseases	188	2.9%	202	5.1%	390	3.7%	0.00	1.8	1.5;2.2
▪ Psychological Diseases	69	1.1%	283	7.2%	352	3.4%	0.00	7.2	5.5;9.4
▪ Epilepsy	220	3.4%	0	0.0%	220	2.1%			
▪ Skin Diseases	18	0.3%	0	0.0%	18	0.2%			
▪ Neurological Diseases	75	1.1%	57	1.4%	132	1.3%	0.20		
▪ Blood Diseases	79	1.2%	38	1.0%	117	1.1%	0.30		
▪ Bone Diseases	14	0.2%	18	0.5%	32	0.3%	0.40		
▪ Liver Diseases	84	1.3%	38	1.0%	122	1.2%	0.10		
▪ Total Individuals	6531	100.0%	3946	100.0%	10477	100.0%			

Table (4): Percent of family members by education status and chronic diseases

Education status	< Secondary		Secondary +		Total		P	OR	CI
Chronic Diseases	No.	%	No.	%	No.	%			
▪ Tuberculosis	103	2.2%	90	1.5%	193	1.8%	0.01	1.5	1.1; 1.9
▪ Hypertension	1116	24.0%	1629	28.0%	2745	26.2%	0.00	1.2	1.1; 1.4
▪ Diabetes Mellitus	2711	58.2%	2722	46.8%	5433	51.9%	0.00	1.6	1.5; 1.7
▪ Asthma	84	1.8%	13	0.2%	97	0.9%	0.00	8.2	4.6; 14.7
▪ Cardiac Diseases	161	3.5%	465	8.0%	626	6.0%	0.00	2.4	2.0; 2.9
▪ Renal Diseases	157	3.4%	233	4.0%	390	3.7%	0.09		
▪ Psychological Diseases	105	2.3%	247	4.2%	352	3.4%	0.00	1.9	1.5; 2.4
▪ Epilepsy	85	1.8%	135	2.3%	220	2.1%	0.00	2.7	2.1; 3.6
▪ Skin Diseases	8	0.2%	10	0.2%	18	0.2%	0.8		
▪ Neurological Diseases	77	1.7%	55	0.9%	132	1.3%	0.00	1.8	1.2; 2.5
▪ Blood Diseases	25	0.5%	92	1.6%	117	1.1%	0.00	3	1.9; 4.6
▪ Bone Diseases	0	0.0%	32	0.5%	32	0.3%			
▪ Liver Diseases	25	0.5%	97	1.7%	122	1.2%	0.00	3.1	2.0; 4.9
▪ Total Individuals	4657	100.0%	5820	100.0%	10477	100.0%			

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Table (5): Percent of family members by work status and chronic diseases

Work Status	Working but not for cash		Working for cash		Total		P	OR	CI
Chronic Diseases	No.	%	No.	%	No.	%			
▪ Tuberculosis	115	1.9%	78	1.7%	193	1.8%	0.000	1.7	1.3; 2.3
▪ Hypertension	1566	26.4%	1179	25.9%	2745	26.2%	0.6		
▪ Diabetes Mellitus	3263	55.0%	2170	47.7%	5433	51.9%	0.000	1.3	1.2; 1.5
▪ Asthma	84	1.4%	13	0.3%	97	0.9%	0.000	5	2.8; 9.0
▪ Cardiac Diseases	261	4.4%	365	8.0%	626	6.0%	0.000	1.9	1.6; 2.2
▪ Renal Diseases	157	2.6%	233	5.1%	390	3.7%	0.000	1.9	1.6; 2.4
▪ Psychological Diseases	197	3.3%	155	3.4%	352	3.4%	0.8		
▪ Epilepsy	185	3.1%	35	0.8%	220	2.1%	0.000	4.2	2.9; 6.0
▪ Skin Diseases	8	0.1%	10	0.2%	18	0.2%	0.4		
▪ Neurological Diseases	42	0.7%	90	2.0%	132	1.3%	0.000	2.8	1.9; 4.1
▪ Blood Diseases	25	0.4%	92	2.0%	117	1.1%	0.000	4.9	3.1; 7.6
▪ Bone Diseases	0	0.0%	32	0.7%	32	0.3%			
▪ Liver Diseases	25	0.4%	97	2.1%	122	1.2%	0.000	5.1	3.3, 8.0
▪ Total Individuals	5928	100.0%	4549	100.0%	10477	100.0%			

Table (6): Percent of family members by habits and chronic diseases

Habits	Bad Habits		No Bad Habits		Total		P	OR	CI
Chronic Diseases	No.	%	No.	%	No.	%			
▪ Tuberculosis	110	1.7%	83	2.0%	193	1.8%	0.3		
▪ Hypertension	1605	25.4%	1140	27.4%	2745	26.2%	0.03	1.1	1.0; 1.2
▪ Diabetes Mellitus	3467	55.0%	1966	47.2%	5433	51.9%	0.00	1.4	1.3; 1.5
▪ Asthma	58	0.9%	39	0.9%	97	0.9%	0.9		
▪ Cardiac Diseases	413	6.5%	213	5.1%	626	6.0%	0.00	1.4	1.2; 1.6
▪ Renal Diseases	173	2.7%	217	5.2%	390	3.7%	0.00	1.9	1.6; 2.4
▪ Psychological Diseases	205	3.2%	147	3.5%	352	3.4%	0.47		
▪ Epilepsy	0	0.0%	220	5.3%	220	2.1%			
▪ Skin Diseases	18	0.3%	0	0.0%	18	0.2%			
▪ Neurological Diseases	83	1.3%	49	1.2%	132	1.3%	0.6		
▪ Blood Diseases	79	1.3%	38	0.9%	117	1.1%	0.1		
▪ Bone Diseases	14	0.2%	18	0.4%	32	0.3%	0.08		
▪ Liver Diseases	84	1.3%	38	0.9%	122	1.2%	0.06		
▪ Total Individuals	6309	100.0%	4168	100.0%	10477	100.0%			

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Table (7): Risk factors associated with chronic diseases (presented as Odds Ratio) among families registered in Talbia Family Health Center- Giza

Risk Factors / Chronic Diseases	High crowding Index	Age less than 40	Age 40 and over	Males	Females	Education Less than secondary	Working but not for Cash	Working for Cash	Bad Habits
▪ Tuberculosis		3.0				1.5	1.7		
▪ Hypertension			1.9	1.3					
▪ Diabetes Mellitus		1.2			1.1	1.6	1.3		1.4
▪ Asthma		5.6				8.2	5.0		
▪ Cardiac Diseases			1.3	1.6				1.9	1.4
▪ Renal Diseases	4.2	3.0			1.8			1.9	
▪ Psychological Diseases		3.8			7.2				
▪ Epilepsy			1.9				4.2		
▪ Skin Diseases									
▪ Neurological Diseases			2.3			1.8		2.8	
▪ Blood Diseases		3.2						4.9	
▪ Bone Diseases									
▪ Liver Diseases								5.1	

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الملخص العربى

عوامل الخطوره المرتبطة بالأمراض المزمنة بين العائلات المسجلة في مركز طب الأسرة ـ مصر

فيروز العجيزى ـ مديحة عبد الرازق ـ هند سامى ـ غادة وهبي ـ هند على صبرى

قسم الصحه العامه وطب المجتمع ـ كلية الطب ـجامعة القاهره

الخلفية: وزارة الصحة والسكان المصرية لديها ٥٣٦٤ منشأة لطب الأسرة تشمل ملفات عائلية بها معلومات طبية مفصلة عن أفراد الأسرة. ومع ذلك ، لا يوجد نظام معلومات صحية على مستوى المنشأة لتوفير إحصاءات مراضة المجتمع ، وخاصة الأمراض المعدية وغير المعدية المزمنة. **الأهداف:** تطوير وحدة إحصائية تركز على عوامل الخطر المرتبطة بالأمراض المزمنة بين العائلات المدرجة في ملفات مركز الأسرة. **منهج الدراسة:** أجريت الدراسة بمركز طب الأسرة بالجيزة. تم اختيار عينة من ٢١٦٩ ملف شكلت ٥٤ ٪ من إجمالي الملفات المتاح بتقنية أخذ العينات العشوائية المنتظمة. تم تصميم برنامج إكسل ليشمل ٨ أوراق لدمج البيانات المسجلة في ١٦ نموذجًا في ٣٢ صفحة ، مع تحليل لاحق لبيانات الأمراض المزمنة. **النتائج:** كانت هناك بيانات عن ١٠٤٧٧ فرداً في ٢١٦٩ملفا. كانت نسب الأفراد الذين تم تشخيص إصابتهم بأمراض مزمنة ٥١,٩٪ داء السكري ، ٢٦,٢٪ ارتفاع ضغط الدم ، ٦٪ أمراض قلب ، ٣,٧٪ أمراض كلى ، ٣,٤٪ اضطرابات نفسية ، ٢,١٪ صرع ، ١,٣٪ اضطرابات عصبية ، ١,٢٪ أمراض كبد ، ١,١٪ أمراض الدم، ٠,٩٪ ربو ، ٠,٣٪ أمراض عظام ، ٠,٢٪ أمراض جلديه ، ١,٨٪ مرض سل. توجد فروق ذات دلالة إحصائية في نسبة الحالات حسب مؤشر الازدحام والعمر والجنس والتعليم والحالة العملية والعادات. **الخلاصة:** قدمت الدراسة وحدة من ٨ نماذج تضمنت بيانات من ٣٢ صفحة من مجلدات الأسرة. تسمح هذه الوحدة بإجراء تحليل إحصائي لعوامل الخطر المرتبطة بالأمراض المزمنة بين العائلات المسجلة في المركز. يمكن لتوسيع نطاق هذه الوحدة أن يوجه مقدمي الخدمات لدعم الأسر المعرضة للخطر.