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ABSTRACT

Objective: This paper deals with the identification of the prevalence and patterns of health information needs and health information provider segmentation among chronically ill patients with comorbidities.

Methods: We synthesised the research on information needs into an integrated framework for patients with chronic disease(s) information seeking behavior. This framework explains and describes why patients need information, their motivations for seeking health information, the information needed, channels of exchange information, sources of information, outputs per patient, and difficulties patients had in getting information. We analyzed demand for health information expressed by 21810 patients with multiple chronic conditions, drawn from the latest release of the Canadian Community Health Survey (CCHS) in 2009/2010. Bivariate and multivariate logistic regression analyses were used to identify factors associated with health information needs and practices for information seeking among people living with chronic disease comorbidities. The relationship between the number of chronic conditions and difficulties in obtaining information was examined.

Conclusion: When controlling for other variables in this study, all the usual socio-demographic characteristics of a person were strong predictors of reported health information need. However, obesity, self-health perceptions, and rating of quality of care were found not to be significant predictors of health information needs. Comorbidities tend to determine information needs: those with migraine and headache alone, arthritis and back problems, arthritis and migraine, and headache. People with two or four comorbidities are more likely to need health information than those with other combinations of diseases. Doctors were the most frequently contacted for information (77.9%), followed by health help-lines (17.9%) and walk-in clinics (17.2%). These were followed in order by others (16.9%), emergency rooms (16.5%), and other hospital services (7.3%). Chronic disease patients reported that waiting too long to speak to healthcare providers (43.5%) or to contact doctors or nurses (40.4%) were the most frequent obstacles to receiving health information.

Practice Implications: Our proposed framework can be used as a template for future data collection and method development for surveys, and potential research about health information needs for patient with chronic disease(s), as most published papers and surveys do not include questions about goals, motivations, outcomes, etc. These results and potential research aimed at providing better health care for chronically ill patients would lead to relative effectiveness research that addresses management and policy-relevant decision making in chronic care situations.

The conclusions of this study show areas where it is particularly important to improve information provision to chronically ill patients. Chronic management programs must pay more attention to providing information to patients about not just one disease, but must take into consideration specific chronic diseases and comorbidities associated with that chronic condition.

Keywords: Health information, information needs, comorbidity, chronic disease, diabetes, asthma, heart disease, patient information, information searching, chronic management

INTRODUCTION

The number of persons living with co-occurring multiple chronic conditions (comorbidities) is growing in Canada, affecting not just their health and quality of life[1,2], but putting a significant burden on individuals, their families, and Canadian society[3]. In 2010, every second Canadian had at least one chronic disease, and 28% or more than 8 million Canadians had more than 1 chronic condition. More than 55% of seniors had 2 or more chronic diseases (Fig.A1, Appendix A). Comorbidities are associated with more complex clinical management, specific health care needs, and increased health care costs[4-6].

The management of chronic diseases for individuals is seen as a 'lifestyle' condition[7] in which all such persons are expected to help manage their diseases through self-care (i.e. changing diet, exercise and other lifestyle choices) and to make day-to-day decisions about managing their own chronic conditions[8]. In a seven-country study comparing chronic care delivery in primary care, Canada ranks last in chronic disease prevention and management. This has been attributed to Canada's lack of national vision or direction in ensuring that standards of chronic care are implemented, integrated, and coordinated[9], possibly through better organization of primary care. The provision of healthcare to people with comorbidities must be offered through seamless, professional and effective treatment in hospitals, general practices and community healthcare[10,11]. A serious problem that afflicts the self-management of chronic illness is the low level of adherence to the treatment regimens that are prescribed and/or recommended by healthcare professionals[12,13]. This is mostly due to: the complexity of the health conditions; the limited time allowed for a typical patient's consultation with a physician[14]; and poor patient understanding of relevant information, due to poor communication skills or inadequate health literacy[1] level of the patient. Thus patients often do not realize the value of following prescribed treatments and the hazards of not complying, not fully understanding their condition or treatment, and not recognizing likely outcomes.

Information seeking has been demonstrated to play a critical role in individual efforts to cope with disruption and uncertainty[16] because 'the advent of the illness is disrupting what people felt was normal, disrupting a future biography, and challenging their everyday physical, emotional, and social lives'[17]. Recent research has shown that most patients want to be fully informed[18] and to be involved in purposeful goal-oriented activities and related decision making, rather than in passive exposure to information[19-22].

Understanding who is more likely to need health information, where they are looking for it, and what difficulties they face in obtaining that information is crucial in helping health-care providers to pass on the right information to people living with chronic conditions.

CONCEPTUAL FRAMEWORK OF INFORMATION NEEDS FOR PATIENTS WITH CHRONIC DISEASES

One of the most frequently mentioned concepts in the literature on health information seeking is "health information-seeking behavior (HISB)"[23], although it is well recognised that researchers

use other terms, such as *information seeking behavior*, *information needs*, *health information*, *coping*, *decision making*, *information services*(*use*), and *health education (use)*[23,24]. Six relevant models or theories were found in the health-related literature: Lazarus and Folkman's[25] stress, appraisal, and coping theory; Miller's[26,27] monitoring and blunting hypothesis; Lenz's[28] information seeking model; the health information acquisition model[29]; the comprehensive model of information seeking[30,31]; and the expanded model of health information–seeking behaviors[32]. Most models or theories that were reviewed tend to focus merely on whether or not individuals seek information and do not take into consideration the possible variability contained within these extreme HISB[23]. Longo's[32] model appears to be the only model that considers different information-seeking outcomes (e.g., a patient might access the information but be unable to use it)[23]. The outcomes of this model include empowerment/ locus of control, satisfaction, activities of daily living, and health outcomes. This model provides knowledge about variables that impact individuals either actively or passively, considering information seeking and the decisions that individuals make when using health information to achieve certain outcomes[32]. All models that were reviewed present significant insights into HISB research and enhance our understanding of why certain individuals might choose to seek available information whereas others may not.

To construct an integrated framework we synthesised variables and concepts from numerous resources on health information seeking, in order to explain the information needs of patients living with chronic disease comorbidities (Fig. 1). A patient information need here is defined as 'recognition that their knowledge is inadequate to satisfy a goal, within the context/situation that they find themselves at a specific point in the time"[33]. The framework integrates several research topics on patients with chronic diseases, including: reasons why patients need information, motivations for seeking health information, information needed, channels of exchange information, sources of information, outputs per patient, and difficulties encountered by patients in getting information.

Compared with previous models, this framework better reflects the current practice of patient chronic disease care by adding measures and outcomes of growing importance to chronic disease patient-centered care. The framework reveals not only assessment of information needs for people with chronic illness, but it also reflects other points of patient care, such as involvement in self-care management, patient satisfaction with care, and difficulties encountered when searching for health information.

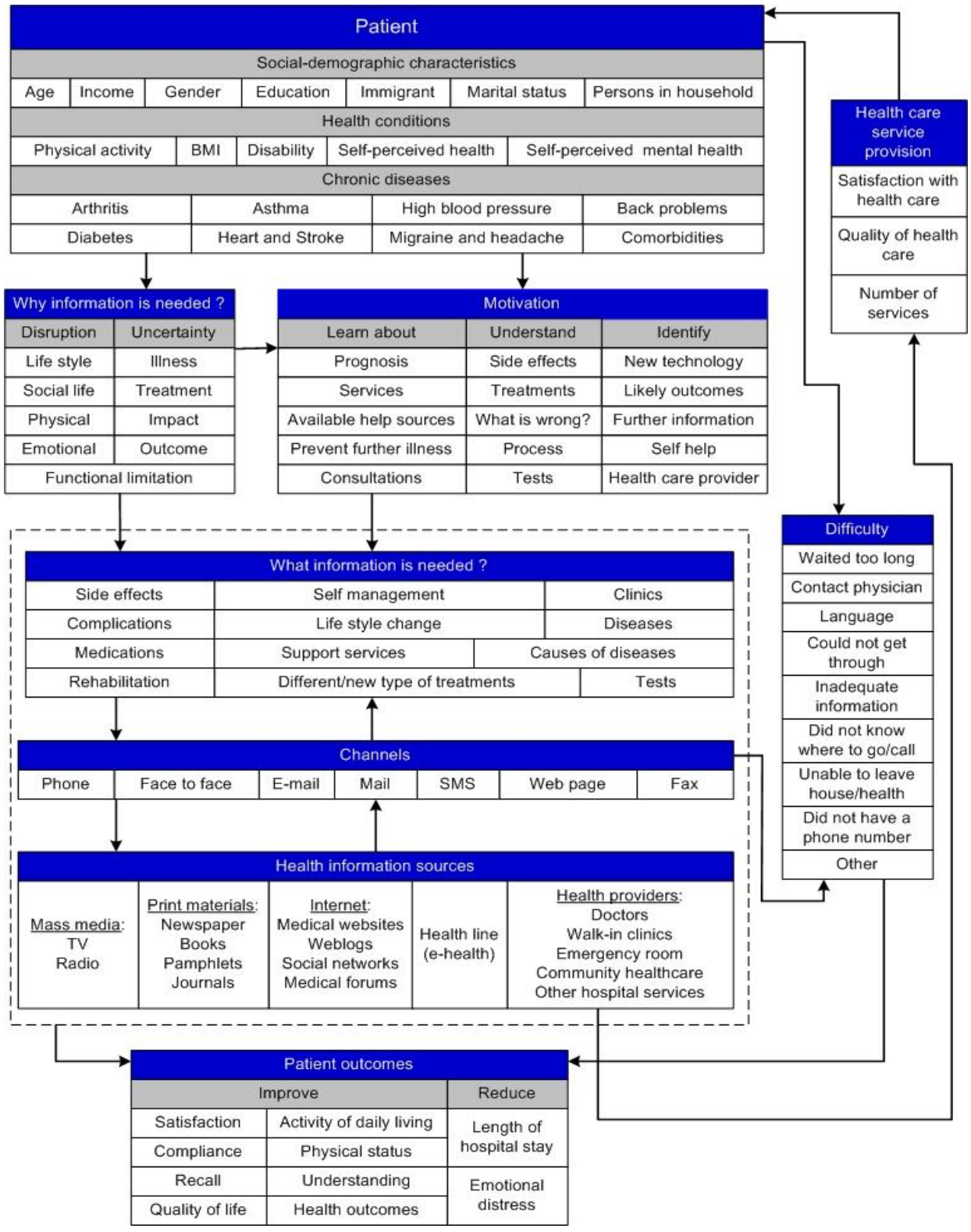


Figure 1. Conceptual Framework of Information Needs for Chronically Ill Patients

Patient chronic diseases (Fig.1). Numerous studies, mostly from the US and Europe, have investigated the characteristics of people who need health information, highlighted the information needs of patients, and explored patient priorities and preferences with regard to what information they need and when it is needed. Most research on this issue has been done for specific diseases: cancer[34-38]; heart disease/stroke[39-44]; arthritis[45]; asthma[46]; diabetes and hypertension[13,47]; dementia[48]; spinal cord surgery[49]; chronic kidney disease[50], multiple sclerosis[51].

Patient socio-demographic characteristics and health conditions (Fig.1). Many such studies concentrated on factors or intervening variables that might influence information needs, taking into consideration socio-demographic characteristics of respondents (such as age, gender, income, education, etc.)[34-36,38,52-60]. The younger that respondents are, the greater is their need for information[34,38,55]. Several studies found that women seek more information than men[35,52,53,59], although others found no significant difference in gender, concerning patient information needs[34,60]. Education, income, family type have been shown to be positively associated with the need for higher levels of information in several studies[35,36,38,57], in contrast to several studies that did not find such an association[34,60]. These inconsistent results suggest a need for further research in identifying patterns of socio-demographic characteristics of information seeking patients with chronic diseases, taking into consideration not only specific diseases, but number of chronic diseases and specific co-occurrence of diseases. Health status, physical activity, obesity[32,34,47,61-64], and satisfaction with care provided[32,65] were also identified as predictors of health information needs. Linguistic and cultural differences make access to health care more difficult for migrant groups compared to indigenous groups in western and other immigrant countries[66]. Overall, immigrant use of healthcare services is less than their native born counterparts, which leads to barriers to disease self-management and poor satisfaction with results. Multiple studies have demonstrated deficiencies in the doctor-immigrant patient communication process such as barriers to shared decision-making, poor patient satisfaction with physician communication behaviour, poor compliance, and limited mutual understanding between ethnic minority patients and their physicians[66-71].

Why information is needed (Fig.1). Chronic disease(s) often disrupt the everyday physical, emotional, and social lives of patients[17], so they are forced to pay conscious attention to their bodies, to be aware of pain, to suffer from functional limitations, and potential death. They also experience uncertainty about diagnoses, treatments, and possible outcomes[14,16], which can lead to psychological states of anxiety and depression[34].

Motivation (Fig.1). Disruptions and uncertainties motivate information needs that persons may have, with three main goals: to cope with stressful situations[72], to participate or be involved in making medical decisions, or to change a behaviour to prevent further problems[23]. Without one or more of these goals, chronically ill persons may be disinclined to seek health information on their own. However, a health motivated consumer tends to participate actively in health-related issues, to search out relevant health information, and to be better able to recall this information when appropriate[73].

What information is needed? (Fig.1). Using these goals, a person is motivated to learn about prognosis, possible treatments, medications , availability of help, and to understand treatments that might be provided and their possible side effects, to identify self-management programs, likely

outcomes, etc.[13,34-36,46,51,74-76]. It should be mentioned that establishing goal priorities for information needs is directly dependent upon the context and situation in which an individual is located [77].

Channels (Fig.1). Although there are many channels of communication typically available for patient-provider communication, including in-person interaction, telephone, fax, and web pages, in practice most patient-provider interactions are generally restricted to office appointments and telephone calls, which can lead to difficulties and delays in obtaining needed information.

Patient Outcomes (Fig.1). Making sense of what is happening, identifying and satisfying information needs, recognising what patients want to know[78], and strengthening patient self-management[79] all play an important part in helping patients cope with their illnesses[35,65]. It also helps to promote increased patient knowledge and involvement in decision-making, greater satisfaction, reduced stress and facilitated coping, improved compliance, and reduced dependency on health services[23,34,35,51,72,73,80,81].

Table 1 summarizes previous studies of the determinants of patient health information needs. Based on these studies, we conclude that important health status characteristics, such as obesity, mental health, disability and context of delivery of care and provision of information, and difficulties in obtaining information are often missing from peer-reviewed investigations and need to be considered to understand how information needs are formed and influenced by such contextual factors[33]. It is also not clear, from recent studies, how many sources of health information that patients with multiple chronic diseases may use to find health information, and the difficulties they face in getting this information. As there is also a dearth of research on information needs for people with chronic diseases(s) aside from studies of American and European populations, it is useful to address the limitations mentioned, for other populations. To address the limitations mentioned, we investigated the prevalence and patterns of health information needs, including considerations of socio-demographic characteristics, health conditions, health care provision, and comorbidities[2] of specific chronic diseases.

Table 1. Selected Empirical Research on Determinants of Health Information Needs

Determinants	**Main Literature Support (Key References)**
Socio-Demographic Characteristics (SD)	
Gender	[34,35,52,53,59,60]
Age	[34, 38,55]
Marital status	[38,56]
Education	[34-36,38,57,60]
Persons in household	[58, 82]
Income	[32, 35,36, 57]
Immigrant	[66-71]
Health Conditions (HC)	

Physical activity index	[32, 34, 47,61-65,82]
Body Mass Index (BMI)	
Disability (Health Utility Index (HUI))	
Self-perceived health	
Self-perceived mental health	
Health Care Service Provision (RS)	
Rating of quality of care	[32,65]
Satisfaction with way care provided	
Number of health services	
Chronic Diseases	
Arthritis (ART)	[45]
Asthma (AST)	[46]
Back Problems (BP)	
High Blood Pressure (HBP)	[13,47]
Diabetes (DIAB)	[47]
Heart and Stroke (HS)	[39-44]
Migraine and Headache (MH)	
Multiple sclerosis	[51]
Cancer	[34-38]
Spinal cord injury	[49]
Chronic Kidney Disease	[50]
Dementia	[48]

More significantly, this study will address the unrecognised relationship between total number of chronic diseases, specific chronic diseases with comorbidities, common chronic disease combinations, and information needs. In addition, we explore differences in health information provider segmentation by specific diseases and their comorbidities and examine expressed difficulties in getting health information by persons living with chronic disease comorbidities via a secondary analysis of survey data from a large sample that is representative of the Canadian province of Ontario.

METHODS

Data source and respondents

Data were obtained from the 2009–2010 Canadian Community Health Survey (CCHS). This cross-sectional survey is conducted by Statistics Canada every two years and collects self-reported information related to the health status, information needs, service use and health determinants of Canadians. The target population for the survey comprised individuals aged 15+ years living in private dwellings in each of the 14 provinces and territories. Individuals living on Indian reserves or in certain remote regions, institutional residents, and members of the armed forces were excluded. Further details of survey methodology, including strategies to ensure representativeness of the sample, have been published[84]. CCHS interviews were completed at a response rate of 72.3% for all Canadians surveyed, and 70% for Ontario alone[3] (Fig. 2). Because of the high

response rate, we do not view non-response error as an area of significant concern. Population estimates were based on CCHS weights, provided by Statistics Canada.

The first subsample of respondents (N=21810 or 51.3%) for this research focused on individuals living in Ontario who reported that they were diagnosed by health professionals (HP) as having one or more of seven high-prevalence chronic health conditions: asthma (AST), arthritis (ART), back problems (BP), high blood pressure (HBP), diabetes (DIAB), heart disease and/or stroke (HS), and migraine and headache (MH). They also answered questions about health information needs and sources of information. The second subsample (N=10339) included only respondents from the first subsample who expressed a need for health information.

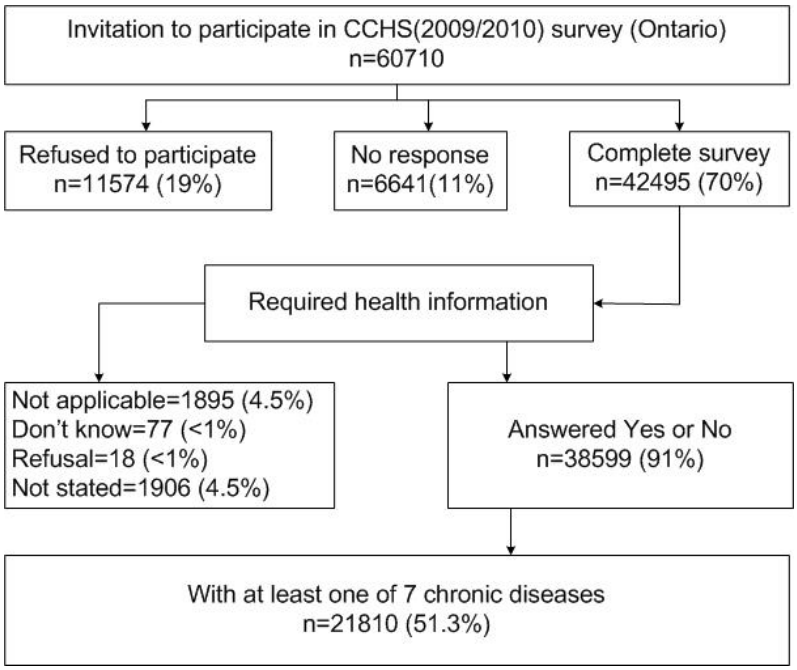


Figure 2. Frequency and Number of Respondents with Chronic Conditions.

MEASURES

Socio-Demographic Characteristics (SD)

Socio-demographic variables were assessed by individual and by household. Individual variables included gender, age, marital status, education, annual income, and immigration status. The household variable included the number of persons in the household.

Health Conditions and Physical Activity (HC)

Four variables were included concerning respondent health conditions: Body mass index (BMI), Health utility index (HUI) categories, self-perceived health, and self-perceived mental health. The HUI describes an individual's functional health status using eight basic attributes: vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain. A multi-attribute scoring algorithm combines the descriptive information into a single global utility score, which ranges from -0.36 (worst health state) through 0.00 (dead) to 1.00 (full health)[85]. An alternative to using HUI global utility scores as continuous indices is to group them into *disability categories* based on a previously established system for classifying disability, according to the functional levels within each

attribute[85,86]. The following disability categories were derived from the HUI global utility scores: no disability (1.00), mild disability (0.89 to 0.99), moderate disability (0.70 to 0.88), and severe disability (less than 0.70). Physical activity is a derived variable for respondents based on their average daily energy expenditure values (kcal/kg/day) calculated from a series of questions on physical activity (i.e., usual daily activities or occupational-related physical activity), physical activity for travel (i.e., biking or walking to school or work), and leisure time physical activity (i.e., walking, running, gardening, soccer) by the respondent in the past three months. For each physical activity engaged in by the respondent, an average daily energy expenditure is calculated by multiplying the number of times the activity was performed by the average duration of the activity by the energy cost (kilocalories per kilogram of body weight per hour) of the activity. The index is calculated as the sum of the average daily energy expenditures of all activities. Respondents are then classified as follows: Active physical activity (27.7 kcal/kg/day or more), Moderate physical activity (15.4-27.6 kcal/kg/day) and Inactive physical activity (0-15.3 kcal/kg/day)[84].

Number of Consultations with HP and Quality of Care (RS)

Number of consultations with HP in a last 12 months were measured by one variable, created through the use of a series of questions that asked respondents how many consultations they had with family physicians, general practitioners, and other medical doctors. Respondents also were asked to rate the quality of care received and their satisfaction with the care provided.

Chronic Disease Comorbidities

A focus of our research was to assess health information needs for people with chronic illness. Dichotomous measures of chronic conditions were used to create a measure of the number of chronic conditions by adding the total number of chronic conditions reported, out of seven possible chronic illnesses or conditions. This categorical variable is consistent with previous published studies on comorbidities[87-90]. In this study, comorbidities are defined as the co-occurrence of two or more of 7 chronic conditions. Additionally, individual and combinations of chronic conditions were examined.

Health Information Needs

The first outcome variable for this research was a measure that assessed whether respondents with chronic disease(s) needed health information.

Health Information Sources and Difficulties in Obtaining Health Information

The second outcome variable was health information sources for patient with chronic illness. Respondents were asked where and whom they had contacted for health/medical information: (1) doctor, (2) community healthcare, (3) walk-in clinic, (4) e-Health (health line), (5) emergency room, (6) other hospital service and (7) other.

The third outcome variable for this research was a measure that assessed whether the respondent had difficulties in receiving health information needed.

DATA ANALYSIS

In the first step of the data analysis, descriptive statistics of the independent variables, such as socio-demographics, health conditions, physical activity, number of consultations with HP, quality

of care, and chronic conditions were used to characterize respondents from the sample population who reported health information needs (see the "Patient" concept in the conceptual framework, Fig.1). Then, in the second step, bivariate analyses and ANOVA (for "Number of consultations with HP") were used to test whether differences existed between respondents who need health information and respondents who do not need health information on the basis of each independent variable (see the "Heath care service provision" concept in the conceptual framework, Fig.1). Wald χ^2 statistics[91] were computed to check the statistical significance of each such test, and unadjusted odds ratios were computed using logistic regression models.

In the third step, multivariate logistic regressions were used to investigate the relationships between the outcome variable of health information needs and the independent variables. To perform these analyses six different models were created. Model 1 included socio-demographics, to which health conditions and physical activity were added to create Model 2. Model 3 was created by adding the number of consultations with HP, the rating of quality of care received, and satisfaction with care provided to Model 2. Models 4 (4.1-4.9) were produced by adding the number of chronic conditions (4.1), specific conditions with comorbidities (4.2-4.8), or most important co-occurring chronic conditions (4.9). Log likelihood ratio tests were used to assess the fit of the three nested models. Model quality was determined by comparing the overall percentage of correct classifications predicted by each model. Additionally, to test the main effects of chronic disease comorbidity (adjusted by different factors) on information needs, Models 5 (5.1-5.9) and Models 6 (6.1-6.9) were created. Due to size limitations of this paper, only the final models results are presented, although interested readers can find all the derived models in Appendixes C and E. Finally, associations between the chronic conditions, information sources ("Heath information sources" concept Fig.1), and a measure that assessed whether the respondent had difficulties ("Difficulty" concept in Fig.1) in receiving health information needed from information sources were analysed.

RESULTS

Subsample Characteristics

The study sample is representative of people living with chronic diseases in the Canadian province of Ontario. Table 2 describes the socio-demographics of individuals who had at least one chronic condition. Of the 21810 respondents, 54% were females, 65.5% were married or living with a partner, and 56.2% had college or some postsecondary education. Only 16% were living alone, 31.2% had no income or income less than CAN $ 20,000 (US$ 19,985), and 67.8% were born in Canada. About 55% of the respondents were inactive, 35.4% reported being overweight and almost 24% reported being obese. 22.7% reported severe disability, although nearly 67% reported self-perceived health as "Excellent" or "Very good" (Table 3). 87% of the respondents rated the quality of care received as "Excellent" and "Good" and 49.2% were very satisfied with care provided (Table 4).

More than half of the respondents (52.4%) had one chronic disease, where respondents with specific chronic condition were 7.4% asthma (AST), 7% arthritis (ART), 13.3% back pain (BP), 10.6% high blood pressure (HBP), 2.9% diabetes (DIAB), 1.5% heart disease and/or stroke (HS), and 9.7% migraine and headache (MH) (Table 5, Table B1 in Appendix B). Arthritis (ART), back problem (BP) and high blood pressure (HBP) with comorbidities were the most frequent chronic

conditions in the subsample (Table 5). Of the 10379 (47.6%) respondents with more than one chronic conditions, 5872 (56.6%) reported having ART, 2150 (20.7%) reported having AST, 5917 (57%) reported having BP, 5605 (54%) reported having HBP, 2446 (23.6) and 2125 (20.5%) reported having DIAB and HS respectively and 4776 (46%) reported having MH (data not shown, though it can be calculated from Table 5). Combinations of two and three chronic conditions included 86.3% of this group; 1017 (10%) respondents reported four chronic conditions, and only 409 (4%) reported having five or more chronic conditions (Table 5).

Association of Health Information Needs with Health Conditions and Physical Activity (HC), Socio-Demographic Characteristics (SD), and Number of Consultations with Health Practitioners and Quality of Care (RS)

Table 2 and Tables C1-C4 (Appendix C) show that there are significant differences between the socio-demographic characteristics of respondents who need health information and those who do not. Women were significantly more likely to report that they need health information than men (unadjusted Odds Ratio (OR) =1.19, 95% Confidence Interval (CI) =1.12-1.25 (Table 2); adjusted OR=1.34, 95% CI=1.24-1.44 (Appendix C, Table C1, Model 4.1). Health information needs decrease with respondent age. Based on unadjusted odds, respondents in the middle age groups (25 to 44) were 1.9-2.0 (adjusted: 1.3-1.6) times more likely need health information than those in the referent group aged 15-24 years. Additionally, health information needs, based on unadjusted and adjusted OR increased with respondent education, household size, and household income (Table 2, Tables C1-C4, Appendix C). People born in Canada were significantly more likely to report that they needed health information than immigrants (unadjusted OR=1.22, 95% CI=1.08-1.38; adjusted OR=2.04, 95% CI=1.73-2.4).

Table 2. Socio-Demographic Characteristics of Health Information Needs

Individual and household Characteristics	Total, n (%) n=21810	Health Information Needs, n (%)		Unadjusted Odds Ratio	95% Confidence Interval
		No n=11471 (52.6%)	Yes n=10339 (47.4%)		
Gender $x^2(1)=37.72$*					
Male	10030 (46.0)	5523 (48.1)	4507 (43.6)	Ref	
Female	11780 (54.0)	5948 (51.9)	5832 (56.4)	1.19*	1.12, 1.25
Age $x^2(6)=669.2$*					
15 to 24	1878 (8.6)	1131 (9.9)	748 (7.2)	Ref	
25 to 34	2204 (10.1)	917 (8.0)	1287 (12.4)	2.01*	1.74, 2.32
35 to 44	3322 (15.2)	1416 (12.3)	1906 (18.4)	1.92*	1.68, 2.20
45 to 54	4505 (20.7)	2182 (19)	2323 (22.5)	1.35*	1.19, 1.53
55 to 64	4397 (20.2)	2401 (20.9)	1997 (19.3)	1.03	0.92, 1.16

65 to 74	3115 (14.3)	1893 (16.5)	1222 (11.8)	0.82**	0.73, 0.93
75 and over	2388 (10.9)	1531 (13.3)	857 (8.3)	0.68*	0.60, 0.77
Marital status $x^2(3)=232.58$*					
Married	12862 (59)	6368 (55.6)	6494 (62.9)	Ref	
Common law	1414 (6.5)	674 (5.9)	740 (7.2)	1.09	0.97, 1.22
Separated/divorced, widow or widower	3636 (16.7)	2162 (18.9)	1474 (14.3)	0.62*	0.58, 0.66
Single, never married	3871 (17.8)	2252 (19.7)	1619 (15.7)	0.79*	0.74, 0.85
Education $x^2(3)=599.35$*					
< Than secondary	3955 (18.3)	2602 (22.9)	1353 (13.2)	Ref	
Secondary graduation	3904 (18.1)	2420 (21.3)	1484 (14.5)	1.36*	1.24, 1.48
Other post-secondary	1601 (7.4)	731 (6.4)	870 (8.5)	2.11*	1.87, 2.37
Post secondary graduation	12148 (56.2)	5590 (49.3)	6557 (63.9)	2.24*	2.09, 2.40
Persons in household $x^2(3)=429.1$*					
1 person	3481 (16)	2154 (18.8)	1327 (12.8)	Ref	
2 persons	8426 (38.7)	4679 (40.8)	3747 (36.2)	1.34*	1.26, 1.43
3 persons	3856 (17.7)	1948 (17)	1907 (18.4)	1.85*	1.68, 2.03
4 persons	3818 (17.5)	1675 (14.6)	2143 (20.7)	2.37*	2.13, 2.63
5 or more persons	2216 (10.2)	1001 (8.7)	1215 (11.8)	2.33*	2.04, 2.67
Income $x^2(4)=117.1$*					
No income	731 (4)	416 (4.4)	316 (3.5)	Ref	
< $20,000	4988 (27.2)	2763 (29.4)	2225 (24.8)	0.94	0.79, 1.12
$20,000 - $39,999	5043 (27.5)	2714 (28.9)	2329 (25.9)	0.90	0.76, 1.07
$40,000 - $59,999	3390 (18.5)	1719 (18.3)	1672 (18.6)	1.12	0.94, 1.34
$60,000 - $79,999	1982 (10.8)	915 (9.7)	1067 (11.9)	1.29**	1.07, 1.57
$80,000 +	2235 (12.2)	867 (9.2)	1368 (15.2)	1.48*	1.22, 1.8
Immigrant $x^2(2)=67.45$*					
0-9 years	1119 (5.2)	611 (5.4)	508 (4.9)	Ref	

10 or more years	5856 (27.0)	3494 (30.7)	2362 (23.0)	0.81**	0.71, 0.92
Born In Canada	14690 (67.8)	7279 (63.9)	7411 (72.1)	1.22**	1.08 , 1.38

Note: * p<0.001; **p<0.05;*** p<0.1

Table 3. Health Indexes, Physical Activity, Self-perceived Health and Mental Health by Health Information Needs

Health Characteristics	Total, n (%) n=21810	Health Information Needs, n (%)		Unadjusted Odds Ratio	95% Confidence Interval
		No n=11471 (52.6%)	Yes n=10339 (47.4%)		
Physical activity index $x^2(2)=14,47$*					
Active	4779 (21.9)	2413 (21)	2366 (22.9)	Ref	
Moderate	5051 (23.2)	2560 (22.3)	2490 (24.1)	0.99	0.92, 1.08
Inactive	11974 (54.9)	6493 (56.6)	5482 (53)	0.9**	0.84, 0.96
BMI $x^2(3)=16.96$*					
Underweight	378 (1.8)	171 (1.6)	207 (2.1)	Ref	
Normal Weight	8014 (38.9)	4286 (39.7)	3728 (38)	0.72**	0.58, 0.88
Overweight	7303 (35.4)	3839 (35.6)	3464 (35.3)	0.74**	0.60, 0.92
Obese	4914 (23.8)	2494 (23.1)	2419 (24.6)	0.80**	0.65, 0.99
HUI index $x^2(3)=76.99$*					
No disability	3527 (16.5)	1823 (16.3)	1704 (16.8)	Ref	
Mild disability	9030 (42.2)	5000 (44.6)	4031 (39.7)	0.87**	0.80, 0.95
Moderate disability	3968 (18.6)	2122 (18.9)	1846 (18.2)	0.97	0.88, 1.07
Severe disability	4854 (22.7)	2274 (20.3)	2580 (25.4)	1.18*	1.08, 1.30
Self-perceived health $x^2(4)=44.2$*					
Excellent	2985 (13.7)	1585 (13.8)	1400 (13.6)	Ref	
Very good	7308 (33.5)	3853 (33.6)	3455 (33.5)	1.09***	0.99, 1.19

Good	7279 (33.4)	3945 (34.4)	3334 (32.3)	1.12**	1.02, 1.23
Fair	3154 (14.5)	1616 (14.1)	1537 (14.9)	1.22*	1.10, 1.35
Poor	1060 (4.9)	468 (4.1)	592 (5.7)	1.5*	1.32, 1.72
Self-perceived mental health $x^2(4)=81.75$*					
Excellent	7206 (33.1)	3874 (33.8)	3332 (32.3)	Ref	
Very good	7792 (35.8)	4185 (36.5)	3607 (35)	1.09**	1.02, 1.17
Good	4982 (22.9)	2610 (22.8)	2372 (23)	1.1**	1.02, 1.19
Fair	1431 (6.6)	640 (5.6)	792 (7.7)	1.43*	1.27, 1.59
Poor	356 (1.6)	146 (1.3)	210 (2)	2.06*	1.69, 2.52

Note: * p<0.001; **p<0.05;*** p<0.1

Physical activity, BMI, HUI and self-perceived health and mental health were each significantly associated with health information needs (Table 3), except when adjusted BMI and self-perceived health were not significant (Tables C1-C4 (Appendix C)). Based on unadjusted odds, respondents with "Poor" rating of self-perceived health were 1.5 times more likely to need health information than respondents with "Excellent" rating of self-perceived health. Similarly, people who rated their self-perceived mental health as "Poor" were 2.1 (unadjusted) and 1.3 (adjusted) times more likely to be in need of health information than those who rated their self-perceived mental health as "Excellent". People with severe disabilities were 1.2 times more likely to report that they needed health information than people with no disability. Surprisingly, respondents who were physical active and underweight were 1.1-1.25 times more likely to need health information than those who were inactive and obese. This may be due to an active self-care concerns of people who are physical active and who are concerned about their weight.

Table 4 shows that respondents who rated quality of care they received as not "Excellent" and were not satisfied with the way care was provided were significantly more likely to need health information. Respondents that were not satisfied with the way care was provided were 1.6-2.5 (unadjusted) and 1.6-2.2(adjusted) times more likely to need health information than those who were very satisfied (Tables C1-C4 (Appendix C)).

Table 4. Rating of Quality of Care Received, Satisfaction with Way Care Provided and Health Information Needs

Chronic Disease Comorbidities	Total, n (%) n=21810	Health Information Needs, n (%) No n=11471 (52.6%)	Yes n=10339 (47.4%)	Unadjusted Odds Ratio	95% Confidence Interval
Rating of Quality of Care Received $x^2(5)=52.13$*					

Excellent	7800 (40.1)	4192 (41.3)	3608 (38.8)	Ref	
Good	9258 (47.6)	4848 (47.8)	4411 (47.4)	1.06***	1, 1.12
Fair	1918 (9.9)	918 (9.1)	1000 (10.8)	1.26*	1.14, 1.4
Poor	467 (2.4)	185 (1.8)	283 (3)	1.78*	1.47, 2.15
Satisfaction with Way Care Provided $x^2(5)=148.2$*					
Very Satisfied	9550 (49.2)	5279 (52.1)	4271 (46)	Ref	
Somewhat Satisfied	7393 (38.1)	3776 (37.3)	3617 (38.9)	1.18*	1.11, 1.26
Neither	991 (5.1)	479 (4.7)	512 (5.5)	1.32*	1.16, 1.51
Somewhat Dissatisfied	974 (5)	429 (4.2)	545 (5.9)	1.57*	1.38, 1.79
Very Dissatisfied	520 (2.7)	173 (1.7)	347 (3.7)	2.49*	2.06, 3.00

Note: * p<0.001; **p<0.05;*** p<0.1

There was a significant difference between people who needed and those who didn't need information for average consultations per year with HP (Figure 3, Tables D1, D2 in Appendix D). On average, respondents had 5.2 consultations with HP per year, although persons who reported that they needed information had significantly fewer consultations with physicians (Mean (95% CI) =4.4(4.3-4.5)) than did persons who did not need health information (Mean (95% CI)=6.0(5.9-6.1)) (Figure 3, Tables D1, D2 in Appendix D).

The annual number of consultations was closely related to the number of chronic conditions. Persons with one chronic condition had on average 4 consultations, and this increased to 5.5 (+38%) with the appearance of a second chronic condition and more than doubled when the person had 4 and more comorbidities (Figure 3, Tables D1, D2 Appendix D). The consultation frequency also varied with the diagnoses behind the chronic conditions with comorbidities. The average number of consultations was highest for patterns that included HS, DIAB and ART (Figure 3, Tables D1, D2 Appendix D).

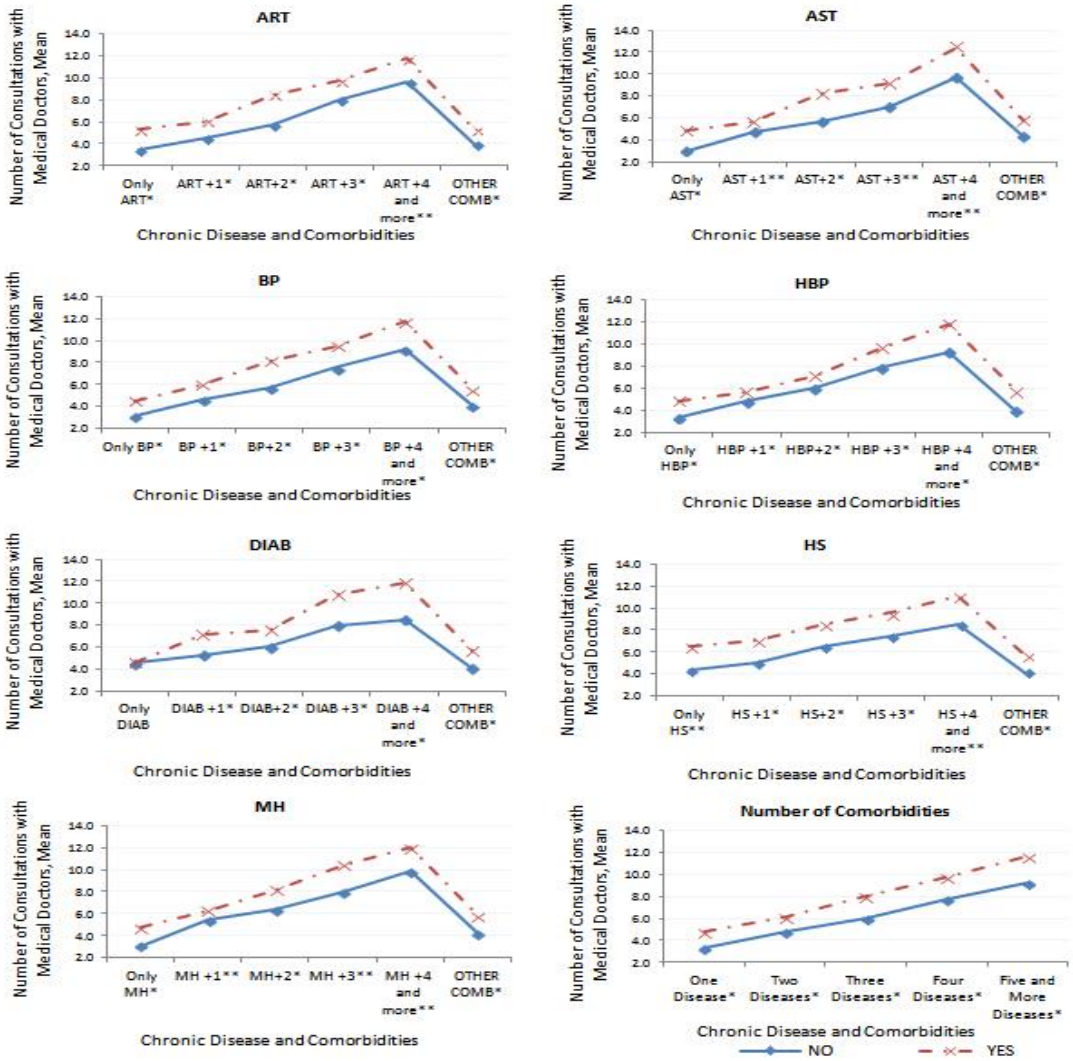


Figure 3. Mean Differences for Number of Consultations per Year with Medical Doctors by Required Information and Comorbidities. *Note:* * p<0.001; **p<0.05;*** p<0.1

Differences in Health Information Needs by Chronic Disease Comorbidity

People with chronic conditions vary in their need for health information. Based on unadjusted odds, all specific chronic diseases and comorbidities, except ART and HS, were significantly associated with health information needs (Table 5, Tables B1, B2 in Appendix B). AST respondents with 1-3 comorbidities were 1.3 times more likely to need health information than those who had AST only. HB respondents with 1-4 and more comorbidities were 1.2-1.6 times more likely to need health information than those who had HB only.

Table 5. Chronic Diseases Comorbidity and Health Information Needs

Chronic Disease Comorbidities	Total, n (%) n=21810	Health Information Needs, n (%) No n=11471 (52.6%)	Yes n=10339 (47.4%)	Unadjusted Odds Ratio	95% Confidence Interval
Arthritis (ART) $x^2(5)=6.32$					
Only ART	1618 (7.4)	871 (7.6)	747 (7.2)	Ref	
ART +1	2679 (12.3)	1386 (12.1)	1294 (12.5)	1.09	0.96, 1.23
ART+2	1916 (8.8)	1038 (9.1)	878 (8.5)	0.99	0.86, 1.13
ART +3	890 (4.1)	464 (4)	426 (4.1)	1.07	0.91, 1.26
ART +4 and more	386 (1.8)	188 (1.6)	198 (1.9)	1.23***	0.99, 1.54
OTHER COMB	14320 (65.7)	7524 (65.6)	6797 (65.7)	1.05	0.95, 1.17
Asthma (AST) $x^2(5)=23.48$*					
Only AST	1526 (7)	815 (7.1)	710 (6.9)	Ref	
AST +1	912 (4.2)	432 (3.8)	480 (4.6)	1.28**	1.08, 1.51
AST+2	648 (3)	310 (2.7)	337 (3.3)	1.25**	1.04, 1.50
AST +3	355 (1.6)	164 (1.4)	190 (1.8)	1.33**	1.05, 1.68
AST +4 and more	236 (1.1)	128 (1.1)	108 (1)	0.96	0.73, 1.27
OTHER COMB	18134 (83.1)	9620 (83.9)	8514 (82.3)	1.02	0.92, 1.13
Back Problems (BP) $x^2(5)=83.48$*					
Only BP	2907 (13.3)	1428 (12.4)	1480 (14.3)	Ref	
BP +1	2773 (12.7)	1295 (11.3)	1478 (14.3)	1.1***	0.99, 1.22
BP+2	1932 (8.9)	991 (8.6)	940 (9.1)	0.92	0.82, 1.03
BP +3	831 (3.8)	440 (3.8)	391 (3.8)	0.86***	0.74, 1.00
BP +4 and more	381 (1.7)	188 (1.6)	194 (1.9)	1	0.80, 1.23
OTHER COMB	12986 (59.5)	7129 (62.2)	5857 (56.6)	0.79*	0.73, 0.86
High Blood Pressure (HBP) x2(5)=191.1*					
Only HBP	2307 (10.6)	1449 (12.6)	858 (8.3)	Ref	
HBP +1	2630 (12.1)	1518 (13.2)	1113 (10.8)	1.24*	1.1, 1.39
HBP+2	1774 (8.1)	993 (8.7)	781 (7.6)	1.33*	1.17, 1.51
HBP +3	818 (3.8)	445 (3.9)	373 (3.6)	1.41*	1.20, 1.66
HBP +4 and more	382 (1.8)	196 (1.7)	186 (1.8)	1.6*	1.28, 1.98
OTHER COMB	13898 (63.7)	6869 (59.9)	7029 (68)	1.73*	1.58, 1.89
Diabetes (DIAB) x2(5)=30.60*					

Only DIAB	630 (2.9)	367 (3.2)	263 (2.5)	Ref	
DIAB +1	979 (4.5)	573 (5)	406 (3.9)	0.99	0.81, 1.21
DIAB+2	752 (3.4)	408 (3.6)	344 (3.3)	1.18	0.95, 1.46
DIAB +3	441 (2)	247 (2.2)	194 (1.9)	1.09	0.85, 1.40
DIAB +4 and more	273 (1.3)	129 (1.1)	145 (1.4)	1.57**	1.18, 2.08
OTHER COMB	18734 (85.9)	9747 (85)	8988 (86.9)	1.29**	1.09, 1.51
Heart and Stroke (HS) x2(5)=8.78					
Only HS	322 (1.5)	167 (1.5)	154 (1.5)	Ref	
HS +1	704 (3.2)	394 (3.4)	310 (3)	0.85	0.65, 1.11
HS+2	711 (3.3)	393 (3.4)	318 (3.1)	0.88	0.67, 1.14
HS +3	431 (2)	231 (2)	201 (1.9)	0.94	0.71, 1.26
HS +4 and more	279 (1.3)	132 (1.1)	147 (1.4)	1.21	0.88, 1.66
OTHER COMB	19363 (88.8)	10154 (88.5)	9209 (89.1)	0.98	0.79, 1.23
Migraine and Headache (MH) x2(5)=134.05*					
Only HS	2121 (9.7)	1003 (0)	1118 (0)	Ref	
MS +1	1513 (6.9)	671 (0)	841 (0)	1.12***	0.98, 1.28
MS+2	841 (3.9)	372 (0)	468 (0)	1.13	0.96, 1.33
MS +3	302 (1.4)	126 (0)	176 (0)	1.25***	0.98, 1.60
MS +4 and more	209 (1)	98 (0)	111 (0)	1.01	0.76, 1.34
OTHER COMB	16825 (77.1)	9199 (0)	7625 (0)	0.74*	0.68, 0.81
Comorbidities x2(4)=7.5					
One Disease	11431 (52.4)	6101 (53.2)	5330 (51.6)	Ref	
Two Diseases	6095 (27.9)	3134 (27.3)	2961 (28.6)	1.08**	1.02, 1.15
Three Diseases	2858 (13.1)	1502 (13.1)	1356 (13.1)	1.03	0.95, 1.12
Four Diseases	1017 (4.7)	529 (4.6)	488 (4.7)	1.05	0.93, 1.2
Five and More Diseases	409 (1.9)	204 (1.8)	205 (2)	1.15	0.95, 1.4

Note: * p<0.001; **p<0.05;*** p<0.1

Table 6a presents results of multiple logistic regressions predicting required health information needs for specific chronic diseases, where chronic diseases with comorbidities were adjusted by social-demographic characteristics (SD) (Table 6a, Models 5.2-5.8); health conditions (HC) (Table 6a, Models 6.2-6.8) and rating, satisfaction (RS) determinants (Table 6a, Models 4.2-4.8). All specific chronic diseases with comorbidities, when adjusted, are significantly associated with health information needs, except DIAB and HS. On average, information needs increased with increasing number of comorbidities, when adjusted by SD. Respondents with ART, BP, HS and MH were 1.2-1.5, 1.04-1.5, 1.2-1.6, 1.1-1.7 times more likely to need information respectively than respondents with other chronic disease combinations, when adjusted by SD. With regards to ART, persons with 2 and 3 comorbidities (ART+2 and ART+3) were 1.3-1.4 times more likely to

need health information than those who had only ART alone. Persons with BP and comorbidities were 1.1-1.2 times more likely to need health information than those who had only BP (Table E1-E2, Appendix E).

Table 6a. Results of Multiple Logistic Regression Models Predicting Required Health Information Needs for Chronic Diseases

Disease and Comorbidities	Adjusted by: SD Model 5.2-5.8 OR (95% CI)	SD+HC Model 6.2-6.8 OR (95% CI)	SD+HC+RS Model 4.2-4.8 OR (95% CI)
Arthritis (ART)	*	**	**
Only ART	1.08 (0.96,1.22)	1.1 (0.97,1.25)	1.11 (0.97,1.27)
ART +1	1.21* (1.1,1.34)	1.14** (1.03,1.26)	1.17** (1.05,1.3)
ART+2	1.18** (1.05,1.32)	1.03 (0.91,1.16)	0.97 (0.85,1.1)
ART +3	1.44* (1.23,1.69)	1.23** (1.04,1.46)	1.16 (0.97,1.39)
ART +4 and more	1.53* (1.21,1.94)	1.05 (0.82,1.36)	0.86 (0.65,1.13)
OTHER COMB	Ref	Ref	Ref
Asthma (AST)	**	***	**
Only AST	0.82** (0.72,0.93)	0.9 (0.78,1.03)	0.91 (0.78,1.06)
AST +1	1.08 (0.93,1.26)	1.02 (0.86,1.19)	1.01 (0.85,1.21)
AST+2	1.14 (0.95,1.37)	0.99 (0.82,1.2)	1.04 (0.85,1.26)
AST +3	1.23*** (0.97,1.55)	1.1 (0.86,1.4)	1.01 (0.78,1.3)
AST +4 and more	0.99 (0.73,1.33)	0.66** (0.48,0.9)	0.56* (0.4,0.78)
OTHER COMB	Ref	Ref	Ref
Back Problems (BP)	*	*	**
Only BP	1.04 (0.95,1.14)	0.99 (0.9,1.09)	1 (0.9,1.11)
BP +1	1.37* (1.25,1.51)	1.26* (1.14,1.39)	1.21* (1.09,1.35)
BP+2	1.2* (1.08,1.34)	1.01 (0.9,1.14)	0.95 (0.84,1.07)
BP +3	1.29** (1.1,1.52)	1.09 (0.92,1.3)	1.05 (0.88,1.27)

BP +4 and more	1.53* (1.2,1.93)	1.04 (0.81,1.34)	0.88 (0.67,1.15)
OTHER COMB	Ref	Ref	Ref
High Blood Pressure (HBP)	*	*	*
Only HBP	0.61* (0.55,0.68)	0.65* (0.58,0.72)	0.66* (0.59,0.74)
HBP +1	0.93 (0.84,1.03)	0.95 (0.85,1.05)	0.92 (0.82,1.03)
HBP+2	0.98 (0.87,1.1)	0.9*** (0.8,1.02)	0.84** (0.74,0.96)
HBP +3	1.16*** (0.98,1.37)	1.03 (0.86,1.23)	0.97 (0.81,1.18)
HBP +4 and more	1.18 (0.93,1.5)	0.84 (0.65,1.08)	0.68** (0.52,0.9)
OTHER COMB	Ref	Ref	Ref
Diabetes (DIAB)	*	**	
Only DIAB	0.83** (0.69,0.99)	0.89 (0.74,1.07)	0.85 (0.7,1.03)
DIAB +1	1.13 (0.97,1.31)	1.15*** (0.98,1.34)	1.04 (0.89,1.23)
DIAB+2	1.3** (1.1,1.54)	1.22** (1.03,1.45)	1.08 (0.9,1.3)
DIAB +3	1.32** (1.06,1.64)	1.17 (0.94,1.47)	1.02 (0.8,1.3)
DIAB +4 and more	1.64* (1.24,2.18)	1.25 (0.93,1.69)	1.05 (0.76,1.46)
OTHER COMB	Ref	Ref	Ref
Heart and Stroke (HS)	*	**	
Only HS	1.15 (0.9,1.48)	1.19 (0.9,1.56)	1.08 (0.8,1.45)
HS +1	1.32** (1.11,1.58)	1.32** (1.1,1.59)	1.29** (1.06,1.57)
HS+2	1.27** (1.07,1.51)	1.14 (0.95,1.36)	1.07 (0.88,1.29)
HS +3	1.36** (1.08,1.7)	1.25*** (0.99,1.59)	1.23 (0.95,1.59)
HS +4 and more	1.58** (1.2,2.09)	1.17 (0.87,1.57)	1.05 (0.77,1.44)
OTHER COMB	Ref	Ref	Ref
Migraine and Headache (MH)	*	*	*
Only MH	1.09 (0.98,1.22)	1.2** (1.07,1.35)	1.32* (1.16,1.5)
MH +1	1.28* (1.13,1.45)	1.26* (1.1,1.43)	1.21** (1.05,1.39)

MH+2	1.26** (1.08,1.48)	1.03 (0.88,1.22)	1.02 (0.86,1.22)
MH +3	1.72* (1.33,2.23)	1.4** (1.07,1.83)	1.26 (0.94,1.67)
MH +4 and more	1.29 (0.94,1.77)	0.86 (0.61,1.2)	0.75 (0.53,1.08)
OTHER COMB	Ref	Ref	Ref

Note: * p<0.001; **p<0.05;*** p<0.1
SD- Social- demographic characteristics
HC- Health Conditions
RS- Rating, satisfaction
REFERENCE-OTHER DISEASES COMBINATIONS

The importance of taking HC and RS into account is illustrated by the difference between unadjusted and adjusted odds. When adjusted by SD+HC+RS the effect of comorbidities on information needs is neither straightforward nor similar among the specific diseases. On average, persons with one-four diseases were 1.2-1.4 times more likely to need health information than those with five and more diseases (Table 6b). The same patterns are revealed in Table 6a for specific diseases. Only two chronic diseases HS and DIAB with comorbidities, when controlling all other variables, were not significant predictors of the need of health information. Those with MH alone, ART+BP and ART+MH are more likely to need health information than those with other combinations of diseases (Table 6b).

Table 6b. Results of Multiple Logistic Regression Models Predicting Required Health Information Needs for Number of Chronic Diseases and Chronic Diseases Comorbidities Combinations#

Disease and Comorbidities	Adjusted by: SD Model 5.1,5.9 OR (95% CI)	SD+HC Model 6.1,6.9 OR (95% CI)	SD+HC+RS Model 4.1,4.9 OR (95% CI)
Number of Comorbidities	*	*	*
One Disease	0.64* (0.51,0.8)	0.93 (0.73,1.2)	1.16 (0.89,1.52)
Two Diseases	0.84 (0.67,1.06)	1.15 (0.9,1.47)	1.36** (1.04,1.78)
Three Diseases	0.84 (0.66,1.07)	1.04 (0.81,1.34)	1.19 (0.91,1.56)
Four Diseases	0.97 (0.75,1.27)	1.2 (0.91,1.58)	1.35** (1,1.81)
Five and More Diseases	Ref	Ref	Ref
Comorbidities	*	*	*
ART	0.82** (0.72,0.93)	0.96 (0.84,1.1)	1.05 (0.91,1.22)

AST	0.67*	0.83**	
	(0.58,0.78)	(0.71,0.98)	0.93 (0.78,1.11)
BP	0.78*	0.87**	
	(0.69,0.87)	(0.77,0.99)	0.98 (0.86,1.11)
HBP	0.53*	0.63*	
	(0.47,0.59)	(0.55,0.71)	0.7* (0.61,0.8)
DIAB	0.65*	0.78**	0.82***
	(0.54,0.79)	(0.64,0.95)	(0.66,1)
HS	0.9	1.03	
	(0.69,1.16)	(0.78,1.36)	1.01 (0.75,1.37)
MH	0.83**		1.24**
	(0.73,0.94)	1.04 (0.9,1.2)	(1.06,1.45)
ART BP	1.08	1.15***	1.27**
	(0.93,1.25)	(0.99,1.34)	(1.08,1.5)
ART HBP	0.76**	0.83**	
	(0.64,0.91)	(0.69,0.99)	0.94 (0.78,1.14)
ART MH	0.93		1.47**
	(0.7,1.25)	1.22 (0.9,1.66)	(1.05,2.05)
AST BP	1.06	1.17	
	(0.81,1.39)	(0.88,1.55)	1.12 (0.82,1.53)
AST MH	0.75***	0.77	
	(0.56,1.01)	(0.56,1.06)	1.06 (0.74,1.52)
BP HBP	0.87		
	(0.7,1.09)	1.01 (0.8,1.27)	1.16 (0.91,1.48)
BP MH	1.08		
	(0.89,1.31)	1.14 (0.94,1.4)	1.12 (0.91,1.4)
HBP HS	0.8***	0.93	
	(0.62,1.03)	(0.72,1.21)	1.04 (0.78,1.37)
HBP DIAB	0.84***		
	(0.69,1.02)	0.97 (0.8,1.19)	0.95 (0.77,1.18)
HBP MH		1.08	
	0.9 (0.68,1.2)	(0.81,1.45)	0.92 (0.67,1.26)
ART BP HBP	0.66*	0.7*	0.75**
	(0.54,0.8)	(0.57,0.86)	(0.6,0.93)
ART BP MH	1.12	1.03	
	(0.85,1.47)	(0.77,1.39)	0.96 (0.7,1.32)
OTHER	Ref	Ref	Ref

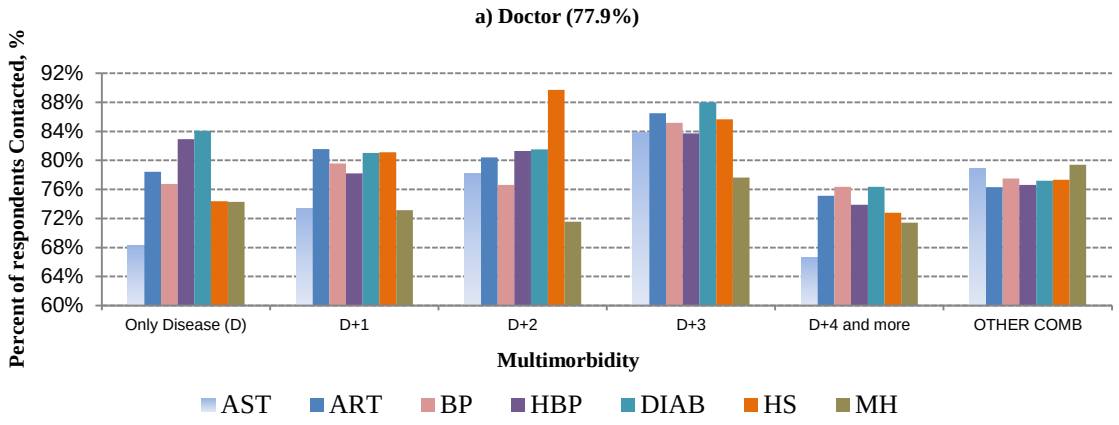
Note: * p<0.001; **p<0.05;*** p<0.1
SD- Social- demographic characteristics
HC- Health Conditions
RS- Rating, satisfaction
REFERENCE-OTHER DISEASES COMBINATIONS

Association of Health Information Sources and Chronic Disease Comorbidities

Bivariate analysis results (Figure 4(a-f), Tables F1, F2, Appendix F) are presented as proportions within chronic diseases (predictor variable categories) by outcome variables (health sources information contacts with: doctor, community healthcare, walk-in clinic, e-Health (health line), emergency room, other hospital service and other). Patient health information contacts with doctors was significantly related to all chronic diseases, including number of diseases and common comorbidities ($p<0.001$). Contacts with community care were not significantly related to ART, AST, HS. Contacts for health information from emergency rooms was not significantly related to the number of chronic diseases the patient had (Table F2, Appendix F).

Figure 4 (a-f) shows the nature of the health information and the sources that respondents consulted for health information. Doctors were the most frequently contacted for information (77.9%), followed by health lines (17.9%) and walk-in clinics (17.2%). These are followed in order by others (16.9%), emergency rooms (16.5%), and other hospital services (7.3%). Only 5.1% of those who needed health information contacted community health care sources for information. Those with four chronic conditions reported contacting doctors for health information more often than did the other chronic disease groups.

Those with three chronic conditions reported contacting community health care for health information more often than other chronic disease groups (Fig.4). Likewise, there is a variation between specific chronic conditions and health information sources contacted for health information. People with DIAB, HBP and HS contacted doctors for health information more than others. Almost 26% of those with MH alone contacted walk-in clinics for health information as compared to 11.7% of those with HS alone.



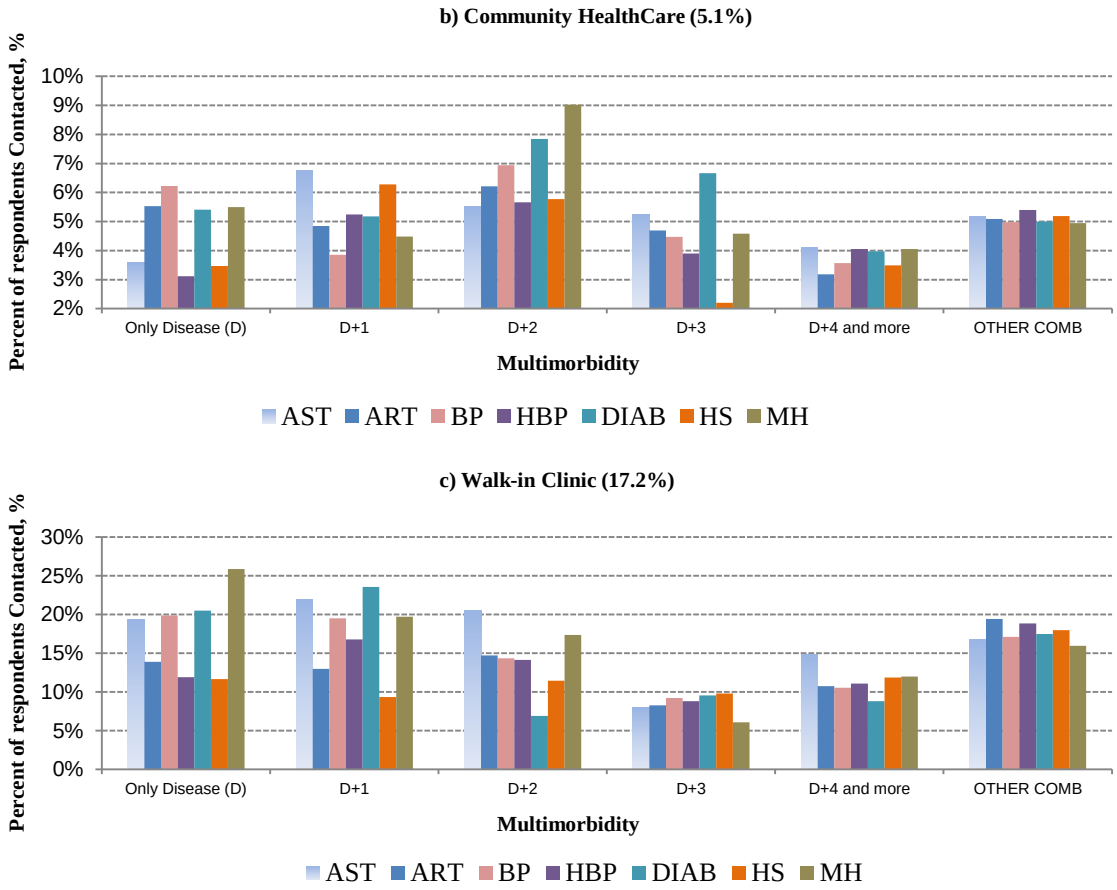
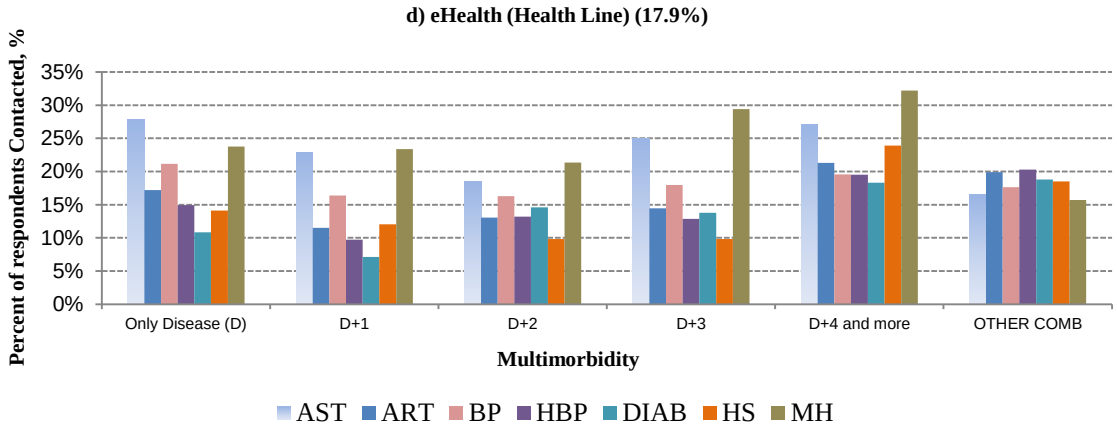


Figure 4a-c. Contacts for Health Information (a-c) by Disease and Comorbidity



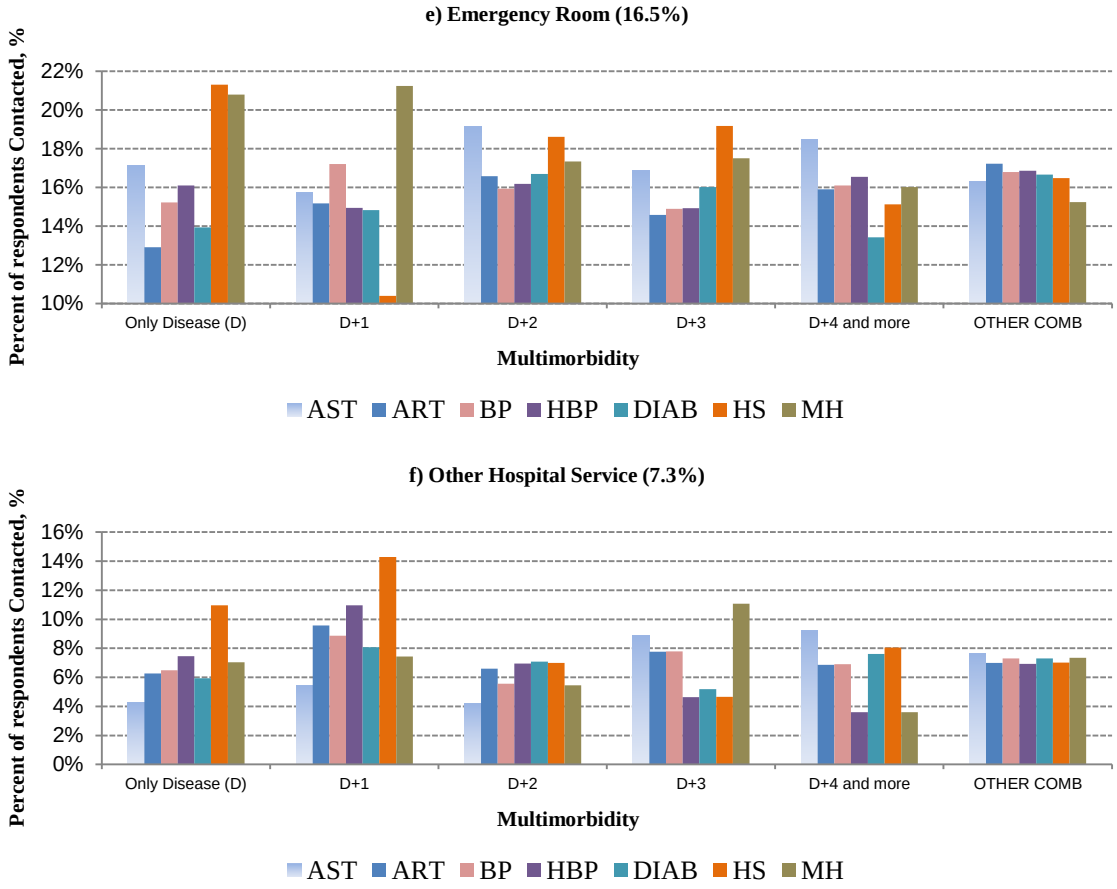


Figure 4d-f. Contacts for Health Information (d-f) by Disease and Comorbidity

Interesting patterns are revealed for contacts from health lines: people with AST, AST +comorbidities, BP alone, HS alone and MH contacted health lines for health information more than others (Fig.4). When compared with other health information sources, 32% of those with DIAB alone used other health information sources as compared to only 13.1% and 13.7% of those with HBP alone and AST alone respectively.

Reported difficulties in getting health information involved 18.2% of respondents (Fig. 5). 76.4%, 37.8% and 15.9% of these had difficulties during regular, evening and midnight hours respectively. 43.5% of these chronic disease patients reported waiting too long to get a response. This, and getting a contact to speak with a doctor or nurse (40.4%) were the most frequent obstacles to these patients in receiving health information (Table 7).

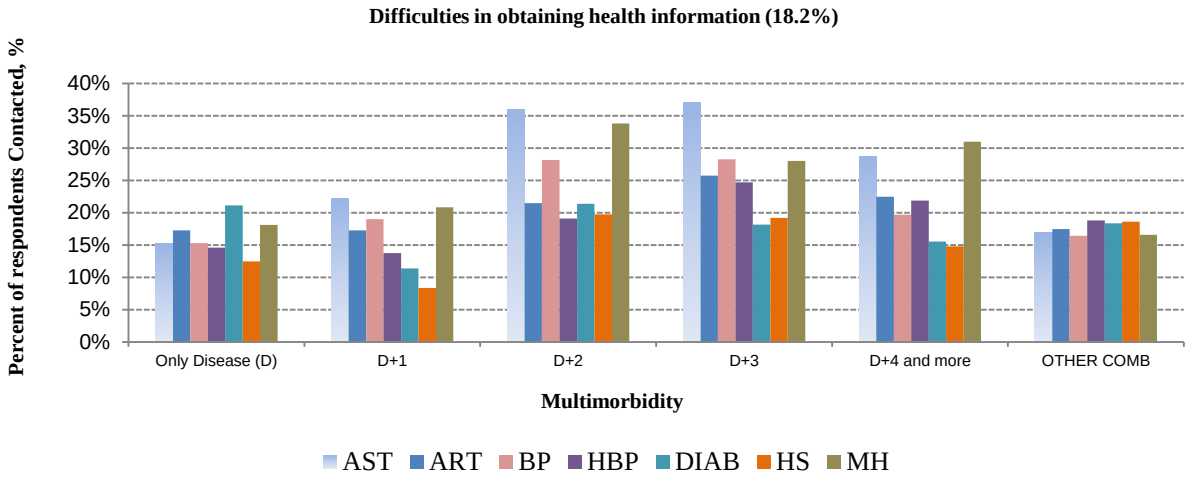


Figure 5. Difficulties in Obtaining Health Information, by Disease and Comorbidity

More than one third (38.2%) of the respondents were not satisfied with the adequacy of information provided. Nearly eight percent did not know where to go or to call for health information. Taking the number of chronic diseases into consideration, almost 42% of those with one chronic condition reported facing difficulties in getting adequate information, as compared to 30.8% of those with four chronic conditions. (Table 7). 16.7% of those with four chronic conditions reported that they did not know where to go or call for health information, as compared to 5.6% of those with one chronic condition. These data indicate areas where it is particularly important to improve information provision. The extended version of Table 7, presented in Appendix F , shows significant differences in difficulties for getting health information among different disease groups (Table F1, Appendix F) and common disease comorbidities (Table F2, Figure F1, Appendix F).

Table 7. Difficulties in Getting Health Information

Difficulties in getting information (18.2%)					
Regular (76.4%)		Evening (37.8%)			
		Midnight (15.9%)			
WHY?		Disease Comorbidity			
	All	1	2	3	4
Contact a physician/nurse	**40.4%**	46.3%	40.9%	28.9%	31.5%
Waited too long to speak	**43.5%**	45.9%	46.1%	36.6%	37.0%
Inadequate information	**38.2%**	42.0%	37.7%	33.0%	30.8%
Could not get through	**19.4%**	22.4%	14.9%	21.8%	13.2%
Did not know where to go/call	**7.5%**	5.6%	8.8%	5.7%	16.7%
Did not have a phone number					
Language					
Unable to leave house/health	**4.3%**	4.6%	3.8%	3.7%	5.1%
Other	**20.2%**	20.2%	18.2%	26.9%	12.6%

DISCUSSION AND CONCLUSIONS

Discussion

We believe that this study is the first of its kind to provide insights into information needs for health information by persons living with comorbidities. Moreover, it is also the first study to assess the relationships among different kinds of health sources and difficulties in obtaining health information for Canadians.

We synthesized the research on information needs into an integrated framework for patient with chronic disease(s) seeking behavior. This framework explains and describes why patients need information, the motivations of health information seeking, the information needed, channels of exchange information, sources of information, outputs per patient, and difficulties patients had in getting information. The proposed framework can be used as a template for future data collection and method developments for surveys, and for potential research about health information needs for patients with chronic disease(s), as most available data do not include questions about goals, motivations, outcomes, etc. These data and potential research aimed to provide better health care for chronic ill patients will lead to relative effectiveness research for management and policy-relevant decision making in chronic care.

In the present study we examined the prevalence and patterns of information needs, segmentation of information sources, and difficulties encountered by persons with chronic disease comorbidities, based on different facets (number of chronic diseases, specific chronic diseases with comorbidities, common chronic disease combinations) to describe comorbidity health information needs. Finding a relationship between the number of chronic conditions, specific diseases, and health information needs is the primary and crucial strength of this study. The percentage of persons with chronic conditions varies with information needs and searches for health information and advice. When unadjusted, as the number of specific chronic diseases and comorbidities increased, except for patients with ART or HS, so did the need for health information. Those who had one chronic disease reported relatively low information needs (46.6%), although the needs of patients with one chronic disease differed. Those who had HBP only or DIAB only reported relatively low information needs (37.2% - 41.8%); rates were slightly higher for persons with ART only (46.2%) and for AST only (46.5%) and were near 51% for BP only. Persons with MH only, ART and BP, ART and MH, AST and BP, BP and MH, ART BP and MH were among the most likely persons with chronic diseases to need health information.

When adjusted by SD (Social Demographics) the tendency of information needs to increase with number of comorbidities remains similar to data not adjusted by SD. Persons with ART, BP, HS and MH were 1.2-1.5, 1.04-1.5,1.2-1.6, 1.1-1.7 times respectively more likely to need information than respondents with other chronic disease combinations. Having DIAB or HS has no relationship with information needs, when controlling with SD+HC+RS factors, although the effect of comorbidities on information needs differs among the specific diseases. Patients with MH alone, or with ART+BP or ART+MH, with two or four comorbidities are more likely to need health information than those with other combinations of diseases. The conclusion that is drawn is that comorbidities determine information needs, and management programs should pay attention to providing information to not just one disease, but should take into consideration the specific chronic disease and specific comorbidities of the chronic condition.

Studies of specific chronic diseases in other countries have shown that women are more likely to have health information needs than men[35,52, 53,59], and that health information needs decrease with respondent age, and with being an immigrant. It increases with level of education, income, and number of persons in the household[35,36,38,57,66]. This study showed similar results but not for just one specific chronic condition, but for comorbidities: 49.5% of women need health information compared with 44.9% of men, people born in Canada were significantly more likely to need health information than immigrants, and respondents with more education were more likely to need health information. When controlling for other variables in this study, all socio-demographic characteristics collected for individuals were strong predictors of reported health information needs. For example, older adults with chronic diseases are less likely to need health information than younger people. There might be several reasons for this: older patients may be adjusted to a different way of health information engagement with their physicians (or other health information sources) from earlier periods in their lives, or they may have different coping styles, or they may just be overwhelmed by information[34].

General and mental health, lifestyle behavior (BMI, physical activity), personal disability, rating of information quality received, and satisfaction with care reveal a more interesting and understated trend. Surprisingly, respondents who were physically active and underweight had more consultations with HP and were more likely to need health information than those who were inactive and obese. Relatively healthy persons become physically active because they are motivated to improve their health and fitness, lose weight, and reduce stress, while others make lifestyle changes after being alerted to ways they can reduce risk factors for conditions such as HS, DIAB, ART[92,93]. People with mental health rated "Poor" and dissatisfied with the way care was provided were more likely to need information, which supports prior research that patient satisfaction is connected to service quality and serves as a predictor of health-related behavior[82]. Despite several studies that link obesity, self-health perceptions, and rating of quality of care as significant predictors of health information needs[62,64,66] our study shows, when controlling for other variables, that these variables are not significant.

Doctors were the most frequently contacted for information (77.9%), followed by health help-lines (17.9%) and walk-in clinics (17.2%). These were followed in order by others (16.9%), emergency room (16.5%), and other hospital services (7.3%). Only 5.1% of the persons who needed health information contacted community health care sources for information. Those who had one chronic disease were relatively less likely than people with comorbidities to contact doctors for health information (76.6%), although this varied among the chronic diseases. Those who had only AST contacted doctors for health information relatively less frequently (68.3%) than those who had ART, BP,HBP, or DIAB only ($p<0.05$); rates were slightly higher for persons with MH only and HS (74.3%- 74.4%), BP only (76.7%) and for ART only (78.5%).

Likewise, there is a difference between specific chronic conditions and health information sources contacted for health information. Persons with HBP only, DIAB only, ART and BP, BP and HBP, ART BP and HBP, and persons with four comorbidities were among the most likely persons with chronic disease to contact doctors for health information. The highest level of contact with community healthcare for health information was by people with ART, BP and MH, HBP and HS, and AST and BP. People with comorbidities (two or more chronic diseases) contacted walk-in

clinics for health information more than others. The highest level for this type of contact was for persons with HBP and DIAB. Health-lines were used mostly by persons with MH alone, AST alone, BP alone, MH with comorbidities, AST with comorbidities. This segmentation reveals that health providers should be prepared to provide information to people not only with different specific chronic conditions, but specific comorbidities also.

18.2% of respondents had difficulties in getting health information, with 76.4%, 37.8 and 15.9% of these reporting difficulties during regular, evening and midnight hours respectively. Chronic disease patients reported that waiting too long to speak with (43.5%) or to contact doctors or nurses (40.4%) were the most frequent obstacles to receiving health information. Our study is the first that reveals the difficulties patients with comorbidities encountered when attempting to contact health information sources, taking the number of chronic diseases into consideration. Almost 42% of those with one chronic condition reported facing difficulties in inadequate information received as compared to 30.8% of those with four comorbidities.

Conclusions

The conclusion to be drawn from these results is that multimorbidity determines the information needs, and chronic disease management must pay attention to providing information about not just one disease, but take into consideration the specific chronic disease and specific comorbidities of the chronic condition of the individual being treated. This study finding bring a novel and comprehensive insight into the complex associations between health information need and its predictors, which will provide an improved understanding of the promotion and preparation of future health-related programs for managing chronic diseases.

Practice Implications

Our proposed framework can be used as a template for future data collection and method development for surveys, and potential research about health information needs for patient with chronic disease(s), as most published papers and surveys do not include questions about goals, motivations, outcomes, etc. These results and potential research aimed at providing better health care for chronically ill patients would lead to relative effectiveness research that addresses management and policy-relevant decision making in chronic care situations.

The synthesis of these findings could be used to guide and train health providers (doctors, nurses, social workers, and others) to develop appropriate evidence-based communication strategies and policies for patients with multimorbidities. These communication strategies will help to optimize the role of patients in the self-management of their care and will provide adequate information to assist them to become better informed, more satisfied, to make choices and to participate more actively in health-related decisions in the self-management of their chronic diseases. This in turn will yield enhanced motivation and self-efficacy of patients, a higher likelihood of adherence and improved health outcomes, improved patient understanding of their medical conditions, and in long run will improve the way people manage their chronic conditions.

Limitations

Although the findings of this study provide further insights into the major factors that predict health information needs and how this information is found, there are some restrictions associated with the cross-sectional, self-reported data that we used. The major limitations of this study are that

nothing was reported in the database about what information respondents were looking for, what were the outcomes when information was provided, and what the motivations of looking for information were. Future research on health information needs should specifically identify what information patients with comorbidities are looking for. This will create a better understanding of the benefits of receiving information and will encourage better educated participation in chronic self-management programs developed by health care providers and government. Further research is also needed to determine the existence and impact of any moderating effects of health information on patient health outcomes and healthcare utilization patterns.

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Endnotes

[1] Health literacy is defined as "the ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course" [15]. Recent research in Canada reveals that almost 55% of Canadians aged 16 to 65 appear to have lower levels of health proficiency than required to meet the demands of modern life, independently and reliably in an industrialized nation. Seven in eight adults (88%) over age 65 appear to lack health literacy skills required to respond to health information needs in different contexts. These numbers are very significant as more than 55% of seniors have two or more chronic conditions (Fig.A1, Appendix A) and are more likely to face high levels of health information needs [15].

[2] Unfortunately, due data restrictions we have no data available on health information search via the Internet. The latest study of a representative national Canadian consumer sample (n=23178) shows that 48.5% of the population sought health information via the Internet [83], although information about chronic conditions for data used in the study was not available. The authors found that socio-demographic characteristics, and important Internet usage characteristics, such as expertise, tenure (number of years of online experience), activities (e.g. general, government information and shopping), and concerns about privacy and security are significant determinants of Internet use for online health information searches by Canadians. Disease-specific information was the most frequently sought health information, followed by lifestyle information and disease symptoms. The study revealed a low level (27%) of communication between physicians and patients about Internet health-related information.

[3] The Ontario response rate is presented separately, as only people from this province were surveyed about heath information needs.

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APPENDIX A

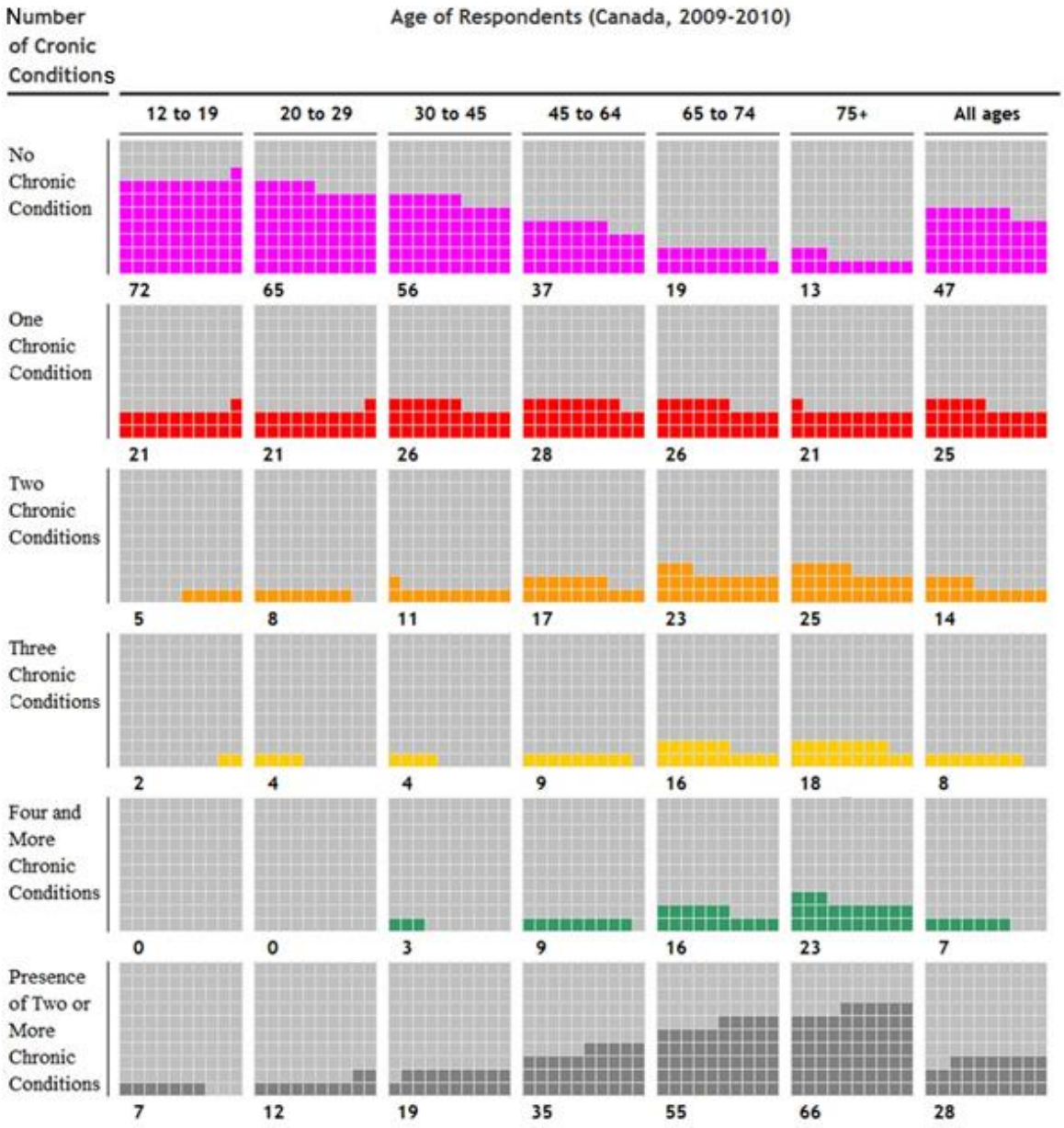

Figure A1. Prevalence of Chronic Conditions, Canada

APPENDIX B

Table B1. Chronic Disease Comorbidities Combinations and Health Information Needs

Chronic Disease Comorbidities	Total, n (%) n=21810	Health Information Needs, n (%)		Unadjusted Odds Ratio	95% Confidence Interval
		No n=11471 (52.6%)	Yes n=10339 (47.4%)		
Disease Comorbidities $x^2(19)=295.54$					
Only One Disease:					
ART	1618 (7.4)	871 (7.6)	747 (7.2)	0.92	0.82, 1.03
AST	1526 (7)	815 (7.1)	710 (6.9)	0.93	0.83, 1.05
BP	2907 (13.3)	1428 (12.4)	1480 (14.3)	1.11**	1.01, 1.22
HBP	2307 (10.6)	1449 (12.6)	858 (8.3)	0.63*	0.57, 0.70
DIAB	630 (2.9)	367 (3.2)	263 (2.5)	0.77**	0.65, 0.91
HS	322 (1.5)	167 (1.5)	154 (1.5)	0.99	0.79, 1.24
MH	2121 (9.7)	1003 (8.7)	1118 (10.8)	1.19*	1.08, 1.32
Multimorbidity:					
ART BP	1181 (5.4)	558 (4.9)	623 (6)	1.2**	1.05, 1.36
ART HBP	816 (3.7)	472 (4.1)	343 (3.3)	0.78**	0.67, 0.90
ART MH	224 (1)	99 (0.9)	124 (1.2)	1.34**	1.02, 1.75
AST BP	296 (1.4)	119 (1)	177 (1.7)	1.59*	1.25, 2.02
AST MH	264 (1.2)	138 (1.2)	126 (1.2)	0.98	0.76, 1.25
BP HBP	464 (2.1)	252 (2.2)	212 (2)	0.9	0.74, 1.09
BP MH	692 (3.2)	292 (2.5)	400 (3.9)	1.47*	1.25, 1.73
HBP HS	359 (1.6)	224 (2)	134 (1.3)	0.64*	0.51, 0.80
HBP DIAB	611 (2.8)	380 (3.3)	231 (2.2)	0.65*	0.55, 0.78
HBP MH	266 (1.2)	119 (1)	147 (1.4)	1.31**	1.02, 1.69
ART BP HBP	551 (2.5)	335 (2.9)	216 (2.1)	0.69*	0.57, 0.83
ART BP MH	311 (1.4)	133 (1.2)	178 (1.7)	1.43**	1.13, 1.81
OTHER	4345 (19.9)	2247 (19.6)	2098 (20.3)	Ref	

Note: * p<0.001; **p<0.05;*** p<0.1

Table B2. Chronic Diseases, Comorbidities, Common Comorbidities Combinations and Health Information Needs

Chronic Disease Comorbidities	Health Information Needs, n (%)	Chronic Disease Comorbidities	Health Information Needs, n (%)	Chronic Disease Comorbidities	Health Information Needs, n (%)
Arthritis (ART)		Diabetes (DIAB)		Multimorbidity:	
Only ART	↘ 46.2	Only DIAB	⇩ 41.8	ART BP	⇧ 52.8
ART +1	⇨ 48.3	DIAB +1	⇩ 41.5	ART HBP	⇩ 42.1
ART+2	↘ 45.8	DIAB+2	↘ 45.8	ART MH	⇧ 55.6
ART +3	⇨ 47.9	DIAB +3	↘ 43.9	AST BP	⇧ 59.8
ART +4 and	⇧ 51.4	DIAB +4 and more	⇧ 52.9	AST MH	⇨ 47.7
OTHER	⇨ 47.5	OTHER COMB	⇨ 48.0	BP HBP	↘ 45.6
Asthma (AST)		Heart and Stroke (HS)		BP MH	⇧ 57.8
Only AST	⇨ 46.5	Only HS	⇨ 48.0	HBP HS	⇩ 37.5
AST +1	⇧ 52.7	HS +1	↘ 44.0	HBP DIAB	⇩ 37.8
AST+2	⇧ 52.1	HS+2	↘ 44.8	HBP MH	⇧ 55.1
AST +3	⇧ 53.7	HS +3	⇨ 46.5	ART BP HBP	⇩ 39.2
AST +4 and	↘ 45.6	HS +4 and more	⇧ 52.7	ART BP MH	⇧ 57.2
OTHER	⇨ 47.0	OTHER COMB	⇨ 47.6	OTHER	⇨ 48.3
Back Problems		Migraine and Headache (MH)			
Only BP	⇧ 50.9	Only HS	⇧ 52.7		
BP +1	⇧ 53.3	HS +1	⇧ 55.6		
BP+2	⇗ 48.7	HS+2	⇧ 55.7		
BP +3	⇨ 47.1	HS +3	⇧ 58.2		
BP +4 and	⇧ 50.8	HS +4 and more	⇧ 53.0		
OTHER	↘ 45.1	OTHER COMB	↘ 45.3		
High Blood		Comorbidities			
Only HBP	⇩ 37.2	One Disease	⇨ 46.6		
HBP +1	⇩ 42.3	Two Diseases	⇗ 48.6		
HBP+2	↘ 44	Three Diseases	⇨ 47.4		
HBP +3	↘ 45.6	Four Diseases	⇨ 47.9		
HBP +4 and	⇗ 48.6	Five and More	⇧ 50.2		
OTHER	⇧ 50.6			**All**	**⇨ 47.4**

WHERE:

Icon	Explanation	Health Information Needs *When value x (%) is:*
⇧	Considerably more than average	x >=50
⇗	Slightly more than average	48.5 <= x < 50
⇨	Average	46.5 <= x < 48.5
↘	Slightly less than average	43.5<= x < 46.5
⇩	Considerably less than average	x < 43.5

APPENDIX C

Table C1. Multiple Logistic Regression Models Predicting Required Health Information Needs (Number of Chronic Diseases)

Independent Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4.1 OR (95% CI)
Gender $x^2(1)=37.72$*	*	*	*	*
Male	Ref	Ref	Ref	Ref
Female	1.35* (1.26,1.45)	1.38* (1.29,1.49)	1.34* (1.24,1.44)	1.34* (1.24,1.44)
Age $x^2(6)=669.2$*	*	*	*	*
15 to 24	Ref	Ref	Ref	Ref
25 to 34	1.78* (1.48,2.13)	1.67* (1.39,2)	1.59* (1.32,1.92)	1.59* (1.32,1.91)
35 to 44	1.45* (1.21,1.74)	1.3** (1.08,1.56)	1.28** (1.06,1.54)	1.26** (1.04,1.53)
45 to 54	1.09 (0.91,1.3)	0.94 (0.78,1.13)	0.96 (0.79,1.16)	0.94 (0.78,1.14)
55 to 64	1 (0.83,1.21)	0.89 (0.74,1.08)	0.91 (0.74,1.1)	0.89 (0.73,1.08)
65 to 74	0.93 (0.76,1.13)	0.86 (0.7,1.06)	0.89 (0.72,1.09)	0.86 (0.7,1.07)
75 and over	0.97 (0.78,1.2)	0.88 (0.71,1.09)	0.9 (0.72,1.12)	0.87 (0.69,1.09)
Marital status	*	*	*	*
Married	Ref	Ref	Ref	Ref
Common law	0.98 (0.85,1.13)	0.94 (0.82,1.08)	0.96 (0.84,1.11)	0.96 (0.83,1.11)
Separated/divorced, widow or widower	0.86** (0.77,0.97)	0.82** (0.73,0.93)	0.84** (0.74,0.95)	0.84** (0.74,0.95)
Single, never married	0.67* (0.59,0.76)	0.64* (0.56,0.73)	0.65* (0.57,0.74)	0.65* (0.57,0.74)
Education	*	*	*	*
< Than secondary	Ref	Ref	Ref	Ref
Secondary graduation	0.94 (0.84,1.06)	0.98 (0.87,1.11)	0.95 (0.85,1.08)	0.95 (0.84,1.07)
Other post-secondary	1.6* (1.37,1.86)	1.67* (1.43,1.94)	1.6* (1.37,1.87)	1.6* (1.37,1.87)
Post secondary graduation	1.71* (1.55,1.9)	1.8* (1.63,2)	1.74* (1.57,1.93)	1.74* (1.57,1.93)
Persons in household $x^2(3)=429.1$*	*	*	*	*
1 person	Ref	Ref	Ref	Ref
2 persons	1.05 (0.93,1.2)	1.08 (0.95,1.23)	1.13*** (0.99,1.29)	1.13*** (0.99,1.29)
3 persons	1.36* (1.18,1.57)	1.42* (1.24,1.64)	1.46* (1.27,1.69)	1.46* (1.27,1.69)
4 persons	1.54* (1.33,1.79)	1.6* (1.37,1.86)	1.68* (1.44,1.96)	1.68* (1.44,1.97)
5 or more persons	1.65* (1.4,1.94)	1.72* (1.45,2.03)	1.84* (1.56,2.18)	1.84* (1.55,2.18)
Income	*	*	*	*
No income	Ref	Ref	Ref	Ref
< $20,000	1.06 (0.88,1.3)	1 (0.82,1.22)	0.97 (0.8,1.19)	0.98 (0.8,1.19)
$20,000 - $39,999	1.03 (0.85,1.26)	1.07 (0.88,1.31)	1.06 (0.87,1.29)	1.06 (0.87,1.29)
$40,000 - $59,999	1.08 (0.88,1.32)	1.19*** (0.97,1.46)	1.2*** (0.98,1.48)	1.2*** (0.98,1.48)
$60,000 - $79,999	1.18 (0.95,1.46)	1.32** (1.06,1.64)	1.32** (1.06,1.64)	1.33** (1.07,1.66)
$80,000 +	1.46* (1.18,1.8)	1.67* (1.34,2.07)	1.68* (1.35,2.09)	1.68* (1.35,2.1)
Immigrant	*	*	*	*
0-9 years	Ref	Ref	Ref	Ref
10 or more years	1.43* (1.21,1.69)	1.37* (1.16,1.62)	1.37* (1.15,1.63)	1.35* (1.14,1.6)
Born In Canada	2.1* (1.79,2.47)	2.01* (1.71,2.36)	2.07* (1.75,2.44)	2.04* (1.73,2.4)
Physical activity index $x^2(2)=14,47$*		**	**	**
Active		Ref	Ref	Ref

Moderate		0.99 (0.9,1.1)	0.99 (0.9,1.1)	0.99 (0.9,1.1)
Inactive		0.89** (0.81,0.97)	0.88** (0.8,0.96)	0.87** (0.8,0.96)
BMI				
Underweight		Ref	Ref	Ref
Normal Weight		0.84 (0.64,1.09)	0.86 (0.66,1.13)	0.85 (0.65,1.12)
Overweight		0.87 (0.67,1.14)	0.89 (0.68,1.17)	0.88 (0.67,1.15)
Obese		0.85 (0.65,1.1)	0.85 (0.65,1.12)	0.84 (0.64,1.1)
HUI index		*	*	*
No disability		Ref	Ref	Ref
Mild disability		0.98 (0.88,1.08)	0.96 (0.87,1.07)	0.96 (0.86,1.06)
Moderate disability		1.06 (0.94,1.2)	1.01 (0.89,1.14)	0.99 (0.88,1.12)
Severe disability		1.41* (1.25,1.59)	1.2** (1.06,1.36)	1.18** (1.04,1.34)
Self-perceived health		*		
Excellent		Ref	Ref	Ref
Very good		0.96 (0.86,1.07)	0.94 (0.84,1.05)	0.93 (0.84,1.04)
Good		1 (0.89,1.12)	0.94 (0.83,1.05)	0.92 (0.82,1.04)
Fair		1.16** (1,1.34)	0.99 (0.86,1.15)	0.98 (0.85,1.13)
Poor		1.4** (1.14,1.72)	0.98 (0.79,1.21)	0.97 (0.79,1.21)
Self-perceived mental health		*	**	**
Excellent		Ref	Ref	Ref
Very good		1.07 (0.99,1.16)	1.06 (0.98,1.15)	1.06 (0.97,1.15)
Good		1.18* (1.07,1.3)	1.15** (1.04,1.27)	1.15** (1.04,1.27)
Fair		1.45* (1.24,1.7)	1.28** (1.09,1.51)	1.28** (1.09,1.51)
Poor		1.6** (1.21,2.13)	1.3*** (0.97,1.75)	1.32*** (0.98,1.77)
Rating of Quality of Care Received				
Excellent			Ref	Ref
Good			0.94 (0.87,1.03)	0.95 (0.87,1.03)
Fair			0.87*** (0.75,1.01)	0.87*** (0.75,1.01)
Poor			0.74** (0.55,0.98)	0.75** (0.56,1)
Satisfaction with Way Care Provided			*	*
Very Satisfied			Ref	Ref
Somewhat Satisfied			1.14** (1.04,1.24)	1.13** (1.04,1.24)
Neither			1.36* (1.15,1.62)	1.37* (1.16,1.63)
Somewhat Dissatisfied			1.58* (1.32,1.9)	1.58* (1.32,1.89)
Very Dissatified			2.2* (1.68,2.87)	2.15* (1.64,2.82)
Number of Consultations with Medical Doctors				
			1.06* (1.05,1.07)	1.06* (1.05,1.07)
Number of Chronical Disease				*
One Disease				Ref
Two Diseases				1.17* (1.08,1.27)
Three Diseases				1.02 (0.91,1.14)
Four Diseases				1.16*** (0.97,1.38)
Five and More Diseases				0.86 (0.66,1.13)
Model -specific				
Wald x^2 (df)	1031.11(24)	1243.39 (40)	1562.81 (48)	1581.6(52)
p-value	0.000	0.000	0.000	0.000
2Log likelihood test	20027.98	19815.70	19496.28	19477.49
Hosmer and Lemeshow Test	63.58	51.30	15.96	42.99

Percentage Correct	60.16	61.48	63.30	63.10

Note: * p<0.001; **p<0.05;*** p<0.1

Table C2. Multiple Logistic Regression Models Predicting Required Health Information Needs (D=ART, AST, BP, HBP)

Independent Variables	Model 4.2 ART OR (95% CI)	Model 4.3 AST OR (95% CI)	Model 4.4 BP OR (95% CI)	Model 4.5 HBP OR (95% CI)
Gender	*	*	*	*
Male	Ref	Ref	Ref	Ref
Female	1.33* (1.23,1.43)	1.34* (1.25,1.45)	1.34* (1.25,1.44)	1.32* (1.23,1.42)
Age	*	*	*	*
15 to 24	Ref	Ref	Ref	Ref
25 to 34	1.59* (1.32,1.91)	1.58* (1.31,1.91)	1.59* (1.32,1.92)	1.59* (1.32,1.92)
35 to 44	1.25** (1.04,1.52)	1.27** (1.05,1.53)	1.27** (1.05,1.54)	1.31** (1.09,1.59)
45 to 54	0.94 (0.78,1.13)	0.95 (0.79,1.16)	0.96 (0.79,1.16)	1 (0.83,1.22)
55 to 64	0.87 (0.72,1.07)	0.9 (0.74,1.1)	0.91 (0.75,1.11)	0.97 (0.8,1.18)
65 to 74	0.86 (0.69,1.06)	0.88 (0.71,1.09)	0.89 (0.72,1.1)	0.96 (0.78,1.18)
75 and over	0.86 (0.69,1.08)	0.89 (0.71,1.11)	0.91 (0.73,1.14)	0.97 (0.78,1.22)
Marital status	*	*	*	*
Married	Ref	Ref	Ref	Ref
Common law	0.96 (0.83,1.11)	0.96 (0.83,1.11)	0.96 (0.83,1.11)	0.96 (0.83,1.11)
Separated/divorced, widow or widower	0.84** (0.74,0.95)	0.84** (0.74,0.95)	0.84** (0.74,0.95)	0.84** (0.74,0.94)
Single, never married	0.65* (0.57,0.74)	0.65* (0.57,0.74)	0.65* (0.57,0.74)	0.64* (0.56,0.73)
Education	*	*	*	*
< Than secondary	Ref	Ref	Ref	Ref
Secondary graduation	0.95 (0.84,1.07)	0.95 (0.84,1.07)	0.95 (0.84,1.07)	0.95 (0.84,1.08)
Other post-secondary	1.6* (1.37,1.87)	1.6* (1.37,1.87)	1.6* (1.37,1.87)	1.6* (1.37,1.87)
Post secondary graduation	1.74* (1.56,1.93)	1.74* (1.56,1.93)	1.74* (1.56,1.93)	1.73* (1.55,1.92)
Persons in household $x^2(3)=429.1$*	*	*	*	*
1 person	Ref	Ref	Ref	Ref
2 persons	1.13*** (0.99,1.29)	1.14*** (1,1.3)	1.13*** (0.99,1.29)	1.13*** (0.99,1.29)
3 persons	1.47* (1.27,1.7)	1.48* (1.28,1.71)	1.46* (1.26,1.68)	1.46* (1.26,1.69)
4 persons	1.68* (1.44,1.96)	1.69* (1.45,1.97)	1.68* (1.44,1.96)	1.66* (1.42,1.93)
5 or more persons	1.85* (1.56,2.18)	1.85* (1.56,2.19)	1.84* (1.55,2.17)	1.8* (1.52,2.13)
Income	*	*	*	*
No income	Ref	Ref	Ref	Ref
< $20,000	0.97 (0.79,1.18)	0.98 (0.8,1.2)	0.98 (0.8,1.19)	0.99 (0.81,1.21)
$20,000 - $39,999	1.05 (0.86,1.29)	1.06 (0.87,1.3)	1.06 (0.87,1.3)	1.07 (0.88,1.31)
$40,000 - $59,999	1.2*** (0.97,1.47)	1.21*** (0.98,1.48)	1.21*** (0.98,1.48)	1.21*** (0.98,1.49)
$60,000 - $79,999	1.32** (1.06,1.64)	1.33** (1.07,1.65)	1.33** (1.06,1.65)	1.35** (1.08,1.68)
$80,000 +	1.67* (1.34,2.07)	1.68* (1.36,2.09)	1.68* (1.35,2.09)	1.72* (1.38,2.14)
Immigrant	*	*	*	*
0-9 years	Ref	Ref	Ref	Ref
10 or more years	1.35* (1.14,1.61)	1.35* (1.14,1.6)	1.36* (1.14,1.61)	1.32** (1.11,1.57)
Born In Canada	2.03* (1.72,2.4)	2.05* (1.73,2.41)	2.04* (1.73,2.41)	1.97* (1.67,2.33)

Physical activity index $x^2(2)=14,47$*	**	**	**	**
Active	Ref	Ref	Ref	Ref
Moderate	1 (0.9,1.1)	0.99 (0.9,1.09)	0.99 (0.9,1.1)	1 (0.9,1.1)
Inactive	0.88** (0.8,0.96)	0.88** (0.8,0.96)	0.88** (0.8,0.96)	0.88** (0.81,0.96)
BMI				
Underweight	Ref	Ref	Ref	Ref
Normal Weight	0.86 (0.66,1.12)	0.86 (0.66,1.13)	0.85 (0.65,1.11)	0.86 (0.66,1.12)
Overweight	0.89 (0.68,1.16)	0.89 (0.68,1.17)	0.88 (0.67,1.16)	0.91 (0.69,1.19)
Obese	0.85 (0.65,1.11)	0.86 (0.65,1.12)	0.85 (0.65,1.11)	0.88 (0.67,1.15)
HUI index	*	*	**	**
No disability	Ref	Ref	Ref	Ref
Mild disability	0.96 (0.87,1.06)	0.96 (0.86,1.06)	0.96 (0.87,1.06)	0.95 (0.86,1.05)
Moderate disability	1 (0.88,1.12)	1 (0.89,1.13)	0.99 (0.88,1.12)	0.97 (0.86,1.09)
Severe disability	1.18** (1.04,1.34)	1.19** (1.05,1.35)	1.18** (1.04,1.34)	1.14*** (1,1.29)
Self-perceived health				
Excellent	Ref	Ref	Ref	Ref
Very good	0.94 (0.84,1.05)	0.94 (0.84,1.05)	0.94 (0.84,1.05)	0.96 (0.86,1.07)
Good	0.94 (0.83,1.05)	0.93 (0.83,1.05)	0.93 (0.83,1.05)	0.96 (0.85,1.08)
Fair	1 (0.86,1.16)	1 (0.86,1.16)	1 (0.86,1.16)	1.02 (0.88,1.18)
Poor	1 (0.81,1.23)	1 (0.81,1.24)	0.99 (0.8,1.23)	1.01 (0.82,1.25)
Self-perceived mental health	**	**	**	**
Excellent		Ref	Ref	Ref
Very good	1.06 (0.98,1.15)	1.06 (0.98,1.16)	1.06 (0.97,1.15)	1.05 (0.97,1.14)
Good	1.15** (1.04,1.27)	1.15** (1.04,1.27)	1.14** (1.04,1.26)	1.14** (1.03,1.26)
Fair	1.29** (1.09,1.52)	1.29** (1.1,1.52)	1.28** (1.09,1.51)	1.28** (1.08,1.5)
Poor	1.3*** (0.97,1.75)	1.32*** (0.98,1.77)	1.31*** (0.98,1.76)	1.32*** (0.98,1.77)
Rating of Quality of Care Received				
Excellent	Ref	Ref	Ref	Ref
Good	0.95 (0.87,1.03)	0.95 (0.87,1.03)	0.94 (0.87,1.03)	0.94 (0.87,1.03)
Fair	0.87*** (0.75,1.01)	0.88*** (0.76,1.01)	0.87*** (0.75,1)	0.87*** (0.75,1.01)
Poor	0.74** (0.56,0.99)	0.74** (0.55,0.99)	0.74** (0.56,0.99)	0.74** (0.56,0.99)
Satisfaction with Way Care Provided	*	*	*	*
Very Satisfied	Ref	Ref	Ref	Ref
Somewhat Satisfied	1.14** (1.04,1.24)	1.13** (1.04,1.24)	1.14** (1.04,1.24)	1.13** (1.04,1.24)
Neither	1.37* (1.15,1.62)	1.36* (1.14,1.61)	1.37* (1.15,1.63)	1.35* (1.14,1.61)
Somewhat Dissatisfied	1.58* (1.32,1.89)	1.57* (1.31,1.88)	1.58* (1.32,1.89)	1.57* (1.31,1.88)
Very Dissatified	2.16* (1.65,2.83)	2.19* (1.67,2.87)	2.18* (1.66,2.85)	2.15* (1.64,2.81)
Number of Consultations with Medical Doctors	*	*	*	*
	1.06* (1.05,1.07)	1.06* (1.05,1.07)	1.06* (1.05,1.07)	1.06* (1.05,1.07)
Disease and Comorbidities	**	**	**	*
Only Disease (D)	Ref	Ref	Ref	Ref
D +1	1.05 (0.9,1.23)	1.11 (0.89,1.39)	1.21** (1.06,1.38)	1.39* (1.2,1.61)
D+2	0.87 (0.73,1.03)	1.14 (0.89,1.45)	0.94 (0.81,1.09)	1.27** (1.08,1.49)
D +3	1.04 (0.84,1.29)	1.11 (0.83,1.49)	1.05 (0.86,1.29)	1.47* (1.19,1.82)
D +4 and more	0.77*** (0.57,1.04)	0.61** (0.42,0.89)	0.87 (0.65,1.16)	1.03 (0.77,1.38)

OTHER COMB	0.9 (0.79,1.03)	1.1 (0.95,1.28)	1 (0.9,1.11)	1.51* (1.34,1.7)
Model -specific (DF=53)				
Wald x^2 (df)	1577.3	1576.344	1579.386	1619.435
p-value	0.000	0.000	0.000	0.000
2Log likelihood test	19481.71	19482.75	19479.71	19439.66
Hosmer and Lemeshow Test	24.52	24.37	33.59	29.47
Percentage Correct	63.10	63.30	63.00	63.20

Note: * p<0.001; **p<0.05;*** p<0.1

Table C3. Multiple Logistic Regression Models Predicting Required Health Information Needs (D=DIAB, HS, MH)

Independent Variables	Model 4.6 DIAB OR (95% CI)	Model 4.7 HS OR (95% CI)	Model 4.8 MH OR (95% CI)
Gender	*	*	*
Male	Ref	Ref	Ref
Female	1.33* (1.24,1.44)	1.35* (1.25,1.45)	1.3* (1.21,1.41)
Age	*	*	*
15 to 24	Ref	Ref	Ref
25 to 34	1.6* (1.33,1.93)	1.6* (1.32,1.92)	1.59* (1.32,1.91)
35 to 44	1.28** (1.06,1.55)	1.28** (1.06,1.55)	1.31** (1.08,1.58)
45 to 54	0.96 (0.8,1.17)	0.96 (0.79,1.16)	1.01 (0.83,1.22)
55 to 64	0.91 (0.75,1.11)	0.9 (0.74,1.09)	0.97 (0.79,1.18)
65 to 74	0.89 (0.72,1.1)	0.87 (0.7,1.07)	0.96 (0.78,1.19)
75 and over	0.9 (0.72,1.12)	0.86 (0.69,1.08)	0.98 (0.78,1.22)
Marital status	*	*	*
Married	Ref	Ref	Ref
Common law	0.97 (0.84,1.11)	0.97 (0.84,1.11)	0.96 (0.83,1.1)
Separated/divorced, widow or widower	0.84** (0.74,0.95)	0.84** (0.74,0.95)	0.84** (0.75,0.96)
Single, never married	0.65* (0.57,0.74)	0.65* (0.57,0.74)	0.65* (0.57,0.74)
Education	*	*	*
< Than secondary	Ref	Ref	Ref
Secondary graduation	0.95 (0.84,1.08)	0.95 (0.85,1.08)	0.95 (0.84,1.07)
Other post-secondary	1.6* (1.37,1.87)	1.6* (1.37,1.87)	1.61* (1.37,1.88)
Post secondary graduation	1.74* (1.57,1.94)	1.74* (1.56,1.93)	1.73* (1.55,1.92)
Persons in household $x^2(3)=429.1$*	*	*	*
1 person	Ref	Ref	Ref
2 persons	1.14*** (1,1.29)	1.13*** (1,1.29)	1.14*** (1,1.3)
3 persons	1.47* (1.27,1.7)	1.47* (1.27,1.69)	1.47* (1.28,1.7)
4 persons	1.69* (1.45,1.98)	1.69* (1.45,1.97)	1.69* (1.45,1.97)
5 or more persons	1.86* (1.57,2.21)	1.85* (1.56,2.18)	1.84* (1.56,2.18)
Income	*	*	*
No income	Ref	Ref	Ref
< $20,000	0.97 (0.8,1.19)	0.98 (0.8,1.19)	0.99 (0.81,1.21)
$20,000 - $39,999	1.06 (0.87,1.3)	1.06 (0.87,1.3)	1.07 (0.87,1.3)
$40,000 - $59,999	1.2*** (0.98,1.48)	1.21*** (0.98,1.48)	1.21*** (0.98,1.49)
$60,000 - $79,999	1.32** (1.06,1.64)	1.32** (1.06,1.64)	1.33** (1.07,1.66)

$80,000 +	1.68* (1.35,2.09)	1.69* (1.36,2.1)	1.7* (1.37,2.11)
Immigrant	*	*	*
0-9 years	Ref	Ref	Ref
10 or more years	1.36* (1.15,1.62)	1.37* (1.15,1.62)	1.36* (1.15,1.62)
Born In Canada	2.05* (1.74,2.42)	2.06* (1.74,2.42)	2.06* (1.74,2.43)
Physical activity index $x^2(2)=14,47$*	**	**	**
Active	Ref	Ref	Ref
Moderate	0.99 (0.9,1.1)	0.99 (0.9,1.09)	0.99 (0.9,1.09)
Inactive	0.88** (0.8,0.96)	0.88** (0.8,0.96)	0.88** (0.8,0.96)
BMI			
Underweight	Ref	Ref	Ref
Normal Weight	0.85 (0.65,1.11)	0.86 (0.66,1.13)	0.86 (0.66,1.12)
Overweight	0.88 (0.67,1.15)	0.89 (0.68,1.17)	0.9 (0.68,1.17)
Obese	0.84 (0.64,1.1)	0.85 (0.65,1.12)	0.86 (0.66,1.13)
HUI index	*	*	*
No disability	Ref	Ref	Ref
Mild disability	0.96 (0.87,1.07)	0.96 (0.87,1.07)	0.96 (0.87,1.06)
Moderate disability	1 (0.89,1.13)	1.01 (0.89,1.13)	1.01 (0.9,1.14)
Severe disability	1.19** (1.05,1.35)	1.2** (1.06,1.36)	1.2** (1.06,1.36)
Self-perceived health			
Excellent	Ref	Ref	Ref
Very good	0.94 (0.84,1.05)	0.94 (0.84,1.05)	0.96 (0.86,1.07)
Good	0.94 (0.83,1.05)	0.93 (0.82,1.04)	0.96 (0.85,1.08)
Fair	0.99 (0.85,1.14)	0.97 (0.84,1.13)	1.02 (0.88,1.18)
Poor	0.97 (0.78,1.2)	0.96 (0.78,1.19)	1.01 (0.82,1.25)
Self-perceived mental health	**	**	**
Excellent		Ref	Ref
Very good	1.06 (0.98,1.15)	1.06 (0.98,1.15)	1.06 (0.98,1.15)
Good	1.15** (1.04,1.27)	1.15** (1.05,1.27)	1.14** (1.04,1.26)
Fair	1.28** (1.09,1.51)	1.28** (1.09,1.51)	1.27** (1.08,1.49)
Poor	1.31*** (0.98,1.76)	1.3*** (0.97,1.75)	1.3*** (0.97,1.74)
Rating of Quality of Care Received			***
Excellent	Ref	Ref	Ref
Good	0.95 (0.87,1.03)	0.95 (0.87,1.03)	0.94 (0.86,1.02)
Fair	0.87*** (0.75,1.01)	0.88*** (0.76,1.02)	0.87*** (0.75,1.01)
Poor	0.74** (0.56,0.99)	0.74** (0.56,0.99)	0.73** (0.55,0.97)
Satisfaction with Way Care Provided	*	*	*
Very Satisfied	Ref	Ref	Ref
Somewhat Satisfied	1.14** (1.04,1.24)	1.14** (1.04,1.24)	1.14** (1.05,1.24)
Neither	1.36* (1.15,1.62)	1.36* (1.14,1.61)	1.36* (1.15,1.62)
Somewhat Dissatisfied	1.58* (1.32,1.9)	1.57* (1.31,1.89)	1.58* (1.32,1.9)
Very Dissatified	2.18* (1.67,2.86)	2.19* (1.68,2.87)	2.2* (1.68,2.88)
Number of Consultations with Medical Doctors	*	*	*
	1.06* (1.05,1.07)	1.06* (1.05,1.07)	1.06* (1.05,1.07)
Disease and Comorbidities			*
Only Disease (D)#	Ref	Ref	Ref
D +1	1.22 (0.96,1.57)	1.2 (0.84,1.69)	0.92 (0.77,1.1)

D+2	1.27*** (0.98,1.64)	0.99 (0.7,1.4)	0.78** (0.63,0.96)
D +3	1.2 (0.88,1.62)	1.14 (0.77,1.67)	0.95 (0.7,1.3)
D +4 and more	1.24 (0.85,1.8)	0.98 (0.64,1.5)	0.57** (0.39,0.84)
OTHER COMB	1.17 (0.97,1.43)	0.93 (0.69,1.25)	0.76* (0.67,0.86)
Model -specific (DF=53)			
Wald x^2 (df)	1566.65	1571.50	1589.581
p-value	0.572	0.122	0.000
2Log likelihood test	19492.435	19487.591	19469.51
Hosmer and Lemeshow Test	18.036	22.836	33.59
Percentage Correct	63.40	63.40	63.10

Table C4. Multiple Logistic Regression Models Predicting Required Health Information Needs (Chronic Disease Comorbidities Combinations)

Independent Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4.9 OR (95% CI)
Gender $x^2(1)=37.72$*	*	*	*	*
Male	Ref	Ref	Ref	Ref
Female	1.35* (1.26,1.45)	1.38* (1.29,1.49)	1.34* (1.24,1.44)	1.29* (1.2,1.39)
Age $x^2(6)=669.2$*	*	*	*	*
15 to 24	Ref	Ref	Ref	Ref
25 to 34	1.78* (1.48,2.13)	1.67* (1.39,2)	1.59* (1.32,1.92)	1.59* (1.31,1.91)
35 to 44	1.45* (1.21,1.74)	1.3** (1.08,1.56)	1.28** (1.06,1.54)	1.31** (1.08,1.58)
45 to 54	1.09 (0.91,1.3)	0.94 (0.78,1.13)	0.96 (0.79,1.16)	1 (0.83,1.22)
55 to 64	1 (0.83,1.21)	0.89 (0.74,1.08)	0.91 (0.74,1.1)	0.97 (0.79,1.19)
65 to 74	0.93 (0.76,1.13)	0.86 (0.7,1.06)	0.89 (0.72,1.09)	0.96 (0.77,1.2)
75 and over	0.97 (0.78,1.2)	0.88 (0.71,1.09)	0.9 (0.72,1.12)	0.99 (0.78,1.25)
Marital status	*	*	*	*
Married	Ref	Ref	Ref	Ref
Common law	0.98 (0.85,1.13)	0.94 (0.82,1.08)	0.96 (0.84,1.11)	0.96 (0.83,1.11)
Separated/divorced, widow or widower	0.86** (0.77,0.97)	0.82** (0.73,0.93)	0.84** (0.74,0.95)	0.84** (0.75,0.95)
Single, never married	0.67* (0.59,0.76)	0.64* (0.56,0.73)	0.65* (0.57,0.74)	0.65* (0.57,0.74)
Education	*	*	*	*
< Than secondary	Ref	Ref	Ref	Ref
Secondary graduation	0.94 (0.84,1.06)	0.98 (0.87,1.11)	0.95 (0.85,1.08)	0.96 (0.85,1.08)
Other post-secondary	1.6* (1.37,1.86)	1.67* (1.43,1.94)	1.6* (1.37,1.87)	1.63* (1.39,1.9)
Post secondary graduation	1.71* (1.55,1.9)	1.8* (1.63,2)	1.74* (1.57,1.93)	1.73* (1.56,1.92)
Persons in household $x^2(3)=429.1$*	*	*	*	*
1 person	Ref	Ref	Ref	Ref
2 persons	1.05 (0.93,1.2)	1.08 (0.95,1.23)	1.13*** (0.99,1.29)	1.14*** (1,1.3)
3 persons	1.36* (1.18,1.57)	1.42* (1.24,1.64)	1.46* (1.27,1.69)	1.48* (1.28,1.71)
4 persons	1.54* (1.33,1.79)	1.6* (1.37,1.86)	1.68* (1.44,1.96)	1.69* (1.45,1.98)
5 or more persons	1.65* (1.4,1.94)	1.72* (1.45,2.03)	1.84* (1.56,2.18)	1.83* (1.54,2.17)
Income	*	*	*	*
No income	Ref	Ref	Ref	Ref
< $20,000	1.06 (0.88,1.3)	1 (0.82,1.22)	0.97 (0.8,1.19)	0.99 (0.81,1.21)
$20,000 - $39,999	1.03 (0.85,1.26)	1.07 (0.88,1.31)	1.06 (0.87,1.29)	1.07 (0.88,1.31)
$40,000 - $59,999	1.08 (0.88,1.32)	1.19*** (0.97,1.46)	1.2*** (0.98,1.48)	1.21*** (0.98,1.48)

$60,000 - $79,999	1.18 (0.95,1.46)	1.32** (1.06,1.64)	1.32** (1.06,1.64)	1.35** (1.08,1.68)
$80,000 +	1.46* (1.18,1.8)	1.67* (1.34,2.07)	1.68* (1.35,2.09)	1.72* (1.38,2.14)
Immigrant	*	*	*	*
0-9 years	Ref	Ref	Ref	Ref
10 or more years	1.43* (1.21,1.69)	1.37* (1.16,1.62)	1.37* (1.15,1.63)	1.33** (1.12,1.58)
Born In Canada	2.1* (1.79,2.47)	2.01* (1.71,2.36)	2.07* (1.75,2.44)	1.96* (1.66,2.31)
Physical activity index $x^2(2)=14,47$*		**	**	**
Active		Ref	Ref	Ref
Moderate		0.99 (0.9,1.1)	0.99 (0.9,1.1)	0.99 (0.9,1.09)
Inactive		0.89** (0.81,0.97)	0.88** (0.8,0.96)	0.88** (0.8,0.96)
BMI				
Underweight		Ref	Ref	Ref
Normal Weight		0.84 (0.64,1.09)	0.86 (0.66,1.13)	0.83 (0.64,1.09)
Overweight		0.87 (0.67,1.14)	0.89 (0.68,1.17)	0.88 (0.67,1.15)
Obese		0.85 (0.65,1.1)	0.85 (0.65,1.12)	0.85 (0.65,1.11)
HUI index		*	*	**
No disability		Ref	Ref	Ref
Mild disability		0.98 (0.88,1.08)	0.96 (0.87,1.07)	0.94 (0.85,1.04)
Moderate disability		1.06 (0.94,1.2)	1.01 (0.89,1.14)	0.96 (0.85,1.08)
Severe disability		1.41* (1.25,1.59)	1.2** (1.06,1.36)	1.11 (0.98,1.27)
Self-perceived health		*		
Excellent		Ref	Ref	Ref
Very good		0.96 (0.86,1.07)	0.94 (0.84,1.05)	0.97 (0.87,1.09)
Good		1 (0.89,1.12)	0.94 (0.83,1.05)	0.97 (0.86,1.1)
Fair		1.16** (1,1.34)	0.99 (0.86,1.15)	1.02 (0.88,1.19)
Poor		1.4** (1.14,1.72)	0.98 (0.79,1.21)	1 (0.8,1.23)
Self-perceived mental health		*	**	**
Excellent		Ref	Ref	Ref
Very good		1.07 (0.99,1.16)	1.06 (0.98,1.15)	1.05 (0.97,1.14)
Good		1.18* (1.07,1.3)	1.15** (1.04,1.27)	1.13** (1.02,1.25)
Fair		1.45* (1.24,1.7)	1.28** (1.09,1.51)	1.28** (1.09,1.51)
Poor		1.6** (1.21,2.13)	1.3*** (0.97,1.75)	1.3*** (0.97,1.75)
Rating of Quality of Care Received				***
Excellent			Ref	Ref
Good			0.94 (0.87,1.03)	0.94 (0.86,1.03)
Fair			0.87*** (0.75,1.01)	0.86*** (0.74,1)
Poor			0.74** (0.55,0.98)	0.73** (0.55,0.98)
Satisfaction with Way Care Provided			*	*
Very Satisfied			Ref	Ref
Somewhat Satisfied			1.14** (1.04,1.24)	1.14** (1.04,1.24)
Neither			1.36* (1.15,1.62)	1.37* (1.15,1.62)
Somewhat Dissatisfied			1.58* (1.32,1.9)	1.57* (1.31,1.88)
Very Dissatified			2.2* (1.68,2.87)	2.18* (1.66,2.86)
Number of Consultations with Medical Doctors			*	*
			1.06* (1.05,1.07)	1.06* (1.05,1.07)
Disease and Comorbidities				*

ART	1.05 (0.91,1.22)
AST	0.93 (0.78,1.11)
BP	0.98 (0.86,1.11)
HBP	0.7* (0.61,0.8)
DIAB	0.82*** (0.66,1)
HS	1.01 (0.75,1.37)
MH	1.24** (1.06,1.45)
ART BP	1.27** (1.08,1.5)
ART HBP	0.94 (0.78,1.14)
ART MH	1.47** (1.05,2.05)
AST BP	1.12 (0.82,1.53)
AST MH	1.06 (0.74,1.52)
BP HBP	1.16 (0.91,1.48)
BP MH	1.12 (0.91,1.4)
HBP HS	1.04 (0.78,1.37)
HBP DIAB	0.95 (0.77,1.18)
HBP MH	0.92 (0.67,1.26)
ART BP HBP	0.75** (0.6,0.93)
ART BP MH	0.96 (0.7,1.32)
OTHER	Ref

Model -specific				
Wald x^2 (df)	1031.11(24)	1243.39 (40)	1562.81 (48)	1651.08(67)
p-value	0.000	0.000	0.000	0.012
2Log likelihood test	20027.98	19815.70	19496.28	19408.01
Hosmer and Lemeshow Test	63.58	51.30	15.96	60.43
Percentage Correct	60.16	61.48	63.30	63.00

APPENDIX D

Table D1. Mean Differences for Number of Consultations Per Year with Medical Doctors by Required Information and Disease and Comorbidity

Chronic Disease Comorbidities	Mean (95% CI)		
	Total 5.2(5.6-5.1)*	Health Information Needs	
		No 4.4(4.3-4.5)	Yes 6.0(5.9-6.1)
Arthritis (ART)			
Only ART*	4.3 (4.1-4.6)	3.5 (3.2-3.7)	5.3 (4.9-5.7)
ART +1*	5.2 (5.1-5.4)	4.5 (4.3-4.7)	6.1 (5.8-6.4)
ART+2*	7 (6.7-7.3)	5.8 (5.4-6.1)	8.5 (8-9)
ART +3*	8.8 (8.3-9.3)	8 (7.4-8.7)	9.7 (9-10.5)
ART +4 and more**	10.7 (10-11.5)	9.6 (8.6-10.6)	11.8 (10.7-12.9)
OTHER COMB*	4.6 (4.5-4.7)	3.9 (3.8-4.1)	5.3 (5.2-5.5)
Asthma (AST)			
Only AST*	3.9 (3.7-4.2)	3.1 (2.8-3.4)	4.9 (4.5-5.3)
AST +1**	5.3 (4.9-5.6)	4.8 (4.3-5.3)	5.7 (5.1-6.2)
AST+2*	7 (6.5-7.6)	5.7 (5-6.4)	8.2 (7.4-9.1)
AST +3**	8.1 (7.4-8.9)	7 (5.9-8)	9.2 (8.1-10.2)
AST +4 and more**	10.9 (9.9-11.9)	9.7 (8.4-10.9)	12.4 (10.9-14)
OTHER COMB*	5 (5-5.1)	4.3 (4.2-4.4)	5.9 (5.7-6)
Back Problems (BP)			
Only BP*	3.8 (3.7-4)	3.1 (2.9-3.4)	4.5 (4.3-4.8)
BP +1*	5.4 (5.2-5.6)	4.7 (4.4-5)	6 (5.7-6.3)
BP+2*	6.9 (6.6-7.2)	5.8 (5.4-6.1)	8.2 (7.7-8.7)
BP +3*	8.5 (8-9)	7.5 (6.9-8.2)	9.5 (8.7-10.3)
BP +4 and more*	10.5 (9.7-11.2)	9.2 (8.2-10.3)	11.7 (10.6-12.8)
OTHER COMB*	4.8 (4.7-4.9)	4.1 (4-4.2)	5.6 (5.4-5.7)
High Blood Pressure (HBP)			
Only HBP*	3.9 (3.8-4.1)	3.4 (3.2-3.5)	4.8 (4.5-5.2)
HBP +1*	5.2 (5-5.3)	4.8 (4.5-5)	5.7 (5.4-6)
HBP+2*	6.5 (6.2-6.8)	6 (5.7-6.4)	7.1 (6.7-7.5)
HBP +3*	8.7 (8.2-9.2)	7.9 (7.2-8.5)	9.7 (8.9-10.5)
HBP +4 and more*	10.5 (9.7-11.2)	9.3 (8.3-10.3)	11.8 (10.7-12.9)
OTHER COMB*	4.8 (4.7-4.9)	3.9 (3.8-4.1)	5.7 (5.6-5.8)
Diabetes (DIAB)			
Only DIAB	4.6 (4.2-4.9)	4.6 (4.1-5)	4.6 (4.1-5.1)
DIAB +1*	6.1 (5.7-6.4)	5.3 (4.9-5.7)	7.2 (6.6-7.7)
DIAB+2*	6.8 (6.4-7.2)	6.1 (5.6-6.6)	7.6 (7-8.2)

DIAB +3*	9.2 (8.5-10)	8 (7.2-8.8)	10.8 (9.7-12)
DIAB +4 and more*	10.2 (9.3-11.2)	8.5 (7.2-9.7)	11.8 (10.5-13.1)
OTHER COMB*	4.9 (4.8-5)	4.1 (4-4.2)	5.7 (5.6-5.8)
Heart and Stroke (HS)			
Only HS**	5.4 (4.7-6.1)	4.4 (3.7-5)	6.5 (5.3-7.8)
HS +1*	5.9 (5.5-6.3)	5 (4.6-5.5)	7.1 (6.4-7.7)
HS+2*	7.4 (7-7.9)	6.5 (6-7.1)	8.6 (7.8-9.3)
HS +3*	8.4 (7.8-9.1)	7.5 (6.7-8.3)	9.5 (8.6-10.5)
HS +4 and more**	9.9 (9.1-10.7)	8.5 (7.3-9.7)	11.1 (10-12.3)
OTHER COMB*	4.9 (4.8-5)	4.2 (4.1-4.3)	5.7 (5.6-5.8)
Migraine and Headache (MH)			
Only MH*	4 (3.7-4.2)	3.1 (2.8-3.4)	4.8 (4.4-5.1)
MH +1**	5.9 (5.6-6.3)	5.5 (5-6)	6.3 (5.8-6.8)
MH+2*	7.3 (6.8-7.9)	6.3 (5.6-7.1)	8.1 (7.4-8.8)
MH +3**	9.4 (8.5-10.3)	8 (6.6-9.4)	10.4 (9.3-11.6)
MH +4 and more**	11 (10-12)	9.9 (8.5-11.2)	12 (10.5-13.5)
OTHER COMB*	5 (4.9-5.1)	4.3 (4.2-4.4)	5.8 (5.7-5.9)
Comorbidities			
One Disease*	4 (4-4.1)	3.3 (3.2-3.4)	4.8 (4.7-5)
Two Diseases*	5.5 (5.3-5.6)	4.8 (4.7-5)	6.1 (5.9-6.3)
Three Diseases*	6.9 (6.7-7.2)	6 (5.7-6.2)	8 (7.6-8.4)
Four Diseases*	8.7 (8.3-9.2)	7.8 (7.2-8.3)	9.8 (9.1-10.5)
Five and More Diseases*	10.4 (9.7-11.2)	9.2 (8.2-10.2)	11.7 (10.6-12.7)

Note: * p<0.001; **p<0.05;*** p<0.1

Table D2. Mean Differences for Number of Consultations Per Year with Medical Doctors by Chronic Disease Comorbidity Combinations

Chronic Disease Comorbidities	Mean (95% CI)		
	Total	Health Information Needs	
	5.2(5.6-5.1)*		
		No	Yes
		4.4 (4.3-4.5)	6.0 (5.9-6.1)
Only One Disease:			
ART*	4.3 (4.1-4.6)	3.5 (3.2-3.7)	5.3 (4.9-5.7)
AST*	3.9 (3.7-4.2)	3.1 (2.8-3.4)	4.9 (4.5-5.3)
BP*	3.8 (3.7-4)	3.1 (2.9-3.4)	4.5 (4.3-4.8)
HBP*	3.9 (3.8-4.1)	3.4 (3.2-3.5)	4.8 (4.5-5.2)
DIAB	4.6 (4.2-4.9)	4.6 (4.1-5)	4.6 (4.1-5.1)
HS**	5.4 (4.7-6.1)	4.4 (3.7-5)	6.5 (5.3-7.8)
MH*	4 (3.7-4.2)	3.1 (2.8-3.4)	4.8 (4.4-5.1)
Multimorbidity:			
ART BP*	5.3 (5-5.6)	4.5 (4.1-4.9)	6 (5.5-6.4)

ART HBP*	5 (4.7-5.2)	4.5 (4.2-4.9)	5.6 (5.2-6)
ART MH**	5 (4.2-5.8)	4.2 (3.4-5)	5.7 (4.5-6.9)
AST BP	4.9 (4.3-5.5)	4.5 (3.7-5.3)	5.2 (4.3-6.1)
AST MH	5.4 (4.7-6.2)	5.5 (4.4-6.7)	5.3 (4.3-6.3)
BP HBP**	4.3 (3.9-4.7)	3.9 (3.4-4.4)	4.8 (4.2-5.5)
BP MH**	6.4 (5.8-6.9)	5.6 (4.8-6.5)	6.9 (6.2-7.7)
HBP HS***	5.1 (4.6-5.5)	4.8 (4.2-5.3)	5.6 (4.9-6.4)
HBP DIAB*	5.9 (5.5-6.3)	5.2 (4.7-5.7)	7.1 (6.5-7.7)
HBP MH	5.6 (4.9-6.2)	6 (5.1-6.9)	5.2 (4.3-6.1)
ART BP HBP*	5.5 (5.1-5.9)	4.9 (4.5-5.4)	6.5 (5.7-7.2)
ART BP MH*	8.6 (7.6-9.5)	5.5 (4.4-6.6)	10.9 (9.5-12.2)
OTHER*	7.5 (7.3-7.8)	6.6 (6.4-6.9)	8.5 (8.2-8.8)

Note: * $p<0.001$; **$p<0.05$;*** $p<0.1$

APPENDIX E

Table E1. Results of Multiple Logistic Regression Models Predicting Required Health Information Needs for Chronic Diseases

Disease and Comorbidities	Adjusted by: SD Model 5.2-5.8 OR (95% CI)	SD+HC Model 6.2-6.8 OR (95% CI)	SD+HC+RS Model 4.2-4.8 OR (95% CI)
Arthritis (ART)	*	**	**
Only ART	Ref	Ref	Ref
ART +1	1.12 (0.97,1.29)	1.03 (0.89,1.2)	1.05 (0.9,1.23)
ART+2	1.09 (0.94,1.27)	0.93 (0.79,1.09)	0.87 (0.73,1.03)
ART +3	1.33** (1.1,1.61)	1.11 (0.91,1.36)	1.04 (0.84,1.29)
ART +4 and more	1.41** (1.09,1.82)	0.96 (0.73,1.26)	0.77*** (0.57,1.04)
OTHER COMB	0.92 (0.82,1.04)	0.91 (0.8,1.03)	0.9 (0.79,1.03)
Asthma (AST)	**	***	**
Only AST	Ref	Ref	Ref
AST +1	1.32** (1.1,1.6)	1.13 (0.92,1.38)	1.11 (0.89,1.39)
AST+2	1.39** (1.13,1.73)	1.11 (0.88,1.38)	1.14 (0.89,1.45)
AST +3	1.5** (1.15,1.95)	1.22 (0.92,1.61)	1.11 (0.83,1.49)
AST +4 and more	1.21 (0.88,1.67)	0.73*** (0.52,1.03)	0.61** (0.42,0.89)
OTHER COMB	1.22** (1.08,1.39)	1.11 (0.97,1.28)	1.1 (0.95,1.28)
Back Problems (BP)	*	*	**
Only BP	Ref	Ref	Ref
BP +1	1.32* (1.18,1.49)	1.27* (1.13,1.44)	1.21** (1.06,1.38)
BP+2	1.16** (1.02,1.33)	1.03 (0.9,1.18)	0.94 (0.81,1.09)
BP +3	1.24** (1.04,1.49)	1.11 (0.91,1.34)	1.05 (0.86,1.29)
BP +4 and more	1.47** (1.15,1.89)	1.05 (0.81,1.37)	0.87 (0.65,1.16)
OTHER COMB	0.96 (0.88,1.06)	1.01 (0.92,1.11)	1 (0.9,1.11)
High Blood Pressure (HBP)	*	*	*
Only HBP	Ref	Ref	Ref
HBP +1	1.53* (1.34,1.74)	1.46* (1.28,1.67)	1.39* (1.2,1.61)
HBP+2	1.6* (1.39,1.85)	1.39* (1.19,1.61)	1.27** (1.08,1.49)
HBP +3	1.9* (1.58,2.29)	1.59* (1.31,1.93)	1.47* (1.19,1.82)
HBP +4 and more	1.94* (1.51,2.49)	1.29*** (0.99,1.69)	1.03 (0.77,1.38)
OTHER COMB	1.64* (1.48,1.82)	1.54* (1.38,1.72)	1.51* (1.34,1.7)
Diabetes (DIAB)	*	**	
Only DIAB	Ref	Ref	Ref
DIAB +1	1.36** (1.08,1.71)	1.29** (1.02,1.63)	1.22 (0.96,1.57)
DIAB+2	1.57* (1.24,2)	1.37** (1.07,1.76)	1.27*** (0.98,1.64)
DIAB +3	1.6* (1.21,2.11)	1.32*** (0.99,1.75)	1.2 (0.88,1.62)
DIAB +4 and more	1.99* (1.43,2.77)	1.41*** (0.99,2)	1.24 (0.85,1.8)
OTHER COMB	1.21** (1.01,1.45)	1.12 (0.93,1.35)	1.17 (0.97,1.43)
Heart and Stroke (HS)	*	**	
Only HS	Ref	Ref	Ref
HS +1	1.15 (0.85,1.55)	1.12 (0.81,1.54)	1.2 (0.84,1.69)
HS+2	1.11 (0.82,1.49)	0.96 (0.7,1.32)	0.99 (0.7,1.4)
HS +3	1.18 (0.84,1.64)	1.06 (0.74,1.51)	1.14 (0.77,1.67)

HS +4 and more	1.38*** (0.95,1.99)	0.99 (0.66,1.47)	0.98 (0.64,1.5)
OTHER COMB	0.87 (0.67,1.12)	0.84 (0.64,1.11)	0.93 (0.69,1.25)
Migraine and Headache (MH)	*	*	*
Only MH	Ref	Ref	Ref
MH +1	1.17** (1.01,1.36)	1.05 (0.89,1.23)	0.92 (0.77,1.1)
MH+2	1.16 (0.96,1.39)	0.86 (0.71,1.05)	0.78** (0.63,0.96)
MH +3	1.58** (1.2,2.08)	1.16 (0.87,1.56)	0.95 (0.70,1.30)
MH +4 and more	1.18 (0.85,1.64)	0.71*** (0.5,1.02)	0.57** (0.39,0.84)
OTHER COMB	0.92 (0.82,1.02)	0.83** (0.74,0.94)	0.76* (0.67,0.86)

Note: * p<0.001; **p<0.05;*** p<0.1
SD- Social- demographic characteristics
HC- Health Conditions
RS- Rating, satisfaction

Table E2. Results of Multiple Logistic Regression Models Predicting Required Health Information Needs for Number of Chronic Diseases and Chronic Disease Comorbidity Combinations

Disease and Comorbidities	Adjusted by: SD Model 5.1,5.9 OR (95% CI)	SD+HC Model 6.1,6.9 OR (95% CI)	SD+HC+RS Model 4.1,4.9 OR (95% CI)
Number of Comorbidities	*	*	*
One Disease	Ref	Ref	Ref
Two Diseases	1.32* (1.22,1.42)	1.23* (1.14,1.33)	1.17* (1.08,1.27)
Three Diseases	1.32* (1.19,1.45)	1.12** (1.01,1.24)	1.02 (0.91,1.14)
Four Diseases	1.52* (1.31,1.77)	1.28** (1.09,1.51)	1.16*** (0.97,1.38)
Five and More Diseases	1.57* (1.24,1.97)	1.07 (0.83,1.37)	0.86 (0.66,1.13)
Comorbidities	*	*	*
ART	Ref	Ref	Ref
AST	0.82** (0.69,0.97)	0.86 (0.72,1.04)	0.88 (0.73,1.07)
BP	0.95 (0.82,1.09)	0.91 (0.79,1.05)	0.93 (0.8,1.09)
HBP	0.64* (0.55,0.74)	0.65* (0.56,0.76)	0.66* (0.56,0.78)
DIAB	0.79** (0.64,0.98)	0.81*** (0.65,1)	0.78** (0.62,0.97)
HS	1.09 (0.83,1.44)	1.07 (0.8,1.43)	0.96 (0.7,1.33)
MH	1.01 (0.86,1.18)	1.08 (0.91,1.27)	1.18*** (0.99,1.41)
ART BP	1.32** (1.11,1.56)	1.2** (1,1.43)	1.21*** (1,1.46)
ART HBP	0.93 (0.76,1.13)	0.86 (0.7,1.05)	0.9 (0.72,1.11)
ART MH	1.14 (0.84,1.54)	1.27 (0.93,1.75)	1.4*** (0.99,1.98)
AST BP	1.3*** (0.98,1.72)	1.22 (0.91,1.63)	1.06 (0.77,1.47)
AST MH	0.92 (0.68,1.25)	0.81 (0.58,1.12)	1.01 (0.7,1.47)
BP HBP	1.07 (0.84,1.36)	1.05 (0.82,1.34)	1.1 (0.85,1.44)
BP MH	1.32** (1.07,1.63)	1.19 (0.96,1.48)	1.07 (0.85,1.35)
HBP HS	0.97 (0.74,1.28)	0.97 (0.73,1.28)	0.99 (0.73,1.33)
HBP DIAB	1.02 (0.83,1.27)	1.01 (0.81,1.26)	0.91 (0.72,1.15)
HBP MH	1.1 (0.82,1.48)	1.12 (0.83,1.52)	0.88 (0.63,1.22)
ART BP HBP	0.8*** (0.65,1)	0.73** (0.58,0.91)	0.71** (0.56,0.9)
ART BP MH	1.36** (1.02,1.81)	1.07 (0.79,1.46)	0.92 (0.66,1.28)

OTHER	1.22** (1.07,1.39)	1.04 (0.91,1.19)	0.95 (0.82,1.1)

Note: * p<0.001; **p<0.05;*** p<0.1
SD- Social- demographic characteristics
HC- Health Conditions
RS- Rating, satisfaction

APPENDIX F

Table F1. Health Information Sources and Chronic Comorbidity by Disease

Chronic Disease and Comorbidities	Contact with/via								
	Doctor	Community	Walk-in clinic	Health line	Emergency room	Other hosp. serv.	Other	Difficulties	
Only ART	78.4	5.5	13.9	17.2	12.9	6.3	13.7	17.28	
ART +1	81.5	4.9	13.0	11.5	15.2	9.6	13.4	17.26	
ART+2	80.4	6.2	14.7	13.1	16.6	6.6	18.6	21.49	
ART +3	86.5	4.7	8.3	14.5	14.6	7.8	12.8	25.74	
ART +4 and more	75.1	3.2	10.8	21.3	15.9	6.9	13.6	22.46	
OTHER COMB	76.3	5.1	19.4	19.9	17.2	7.0	18.1	17.47	
Only AST	68.3	3.6	19.4	27.9	17.2	4.3	24.2	15.20	
AST +1	73.4	6.8	22.0	22.9	15.7	5.4	17.2	22.18	
AST+2	78.2	5.5	20.5	18.5	19.2	4.2	25.6	35.98	
AST +3	83.8	5.3	8.0	25.0	16.9	8.9	12.4	37.14	
AST +4 and more	66.7	4.1	14.9	27.1	18.5	9.2	13.2	28.64	
OTHER COMB	78.9	5.2	16.8	16.5	16.3	7.7	16.1	16.98	
Only BP	76.7	6.2	19.9	21.2	15.2	6.5	19.2	15.30	
BP +1	79.6	3.9	19.5	16.4	17.2	8.9	14.1	18.99	
BP+2	76.6	6.9	14.4	16.3	15.9	5.6	22.1	28.15	
BP +3	85.2	4.5	9.2	18.0	14.9	7.8	12.8	28.28	
BP +4 and more	76.4	3.6	10.5	19.6	16.1	6.9	11.6	19.67	
OTHER COMB	77.5	5.0	17.1	17.6	16.8	7.3	16.7	16.42	
Only HBP*	82.9	3.1	11.9	14.9	16.1	7.5	13.1	14.61	
HBP +1*	78.2	5.2	16.8	9.7	15.0	11.0	12.7	13.75	
HBP+2*	81.3	5.7	14.1	13.2	16.2	6.9	14.7	19.08	
HBP +3*	83.7	3.9	8.8	12.9	14.9	4.6	13.7	24.68	
HBP +4 and more*	73.9	4.1	11.1	19.5	16.5	3.6	13.0	21.85	
OTHER COMB*	76.6	5.4	18.8	20.3	16.9	6.9	18.6	18.81	
Only DIAB	84.1	5.4	20.5	10.8	13.9	5.9	32.5	21.11	
DIAB +1*	81.0	5.2	23.6	7.1	14.8	8.1	10.9	11.37	
DIAB+2*	81.5	7.8	6.9	14.6	16.7	7.1	10.9	21.38	
DIAB +3*	88.0	6.7	9.6	13.8	16.0	5.2	11.1	18.15	
DIAB +4 and more*	76.3	4.0	8.8	18.3	13.4	7.6	10.8	15.56	
OTHER COMB*	77.2	5.0	17.5	18.8	16.7	7.3	17.2	18.35	
Only HS**	74.4	3.5	11.7	14.1	21.3	11.0	21.3	12.46	
HS +1*	81.1	6.3	9.4	12.0	10.4	14.3	14.0	8.37	
HS+2*	89.7	5.8	11.5	9.8	18.6	7.0	14.1	19.75	
HS +3*	85.7	2.2	9.8	9.8	19.2	4.7	13.9	19.20	
HS +4 and more**	72.8	3.5	11.9	23.9	15.1	8.1	15.6	14.81	
OTHER COMB*	77.3	5.2	18.0	18.5	16.5	7.0	17.1	18.61	
Only MH*	74.3	5.5	25.9	23.7	20.8	7.0	18.9	18.12	
MH +1**	73.2	4.5	19.7	23.4	21.2	7.4	12.3	20.82	
MH+2*	71.6	9.0	17.4	21.4	17.3	5.4	27.6	33.79	
MH +3**	77.6	4.6	6.1	29.4	17.5	11.1	11.3	28.01	
MH +4 and more**	71.4	4.1	12.0	32.2	16.0	3.6	13.9	31.00	
OTHER COMB*	79.4	4.9	16.0	15.7	15.2	7.4	16.7	16.56	
TOTAL	**77.9**	**5.1**	**17.2**	**17.9**	**16.5**	**7.3**	**16.9**	**18.2**	

Table F2. Health Information Sources and Chronic Comorbidity by Number of Diseases and Common Comorbidity Patterns

Chronic Disease and Comorbidities	Contact with/via							
	Doctor	Community	Walk-in clinic	Health line	Emergency room	Other hosp. serv.	Other	Difficulties
One Disease	76.63	5.00	18.74	20.33	16.58	6.53	18.78	16.25
Two Diseases	78.52	4.88	17.56	14.72	16.28	9.16	13.47	17.07
Three Diseases	79.33	6.65	14.39	15.12	16.83	6.17	19.27	25.04
Four Diseases	84.70	4.48	8.63	16.69	15.82	7.00	12.74	25.94
Five and More Diseases	74.91	3.78	10.41	20.58	15.69	6.79	13.27	21.85
ART	78.45	5.53	13.88	17.19	12.91	6.27	13.72	17.28
AST	68.31	3.58	19.39	27.88	17.15	4.26	24.25	15.20
BP	76.74	6.23	19.88	21.17	15.23	6.48	19.17	15.30
HBP	82.93	3.11	11.89	14.93	16.10	7.46	13.10	14.61
DIAB	84.07	5.40	20.52	10.84	13.93	5.94	32.55	21.11
HS	74.38	3.47	11.66	14.10	21.31	10.97	21.28	12.46
MH	74.29	5.50	25.88	23.74	20.79	7.03	18.94	18.12
ART BP	84.09	3.19	16.98	12.17	13.50	11.44	13.67	19.15
ART HBP	80.16	6.42	7.59	5.03	16.93	8.10	13.18	20.46
ART MH	72.62	6.75	13.91	24.72	18.40	11.11	16.47	15.66
AST BP	76.46	8.42	21.71	22.59	16.71	6.94	20.32	26.03
AST MH	61.20	4.73	22.42	31.28	15.96	1.68	18.64	26.43
BP HBP	80.42	1.63	25.73	9.40	18.51	8.57	15.94	11.30
BP MH	74.08	3.42	21.12	24.00	23.64	6.22	10.54	20.88
HBP HS	74.38	11.18	4.30	19.64	8.27	24.85	10.86	8.23
HBP DIAB	77.29	3.61	30.40	3.85	9.16	8.68	12.77	5.81
HBP MH	74.83	6.28	14.22	19.14	19.03	11.97	9.35	16.65
ART BP HBP	80.68	4.94	16.55	10.64	13.11	7.94	16.22	13.13
ART BP MH	65.32	13.61	9.25	23.16	17.10	6.93	27.75	31.73
OTHER	81.98	5.16	13.07	15.15	16.78	6.29	15.29	23.20
TOTAL	**77.87**	**5.13**	**17.19**	**17.87**	**16.47**	**7.26**	**16.93**	**18.21**

WHERE (Table F1 and Table F2):

Icon	Explanation	Contact with/via: Doctor	Community	Walk-in clinic	Health line	Emergency room	Other hosp. serv.	Other	Difficulties
		When value x (%) is:							
	Considerably more than average	x >=82	x >=6	x >=20	x >=20	x >=20	x >=10	x >=20	x >=20
	Slightly more than average	79 <= x < 82	5.5 <= x < 6	19 <= x < 20	19 <= x < 20	17.5 <= x < 20	9 <= x < 10	17.5 <= x < 20	19 <= x < 20
	Average	77 <= x < 79	5 <= x < 5.5	17 <= x < 19	17.2 <= x < 19	16 <= x < 17.5	7<= x < 9	6.5 <= x < 17.5	18.5<= x < 19
	Slightly less than average	65<= x < 77	4 <= x < 5	15 <= x < 17	16 <= x < 17	15 <= x < 16	6.5 <= x < 7	16.5 <= x < 16	16 <= x < 18
	Considerably less than average	x < 65	x < 4	x < 15	x < 16	x < 15	x < 6.5	x < 16	x < 16

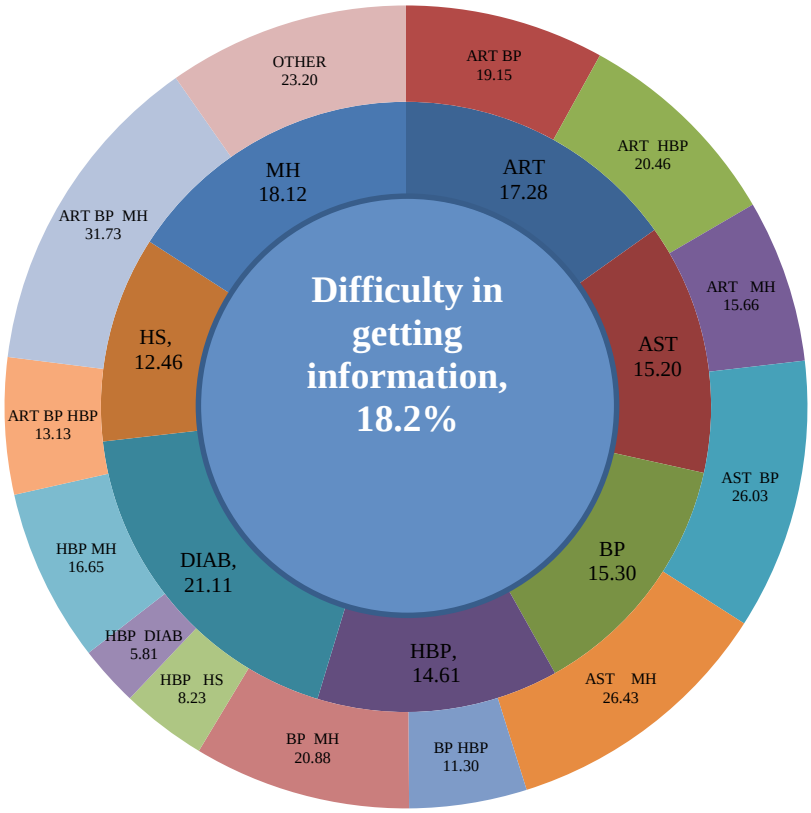

Figure F1. Percent of respondents with difficulty in getting health information from health sources, by chronic disease (second circle) and common comorbidities (third circle)

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