IMPACT OF GENERAL PRACTITIONER PAYMENT SCHEME ON HEALTH CARE SYSTEM IN AVOIDABLE HOSPITALIZATION FOR AMBULATORY CARE SENSITIVE CONDITIONS

By

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Abstract

This study compares the effectiveness of primary care interventions provided by general practitioners (GP) remunerated under the fee-for-service (FFS) or alternative payment plan (APP), using hospitalization rates for ambulatory care sensitive conditions (ACSC) in select Northern British Columbia (BC) communities. This study used BC Ministry of Health hospital separation data held at Population Data BC. Bivariate statistics were used to compare hospitalization rates for ACSC between both groups. The results indicate overall hospitalization rates of ACSC were higher in APP than FFS communities. Further, several ACSC showed varying hospitalization rates (asthma, pneumonia, COPD, diabetes, angina, gastroenteritis/dehydration and convulsion/epilepsy) and length of hospitalizations (convulsion/epilepsy and dental conditions) between both groups. In summary, this research informs policy on the effectiveness of GP remuneration adopted in Northern BC using hospitalization rates for ACSC. Further research is needed to further validate the findings of this study.

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"But regarding anything beyond this, dear friend, go easy. There's no end to the publishing of books, and constant study wears you out so you're no good for anything else. The last and final word is this: Fear God. Do what he tells you....."
Ecclesiastes 12:12-13 (MSG)

Chapter One: Introduction

Universal access to medically necessary care remains one of the chief principles of a publicly funded health care system. In the Canadian health care system, the general practitioner (GP) acts as the gate keeper charged with coordinating and providing longitudinal relational care (Brown, Goldacre, Hicks Rourke, McMurray, Brown et al., 2001; Fleming, 1995). In Canada, the GP is the cornerstone of primary care and they work both independently and in group practices (Holden & Madore, 2002). This system has been practiced since the 1970s in most Canadian provinces (Health Canada, 2005). Currently however, the cost of this system is exceeding available resources (Fujisawa & Lafortune, 2008; Lee et al., 1999). Escalating care costs and modes of remunerating physicians continues to be a key policy challenge in the Canadian health care system (Xu & Yu 2003).

The primary care physician is an important component of the health care system in Canada. The payment of general practitioners (GPs) is one of the largest drivers of health service cost (Fujisawa & Lafortune, 2008). Hence, reforms of both GP practice approaches and payment schemes have occurred in several countries, (Scott & Hall, 1995). Despite these reforms, there is only modest empirical evidence about the impact of GP remuneration plans on GP performance, patient health outcomes and the overall cost of care. This evidence is paramount since it is an indicator of the effectiveness of the health care system (Scott & Hall, 1995).

Over the past decade, several GP payment schemes have been adopted in Canada (Xu & Yu, 2003). The two most prominent payment schemes adopted for GPs are the alternative payment plan (APP), which is payment by contract, salary or capitation and the fee-for-

service (FFS) plan, where GPs are compensated for each unit of service according to a provincially bargained fee schedule (Matthew & Lockhart 2003; Holden & Madore, 2002). The FFS payment is the most predominant form of payment for GP: the Canadian Institute for Health Information (CIHI) reported that approximately eighty percent of family physicians in 2004 received payment by FFS and approximately twenty percent received payment alternatively, i.e., salary, capitation, and contract (CIHI, 2005). Further, with the increasing criticism of the FFS remuneration for GP particularly with regards the objectives of the health care system such as improved outcomes for patients, improved provider satisfaction, and decreased costs (Berwick, Nolan & Whittington 2008; Beasley, 2009), health care policy makers in Canadian provinces have implemented several forms of alternative payment methods for GPs, such as salaries and mixed payment method (Wranik & Durier-Copp, 2010). Moreover, the government and policy makers seem to believe that having an alternative remuneration will tackle these challenges as well as encourage more GPs to become involved in primary health care reform (Martin & Hogg, 2004).

The alternative remuneration schemes for GPs are also not devoid of criticisms, as several studies have highlighted their disadvantages, such as under servicing and loss of physician autonomy (Devlin & Sarma, 2008; Holden & Madore, 2002; Xu & Yu, 2003; Lee et al., 1999). Thus, an effective remuneration scheme for GP should be focused on improving access to care, quality, integration, health outcomes and decrease cost.. Additionally, reforming the method of payment could have a significant potential to modify the focus of primary health service delivery and potentially, patient outcomes.

Opportune access to primary care is an important indicator for an effective health care system (Shah, Gunraj & Hux, 2003). The gauging of such access to care is dependent on

the individual or community health profile and the organization of health delivery system (Shah et al., 2003). One marker for gauging this access to care is to evaluate the hospitalizations for medical conditions that could have been prevented or effectively managed in an outpatient ambulatory setting. These medical conditions are known as ambulatory care sensitive conditions (ACSC), and consists of asthma, hypertension, diabetes, congestive heart failure, chronic obstructive pulmonary disease (COPD) etc (Shah et al., 2003; Billings, Zeitel, Lukomnik, Carey, Blank & Newman, 1993; Pappas, Hadden, Korak & Fisher, 1997; Bindman, Grumbach, Osmond, Komaromy, Vranizan, Karen et al., 1995; Ansari, Laditka, Laditka, 2006; Rizza, Bianco, Pavia & Angelillo, 2007; Chen, Zhang, Sun & Mueller, 2009; Gao, Manns, Culleton, Tonelli, Quan, Crowshoe et al., 2008; Blustein, Hanson & Shea, 1998). Thus hospitalizations for these diagnoses that are best treated in primary health care settings are one indicator of access to or quality of care.

Disparities in ACSC hospitalizations can be used to evaluate health system performance, quality of care and inform policy development (Brown et al., 2001; Ricketts, Randolph, Howard, Pathman, & Carey, 2001). Hospitalization for ACSC are considered as potentially avoidable, since because hospitalization may be prevented with timely and opportune access to primary care, however, less likely to be considered as 'inappropriate' since not all hospitalizations are avoidable (Brown et al., 2001; Lavoie, Forget, Prakash, Dahl, Martens & O'Neil, 2010; Starfield, Shi, Macinko, 2005; Parker, Simon, Parham, Teague & Li, 2005).

Conceptual Framework

The purpose of this study was to explore the differences in rates of hospitalizations for ACSC in select communities where GPs are remunerated either by FFS or APP. I acknowledge that not all hospitalizations are avoidable (Starfield et al., 2005; Lavoie et al. 2010), however, timely and effective access to and quality of primary care and intervention may prevent hospitalizations for these conditions (Lavoie et al., 2010). Thus, an effective GP remuneration plan can be defined conceptually as a remuneration plan that translates into better health outcomes, lower cost and improved physician satisfaction. Figure 1 below illustrates this correlation and outlines the conceptual model upon which this thesis is based.

Research Objectives

The purpose of this study was to explore the impact of two GP payment schemes (fee-for-service or alternative payment plans) on the quality of primary care interventions by comparing the rates of avoidable hospitalization for ACSC in eight communities (McBride, Fraser Lake, Valemount, Queen Charlotte, Prince Rupert, Stewart, Smithers, and Tumbler Ridge), where GPs are remunerated exclusively with FFS or APP. These communities were chosen because comparing ACSC hospitalization rates at a community level using GP remuneration was possible, since GPs are remunerated either by the FFS or APP. Moreover, research indicates that ACSC hospitalization rates are generally higher in individuals living in rural communities. Specifically, I will ascertain whether or not rates of avoidable hospitalization for ACSC are higher in communities where a GP is remunerated by FFS in comparison to communities where a GP receives payment through the APP. Additionally, the

study will also explore trends in rates of avoidable hospitalization for ACSC in either and both types of communities.

Objective and Hypotheses

The objective of this study was to test the following hypotheses:

1.a To compare rates of avoidable hospitalization for ACSC between communities served by GPs remunerated on a FFS payment plan and APP.

H1a: There is no difference in the rates of avoidable hospitalization for ACSC between communities with FFS payment plan and APP for the general practitioner.

1.b To compare rates of hospitalization for diagnoses classified as ACSC between APP communities and FFS communities.

H1b: There is no difference in rates of hospitalization for diagnosis classified as ACSC in APP communities and FFS communities.

2.a To examine (descriptive only) trends in rates of hospitalization for ACSC between communities served by GPs remunerated on a FFS payment plan and APP.

H2a: There is no difference in trends in rates of avoidable hospitalization for ACSC between communities with FFS payment plan and APP for the general practitioner.

3.a To compare length of hospitalization of diagnoses classified as ACSC between communities with FFS payment plan and APP plans for the general practitioner.

H3a: There is no difference in length of hospitalizations of diagnoses classified as ACSC between communities with FFS payment plan and APP plans for the general practitioner.

Significance

This study was poised to make a significant contribution to knowledge and policy. First, the study design is innovative and will bring evidence to an important question: how to best provide payment for GP services. Second, the result of the study will provide information relevant to curtailing the cost of hospitalization for conditions sensitive to the provision of effective PHC. Reducing the rate of ACSC hospitalization can improve patient outcomes, preserve health care dollars and improve service delivery in ambulatory setting. For example, Kruzikas and colleagues hypothesized that, "assuming that an average hospital stay costs $5,300 per admission, even a modest five percent decrease in hospitalizations for this ambulatory care sensitive conditions would save more than $1.3 billion in inpatient cost" (Kruzikas, Jiang, Remus, Barrett, Coffey & Andrews, 2004). Third, this study will contribute to the evaluation of access to and quality of primary care system and health care services in the communities studied (Chen et al., 2009).

This thesis is organized into five chapters. The next section of the thesis reviews the existing literature on the GP remuneration plans and primary care intervention. The approach used to define ACSC is described and analysed. Findings related to GP remuneration and rates in avoidable hospitalization for ACSC and the overall hospitalization are summarized. This review of literature is followed by a description of the method used in analysis and a presentation of results from each GP remuneration plan at the community level. Finally a discussion of the research finding and implications will be described.

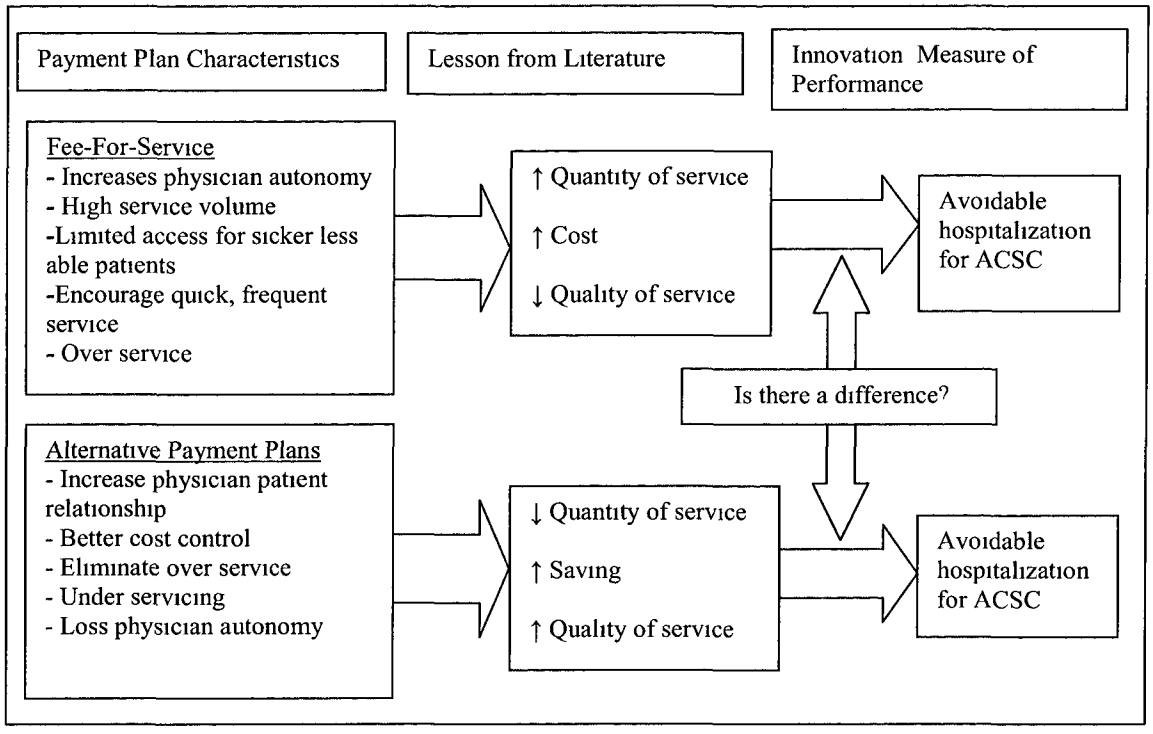

Figure 1. Conceptual model for comparison of general practitioner remunerations.

Chapter Two: Literature Review

The Canadian health care system continues to evolve in the range of health care services provided and user demands (Pfaff, Guerriero, Martalog, Arscott, Fontaine & Laforet, 2009). These changes have impacted GP practice as well as their perspectives on quality of care (Lepnurm, Dobson & Backman & Keegan, 2006). The primary care system has formed the bedrock of the Canadian health care system; a vibrant primary health system has been shown to correlate with a healthy and productive population (Katz, Soodeen, Bogdanovic, De Coster & Chateau, 2006).

In Canada, the primary health care delivery system is built around the GP playing a central role as the front line practitioner within the health care system. The ageing population, together with the increasing rates of chronic disease, indicate that a growing number of patients are in need of a high level care provided in a more comprehensive, longitudinal and accessible setting. This generates an additional burden on the health care system, as demonstrated in the number of hospitalizations that are preventable (Sanchez, Vellanky, Herring, Liang & Jia, 2008). Thus, implementing adequate and effective incentives for GPs to be productive and provide quality care is pivotal to the challenges of the primary health care system.

The literature review reported in this Chapter has been organized into three sections. First, I will discuss GP remuneration plans including advantages and disadvantages to the health care system. Second, I will discuss and outline the significance of primary care intervention to the health care system. Third, I will discuss researchers' efforts to clarify and define the concept of avoidable hospitalization for ambulatory care sensitive conditions.

A literature search was undertaken using CINAHL and Medline databases. CINAHL (1990 – July 2010) search terms included, "general practitioner remuneration plans", "primary care intervention", "ambulatory care sensitive conditions", "primary health care", "fee-for-service payment plan" and "alternative payment plan" and resulted in 853 articles. The MEDLINE (1996 – July 2009) search included the MESH terms "primary care intervention", "general practitioner remuneration plan" and "ambulatory care sensitive conditions" and resulted in 705 articles. All abstracts were reviewed and all articles with a declared focus on GP remuneration plans, ambulatory care sensitive conditions, and primary care intervention were retrieved. Published bibliographies and web sites of Canadian professional associations and organizations were also utilized to identify additional relevant work on GP remuneration plans, ambulatory care sensitive conditions, and primary care intervention.

General Practitioner Remuneration and Incentives

General practitioner remuneration schemes are central to the health care debate in Canada and around the world. Over the past decade, the escalating cost of health care services and the drive to sustain the publicly financed health care system (Devlin & Sarma, 2008; Fujisawa & Lafortune, 2008), particularly with an aging population, has shifted the focus of policy makers to the general practitioner remuneration and practice style (Wright, 1996; Lee, Cowie & Slobodian, 1999; Scott & Hall, 1995). In 2000, CIHI reported that approximately 13 billion was spent on physician services, reflecting 13.3% of the overall health care cost (CIHI, 2001). In spite of the significant reform initiatives and strategies that have been enacted, the question remains how GPs can be adequately reimbursed so it

translates into improved outcomes for patients, improved provider satisfaction, and decreased costs.

The OECD countries have adopted a range of remuneration methods for their GPs in the private and public sectors. As a result, policy makers in several countries have modified their remuneration system for physicians, so as to encourage productivity, as well as to contain the cost of care (Simeons & Hurst, 2006). Some OECD countries (Greece, Portugal, Spain and Sweden), where health care is financed through taxation, hire GPs directly and remunerate by salary, while in others (such as in Australia, Norway, the United Kingdom, Denmark, and New Zealand), where GPs are freelance remuneration occurs through capitation/blended or salary or fee-for-service (Simeons & Hurst, 2006). GPs in countries with an insurance-based system are remunerated mainly through the fee-for-service method, such as in Austria, Belgium, France, Germany, Japan, Switzerland, the United States and Korea (Simeons & Hurst, 2006).

Over the past decade, several GP payment schemes have been adopted in Canada (Xu & Yu, 2003). A summary of the alternative clinical payment types adopted by the Canadian provinces and territories is represented in Table 1, below. The most prominent form of GP remuneration in Canada is fee-for-service payments, where GPs are compensated for each unit for service according to the bargained fees (Wranik & Durier-Copp, 2010; Holden & Madore, 2002; Devlin & Sarma, 2008). There appears to be a move towards the alternative payment plans (APP) among physicians, government and regional health authorities as shown on Tables 2 and 3, below. Moreover, in British Columbia and Quebec, policy makers are increasingly remunerating GP through the alternative methods (Xu & Yu, 2003). CIHI

reported that in 2004\2005 approximately 80% of remuneration to family physician was on fee-for-service basis (Wranik & Durier-Copp, 2010).

The other type of GP remuneration is the APP, which includes salary, sessional fees, capitation, and blended funding arrangement. Other less common APP payment mechanisms include service arrangement (utilized in recruitment and retention of general practitioners in rural areas, and may come as contractual payments or the blended payment, i.e., APP and FFS); and block funding, where annual budgets are negotiated for a group of general practitioners to provide all their medical services for a specific period of time at specific sites. This is mainly used in academic medical centre for clinical services, education and research (Martin & Hogg, 2004).

In Canada, the APP remuneration plan accounts for approximately 20% of primary care physician's remuneration plan (CIHI, 2008). Regardless of the widespread utilization of fee-for service payment, recent assessments particularly among researchers and policy makers have shown that the fee-for-service payment is not the most efficient mode of GP payment (Wranik & Durier-Copp, 2010; Xu & Yu, 2003). Studies conducted in Ontario and Quebec have shown that salaried general practitioners practicing in community health centres provide more preventive services than their fee for service counterparts or colleagues. These findings are however debatable because they are based on personal perception and a low response rates (Lee et al., 1999).

Several studies have shown that the methods of payment for GPs influences their behaviour, the mode of service delivery, quality and cost of health care provided (Gosden, Pedersen & Torgerson, 1999; Scott & Hall, 1995). Further, given that efficiency, equity and quality are greatly dependent on workers' incentive, an adequate understanding of

determinants of physician behavior is essential, in order to carve out appropriate policy to guide allocation and incentive (financial) decisions that may improve quality and access to care. Thus, an adequate evaluation of GP remuneration on health care service delivery should be based on the performance measured in terms of patient health outcomes, patient and provider satisfaction, decrease cost and quality of primary physician services. Additionally, the quality of primary physician services plays an important role in the utilization and effectiveness of specialized health services (Hogg et al. 2007).

To date, there has been a paucity of research on the influence of the various GP remuneration plans with regard to how it translates into better delivery of in primary care (Devlin & Sarma, 2008), particularly in Canada where GP remuneration reforms are still in their infancy. Hence, this study will be relevant for policy on efficient and effective physician remuneration. In the next section will discuss the various GP payment methods adopted in Canada.

Table 1

Summary of Alternative Clinical Payment Type by Province and Territory, 2005-2006

CIHI, 2008

	N.W.T.	Y.T.	B.C.	AB.	SASK.	MB.	ONT.	QUE.	N.B.	N.S.	P.E.I.	N.L.
Alternative Payment Types												
Salary	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sessional	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capitation	-	-	-	Yes		-	Yes	-	-	-	-	-
Block Funding	-	-	-	Yes		-	Yes	Yes	-	Yes	-	Yes
Blended	-	-	Yes		Yes	Yes	-	Yes	-	-	Yes	-
Emergency and on Call	-	-	-		Yes	-	-	-	-	Yes	-	-
Contract/unspecified	-	Yes	Yes	Yes	Yes	-	Yes	-	Yes	Yes	-	-
Information collection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
Others	-	-	-	-	Yes	-	-	-	Yes	-	-	-

Note. The blank space represents year that data were not submitted. Further, most of the provinces may not have reported on a particular payment type/s because the amount of physician receiving remuneration under the plan may be insignificant.

Fee-for service (FFS)

The FFS payment scheme remunerates GPs based on a negotiated rate for each individual service they provide to a given patient (Drossos, 2002; Matthew & Lockhart 2003). Thus the GP makes claims for each unit of service provided to patients from the provincial or territorial health insurance plan (Xu & Yu, 2003; Holden & Madore, 2002). The general practitioners' gross annual income will be dependent on the number of hours worked, patients treated and the varieties of health service provided (Drossos, 2002; Holden & Madore, 2002). The FFS payment scheme is implemented in whole or part in several OECD member countries. In countries like Japan, Australia, Germany, and Belgium physicians are remunerated exclusively under the FFS. Others like Norway and the United States have incorporated portions of the FFS scheme in reimbursing physicians (Fujisawa & Lafortune, 2008; Holden & Madore, 2002).

In 2005-2006 fiscal years, the CIHI reported that the "total in-province" FFS payment (without payments for services like radiology, laboratory and anaesthesia, as well as anaesthesia specialty) to physicians were approximately $10.2 billion, in addition to $248 million for standardized service delivered (CIHI, 2008). Further, of this $10.2 billion; approximately $4.9 billion (48%) and $5.3 billion (52%) accounted for FFS payments to general practitioners and specialist respectively. Additionally, of the $248 million for standardized services, the general practitioners and specialist received approximately $161 million (65%) and $87 million (35%) (CIHI, 2008). Furthermore, of the overall $10.2 billion for fee-for-service remuneration, Ontario reported $4.3 billion (42%) while combine FFS payment of $4.5 billion (44%) was reported in provinces of Alberta, British Columbia and

Quebec (CIHI, 2008). Also, consultation and visits accounted for 86.2% of the claims and payment to FFS family physician, which is 81.1% of the services provided (CIHI, 2008).

Table 2 presents a summary FFS remuneration for physicians' method as a percentage to all physicians. In British Columbia (BC) 87.5% of physicians, 72.9 in Manitoba (MB), 91.5 in Ontario (ONT), 72.1 in Nova Scotia (NS), 81.9 in Prince Edward Island (PEI), 97.2 in Alberta (AB), and 80.8 in Quebec (QUE) were remunerated under the FFS method in 2000-2001 fiscal year. Conversely, in 2005-2006 fiscal year, 79.6% of physicians in BC, 68.7 in MB, 81.6 in ONT, 57.2 in NS, 64.2 in PEI, 87.7 in AB, and 75.9 in QUE were remunerated under the fee-for-service method in 2000-2001 fiscal year (CIHI, 2008). This decline in FFS remuneration for physician in Canadian provinces and territories reflects a gradual shift to alternative forms of remuneration for physician.

There is considerable empirical evidence documenting the merits and the demerits of utilizing the FFS approach in remunerating general practitioners. The intrinsic worth of FFS will be highlighted in relation to improved patients' outcome and improved provider satisfaction, and decreased costs. First, under the FFS, several studies have shown that patients cared for under FFS GPs have better access to health care services in comparison to patients under the care of a GPs paid under an alternative remuneration (Xu & Yu, 2003; Holden & Madore, 2002; Drossos, 2002). Second, several studies have documented that, under the FFS, GPs are being paid according to the number of patients treated. Thus the amount of patients treated will equate to the amount of income. Consequently, this makes the FFS remuneration scheme more enticing to primary care physicians because they tend to have control over their net revenue (Holden & Madore, 2002; Drossos, 2002). Third, as mentioned previously, GPs under FFS are remunerated based on the number of patients seen

and treated. Thus, this creates a compelling incentive for the GPs to provide health care services in a more economic and efficient fashion (Holden & Madore, 2002), thereby benefiting the healthcare system economically. Finally, the FFS scheme makes it easier for government to initiate targeted FFS codes like, health promotion, disease-prevention services, and chronic disease management programs (Xu &Yu, 2003).

On the other hand, the demerits of FFS remuneration for the general practitioner are also well documented in the literature. Firstly, GPs are remunerated according the number of patients treated. Thus this may provide GPs with a financial incentive to opt for procedure-oriented specialty and reject engaging in non-billable services, such as using fewer expensive sources of care and patients consultation (Matthew & Lockhart 2003). These conclusions were echoed by Holden and Madore (2002) who reported that GPs under the FFS remuneration scheme over-strain the health care system with unnecessarily expensive procedures on the grounds that they have the propensity to pay better. The fees may also vary depending on the kind of service delivered; thus, there is an incentive to deliver more services so as to increase income (Gosden et al 2001; Devlin & Sarma, 2008; Xu & Yu, 2003; Holden & Madore, 2002). As a result, incentive-driven services may result in 'supplier induced demand' (SID), where patients are over treated (Gosden et al., 2001; Drossos, 2002), hence, increasing the overall health care cost (Xu & Yu, 2003).

Consequently, uncontrolled health care cost as a result of GPs budgetary cost has made it difficult for health authorities to curb the overall cost of health care and the impact on the health system (Holden & Madore, 2002). In Canada, the uncontrollable FFS expenditure has resulted in five Canadian provinces (British Columbia, Manitoba, Ontario, Quebec and Saskatchewan) incorporating some cost containment strategies like placing a

ceiling on the maximum number and kind of services a FFS physician can claim in a fiscal year (Xu & Yu, 2003). Similarly, this same cost containment strategy is being implemented in Germany and has been proven effective (Fujisawa & Lafortune, 2008).

Another demerit of the FFS payment plan documented in the literature is that, given visit-time limitations, GPs under the FFS are remunerated on the basis of the number of patients seen or treated, i.e., incentivized to provide a more frequent and quicker services (Holden & Madore, 2002). Thus patients have insufficient visit-time with the GP, particularly among elderly patients with complex morbidities. As a result, elderly and sicker patients may be discriminated against or denied access to quality care (Xu & Yu, 2003; Drossos, 2002).

Table 2

Physicians' Fee-for-service Remuneration Method as a percentage of all Payment to all Physicians

CIHI, 2008

	N.W.T.	Y.T.	B.C.	AB.	SASK.	MB.	ONT.	QUE.	N.B.	N.S.	P.E.I.	N.L.
Fiscal Year												
2000-2001	-	-	87.5	97.2	78	72.9	91.5	80.8	83.5	72.1	81.9	67.6
2001-2002	-	95.3	82.5	93.2	75.8	72	88.1	78.7	82	69.8	81.9	60.7
2002-2003	-	92	80.8	91.3	72.9	70.5	88.5	78.1	81.5	68.4	75	57.8
2003-2004	2.6	88.5	80.3	90.9	74.1	70.1	84.0	77	77.9	64.3	69.5	58.2
2004-2005	5.6	83.7	80.1	89.2	73.6	70.4	83.2	76.1	76.3	58.5	66.9	58.8
2005-2006	3.9	84	79.6	87.7	74.1	68.7	81.6	75.9	74.7	57.2	64.2	62

Note. The blank space represents year that data were not submitted. Further, most of the provinces may not have reported on a particular payment type/s because the amount of physician receiving remuneration under the plan may be insignificant.

Table 3

Physicians' Alternative Remuneration Method as a percentage of all Payment to all Physicians

CIHI, 2008

	N.W.T.	Y.T.	B.C.	AB.	SASK.	MB.	ONT.	QUE.	N.B.	N.S.	P.E.I.	N.L.
Fiscal Year												
2000-2001	-	-	12.5	2.8	22	27.1	8.5	19.1	16.5	27.9	18.1	32.3
2001-2002	-	4.7	17.5	6.8	24.2	28	11.9	21.3	18	30.2	18.1	39.3
2002-2003	97.4	8	19.2	8.7	27.1	29.5	11.5	21.9	18.5	31.6	25	42.2
2003-2004	94.4	11.5	19.7	9.1	25.9	29.9	16	23	22.1	35.7	30.5	41.8
2004-2005	94.4	16.3	19.9	10.8	26.4	29.6	16.8	23.9	23.7	41.5	33.1	41.2
2005-2006	96.1	16	20.4	12.3	25.9	31.3	18.4	24.1	25.3	42.8	35.8	38

Note. The blank space represents year that data were not submitted. Further, most of the provinces may not have reported on a particular payment type/s because the amount of physician receiving remuneration under the plan may be insignificant.

Alternative payment plan (APP)

The escalating health care cost and the increasing aging population creates a significant challenge to the sustainability of the health care delivery system, particularly the publicly funded system (Delvin & Sarma, 2008; Hurst, Forde, Reiter-Theil, Slowther, Perrier & Pegoraro et al., 2007). Consequently, several industrialized countries have reformed or are in the process of reforming, their health care delivery system as a result of budgetary constraints (Delvin & Sarma, 2008), focusing particularly on the mode of physician remuneration. In contrast to the fee-for-service, the most predominant mechanism of payment for general practitioners, quite a number of alternative payment mechanisms are also being employed. In 2005-2006, CIHI reported that the overall payments made to physician through the alternative payment mechanism was approximately $2.98 billion, representative of 21.3% of the overall payments made to physicians for clinical services in Canada (CIHI, 2008). Further, over the previous six years the overall expenditure for alternative payments to physician for clinical services increased significantly, from $1.31 billion (13.0%) in 2000-2001 to $2.98 billion (20.3%) in 2005-2006 (CIHI, 2008).

From Table 3, a summary of physicians' alternative remuneration method as a percentage of all payment to all physicians showed that, 12.5% of physicians in BC, 27.1 in MB, 8.5 in ONT, 27.9 in NS, 18.1 in PEI, 2.8 in AB, and 19.1 in QUE were remunerated under the alternative method in 2000-2001 fiscal year. Conversely, in 2005-2006 fiscal year, the proportion of alternative payment mechanism varied substantially across province in Canada, ranging from 96.1% in Northwest Territories to 42.8% in NS, 38.0% in NL, 35.8% in PEI, 31.3% in MB to 25.9% in SASK, 25.3% in NB, 24.1% in QUE, 20.4% in BC, 18.4% in ONT, 16.0% in the YT and 12.3% in AB (CIHI, 2008).

A review of academic and grey literature on alternative remuneration plans for GPs demonstrated that there are merits and demerits of remunerating physicians through this mechanism. Thus, in evaluating Alternative Payment Plans, I will focus on four most widely used alternative remuneration plans, i.e., salary, capitation, sessional fees and blended remuneration mechanism.

Salary remuneration mechanism.

The salary remuneration mechanism is a defined payment to the GPs negotiated annually between the physician and the government, regardless of the volume of services executed (Wranik & Durier-Copp, 2010; Xu & Yu, 2003; Fujisawa & Lafortune, 2008; Holden & Madore, 2002). Thus, under the salary remuneration mechanism, services are impartial since it is independent of the amount or cost of services provided (Xu & Yu, 2003). Moreover, GPs negotiate their salaries and enjoy certain additional benefits (Wranik & Durier-Copp, 2010), that can be adjusted based on seniority and promotions (Holden & Madore, 2002). The salary is a predominant form of remuneration for GP in a number of OECD countries, including Iceland, Finland (Fujisawa & Lafortune, 2008), Sweden and France (Holden & Madore, 2002). This is due to the fact that GPs in these countries are employees of the public health authority, giving the public sector a significant role (Fujisawa & Lafortune, 2008; Holden & Madore, 2002). Traditionally, most GPs under the salary remuneration mechanism signed a contract with the ministry or health authority (Wranik & Durier-Copp, 2010) and are required to work a specific number of hours per week and most often a specific geographical location or population (Wranik & Durier-Copp, 2010).

The salary remuneration mechanism is operational in all Canadian jurisdictions with an intention of curbing the cost of care increasing quantity of services, and improving GP

recruitment and retention (Wranik & Durier-Copp, 2010). However, recruitment and retention of GPs in rural and remote communities has been difficult (Wranik & Durier-Copp, 2010). This may be as a result of the inadequate availability of social amenities and general living conditions in rural and remote communities (Wranik & Durier-Copp, 2010). Further, remunerating GPs practicing in rural and remote via salary rather through capitation or FFS plan will boost their retention, since a "low patient base" and sparse population of the rural and remote communities may be a major determinant. Therefore APP provides a stable, predictable and high income for GPs working in remote and rural communities (Wranik & Durier-Copp, 2010).

There are several advantages associated with the salary remuneration mechanism for general practitioners. First, as a corollary to salary remuneration, general practitioners have no reason to over-service, prescribe avoidable treatments or visits irrespective of the type or level of services provided, contrary to the FFSs mechanism that rewards GP for such behaviour (Holden & Madore, 2002; Xu & Yu, 2003). Thus, APP is more likely to result in consistency and sureness of services and procedures performed (Holden & Madore, 2002). Secondly, the salary remuneration mechanism eradicates any form of financial penalties associated with lengthy patient visits under the FFS. Thus, GPs have the liberty to have a thorough consultation, thereby promoting more preventive care resulting in improved health care outcomes (Holden & Madore, 2002). Third, the salary remuneration mechanism has the potential to induce a more efficient use of health care resources (Holden & Madore, 2002; Devlin & Sarma, 2008). Since salaried GPs are associated with larger primary care centres that utilize a variety of health care providers, health care centres and authorities have the potential to effectively distribute patients and responsibilities to their employees in a more

efficient and cost-effective approach (Holden & Madore, 2002). Further, this eliminates the propensity of 'cream-skimming'[1] associated with capitation mechanisms and a subjective selection with the FFS remuneration mechanism (Xu & Yu, 2003). APP also allows for increased consultation with the interdisciplinary team resulting in more comprehensive care to patients.

On the other hand, several studies have identified a number of demerits associated with salary remuneration mechanisms for GPs. First, salaried GPs have little incentive to see more patients, since salary remuneration is independent to the level of service provided, whereas, the FFS remuneration is dependent on the level of services provided (Lee et al., 1999; Holden & Madore, 2002; Xu & Yu, 2003; Devlin & Sarma, 2008). Many studies have demonstrated that salaried practitioners provide fewer services in comparison to GP under the FFS remuneration (Xu & Yu, 2003). This may be due to the fact that salaried GP are more likely to be working in underserviced or high-need population where comprehensive care and more consultation time are required per patient (Tu, Cauch-Dudek & Chen, 2009; Delvin, Sarma & Hogg, 2006). Second, salaried GPs have little incentive to retain steady patient populations, hence posing a significant challenge for patient-physician relationship and continuity of care (Xu & Yu, 2003; Holden & Madore, 2002). This is more prevalent in urban areas than rural and remote areas. Third, GPs under the salary remuneration

[1] 'Cream skimming' is a term that refers to "choosing patients for some characteristic(s) other than their need for care, which enhances the profitability or reputation of the provider" (Friesner & Rosenman, 2009).

mechanism may have diminished satisfaction with the health care system, since physician autonomy is reduced as a result of more governmental control (Xu & Yu, 2003). Fourth, under the salary remuneration mechanism, the supply of medical services and physicians are independent of the costs, thus an increase in demand of medical services may result in increased wait times (Devlin & Sarma, 2008) and a reduction in the number of patient visits may result in increasing the cost of care, i.e., hiring more GPs (Holden & Madore, 2002). Finally, under the salary remuneration mechanism, patients may slip through the health care system particularly those at the margin, because the hours of operation under the contractual arrangement may not correspond with the timing or access the high-need population requiring care (Holden & Madore, 2002).

Capitation remuneration mechanism

The capitation remuneration mechanism, also known as 'rostering' (Xu & Yu, 2003; The College of Family Physician of Canada (CFPC), 2007), is the flat payment to the GP for each patient enrolled with them, in return for a commitment that they will provide a basket of services to their patients or practice population over a period of time (Fujisawa & Lafortune, 2008; CFPC, 2007; Gosden, Forland, Kristiansen, Sutton, Leese, Giuffrida et al., 2006; Xu & Yu, 2003; Drossos, 2002, Holden & Madore, 2002). This implies that the remuneration of GPs is dependent on the number of patients on their list and the level of care provided per patient, which is typically negotiated between the health care providers and funders. The capitation fee per patient amount is adjusted according to sex, age, and geographical location (Fujisawa& Lafortune, 2008; Drossos, 2002; Holden & Madore, 2002). The efficiency of the capitation mechanism is dependent on the patients' commitment, meaning that patients must be committed to seeking primary care services from a pre-determined GP or group practice

(Holden & Madore, 2002). This commitment on the patient's part can be done in two ways: through a voluntary patient enrolment or propinquity-based registration where patients are automatically enlisted or assigned to a particular practice in their region (the latter is predominant in rural and remote area) (Holden & Madore, 2002).

In many industrialized countries like Italy, New Zealand and the Netherlands, capitation is the most prominent form of remunerating GPs. In 2007 the College of Family Physician of Canada (CFPC) reported that the capitation remuneration mechanism is increasingly becoming the preferred mechanism of GP remuneration in Canada. Moreover, several health authorities have been directed by provincial and territorial governments to take up the responsibility to remunerating general practitioners for the services provided to local population. Further, the escalating cost for health care associated with physician remuneration has motivated health authorities to seek means of containing the cost of health care by budgeting general practitioners remuneration in a rather predictable manner (CFPC, 2007). Capitation is particularly interesting to health authorities, because health care funding is based on need rather than entirely on service utilization (2007). Hence, the capitation is a rising method for remunerating general practitioners (Tu et al., 2009; Fujisawa & Lafortune, 2008). Moreover, newer capitation mechanisms in Canada include financial incentives for reaching certain goals for preventive care (Tu et al., 2009). This contributes to better care of chronic diseases.

Several potential advantages of capitation remuneration for general practitioners have being highlighted in the literature. First, GPs remunerated by capitation have incentives to contain costs and financial risk, due to the predetermined payments to the GPs for the care of their enrolees (Gosden et al., 2006; Xu & Yu, 2003). Further, this offers fiscal predictability

to the payer, as well as relative income predictability for the GP (CFPC, 2007). Second, there is less incentive for GPs under capitation to over-service or provide unnecessary care, since, revenue received and the number of services provided are negatively correlated (Xu & Yu, 2003; Holden & Madore, 2002). Third, the capitation mechanism offers a long term relationship or longitudinal relationship between the patient and physician or a specific population and the physician. This aligns patients with a suitable GP, encouraging continuity, preventive and completeness of care. Thus GPs are remunerated for affirmative health outcome of their patients rather than for the amount services of provided as in the fee-for-service (CFPC, 2007; Xu & Yu, 2003; Holden & Madore, 2002; Drossos, 2002). Fourth, GPs under the capitation mechanism are remunerated based on the number of patients enrolled with them; hence, this provides a strong incentive to GPs to offer services that resonate with the needs of their patients, thereby promoting and sustaining strong patient satisfaction (Holden & Madore, 2002).

There are several problems associated with the capitation remuneration mechanism that health care experts have identified. First, the capitation mechanisms as mentioned previously incentivizes GPs to provide health care services in a practical, cost-effective manner, thereby providing only that care which is appropriate. On one hand, this may result in GPs providing fewer services (fewer examination, attention and shorter consultation time) than the population may actually need, since the GP is required to roster a large number of patient in other to stay within the capitated amount negotiated (CFPC, 2007; Gosden et al., 2006; Xu & Yu, 2003; Drossos, 2002; Holden & Madore, 2002). Second, several empirical studies have argued that GPs under the capitation remuneration have the potential to "cherry pick" patients that are easier to care for rather than those who have with complex morbidities

because of their health status, particularly in cases where rostering is by recruitment and alternatives are limited (CFPC, 2007; Gosden et al., 2006; Xu & Yu, 2003; Holden & Madore, 2002). Third, in rural and remote communities with an inadequate number of GPs, patients under a GP paid with the capitation mechanism have limited freedom of choice, since recruitment is by geographic rostering (Holden & Madore, 2002).

Blended remuneration mechanism

An effective remuneration for GPs should translate into an effective delivery of care that is in compliance with overarching objectives of the health care system (cost control, quality of care and good patients' access to care). However, the outstanding question remains, how best can general practitioners be remunerated thereby actualizing these objectives (Xu & Yu, 2003)? Several empirical studies have suggested that the blended remuneration mechanism may be central to this goal, since the blended remuneration is not only a specific mechanism of remuneration but a combination of several remuneration types (Xu & Yu, 2003; Holden & Madore, 2002). Further, the policy shift of the GP to a blended capitation model as promoted by the Canadian Primary Health Care Transition Fund (PHCTF)[2] is focused on improving access to health care, health outcome, quality and cost efficiency (Martin & Hogg, 2004). The two prominent blended remuneration types documented in the literature particular to the Canadian health care system are blended capitation model and the blended complement model.

The 'blended capitation model', also known as the Family Health Network (Glazier, Klein-Geltink, Kopp & Sibley, 2009), makes a based payment to a GP per patient in return

[2] The PHCTF was established in 2000, with $800 million fund setup to support efforts of provinces and territories to develop and implement transitional primary health care renewal initiatives (Health Canada, 2004).

for the provision of comprehensive care, in addition to incentives for the provision of specific primary care services (Ontario Ministry of Health and Long-Term Care, 2009). Second, the 'blended complement model' provides compensation based on the number of physicians within the group. Thus general practitioners are offered a base payment for the provision of comprehensive care, in addition to incentives for provision of specific primary health care services, as well as funding for emergency service (Ontario Ministry of Health and Long-Term Care, 2009).

There are several empirical advantages and disadvantages that have been identified with the blended remuneration mechanism for GPs. The advantages of remunerating GPs include minimizing the tendency to under-service and 'cherry-pick' patients, as well as curbing the overall health care cost (Ontario Ministry of Health and Long-Term Care, 2009; Xu & Yu, 2003; Holden & Madore, 2002). On the other hand, the disadvantages of blended payment include difficulties in setting or developing combination proportions, since blended remuneration is a combination of two or more payment types (Xu & Yu, 2003). Furthermore, the blended remuneration attenuates the advantages of the "pure" remuneration scheme (Holden & Madore, 2002). Moreover, the blended remuneration requires maintaining different payment schedules, thus may increase the administrative burden and cost (Holden & Madore, 2002).

In sum, the fee-for services remains the most prominent form of remunerating GPs in Canada with exception of the territories. Provincial and territorial governments negotiate the fee schedule with the health care providers. The Canada Health Act prohibits provinces from allowing private billing for publicly insured services by physicians, otherwise they are penalized financially. In most provinces, budget cap was introduced for fee-for-services

payments to GPs. The essence of this ceiling was to curb the increasing cost of care. The advantages and disadvantages of the fee-for service remuneration for general practitioners are itemized on Table 4.

In recent years, all Canadian jurisdictions have developed one form of alternative remuneration for GPs, such as salary, mixed payment method, and blending FFS with the salary or capitation model. This shift towards an alternative payment is an attempt to control the cost of care and also to transfer some of fiscal the responsibility from funders to providers, like in the capitation-based models in primary health care. The merits and demerits of the alternative are also itemized on Table 4. In 2004, approximately 20% of physicians (including both GPs and specialists) received a form of alternative remuneration other than FFS (Fujisawa & Lafortune, 2008). In Alberta and British Columbia, physicians are either paid by contract, session or salary; in Ontario50 % of general practitioner are remunerated with the alternative model other than fee-for-service (Fujisawa & Lafortune, 2008). Alternative forms of remuneration also exist in most other provinces in Canada.

Remuneration of health professional remains one of the largest drivers of cost of provision of health services. Thus making remuneration a pivotal concern for policy makers endeavouring to improve efficiency, access and quality of care provided while curbing the escalating cost of care, particularly in the primary health care.

Table 4

Evaluating Physician Remuneration Methods

Remuneration Type	**Advantages**	**Disadvantages**
Fee-for-service	i. Better accessibility ii. Target income iii. Better Physician autonomy iv. High volume driven v. Incentives for health promotion	i. Incentives to over service ii. Limited for sicker less capable patients iii. Promotes quicker and frequent services iv. Short visit and consultation with GP v. Unpredictable budget
Salary	i. No incentive to over service ii. Reduces cream-skimming iii. Increased budget certainty iv. More efficient use of resources v. Consistency and sureness of service provided	i. No incentive to see more patient ii. No incentive for continuity of care iii. Reduced Physician autonomy iv. Inadequate services for vulnerable population
Capitation	i. Improved budget certainty ii. Better patient-physician relationship iii. services resonant with patient needs iv. Less incentive to over-service v. Income predictability for physicians	i. Reduced Physician autonomy ii. Cream-skimming in recruitment iii. Providing only necessary care iv. Incentives to over service
Blended	i. Reduces under-servicing ii. Reduces cream-skimming iii. Curbs health care cost	i. Difficulty in developing combination proportion ii. Increased administrative burden and cost

Primary Health Care

In this era of shrinking health care resources and budgetary constraints, the capacity of health care providers to respond to the need of the increasing ageing population and those with chronic diseases has become severely limited. Hence, recent cost reduction strategies have resulted in the need to identify where and how health care resources might be effectively invested and monitored to yield the desirable goal of efficient care delivery (World Health Organization, 1996; Roos, Walld, Uhanova & Bond, 2005). It is generally accepted that an integrated primary health care (PHC) sector plays a key role in delivering preventive services, diagnosis, in long term disease management, and in the coordinating of specialized care (Shah et al., 2003). Thus, exploring the relevance of an effective primary health care system to health service utilization delivered in ambulatory care settings is important is important to curbing health care cost and improved patient outcome. Further, high rates of hospitalization for ACSCs may provide indirect evidence of problems associated with patient access to primary care.

In the Canadian context, a commonly used definition from the Canadian Health Services Research Foundation (CHSRF) is: "primary health care is defined as a set of universally accessible first-level services that promote health, prevent disease, and provide diagnostic, curative, rehabilitative, supportive and palliative services" (Lamarche, Beaulieu, Pineault, Contandriopoulos, Denis & Haggerty, 2003, pp. 2). Primary care according to Starfield (1998), is "that level of a health service system that provides entry into the system for all new needs and problems, provides person-focused (not disease-oriented) care over time, provides care for all but very uncommon or unusual conditions, and co-ordinates or integrates care provided elsewhere by others." (pp. 8-9). This implies that primary care is an

integral part health care system or primary health care, since primary care focuses on health care services that include health promotion, diagnosis, prevention and treatment of illness and injury (Health Canada, 2006). The 1978 Declaration of Alma-Ata defined primary health care as:

> ...essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community, through their full participation and at a cost that the community can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and the community with the national health system, bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process (World Health Organization, 1978, pp. 1-2).

Primary health care provides a two-fold function in the health care system. First, primary health care provides direct first-contact services with the health care system via providers like general practitioner, pharmacist, nurse practitioners, and telephone counseling services. Second, primary health care coordinates services to maintain continuity of care, as well as easy movement within the system. This enables care to be integrated when patients require specialized care from specialist (Health Canada, 2006).

According to Lamarche et al. (2003), the six broad outcomes the primary health care system should produce are effectiveness (ability to improve or maintain health); productivity

(the cost, type, nature of service for health concern); accessibility (easy accessing general practitioner, specialized and diagnostic services); continuity (extent to which care is provided as a consistent progression of episode); quality (appropriateness of care as perceived patient and provider); and responsiveness (accommodation for the expectation and preference of patient and provider). Further, with the ageing population and the increasing rate of chronic illnesses, the approach to treatment has to be modified as well. Thus primary health care plays an integral role in education, promotion and prevention of chronic diseases, since the major goal of primary health care is to enable patient to take responsibility for their own care (Khan, Mclntosh, Sanmartin, Watson & Leeb, 2008). This was echoed by the WHO in a statement that:

> The service delivery reforms advocated by the PHC [Primary Health Care] movement aim to put people at the centre of health care, so as to make services more effective, efficient and equitable. Health services that do this start from a close and direct relationship between individuals and communities and their caregivers. This, then, provides the basis for person-centredness, continuity, comprehensiveness and integration, which constitute the distinctive features of primary care (WHO, 2008, pp. 43).

Consequently, timely access to primary health care is an essential quality indicator of the performance of the overall health care system. One instrument for measuring access to PHC is to examine the rate of health service utilization for ambulatory care sensitive conditions, ACSC, (Shah et al 2003; Billings et al., 1993; Pappas et al., 1997; Bindman et al., 1995; Ansari et al., 2006; Rizza et al., 2007; Chen et al., 2009, Gao et al., 2008; Blustein et al., 1998).

Ambulatory Care Sensitive Conditions

In the Canadian health care system access to care is universal, thus everyone has access to care regardless of their economic status. The Canadian Health Act 1984 specifies that health care services must be publicly administered, universal, accessible, portable and comprehensive (Madore, 2005). Thus, considering this provision in the Canadian Health Act, one may presume all hospitalizations are appropriate, particularly in a scenario where resources are inadequate and the population is ageing. However, in principle, it is well documented in the literature that many hospital resources are used inappropriately, whether by providing services that do not translate into health benefit, or providing services that would have been provided at a different organizational level utilizing lesser resources (CIHI, 2008). This reflects the deficit in preventive care leading up to hospitalizations for conditions sensitive to the primary health care settings.

One indirect measure used in defining preventable hospitalizations or the overall performance of the health care system is to identify those conditions for which hospitalizations are generally considered preventable i.e. ambulatory care sensitive conditions (ACSC) (Brown et al., 2001; Shah et al., 2003). The hypothetical concept of ACSC was developed by Billings et al. (1993), and refers to conditions for which hospitalization might be avoided with timely and effective outpatient care, that either prevents the onset of the condition, assists in managing a chronic condition, or helps controlling acute periodic condition (Roos et al. 2005; Caminal, Starfield, Sánchez, Casanova & Morales, 2004; Parker et al., 2005; Rizza et al., 2007; Flores, Abreu, Chaisson & Sun, 2003). The ACSC diagnosis lists generally include the following conditions: asthma, diabetes, chronic obstructive pulmonary disease (COPD), angina pectoris, cellulitis,

congestive heart failure (CHF), dehydration, dental conditions, diabetes, gastroenteritis, seizure disorders, hypertension, hypoglycaemia, vaccine-preventable conditions, urinary tract infection, pneumonia, severe ear/nose/throat infection, tuberculosis, nutritional deficiency (Billings, Anderson & Newman, 1996).

Hospitalization rates for ACSC conditions have been linked with the absence or presence of adequate and effective principal or preventive care (Roos et al 2005; Billings et al., 1993; Chen et al., 2009). Comparing rates of hospitalization for ACSC across populations or communities can therefore provide insight into the quality of care in the ambulatory care settings of these populations or communities. Further, it is assumed that the disproportionate rates of hospitalization for ACSC in a given population or community indicates delay in diagnosis or treatment of these conditions because of insufficient access to PHC. Moreover, reducing ACSC hospitalization is a cost restraining mechanism that will enhance patients' quality of life and efficient use of the health care delivery system (Clancy, 2005; Chen et al., 2009).

In 2001 the Agency for Healthcare Research and Quality (AHRQ) published Preventive Quality Indicators (PQIs) as an instrument to measure rates of ACSC hospitalization, with the presumption that access to primary care could be improved (AHRQ, 2001). The concept of ACSC has been widely researched in several western countries including Canada, Australia and the U.S. (Rizza et al., 2007; Ansari et al., 2006), as well as many European countries (Rizza et al., 2007). Hospitalization rates for ACSC have been widely used as a measure of access to care. However, these rates varies by populations (Billings et al., 1993), with higher rates being documented for Aboriginal people in Canada (Shah et al., 2003; Lavoie et al. 2010) and geographical location, with higher rates in

communities with a lower aggregate income level (Billings et al., 1993). Furthermore, other factors that influence rates in ACSC hospitalizations are inadequate access to primary care (Rizza et al., 2007; Bindman et al., 1995); and greater supply of hospital bed (Rizza et al., 2007), as well as socioeconomic indicators, with higher rates among uninsured individuals particularly in the U.S. (Billings et al., 1993).

Further, hospitalization for ACSC is higher among rural residents in comparison to the urban counterparts, because rural residents have lower health status and shortage of primary care facilities and physician when compared to their urban counterpart (Chen et al., 2009). This disparity in ACSC rates between rural residents and urban residents may also be as a result of people traveling longer distances for care and are often admitted so as to precipitate care or supports might be inadequate; hence people get admitted into so call "social admissions". Moreover, Billings and colleagues (1996) found that Canadians from low income communities were 40% more likely to be at risk for avoidable hospitalizations in comparison to their counterparts in high income communities (Blustein et al., 1998). In 2010, Lavoie and colleagues used a full range of ACSC diagnosis (chronic, acute and vaccine-preventable) to explore the relationship between of community controlled health services and local access to primary health care services for Aboriginal people in Manitoba. Their study demonstrated that Aboriginal communities with improved access to primary health care at the local level (such as nursing stations) had lesser rates of hospitalization for ACSC, in contrast to communities with limited access to primary health care at local level, where rates hospitalization for ACSC were higher (Lavoie et al., 2010).

The Canadian Institute for Health Information (CIHI) identified a significant downward trend in rate of ACSC hospitalization for the Canadian population younger than

age 75 (exclude Quebec); however, Canadians aged 64 to 74 accounted for 50% of all ACSC hospitalization (CIHI, 2009). This study explored trends in ACSC hospitalization rates for seven conditions (angina, asthma, COPD, diabetes, epilepsy, heart failure and pulmonary edema, and hypertension). They estimated that about 1 in 8 (13%) medical hospitalizations in Canada for patients younger than 75 years of age were for ACSC (CIHI, 2008). Further, ACSC admission rates ranged from a low of 281 per 100,000 in British Columbia population to a high of 1,298 per 100,000 in Nunavut (CIHI, 2009). The same studies found that ACSC hospitalization rates were 60% higher in rural communities (510 per 100,000 population) in comparison to urban communities (318 per 100,000 population) (CIHI, 2008). Moreover, the rates for ACSC hospitalization increased as income level decreased, since those living in less affluent areas were 2.6 times more likely to be hospitalized for ACSC than those living in an affluent area (CIHI, 2009).

Despite the fact that the ACSC lists generally include a core diagnoses group, in most cases the conditions have been modified and selected to align with the population of interest. For instance, Weissman and colleagues excluded pulmonary emboli and stroke in their list of ACSC because avoidable hospitalizations for these conditions were considered to be arguable (Pappas et al., 1997). Furthermore several other researchers have excluded congestive heart failure and pneumonia in their study of older populations because these conditions are viewed as an unavoidable trajectory for elderly people, even though these two conditions are the most common cause hospitalization for elderly people (Bindman et al., 1995; Pappas et al., 1997).

One reason for measuring ACSC hospitalization rates was the assumption that these conditions are sensitive to care in the primary health care system. While this method is

widely used in the literature, no studies were found that have examined the relationship of GP payment schemes and avoidable hospitalization for ACSC. Hence, this study is innovative and timely, particularly with the changing demographics care should be delivered smartly so it translates into lower cost, improved patient outcome and providers' satisfaction. Additionally, economic incentives for GPs are widely adopted by health care policy-maker to improve allocative effectiveness and quality in primary care (Lippi Bruni et al 2009). In spite of the evidence that incentive-based remuneration can have an influence on GP behavior, there is yet limited evidence to relate the impact of this policy on health outcomes with respect to hospitalization for ACSC (Lippi Bruni et al., 2009).

Summary

There is a robust body of knowledge in the literature on general practitioner (GP) remuneration, ambulatory care sensitive conditions (ACSC) and primary health care. Several studies have explored the effectiveness of general GP remunerations on the health care system; however no studies were found that have employed health services utilization for ACSC. The literature is consistent in stating that the primary health care system is the bedrock of the health care system, hence adequate access to GPs is central, particularly in countries like Canada where they are the first point of contact with the health care system. One way of measuring access or quality of care is to capture those hospitalizations that could be avoided with high preventive care in the primary care settings. The literature has been inconsistent with the definition of ACSC conditions, as well as their predictors. This is the gap in the literature that this study proposes to address.

Chapter Three: Methods

This Chapter provides an overview of the methods used in this study. This study was an analysis of health services utilization administrative data in order to examine rates and predictors of hospitalization, as well as trends in hospitalization for ambulatory care sensitive conditions (ACSC). This study employed administrative health utilization data on hospitalizations from the BC Ministry of Health Hospital Separations dataset, housed in Population Data BC for selected communities.

Research Design

This is a population-based database study. A retrospective cohort analysis of all hospitalizations classified as ACSC from 1992/1993 onward was conducted to compare trends and patterns of hospitalizations for ACSC in select communities with fee-for-service (FFS) and alternative payment plans (APP) for GPs. Descriptive statistics on selected communities were used to predict hospitalization rates for ACSC among selected communities that are matched based on their community and individual level characteristics. I also examined the data for relationships between GP payment schemes and rates of hospitalization for ACSC.

Study populations

In this study, aggregate-level hospitalization data was used to identify all individuals under 65 years of age on March 31, 2008, who were admitted to hospital for selected conditions classified as ACSC (see Appendix A for list of ICD-9 and ICD-10-CA codes) between April 1, 1992 to March 31, 2008 while living in selected communities (as shown in Appendix B). This study includes northern communities served by GPs remunerated with APP (McBride, Dunster, Fraser Lake, Valemount & Robson; Haida Gwaii (Queen Charlotte

& Sandspit) and Stewart) and FFS (Prince Rupert, Tumbler Ridge, Smithers and Telkwa) GP payment plans. Communities with APP and FFS are listed in Appendix B. Postal codes in the database were used to identify all patients in the selected communities hospitalized for ACSC; however, postal codes were not released to the researcher. Geographic information was provided as flags, i.e. ACSC hospitalizations from APP and FFS communities were flagged as APP and FFS respectively; ACSC hospitalizations from postal codes not listed were flagged as NA (see Appendix B).

Community profile.

A community profile for each community by demographic characteristics was extracted from the 2006 census data as well as Northern Health. This study is intended to investigate the quality of and access to primary care physicians for selected communities. These parameters were measured using the hospitalization for ACSC in five Northwest communities (Prince Rupert, Stewart, Queen Charlotte, and Smithers), three Northern interior communities (Valemount, McBride, and Fraser Lake) and one Northeast community (Tumbler Ridge). The profiles of these communities are discussed based on the demographic characteristics, health status, and health facilities in this community. Of the Northern Interior communities, the population of McBride was approximately 655, with 49.6% male and 50.4% female; Fraser Lake was approximately 1115, with 51.6% male and 48.4% female; Valemount was approximately 1020, with 51% male and 49% female (see Table 5). Of the Northwest communities, the population of Queen Charlotte with approximately 945, with 51.9% male and 48.1% female; Stewart was approximately 495, with 49.5% male and 50.5% female; Prince Rupert was approximately 12,815, with 49.5% male and 50.5% female; Smithers was approximately 5,220, with 48.5% males and 51.5% female (see Table 5). The

population of the Northeast community (Tumbler Ridge) was approximately 2,455 with 53% male and 47% female (see Table 5).

The communities in this study have a relatively young population, with the average ranging from 36.1 years in Smithers to 42.9 years in Stewart. The average age for McBride, Prince Rupert, Fraser Lake, Queen Charlotte, Valemount, and Tumbler Ridge are 37.1, 38.5, 39.2, 41.1, 42.2 and 42.3 years respectively (see Table 5). The average age for McBride, Prince Rupert, Fraser Lake, Queen Charlotte, Valemount, and Tumbler Ridge are 37.1, 38.5, 39.2, 41.1, 42.2 and 42.3 years respectively (see Table 5). The annual number of births for women of childbearing age is approximately 15, 15 -20, 8-10, 48, and 175 in McBride, Fraser Lake, Valemount, Queen Charlotte and Prince Rupert respectively. On the other hand, the annual death rate is 15, 12-15, 12, 30, and 116 in McBride, Fraser Lake, Valemount, Queen Charlotte and Prince Rupert respectively. The average life expectancy for residents in McBride, Fraser Lake, Valemount, and Prince Rupert is 78.5, 76.9 – 77.7, 78.5, and 78.9 years respectively (see Table 5).

In Canada, chronic diseases and the risk factors associated with them remain a significant public health concern, since a significant portion of morbidity and mortality among Canadians are attributable to chronic disease (Patra, Popova, Rehm, Bondy, Flint & Giesbrecht, 2007). The four prevalent chronic diseases in McBride, Fraser Lake, Valemount, Queen Charlotte and Prince Rupert include hypertension; asthma, diabetes, and cardiovascular disease (see Table 5).

As illustrated on Table 5, all communities have one or more health care facilities that provide primary care services to their residents. In the Northern Interior Health Service Delivery Area (HSDA), the number of primary health care physician per 100,000 population

is 104 in 2004/2005 fiscal year, while in the Northwest and Northeast Health Service Delivery Area the number primary health care physician per 100,000 population in 2004/2005 fiscal year was 116 and 79 respectively (Watson et al., 2009). The percentages of individuals age 12 and older that have a regular family physician in Northern Interior, and Northwest/Northeast HSDA are 90% and 88% respectively (Watson et al., 2009). Furthermore, 41% of individuals age 12 and older in both Northern Interior, Northwest/Northeast HSDA have visited a family physician at least 3 times in the past year, in contrast to 10% and 13% respectively, who have consulted a nurse in the past year (Watson et al., 2009).

Table 5

Selected Characteristics of Study Population

	Alternative Payment Plan					Fee-for-service		
	McBride	Fraser Lake	Valemount	Queen Charlotte (Haida Gwaii)	Stewart	Prince Rupert	Tumbler Ridge	Smithers
Characteristics	Number	Number	Number	Number	Number	Number	Number	Number
Gender[3a]								
Male	325	575	520	490	245	6,345	1,300	2,530
Female	330	540	500	455	250	6,470	1,155	2,690
Age Groups (Yrs)[3a]								
0-19	180	320	250	255	120	3,690	595	1,580
20-39	175	265	240	220	125	3,015	550	1,335
40-64	225	410	385	405	205	4,785	1,040	1,720
65+	80	125	145	80	60	1,355	275	585
Median Age	37	39	42	41	43	39	42	36
Ethnicity[3a]								
Visible Minority	35	15	20	40	10	1,369	15	260
Aboriginal Population	60	200	75	135	55	4,475	220	765
Rest of the population	565	895	925	760	430	6,911	2,215	4,120
Health Status[3b]								
Annual average birth rate	15	15 - 20	8 -10	48	-	175	-	-
Annual average death rate	15	12 - 15	12	30	-	116	-	-
Average life expectancy	79	77 - 78	79	-	-	79	-	-
Estimated Prevalence (existing cases) of selected chronic conditions[3b, a]								
Hypertension	111 (8)	176 (11)	175 (13)	712 (68)	-	2,765 (189)	-	-

Asthma	61 (4)	83 (6)	96 (6)		-	1,275 (72)	-	-
Diabetes	45(3)	61 (6)	70 (5)	279 (27)	-	1,063 (79)	-	-
Ischemic Heart Disease	20 (2)	28 (2)	31 (3)	63 (9)	-	476 (23)	-	-
Congestive Heart Failure	12 (2)	25 (4)	19 (3)	92 (14)	-	335 (41)	-	-
Cardiovascular Disease	29 (3)	52 (5)	45 (5)	228 (22)	-	726 (47)	-	-
Stroke	6 (1)	12 (2)	10 (1)	58 (6)	-	168 (21)	-	-
Chronic Kidney Disease	11 (2)	15 (3)	17 (3)	49 (10)	-	190 (37)	-	-
COPD	13 (2)	26 (3)	21 (2)	89 (10)	-	280 (36)	-	-
Health care Facility[3]								
Health Facility type	District Hospital	Community Health Centre	Community Health Centre	General hospital, Community health centre, medical clinic, city health centre	Health centre	Regional hospital, community health centre	Community health centre, health unit	District hospital, Community health centre
Emergency room visit	2,035	5,349	4,401	3,184	808	24,662	-	13,701

Note. Cells with hyphen indicate that data not available at the time of compilation

[a] The numbers in parenthesis are the incident rates of the chronic condition per year. Also, the health status data used for Queen Charlotte covers all diagnosis for select chronic conditions in Queen Charlotte Local Health Area.

3a Statistics Canada, 2010

3b Northern Health, (n.d)

Estimation of Study population

I conducted a retrospective population-base study to assess hospitalization rates for ACSC in five APP communities and three FFS communities. Based on Table 5, the total population of the FFS communities is approximately five times that of the APP communities. These significant variations in population size for APP and FFS make it improper to compare the number of hospitalizations for ACSC between both sets of communities. In order to suitably compare ACSC hospitalization in communities under the FFS remuneration versus the APP remuneration, community populations from census data within the study period were processed in order to obtain for each considered community a standard population and single calendar year from 1992 – 2008. Linear interpolation procedure was used to predict the population of calendar years 1992 – 2006. As shown in Table 6, the APP communities showed a positive growth in population between 1991 and 1996 census data; and a negative growth in population between 1996 and 2001, as well as 2001 and 2006 census data, i.e., 0.23%, 0.28% and 0.14% respectively. This implies 0.05%, 0.06% and 0.03% changes per year between 1991, 1996, 2001, and 2006 census year respectively. On the other hand, the FFS communities showed negative growth in population between 1991, 1996, 2001, and 2006 census year data, i.e., 0.01%, 0.17% and 0.09% respectively. This implies 0.00%, 0.03% and 0.02% changes per year between 1991, 1996, 2001, and 2006 census year respectively. I assumed there was no change in the population for calendar year 2007 and 2008 since the last census during the period of study was in 2006 (see Table 7).

Table 6

Population per Census Year in APP and FFS Communities

	1991	1996	2001	2006
Population Under 65yrs by census year				
APP	4860	6175	4430	3820
FFS	25830	25710	21385	19495
percentage change 1991-2006				
APP	0 (0%)	0.23(23%)	0.28 (28%)	0.14 (14%)
FFS	0 (0%)	0.01 (1%)	0.17 (17%)	0.09 (9%)
percentage change per year by census year				
APP	0 (0%)	0.05(5%)	0.06 (6%)	0.03 (3%)
FFS	0 (0%)	0.00 (0%)	0.03 (3%)	0.02 (2%)

Table 7

Estimation of Community Population

	1991	1992	1993	1994	1995	**1996**	1997	1998	1999
APP	**4860**	5123	5386	5649	5912	**6175**	5826	5477	5128
FFS	**25830**	25806	25782	25758	25734	**25710**	24845	23980	23115

	2000	**2001**	2002	2003	2004	2005	**2006**	2007	2008
APP	4779	**4430**	4308	4186	4064	3942	**3820**	3820	3820
FFS	22250	**21385**	21007	20629	20251	19873	**19495**	19495	19495

Note. Census year and data are in boldface.

Selection of ACSC hospitalizations.

Ambulatory Care Sensitive Conditions include conditions that can be prevented via vaccination and/or PHC intervention (Ansari et al., 2006). Previous studies have identified hospitalization for ACSC, by focusing on principal diagnosis at hospital discharge abstract (Steiner, Braun, Melinkovich, Glazner, Chandramouli, LeBaron & Davidson, 2003; Falik, Needleman, Wells & Korb, 2001). Data from these abstracts are stored in the Hospital Separation Database (HSD).

For this study I adapted the list of ACSC conditions developed by Lavoie et al. (2010). The definition of ACSC by Lavoie and colleagues includes three main categories: chronic conditions, vaccines preventable conditions, acute conditions and their corresponding ICD-9 and 10 codes (International Classification of Disease, 9^{th} and 10^{th} Revision) (see Table 8). This classification is consistent with the widely used definition of ACSC by Billings et al. (1993). Conditions classified as chronic conditions may require partial medical management and episodic office visits (Falik et al., 2001). Conditions classified as acute most likely require timely intervention and care to prevent hospitalization. Furthermore, acute conditions can develop into chronic conditions if preventive measures are not timely. Conditions classified as vaccine preventable conditions could be averted if timely and appropriate vaccination was administered. It is worth noting that the selected conditions were developed to monitor hospitalizations principally in populations under age 65, since some diseases are presented differently in the elderly (Blustein et al., 1998; Billings et al., 1993; Bindman et al., 1995).

The hospital separation abstract is based on the primary diagnosis such as asthma, COPD, congestive heart failure, diabetes mellitus, and hypertension.

Table 8

Definition of Ambulatory Care Sensitive Conditions

List of ACSC adapted from Lavoie et al. (2010)		
Chronic Conditions	Asthma	Hypertension
	Angina	COPD
	Heart Failure and pulmonary edema	Pneumonia
	Convulsion & Epilepsy	Acute Bronchitis
	Diabetes with complications	Iron deficiency anemia
Vaccine Preventable Conditions	Diptheria	Mumps
	Hemophilus Influenza type B	Pertussis
	Hepatitis A	Pneumococcal
	Hepatitis B	Poliomyelitis
	Influenza	Tuberculosis
	Measles	Rubella
	Meningococcal disease (meningitis)	Tetanus
Acute Conditions	Dental Conditions	Gastroenteritis & Dehydration
	Cellulitis	Severe ENT infections
	Pelvic Inflammatory Disease	

However, asthma and COPD are also classified as secondary diagnosis so long as the primary diagnosis is either pneumonia or acute bronchitis. Thus the selected conditions are believed to reflect adult chronic conditions that should have benefited from timely outpatient primary care. Consequently, for the purpose of this study, ICD-9 and 10 codes are used in identifying a potential ACSC hospitalization provided the codes were reported as the principal diagnosis for any hospitalization as shown in Appendix C.

Data sources

The administrative health data used for this study is from the BC Ministry of Health and is held at Population Data BC. The Population Data BC maintains a comprehensive, longitudinal, population-based administrative database comprised of core data from health service utilization and physician billings files and hospitalization for residents of BC. The data obtained reflects population-based health service utilization because the health care delivery system in BC is universal. The hospital separation database for population data BC is comprehensive on health service utilization in BC, regardless of where the hospitalization took place. Hence, hospitalization data is an essential part of this study.

The Population Data BC have the authority to hold individual-level personal information based on the information sharing agreements with provincial ministries and other public body data providers. They are permitted to disclose anonymized personal health information without consent for the purposes of evaluating and monitoring health system performance (Population Data BC, 2010). Population Data BC also accepts the responsibility of maintaining the confidentiality of the health information it receives. The protocol for this project was reviewed by the Population Data BC Privacy Officer to ensure that it met the criteria for privacy and confidentiality of data outlined in Population Data BC Privacy Policies and Procedures (Population Data BC, 2010). Overall, the use of administrative data for research brings strengths and limitations to the research project. These are more completely described in Chapter 5: Discussion.

Ethics Approval

Ethics approval to collect the data related to this study was granted from the University of Northern British Columbia Research Ethics Committee.

Data Analysis

Hospitalization and ACSC hospitalization rates

The community population was used as standard population and was estimated using figures from 1991, 1996, 2001 and 2006 censuses. Overall annual hospitalization rates were calculated as the number of hospitalizations per 1000 population in each fiscal year between April 1, 1992 and March 31, 2008 to examine trends over time. The overall hospitalization rates were first calculated to minimize the impact of rehospitalizations on the rates. In calculation of the rate, the numerator data consisted of the total number of hospitalization of ACSC for each calendar year of the principal and primary diagnoses. Denominator data was derived from estimated annual census data for each community as provided on Table 7. The annual census population estimates for each community were derived through linear interpolation. The incidence rates described above were also calculated for ACSC hospitalization specifically.

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) for Windows version 11.5. Descriptive statistics using nonparametric test were used to compare the difference in rate of hospitalization for ACSC in communities with FFS and APP physician remuneration scheme. For all of the analysis, alpha was set at .10, i.e., $p < .10$. A more liberal alpha (α) was used for this analysis, since it decreases likelihood of making a Type II Error (i.e., saying there is no difference in the population when there is) and the rigor

of the test. Moreover, the data for this study consist of yearly rates over 17 years, hence the number of data points is quite small, i.e., 17. This would suggest the probability of high Type II error if $\alpha = .05$. However, the likelihood of making Type I error increases (i.e., saying there is a difference in the population that might not exist). Furthermore, α-level of .10 increases power, thereby there is a greater chance of accepting the alternative if it is true (i.e., power) and, consequently the likelihood of rejecting the null hypothesis will be increased. The subsequent chapters present and discuss the results of this study.

Chapter Four: Results

This chapter outlines the results from the data analyzed for this thesis. The chapter is arranged as follows. First, a descriptive analysis of both payment plans is presented using rates of ACSC hospitalization. Second, statistical difference between ACSC rates in APP and FFS Communities are described in some detail. Third, the lengths of stay in hospital for both plans are presented. This is followed by statistical testing for significance differences between plans. The population used throughout this analysis were taken from the described procedure as shown on Tables 6 and 7 in methodology chapter.

Preliminary Data Analysis

I decided not to adjust the rates of ACSC hospitalization by age and gender in both APP and FFS communities, since the gender ratio and age 95% CI split by gender indicates that there is no difference between the populations (APP and FFS). Further, the median and mean age split by gender in both communities also indicated that the populations were fairly homogenous (see Table 9 below). Thus, there was no concern to adjust rates of ACSC hospitalizations in these important characteristics that might influence reported proportions of health event rates or physician visits in the APP or FFS communities.

Table 9

Age and Gender Proportion of ACSC Hospitalization in APP and FFS Communities

	APP					
Gender	*n*	*M*	*SD*	*Mdn*	95% CI	Gender Ratio
Female	505	34.81	18.99	37	[33.15, 36.47]	1.13
Male	446	33.46	20.55	31	[31.55, 35.37]	1
	FFS					
Gender	*n*	*M*	*SD*	*Mdn*	95% CI	Gender Ratio
Female	2110	36.11	18.67	39	[35.31, 36.91]	1.12
Male	1877	33.03	20.03	30	[32.12, 33.94]	1

Hospitalization Rates for ACSC

The hospitalization rates for ACSC discussed includes hospitalization rates for chronic, acute and vaccine preventable conditions. Between 1992- 2008 there were 2,887 ACSC hospitalizations in the APP communities and 12, 270 ACSC hospitalizations in FFS communities. The mean hospitalization rates for all ACSC per 1,000 population in APP communities was 36.94 per 1000 person, in comparison to FFS communities where the mean hospitalization rate was 32.03 per 1000 person (see Table 10). The hospitalization rates in the APP community were lower than the FFS until 1997/98 when they even out. In 2005/06 there was a significant spike in the rates of hospitalization for ACSC in both communities, although the most significant spikes occurred in the APP communities (see Figure 2). The rates of ACSC hospitalizations in the APP communities ranged from a low of 20.57 per 1,000 population in 1996/97 to a high of 68.06 per 1,000 population in 2007/08. The hospitalization rates for ACSC in the FFS communities range from a low of 25.03 per 1,000 population to a high of 44.93 per 1,000 population (see Figure 2).

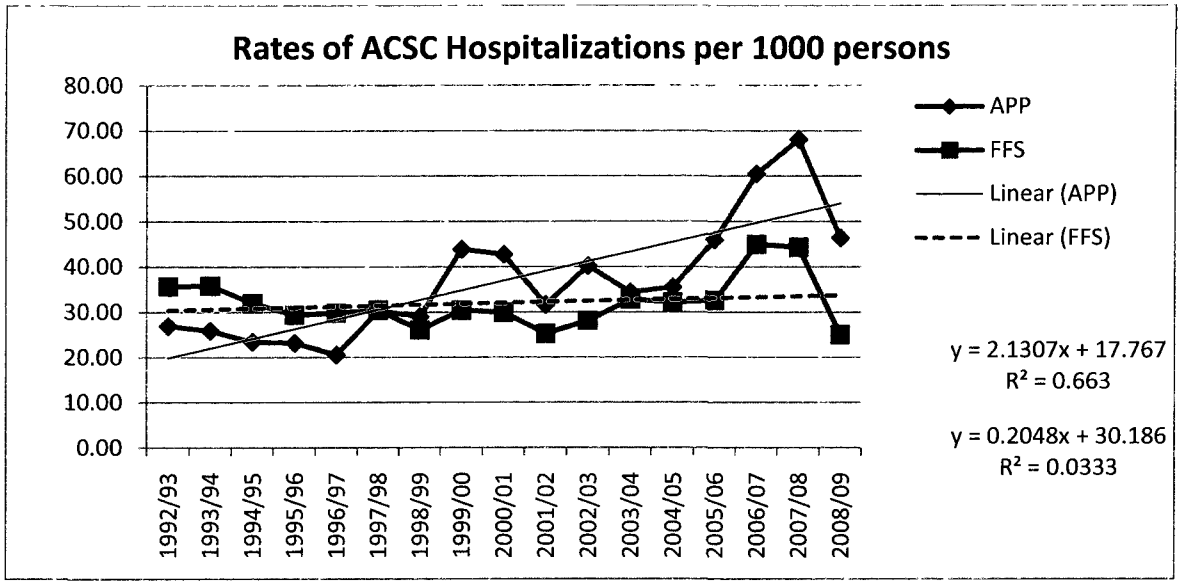

Figure 2. Rates of ACSC hospitalizations in APP and FFS communities.

The second highest rate of ACSC hospitalization in the APP communities was 60.47 per 1,000 population in 2006/07, in comparison to 44.32 per 1,000 population in the FFS communities. ACSC hospitalization rates appear higher in FFS communities in comparison to APP communities. Additionally, the slopes of the APP and FFS communities appears significantly dissimilar as the hospitalization rate for ACSC in the APP communities grew at a rate of 2.1 cases per 1000 persons per year, whereas the FFS communities grew slightly at 0.2 cases per 1000 person per year (see Figure 2). The results are summarized on Table 10.

Table 10

Rates of ACSC Hospitalizations in APP and FFS Communities, 1992/93-2008/09

	Total ACSC Hospitalizations			
	APP		FFS	
	Number of hospitalizations	Rates per 1,000	Number of hospitalizations	Rates per 1,000
1992/93	138	26.94	920	35.65
1993/94	139	25.81	923	35.80
1994/95	132	23.37	823	31.95
1995/96	137	23.17	756	29.38
1996/97	127	20.57	767	29.83
1997/98	176	30.21	757	30.47
1998/99	159	29.03	624	26.02
1999/00	225	43.88	703	30.41
2000/01	204	42.69	666	29.93
2001/02	140	31.60	539	25.20
2002/03	173	40.16	590	28.09
2003/04	144	34.40	676	32.77
2004/05	144	35.43	651	32.15
2005/06	181	45.92	647	32.56
2006/07	231	60.47	876	44.93
2007/08	260	68.06	864	44.32
2008/09	177	46.34	488	25.03

Rates of hospitalizations for chronic ACSC conditions

Chronic ACSC evaluated in this study include hospitalizations for asthma, angina pectoris, heart failure, bronchitis, hypertension, convulsion and epilepsy, diabetes, COPD, pneumonia, and anemia. These chronic conditions were analyzed in groups of related conditions, similar data pattern and dissimilar data pattern.

Hospitalization rates for chronic ACSC with similar patterns in the FFS and APP data.

The ACSC chronic conditions classified as having similar data pattern include, asthma, bronchitis epilepsy, pneumonia, COPD, hypertension and diabetes. The trend lines of these chronic conditions illustrated similar directional data pattern, which is either increasing or decrease in both APP and FFS communities.

The mean hospitalization rates per 1,000 population and the 95% confidence intervals for asthma, bronchitis epilepsy, pneumonia, COPD, hypertension and diabetes in the APP communities were 3.40 [3.22, 3.58], 0.82 [0.66, 0.98], 2.18 [2.03, 2.34], 2.94 [2.62, 3.27], 1.06 [0.78, 1.35], 4.23 [3.85, 4.61] and 3.60 [2.65, 4.54], respectively while the FFS communities had a mean hospitalization rates of 2.55 [2.64, 2.46], 0.79 [0.72, 0.87], 2.82 [2.77, 2.86], 1.65 [1.57, 1.74], 0.49 [0.42, 0.56], 4.49 [4.35, 4.62], and 1.64 [1.36, 1.91], respectively (see Table 11).

From Figures 3, 4, and 5, the rates of hospitalization for asthma, bronchitis and epilepsy from 1992/93 – 2008/09 in the APP communities are similar to that of the FFS communities. Also, all three conditions appear to show a downward trend in their hospitalization rates (see Figures 3, 4, and 5). Further, the slopes of the APP and FFS

Table 11

Rates for Chronic ACSC Hospitalizations in APP Communities, 95% Confidence Intervals, 1992/93-2008/09

	APP				FFS			
	n	*M*	*SD*	95% CI	*n*	*M*	*SD*	95% CI
Asthma	282	3.40	1.55	[3.22, 3.58]	1040	2.55	1.54	[2.64, 2.46]
Angina Pectoralis	181	2.34	1.36	[2.14, 2.54]	355	0.90	0.35	[0.86, 0.93]
Convulsion & Epilepsy	182	2.18	1.07	[2.03, 2.34]	1106	2.82	0.73	[2.77, 2.86]
Hypertension	313	4.23	3.41	[3.85, 4.61]	1644	4.49	2.73	[4.35, 4.62]
Bronchitis	70	0.82	0.67	[0.66, 0.98]	330	0.79	0.69	[0.72, 0.87]
Pneumonia	219	2.94	2.43	[2.62, 3.27]	598	1.65	1.08	[1.57, 1.74]
Heart Failure and Pulmonary Edema	33	0.42	0.34	[0.30, 0.54]	203	0.53	0.12	[0.51, 0.54]
Anemia	66	0.84	0.54	[0.71, 0.98]	353	0.90	0.38	[0.86, 0.94]
Diabetes with complications	239	3.60	7.44	[2.65, 4.54]	554	1.64	3.31	[1.36, 1.91]
COPD and Allied conditions	74	1.06	1.27	[0.78, 1.35]	175	0.49	0.47	[0.42, 0.56]

Note. M = mean rate per 1,000 persons.

communities in all three conditions appear to have a similar pattern. The hospitalization rate for asthma in the APP communities decreased at a rate of 0.17 per 1000 persons per year, in comparison to 0.29 per 1000 persons per year in FFS communities (see Figure 3). Likewise the hospitalization rate for bronchitis in the APP communities decreased at a rate of 0.05 per 1000 persons per year, in comparison to 0.12 per 1000 persons per year in FFS communities (see Figure 4). The hospitalization rate for convulsion and epilepsy in the APP communities decreased at a rate of 0.03 per 1000 persons per year, in comparison to 0.11 per 1000 persons per year in FFS communities (see Figure 5). There were slight spikes in hospitalization rates in both types of communities for asthma, bronchitis and epilepsy, but it was very noticeable in the APP communities in comparison to the FFS communities (see Figures 3, 4 and 5).

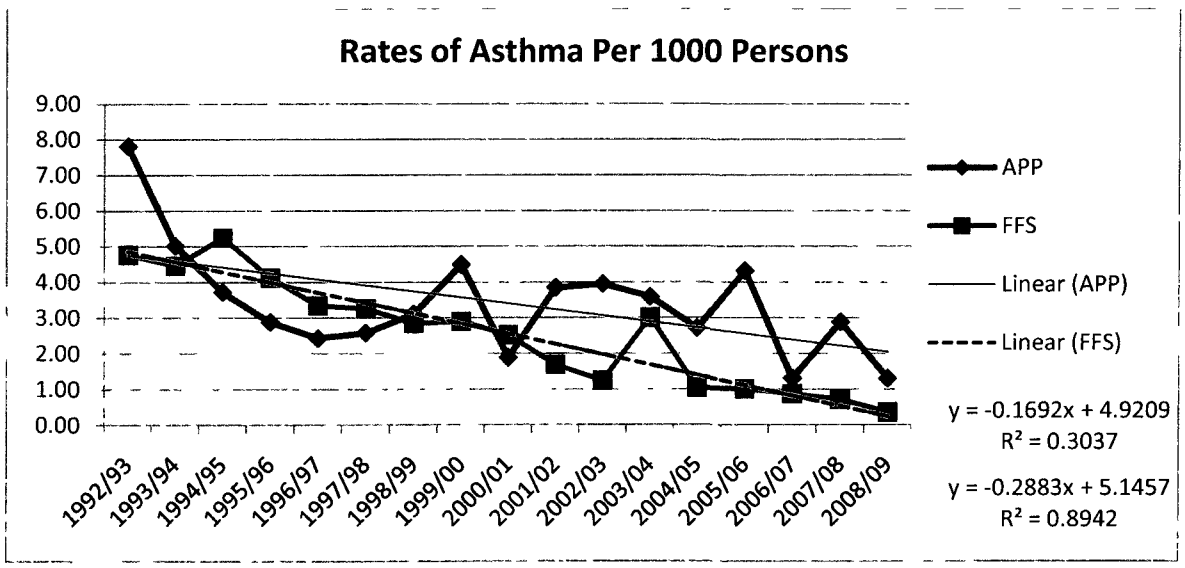

Figure 3. Rates of hospitalization for asthma, 1992/93 – 2008/09.

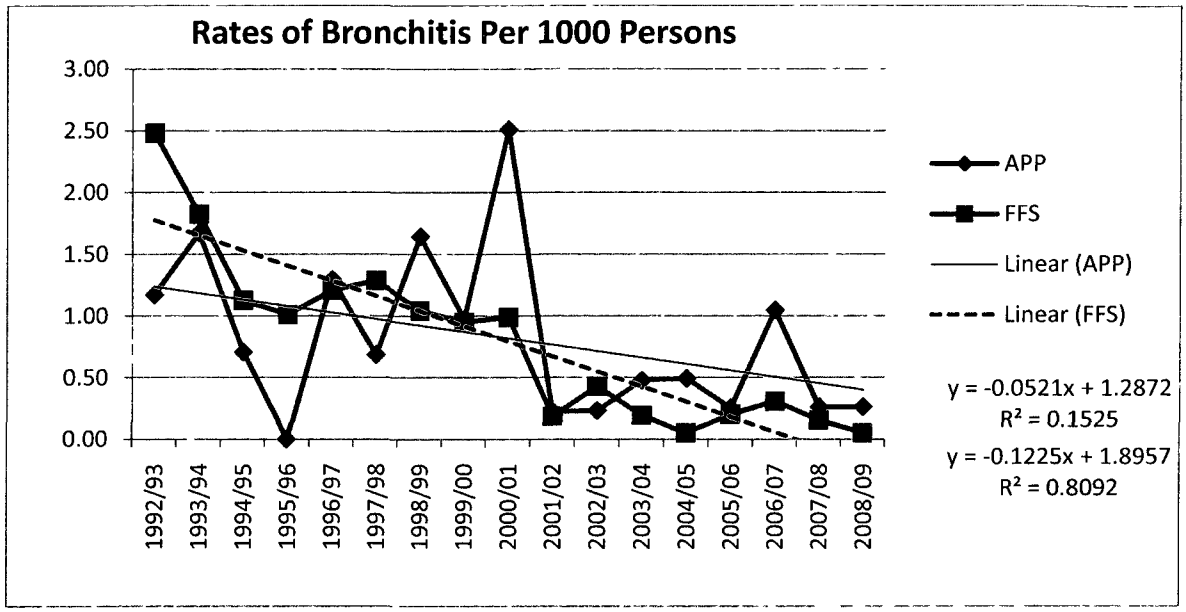

Figure 4. Rates of hospitalization for bronchitis, 1992/93 – 2008/09.

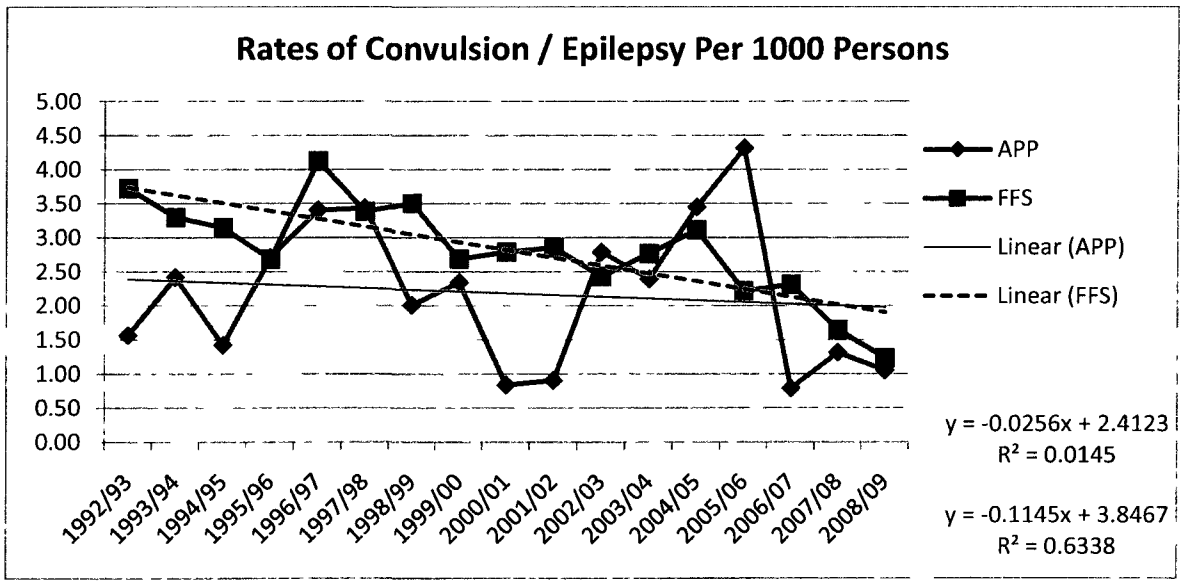

Figure 5. Rates of hospitalization for convulsion and epilepsy, 1992/93 – 2008/09.

Based on Figures 6, 7, and 8, the rates of hospitalization for pneumonia, COPD and hypertension from 1992/93 – 2008/09 in the APP communities are appeared similar to that of the FFS communities, since all three conditions appear to show an upward trend in their hospitalization rates. Further, the slopes of these conditions in the APP and FFS communities appear to have a similar pattern. The hospitalization rate for pneumonia in the APP communities increased at a rate of 0.32 per 1000 persons per year, in comparison to 0.18 per 1000 persons per year in FFS communities (see Figure 6). Likewise the hospitalization rate for COPD in the APP communities decreased at a rate of 0.21per 1000 persons per year, in comparison to 0.07 per 1000 persons per year in FFS communities (see Figure 7). The hospitalization rate for hypertension in the APP communities decreased at a rate of 0.56 per 1000 persons per year, in comparison to 0.40 per 1000 persons per year in FFS communities (see Figure 5). There were significant spikes in hospitalization rates in both types of communities, but it was very noticeable in the APP communities in comparison to the FFS communities, particularly of pneumonia. Also, the hospitalization rates for hypertension and COPD in the APP communities had significant spikes in 2007/2008 for the (see Figures 6, 7 and 8).

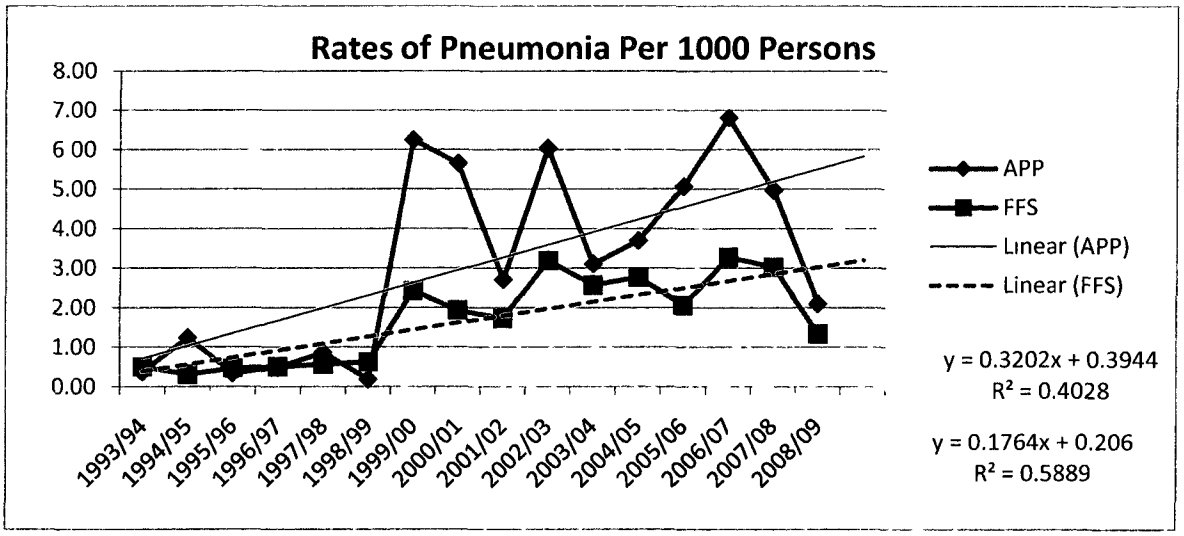

Figure 6. Rates of hospitalization for pneumonia, 1992/93 – 2008/09.

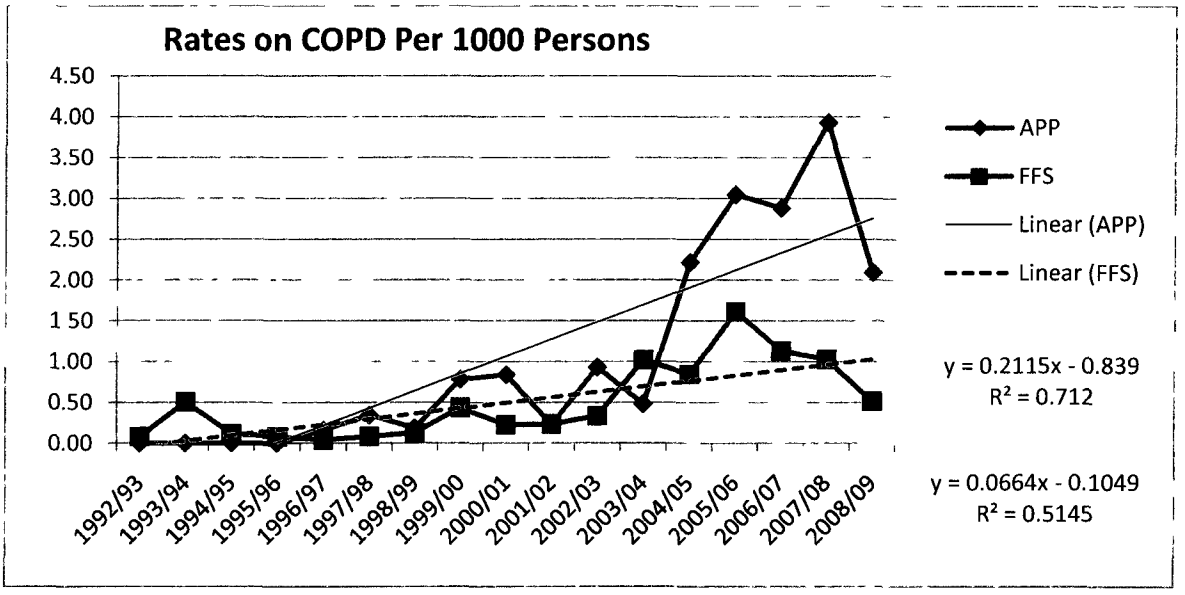

Figure 7. Rates of hospitalization for COPD, 1992/93 – 2008/09.

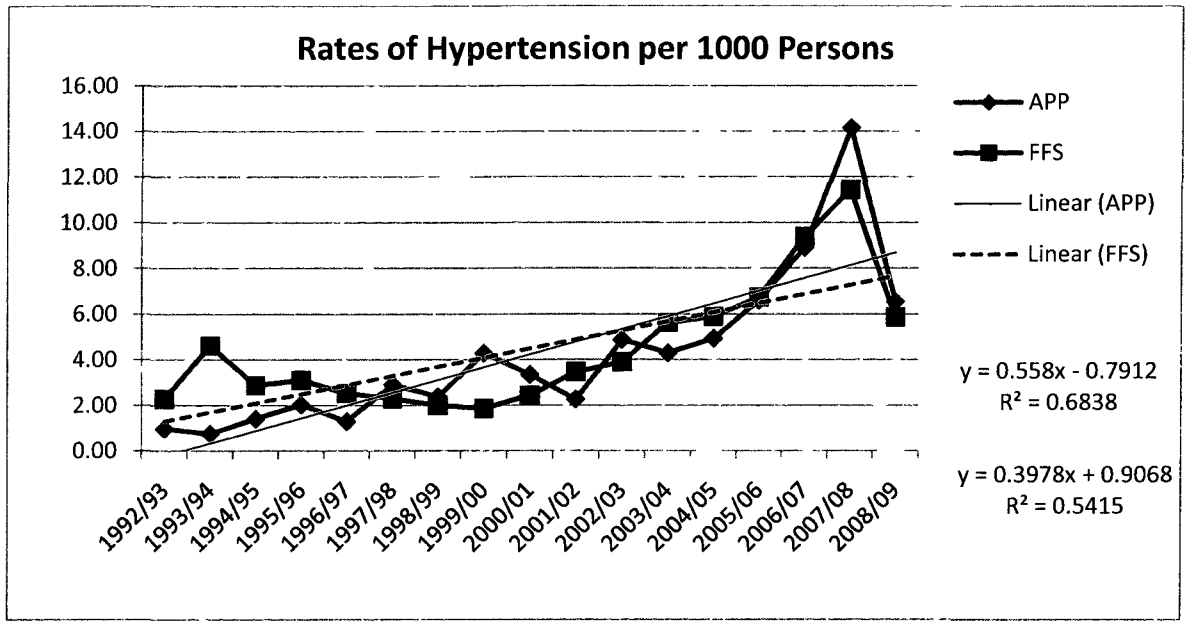

Figure 8. Rates of hospitalization for hypertensions, 1992/93 – 2008/09.

Interestingly, the hospitalization rates for diabetes in the APP and FFS communities were both flat and near zero until 2005/2006 - 2008/2009, when there was a sudden jump in hospitalization rates for diabetes. This sudden jump in hospitalization rate for diabetes may have being as a result of changes in reporting perhaps. Thus, the slope in both APP and FFS communities appears useless since, hospitalization data are inconsistent. However, in analyzing this rapid three year jump, both communities indicated similar pattern i.e., rising (2005/06 – 2007/08) and falling (2008/09). The APP indicated a higher rate in comparison to their FFS counterpart as shown in Figure 9.

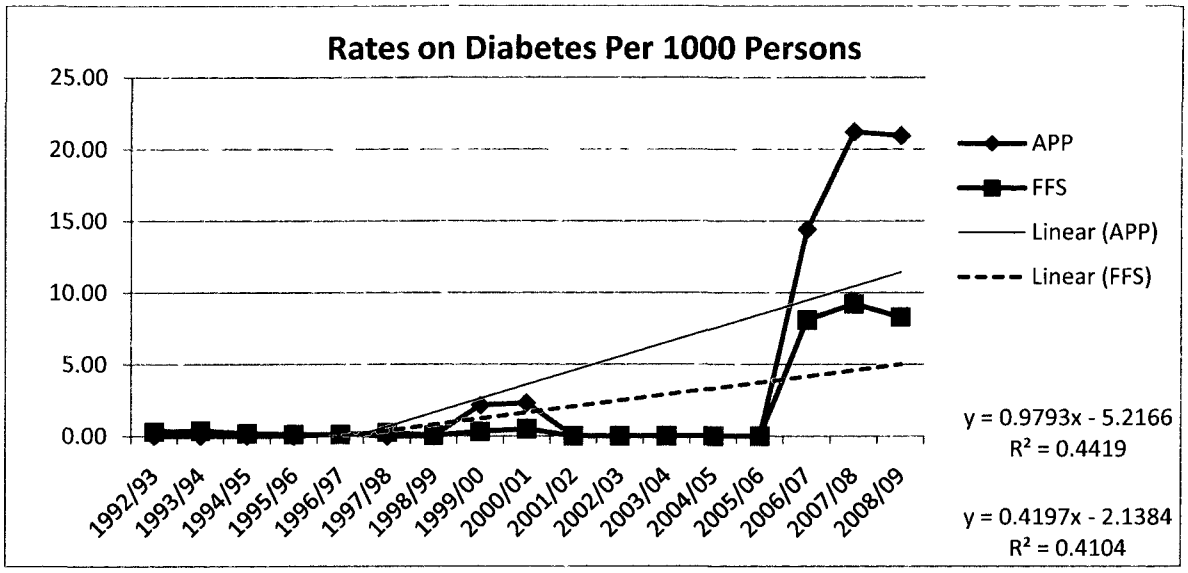

Figure 9. Rates of hospitalization for diabetes and allied conditions, 1992/93 – 2008/09.

Hospitalization rates for chronic ACSC with dissimilar patterns in the FFS and APP data.

The ACSC chronic conditions classified as having dissimilar data pattern include angina pectoris, heart failure and anemia. The trend lines of these chronic conditions illustrated dissimilar directional data pattern, which may indicated change pattern between both payment plans.

The mean hospitalization rates per 1,000 population and the 95% confidence intervals for angina pectoris, heart failure and anemia in the APP communities were 2.34 [2.14, 2.54], 0.42 [0.30, 0.54] and 0.84 [0.30, 0.54] respectively whereas the FFS communities had a mean hospitalization rates of 0.90 [0.86, 0.93], 0.53 [0.51, 0.54], and 0.90 [0.86, 0.94] respectively (see Table 11).

From Figures 10, 11, and 12, the rates of hospitalization for angina pectoris, heart failure and anemia from 1992/93 – 2008/09 in the APP communities are dissimilar to that of the FFS communities, since all three conditions appear to show an upward trend in their hospitalization rates in the APP communities and a somewhat flat hospitalization rates in their FFS counterpart. The hospitalization rate for angina pectoris in the APP communities increased at a rate of 0.13 per 1000 persons per year, in comparison to a somewhat flat rate of 0.04 per 1000 persons per year in FFS communities (see Figure 10). Similarly, the hospitalization rate for heart failure in the APP communities indicated a slight upward trend of 0.02 per 1000 persons per year, in comparison to a somewhat flat rate of 0.001per 1000 persons per year in FFS communities (see Figure 11). The hospitalization rate for anemia indicated a similar pattern, in the APP communities was slightly up at a rate of 0.04 per 1000 persons per year, in comparison to a decline of 0.04 per 1000 persons per year in FFS communities (see Figure 12). There were significant spikes in hospitalization rates in both types of communities, but it was very noticeable in the APP communities in comparison to the FFS communities, particularly of anemia (see Figures 10, 11 and 12).

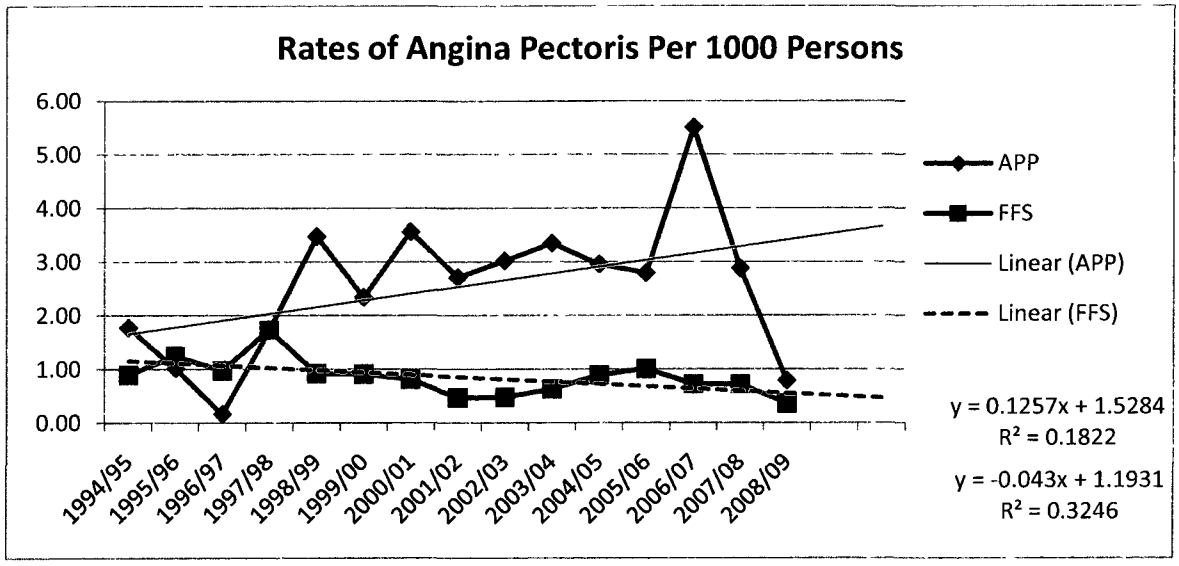

Figure 10. Rates of hospitalization for angina pectoris, 1992/93 – 2008/09.

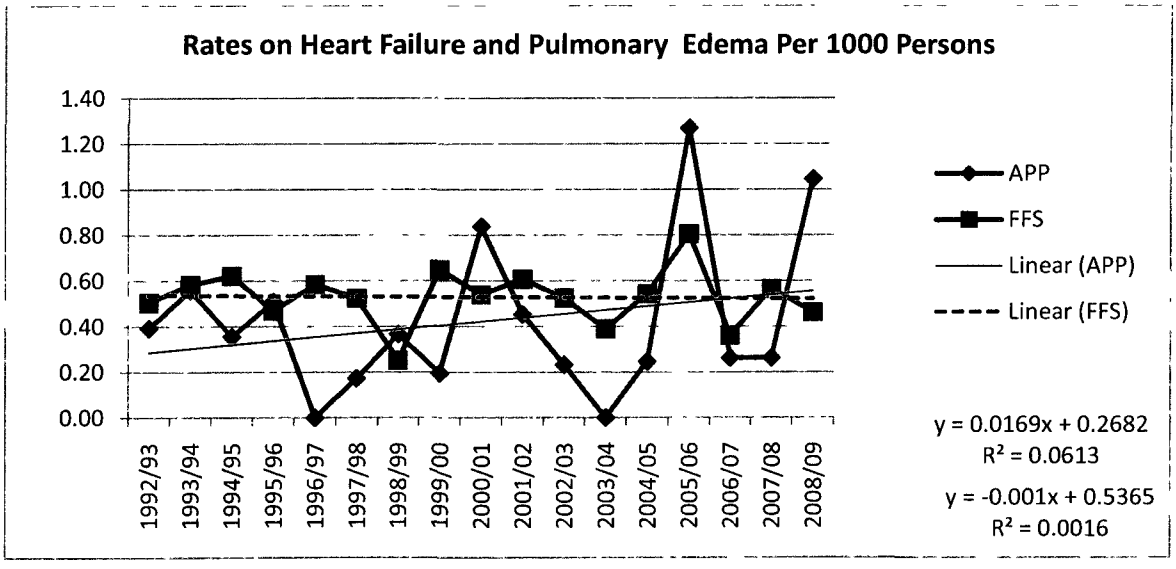

Figure 11. Rates of hospitalization for heart failure and pulmonary edema, 1992/93 – 2008/09.

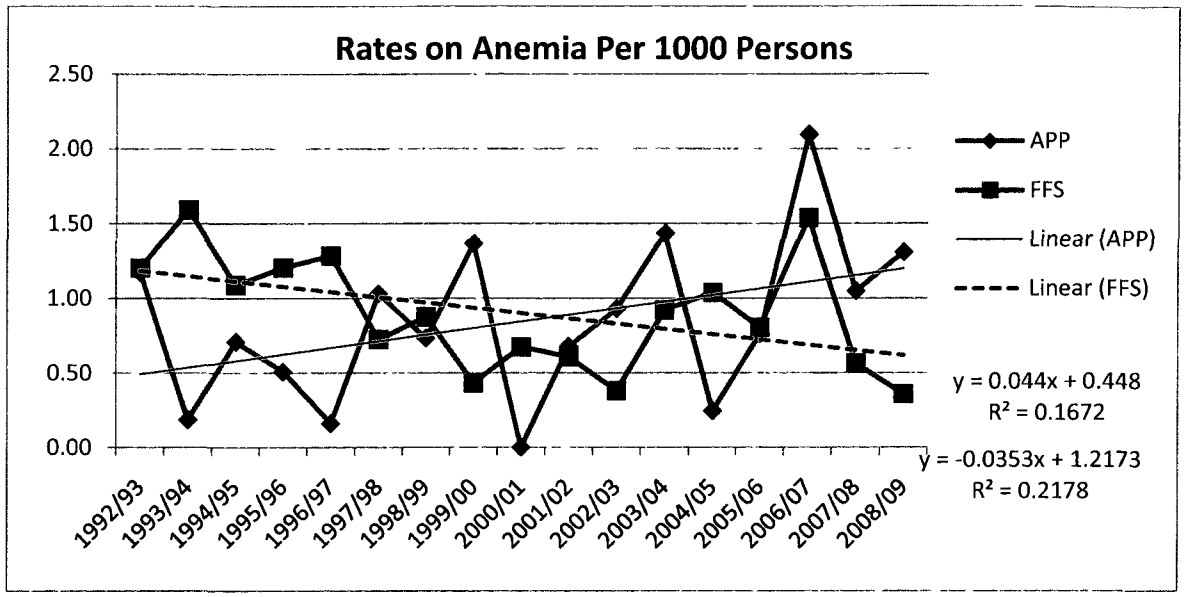

Figure 12. Rates of hospitalization for anemia, 1992/93 – 2008/09.

Rates of hospitalizations for acute ACSC conditions

Acute ACSC evaluated in this study include hospitalizations for dental conditions cellulitis, pelvic inflammatory disease, gastroenteritis and dehydration and severe ear, nose and throat infections (ENT). The acute conditions were analyzed in groups of related conditions and similar pattern. Of these acute conditions, pelvic inflammatory disease, ENT and dehydration all indicated similar patterns in rates of hospitalizations, which are either increasing or decreasing rates in hospitalizations in both APP and FFS communities. On the other hand, hospitalization rates for dental conditions and cellulitis indicated change pattern between both payment plans.

The mean rate of hospitalizations per 1,000 population for dental conditions, cellulitis, pelvic inflammatory disease, gastroenteritis and dehydration and ENT in the APP communities are 4.98 [4.83, 5.13], 1.55 [1.45, 1.65], 2.12 [1.94, 2.29], 2.70 [2.48, 2.92] and

2.61 [2.51, 2.70] respectively, while the FFS communities had mean hospitalizations rates of 4.68 [4.63, 4.73], 1.47 [1.43, 1.51], 1.79 [1.73, 1.85], 3.59 [3.48, 3.70] and 2.64 [2.55, 2.72] per 1000 population for dental conditions, cellulitis, pelvic inflammatory disease, gastroenteritis and dehydration and ENT respectively (see Table 12).

From Figures 13 and 14, the rates of hospitalization for pelvic inflammatory disease and ENT from 1992/93 – 2008/09 in the APP communities are similar to that of the FFS communities, since both conditions appear to show a downward trend in their hospitalization rates. Further, the slopes of the APP and FFS communities in both conditions appear to be similar. The hospitalization rate for pelvic inflammatory disease in the APP communities decreased at a rate of 0.14 per 1000 persons per year, in comparison to 0.14 per 1000 persons per year in FFS communities (see Figure 13). Likewise the hospitalization rate for ENT in the APP communities decreased at a rate of 0.07 per 1000 persons per year, in comparison to 0.25 per 1000 persons per year in FFS communities (see Figure 14). Although the hospitalization rates for pelvic inflammatory disease are unidirectional, the decline in ENT appears steeper. There were slight spikes in hospitalization rates in both types of communities for pelvic inflammatory disease and ENT, but it was very noticeable in the APP communities in comparison to the FFS communities (see Figures 13 and 14).

Table 12

Rates for Acute ACSC Hospitalizations in FFS Communities, 95% Confidence Intervals, 1992/93-2008/09

	APP				FFS			
	n	*M*	*SD*	95% CI	*n*	*M*	*SD*	95% CI
Dental conditions	403	4.98	1.51	[4.83, 5.13]	1795	4.68	1.09	[4.63, 4.73]
Cellulitis	126	1.55	0.60	[1.45, 1.65]	575	1.47	0.48	[1.43, 1.51]
Pelvic inflammatory disease	179	2.12	1.19	[1.94, 2.29]	715	1.79	0.83	[1.73, 1.85]
Gastroenteritis & Dehydration	204	2.70	1.61	[2.48, 2.92]	1313	3.59	2.00	[3.48, 3.70]
Severe Ear, Nose and Throat (ENT) infection	216	2.61	0.71	[2.51, 2.70]	1063	2.64	1.40	[2.55, 2.72]

Note. M = mean rate per 1,000 persons.

Based on Figure 15, the rates of hospitalization for dehydration from 1992/93 – 2008/09 in the APP communities are appeared similar to that of the FFS communities, since both communities showed an upward trend in their hospitalization rates. Further, the slopes of both APP and FFS communities appear to have a similar directional pattern. The hospitalization rate for dehydration in the APP communities increased at a rate of 0.28 per 1000 persons per year, in comparison to 0.31 per 1000 persons per year in FFS communities (see Figure 15). Both the APP and FFS communities had several fluctuations in the rates of hospitalization of these conditions; however it was noticeable in the APP communities particular in 2006/07 calendar year (see Figure 15).

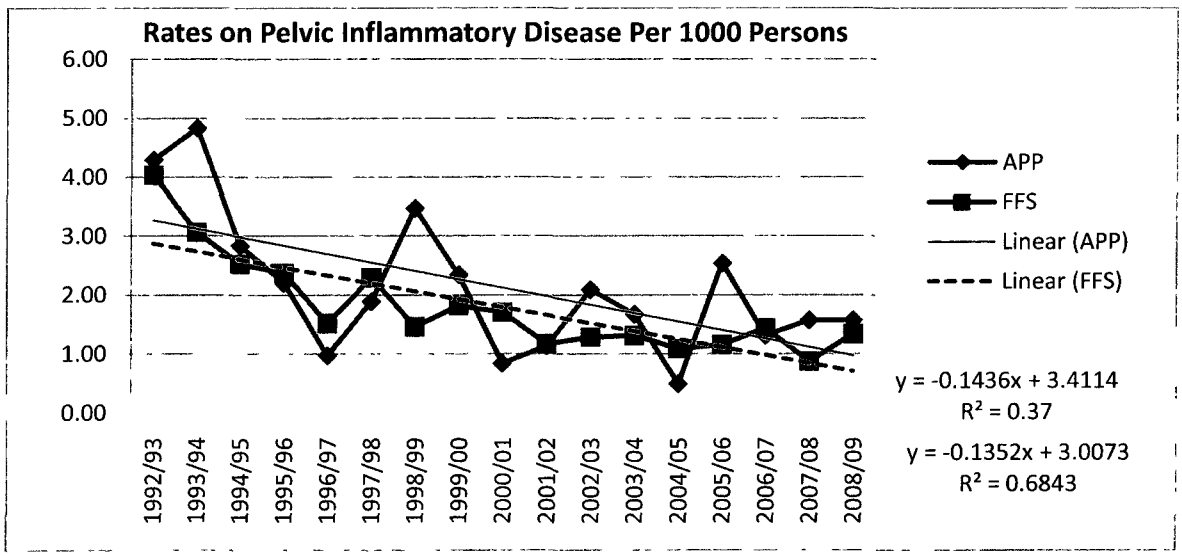

Figure 13. Rates of hospitalization for pelvic inflammatory disease, 1992/93 – 2008/09.

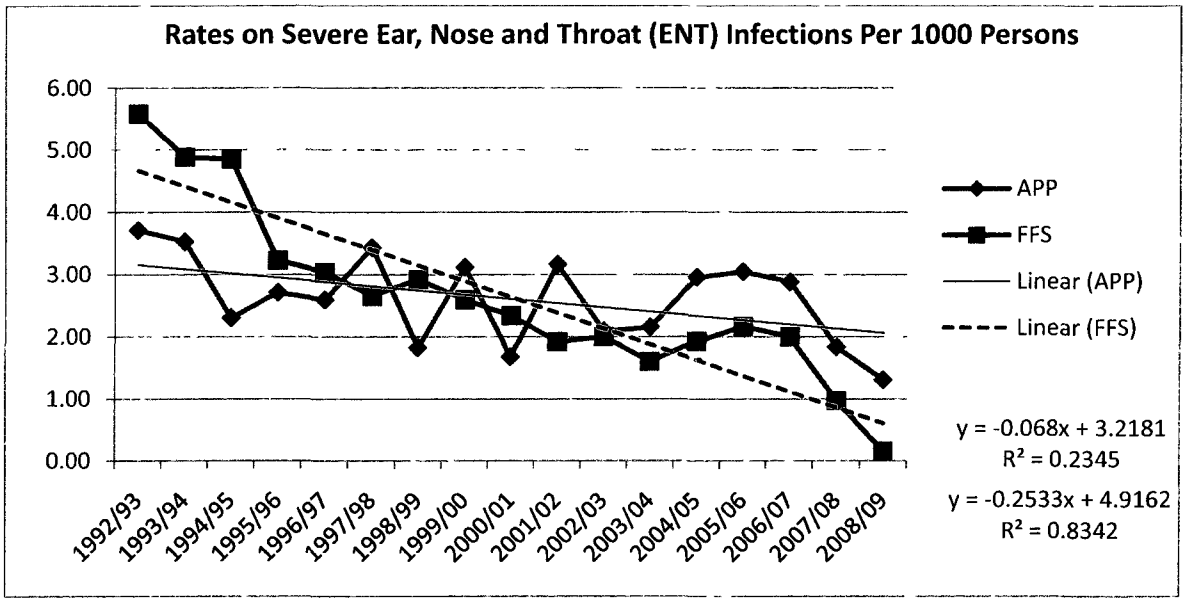

Figure 14. Rates of hospitalization for severe ENT infections, 1992/93 –2008/09.

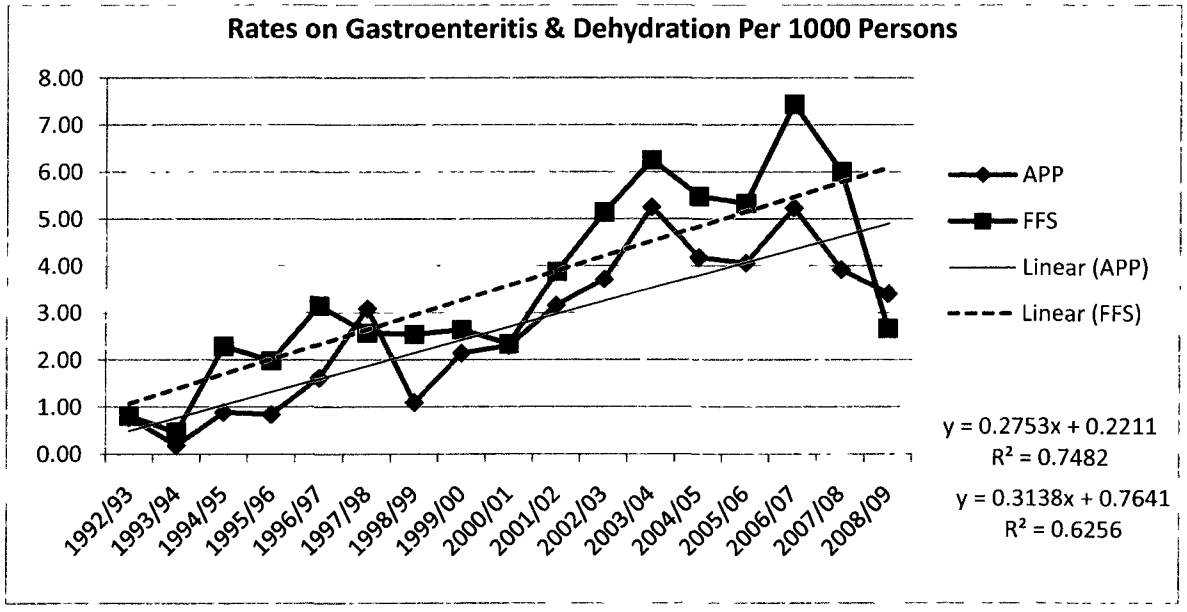

Figure 15. Rates of hospitalization for gastroenteritis and dehydration, 1992/93 – 2008/09.

From Figures 16 and 17, the rates of hospitalization for dental conditions and cellulitis from 1992/93 – 2008/09 in the APP communities are dissimilar to that of the FFS communities, since both conditions appear to show an upward trend in their hospitalization rates in the APP communities and a somewhat flat hospitalization rates in their FFS counterpart. The hospitalization rate for dental conditions in the APP communities increased at a rate of 0.10 per 1000 persons per year, in comparison to a somewhat flat rate of 0.001 per 1000 persons per year in FFS communities (see Figure 16). Similarly, the hospitalization rate for cellulitis in the APP communities indicated a slight upward trend of 0.003 per 1000 persons per year, in comparison to a slight downward rate of 0.05 per 1000 persons per year in FFS communities (see Figure 17).

The hospitalization rate for dental conditions in the APP communities showed a significant spike in 2000/01 and 2001/02, as well as a sharp fall in both communities in 2007/08. , In Figure 17, the rates in hospitalization for cellulitis in the APP communities was less in comparison to their FFS counterpart in 1992/93, afterwards the rates fluctuated in both communities until 2001/02 when the APP communities had a sharp spike and the FFS communities had a moderated fall in same year. Interestingly, in 2007/08 both APP and FFS communities had a sharp decline in hospitalization rates for cellulitis (see Figures 16 and 17). This decline may have been as a result of changes in practice or reporting.

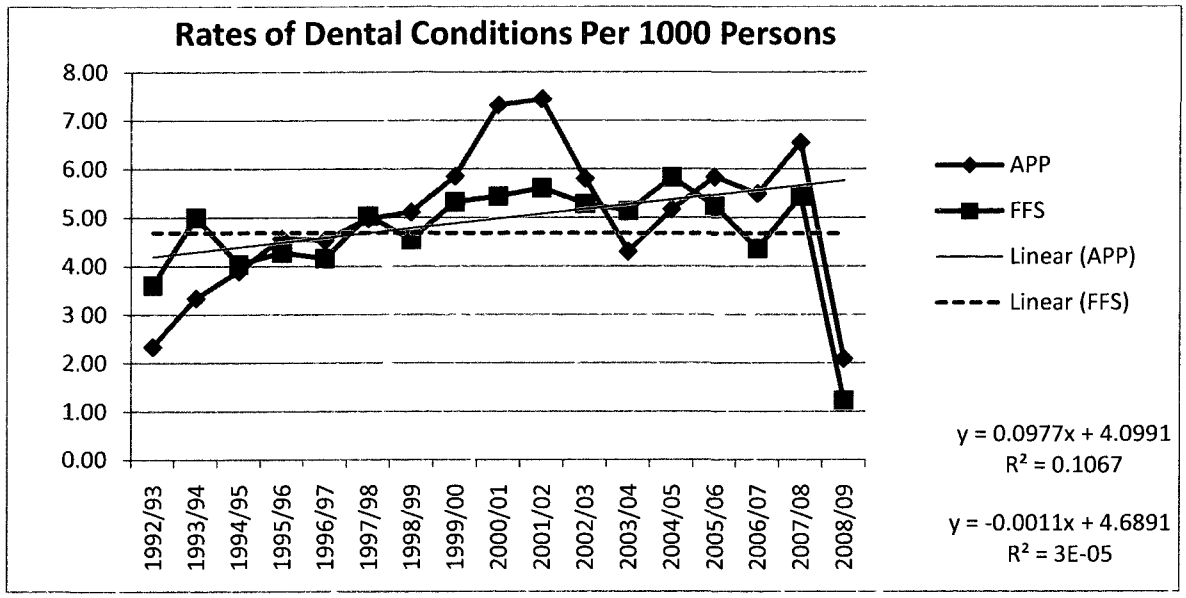

Figure 16. Rates of hospitalization for dental conditions, 1992/93 – 2008/09.

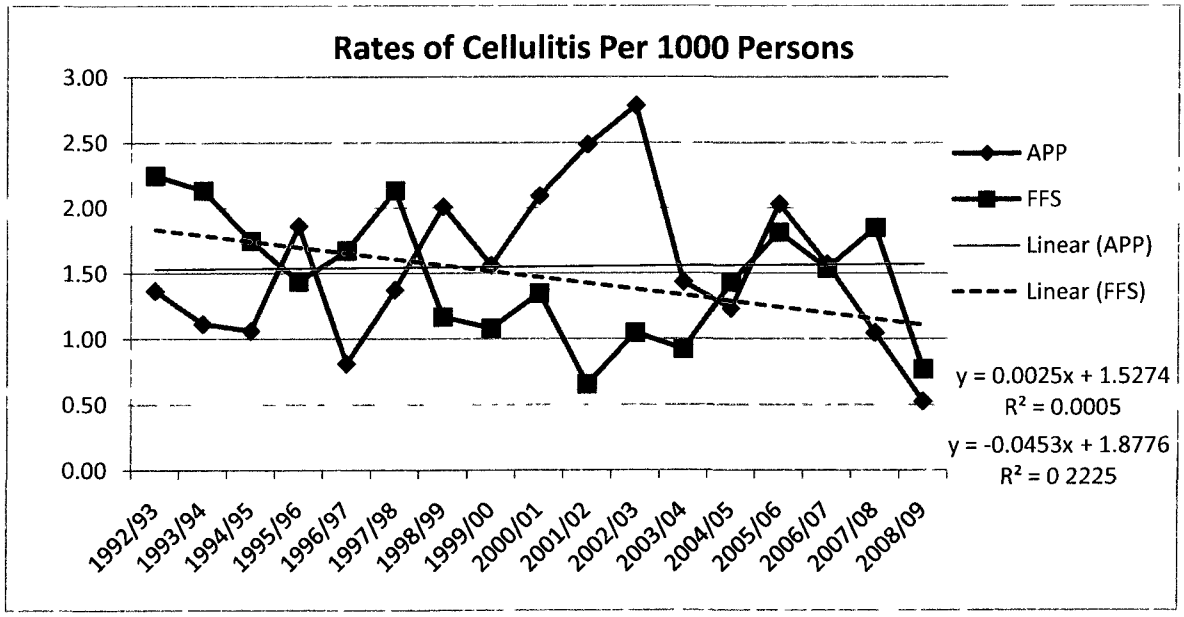

Figure 17. Rates of hospitalization for cellulitis, 1992/93 – 2008/09.

Rates of hospitalizations for vaccine preventable ACSC conditions

The conditions shown in Figures 18-29 all have erratic patterns and sudden spikes in data that appear then disappear. Comparison of these conditions, slopes and any statistical inference would not be useful. Simple description of these conditions follows. The results for the vaccine preventable conditions include hospitalizations for diphtheria, hemophilus influenza type B, hepatitis A, hepatitis B, mumps, influenza, measles, meningococcal disease (meningitis), pertussis, pneumococcal, poliomyelitis, tuberculosis, rubella and tetanus. During the period of study, 1992/93 – 2008/09, there was no hospitalization for tetanus and poliomyelitis in either of the communities either. Further, there were no hospitalizations for hepatitis B and diphtheria in the APP communities as well. The mean rate of hospitalizations per 1,000 population for these conditions are summarized in Table 13 .

The hospitalization rates for vaccine preventable conditions vary throughout the study years for both APP and FFS communities. As illustrated in Figures 18 and 19, the rates of hospitalization for influenza and rubella from 1992/93 – 2008/09 in the FFS indicated erratic spikes in APP communities and a slight spike in their FFS counterpart. Also, their trend lines in both the APP and FFS communities indicate a downward movement and the slope of the trend lines is somewhat similar in both plans (see Figure 18 and 19). The hospitalization rate for pneumococcal from 1992/93 – 2008/09 in the APP communities had a sudden spike whereas their FFS counterpart was somewhat flat. Interestingly, there was a sudden spike in 2000/01 in the APP communities for influenza, rubella and pneumococcal. This sudden spike in hospitalization rates may be as a result of a reporting issue or a systemic glitch, as well as an epidemic outbreak. Their trend lines appear to be declining as well (see Figures 18, 19 and 20 respectively).

Table 13

Rates for Vaccine Preventable Conditions ACSC Hospitalizations in APP Communities, 95% Confidence Intervals, 1992/93-2008/09

	APP				FFS			
	n	M	SD	95% CI	*n*	M	SD	95% CI
Influenza	27	0.32	0.27	[0.22, 0.42]	93	0.23	0.18	[0.19, 0.26]
Hemophilus Influenza Type B	1	0.01	0.05	[-0.08, 0.10]	4	0.01	0.02	[-0.01, 0.03]
Mumps	2	0.02	0.07	[-0.07, 0.12]	8	0.02	0.03	[0.00, 0.04]
Rubella	26	0.29	0.50	[0.09, 0.48]	72	0.17	0.20	[0.12, 0.22]
Pneumococcal	16	0.19	0.19	[-0.06, 0.44]	105	0.25	0.27	[0.20, 0.31]
Pertussis	2	0.02	0.02	[-0.10, 0.14]	12	0.03	0.05	[0.00, 0.06]
Measles	22	0.26	0.26	[-0.05, 0.57]	87	0.23	0.63	[0.09, 0.36]
Pulmonary / other Tuberculosis	2	0.03	0.03	[-0.08, 0.13]	11	0.03	0.06	[0.00, 0.07]
Hepatitis A	1	0.01	0.01	[-0.08, 0.10]	13	0.03	0.04	[0.01, 0.05]
Meningococcal Disease (Meningitis)	1	0.01	0.01	[-0.08, 0.10]	18	0.04	0.06	[0.02, 0.07]
Hepatitis B	0	0			27	0.07	0.08	[0.04, 0.10]
Diphtheria					1	0.00	0.01	[-0.02, 0.02]

Note. M = mean rate per 1,000 persons.

The hospitalization rates for pertussis, hemophilus influenza type B and hepatitis A in the APP communities had significant spikes 1998/99, 1993/92 and 1999/00 respectively, whereas in 1995/96 and 1997/98 there was a spike in rates of hospitalization for hepatitis B and diphtheria respectively in the FFS communities (see Figure 21, 22 and 23). This spike in hospitalization rates in APP communities in same study period may have been as a result changes in reporting or an outbreak, particular in remote and rural communities where few cases double the incidence of the disease. The hospitalization rates (per 1,000 population) of mumps, measles, meningitis and tuberculosis are shown on figures 26, 27, 28 and 29 below.

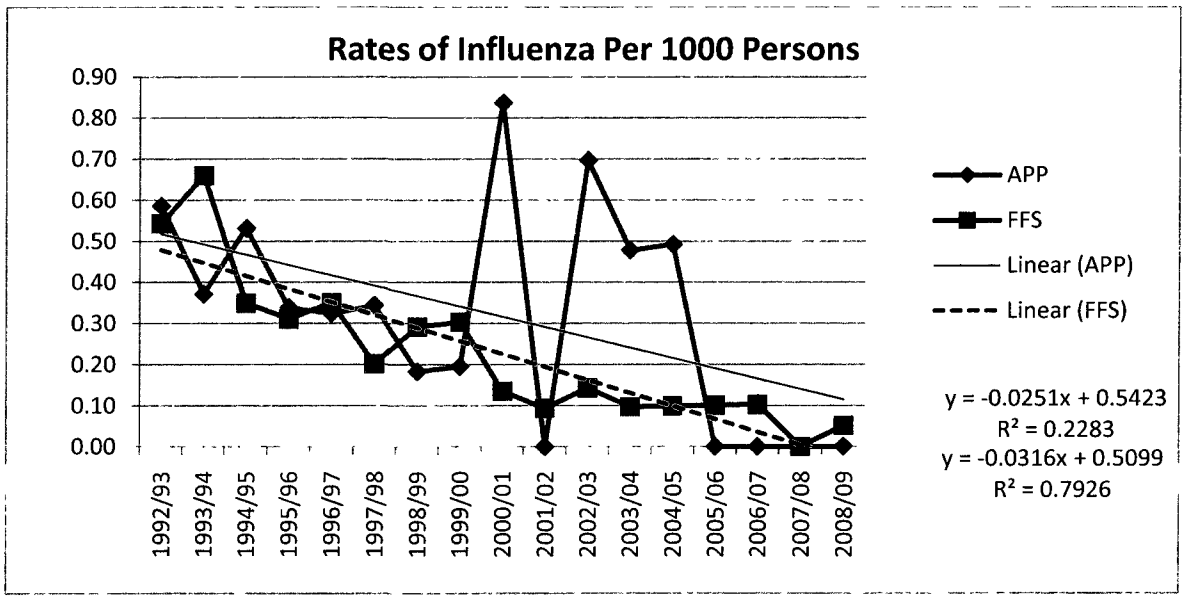

Figure 18. Rates of hospitalization for influenza, 1992/93 – 2008/09.

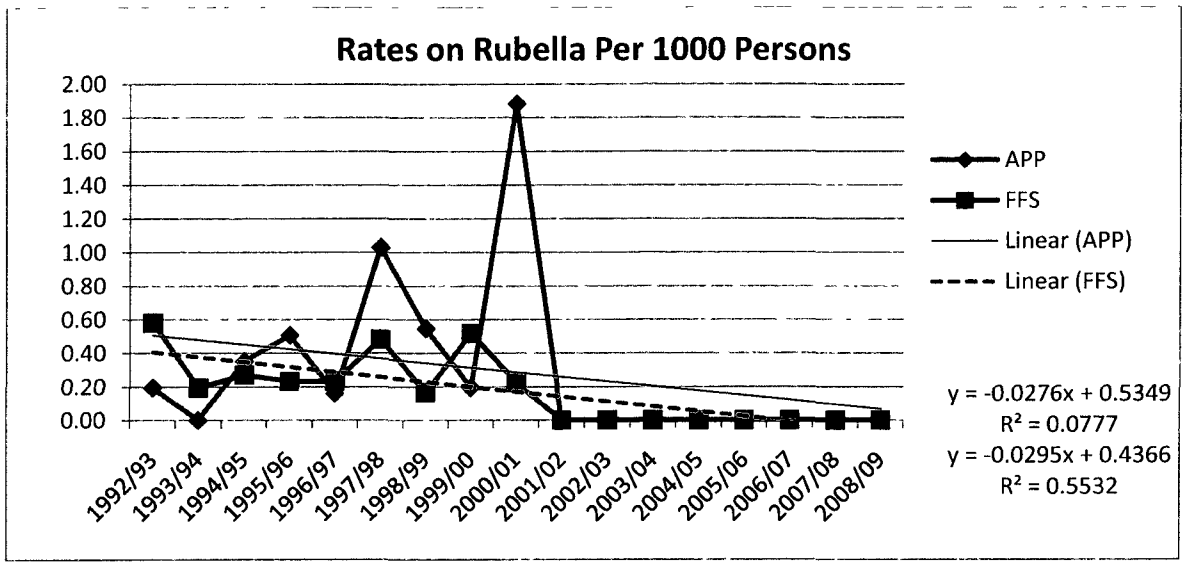

Figure 19. Rates of hospitalization for rubella, 1992/93 – 2008/09.

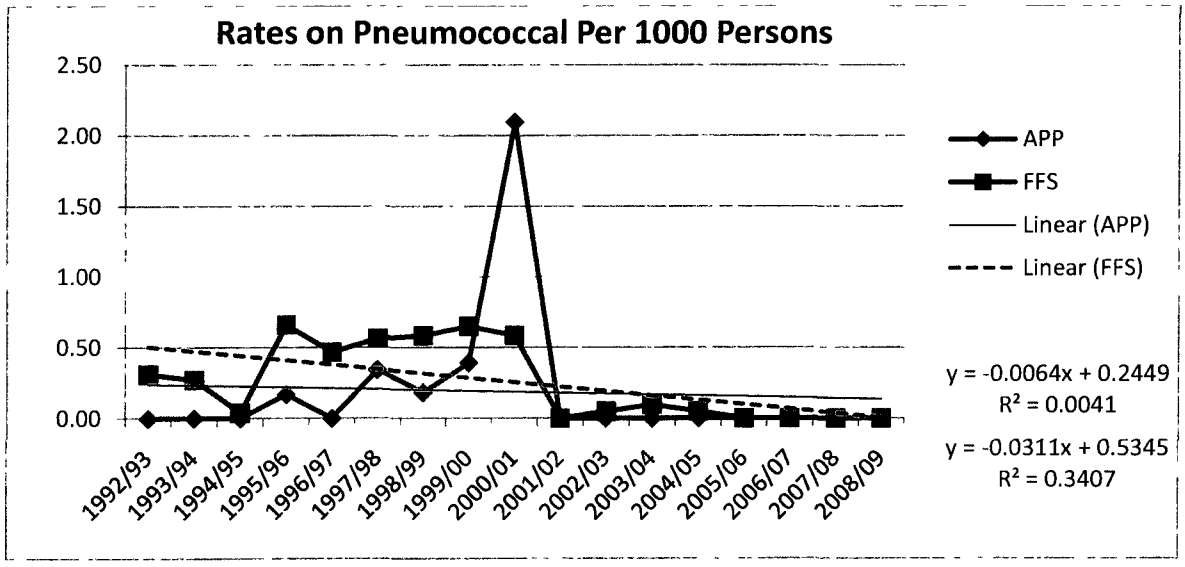

Figure 20. Rates of hospitalization for pneumococcal, 1992/93 – 2008/09.

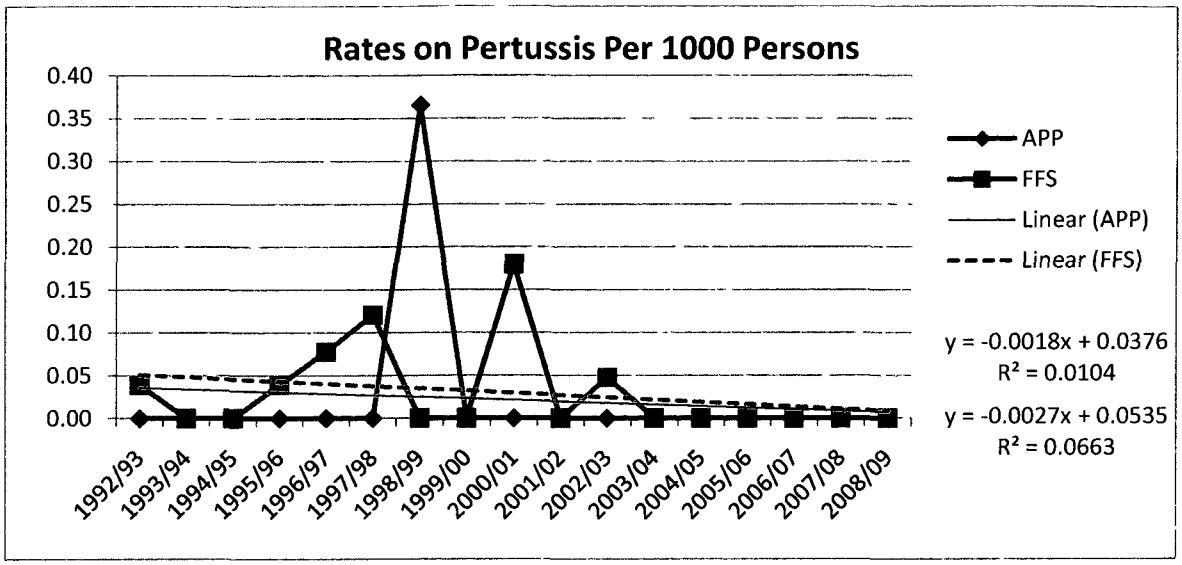

Figure 21. Rates of hospitalization for pertussis, 1992/93 – 2008/09.

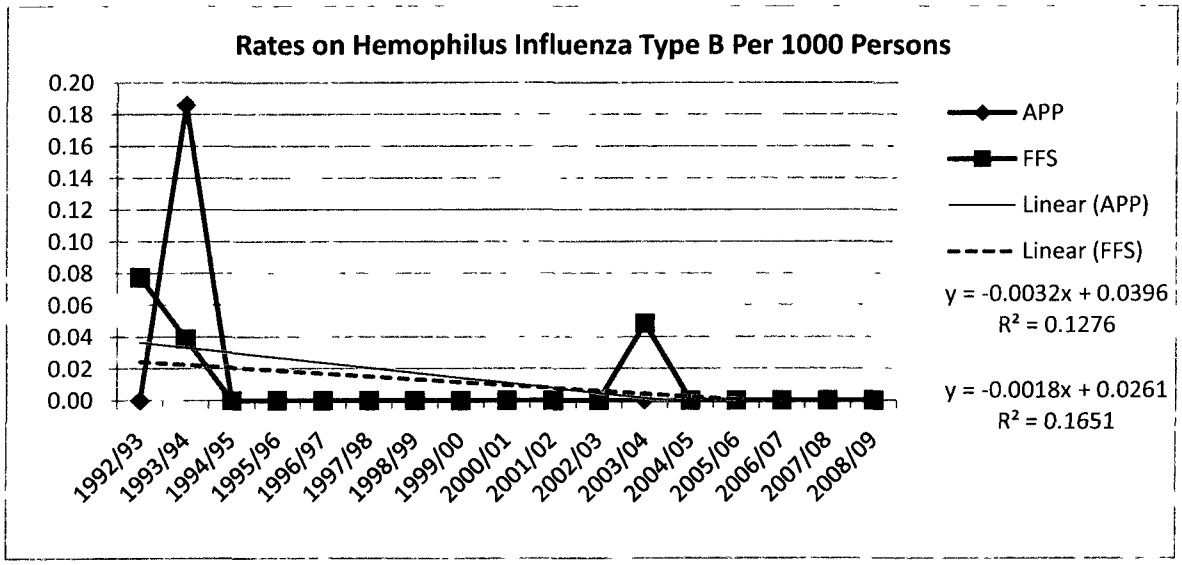

Figure 22. Rates of hospitalization for hemophilus influenza type B, 1992/93 – 2008/09.

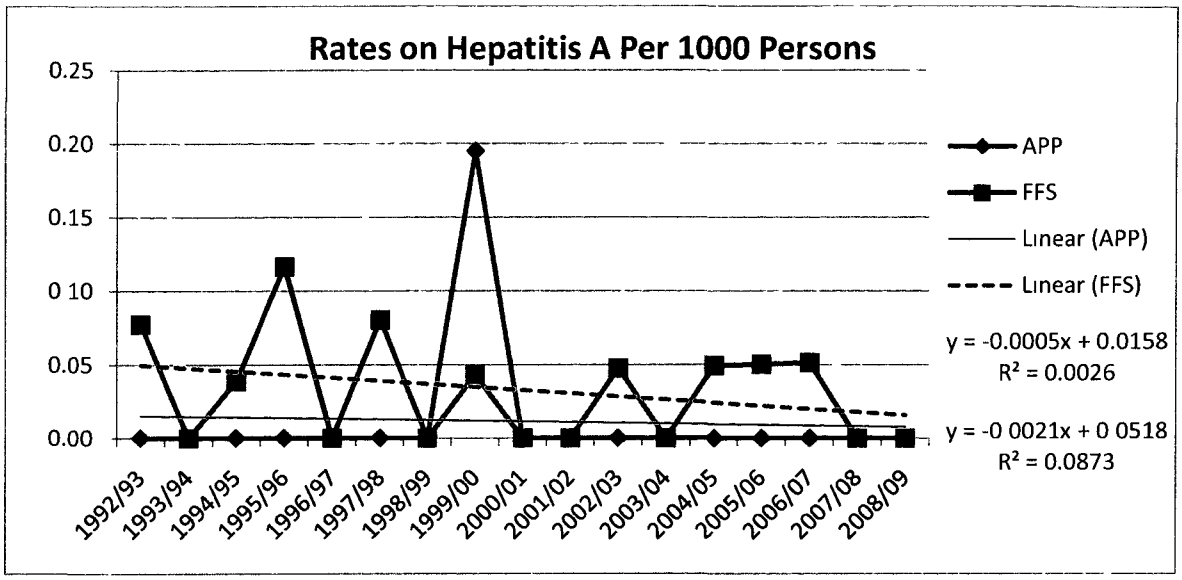

Figure 23. Rates of hospitalization for hepatitis A, 1992/93 – 2008/09.

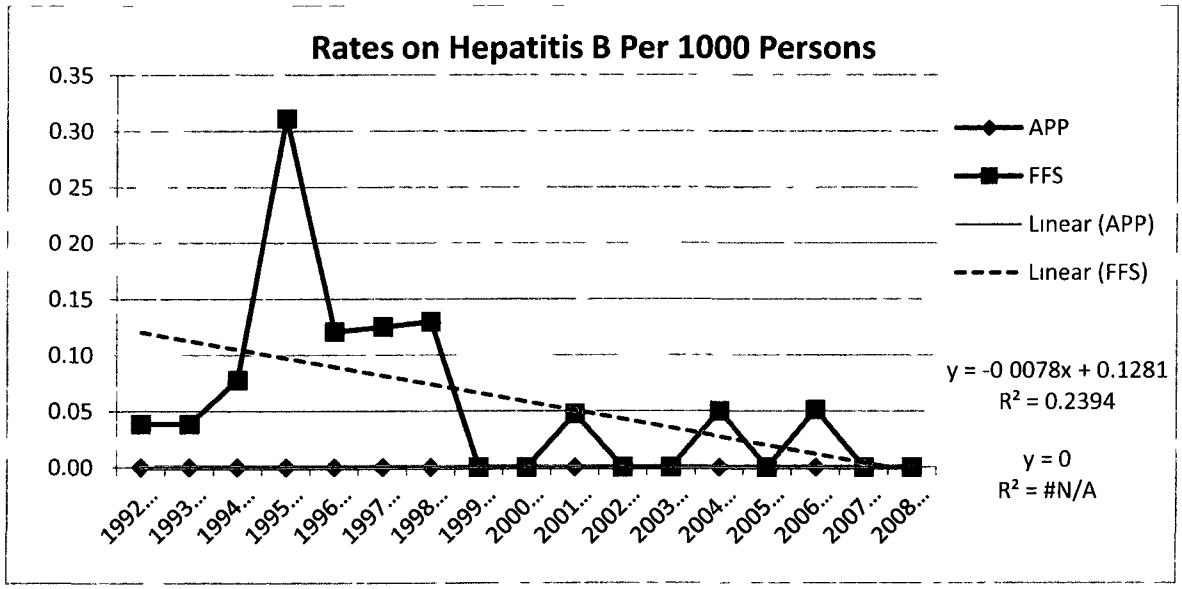

Figure 24. Rates of hospitalization for hepatitis B, 1992/93 – 2008/09.

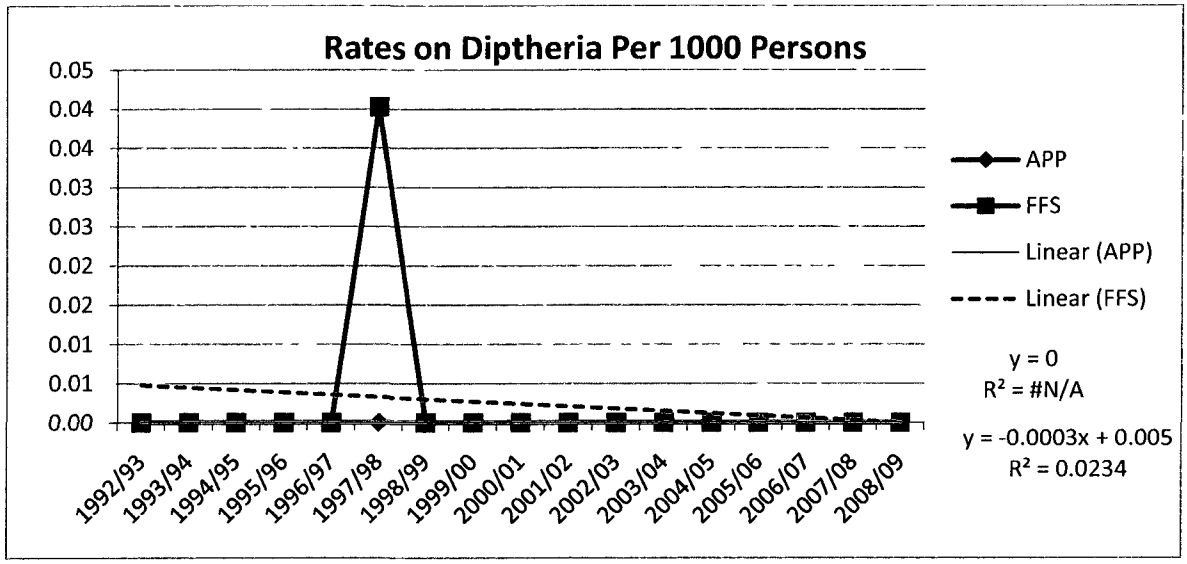

Figure 25. Rates of hospitalization for diphtheria, 1992/93 – 2008/09.

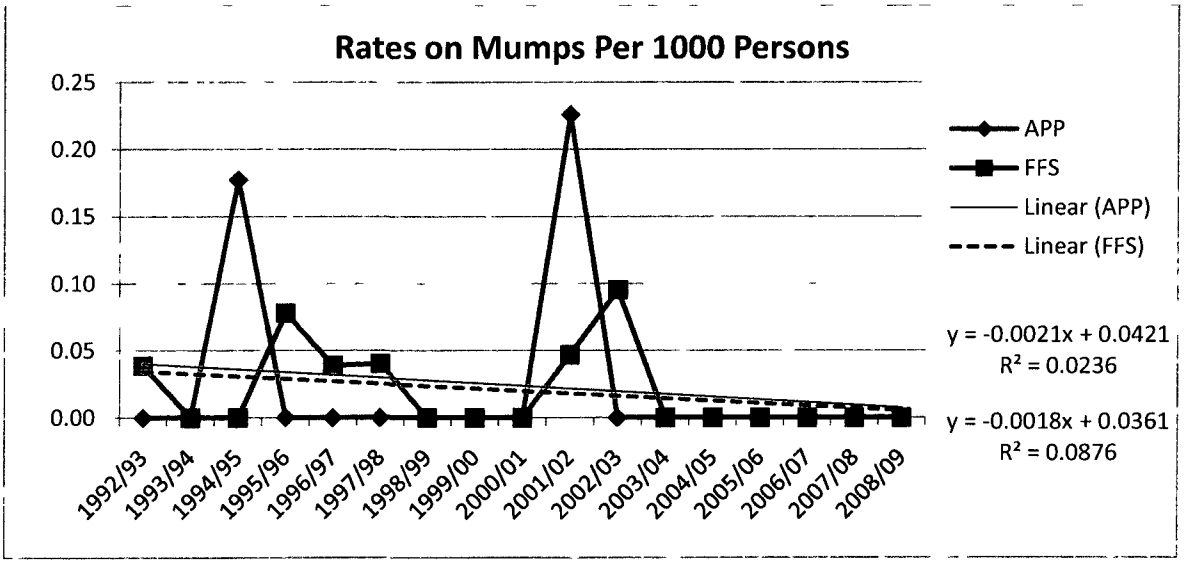

Figure 26. Rates of hospitalization for mumps, 1992/93 – 2008/09.

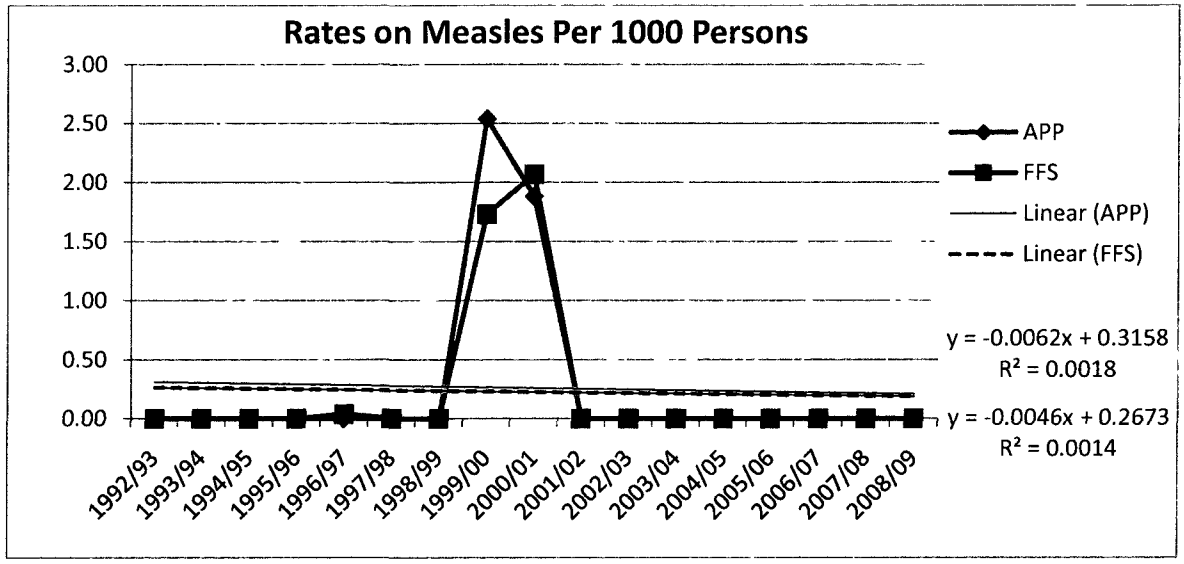

Figure 27. Rates of hospitalization for measles, 1992/93 – 2008/09.

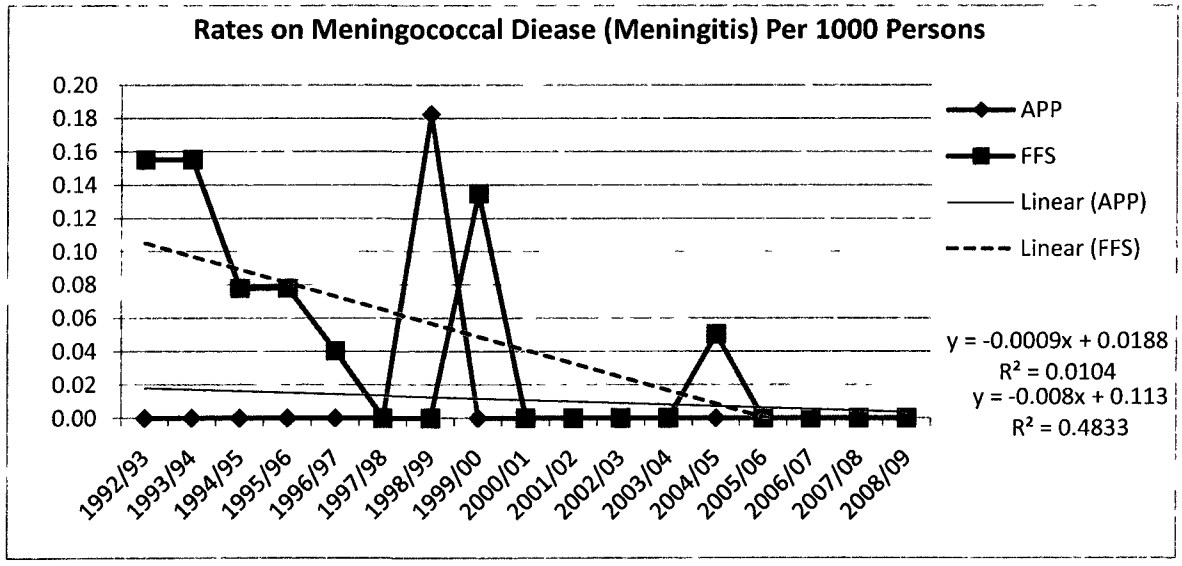

Figure 28. Rates of hospitalization for meningitis, 1992/93 – 2008/09.

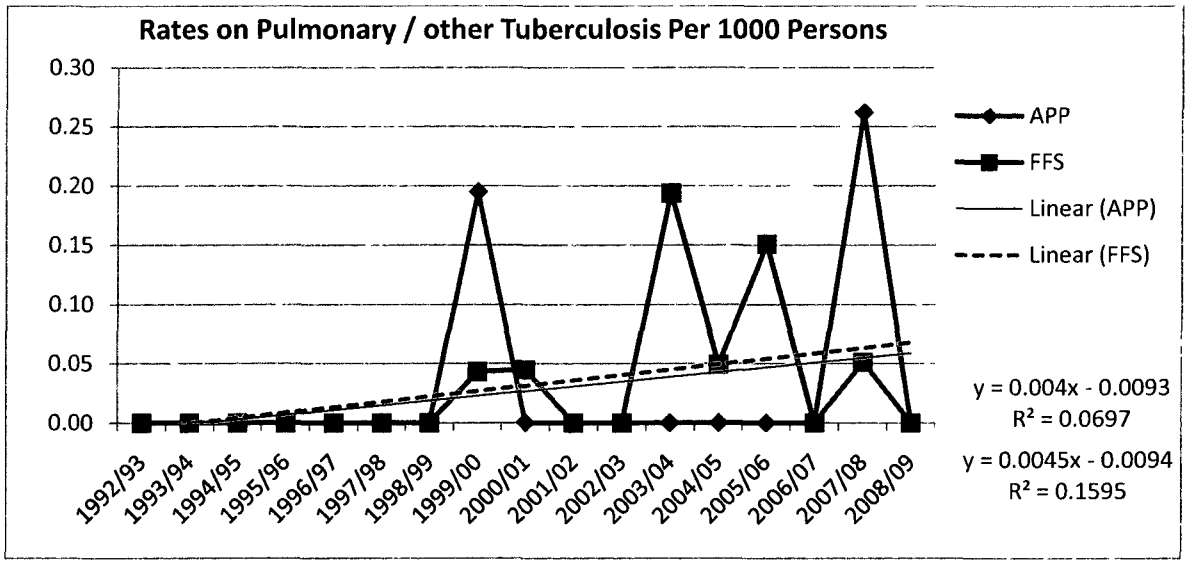

Figure 29. Rates of hospitalization for pulmonary/other tuberculosis, 1992/93 – 2008/09.

Statistical Difference between APP and FFS Communities

Table 14 indicates that the two remunerations plans for GPs (APP and FFS) are different with regards to mean hospitalization rates for ACSC per 1,000 population. The mean hospitalizations rates per 1,000 population in the APP communities was 36.94 (13.21) whereas the FFS communities had a mean hospitalizations rates of 32.02 (5.67) per 1,000 population for all ACSC. Further, there was a statistical difference in hospitalization rates for ACSC between plans, with the APP showing higher rates in hospitalization for ACSC ($t(16) = 1.83, p = .08, d = 0.48$). Note however, that the APP rates appear to be trending upwards as shown in Figure 2. This finding demonstrates the importance of my chosen α-level; since α-level of .05 would not have seen any difference in population even when the effect size (0.48) was small almost medium (see Table 14).

From Figure 2, the hospitalization rates for all conditions suggested to be ACSC showed a statistically difference in the means hospitalization rates of both APP and FFS population.

Table 14

Overall Analysis of ACSC Hospitalizations Rates per 1000 Population in APP and FFS Communities

	M	*SD*	*t*(16)	*P*	Cohen's *d*
APP	36.94	13.21	1.83	**.08**	0.48
FFS	32.03	5.67			

Analysis of hospitalization rates for ACSC specific conditions

Based on figures 22, 23, 24, 25, 26, 27, 28 and 29 a t-test analysis is improper in my opinion. In these cases trend lines are either having irregular ACSC hospitalizations pattern (see Figures 22, 23, 26, 27, 28 and 29) or having a condition show up in one community and not the other (see Figures 24 and 25). Further, the actual number of cases is so low as to make any further analysis meaningless.

Chronic ACSC hospitalizations

Table 15 clearly indicates that there were statistically significant differences found in hospitalization rates for chronic ACSC with asthma, pneumonia, COPD, diabetes, angina pectoris, convulsion and epilepsy showing a statistical difference in both payment plans. There is overwhelming evidence showing that the mean hospitalization rates for these conditions above are higher in the APP communities in comparison to their FFS counterpart.

It is also worth noting that the difference in the hospitalization rates for diabetes with a significant level of $p = (.07)$ would not have been detected if the alpha level was .05, particularly when the effect size was small (0.34). This reinforces the importance of an alpha level .10.

The hospitalization rates for asthma showed a downward trend of 0.29 and 0.17 per year per 1000 for the APP and FFS plans respectively, while convulsion and epilepsy showed downward trends of 0.03 and 0.11 respectively (see Figure 3 and 10). Whereas the hospitalization rate for pneumonia and COPD showed an upward trend of 0.32 and 0.18 per year per 1000 population for the APP and FFS plans respectively, while COPD had an upward trend of 0.21 and 0.07 per year over 1000 population respectively (Figure 4 and 5). Interestingly, the hospitalization rate for angina shows an upward trend of 0.13 per year per 1000 population in the APP communities and a downward in the FFS communities, 0.04 per year per 1000 population (Figure 7). Other chronic conditions (not statistically significant) such as hypertension and diabetes showed upward trends; anemia and heart failure showed both showed an upward trend for APP and a downward trend for FFS ; bronchitis showed a downward trend for APP and an upward trend for FFS. The summary of the means and standard deviations can be found on Table 15.

Table 15

Contrast of APP Communities with FFS Communities in Hospitalization for Chronic ACSC

	APP		FFS				Cohen's
ACSC conditions	*M*	*SD*	*M*	*SD*	*t*(16)	*p*	*d*
Asthma	3.40	1.55	2.55	1.54	2.29	**.03**	0.55
Bronchitis	0.82	0.67	0.79	0.69	0.16	.88	0.04
Pneumonia	2.94	2.43	1.65	1.08	3.46	**.00**	0.69
COPD	1.06	1.27	0.49	0.47	2.53	**.02**	0.60
Hypertension	4.23	3.41	4.49	2.73	-0.66	.52	-0.08
Heart Failure	0.42	0.34	0.53	0.12	-1.37	.19	-0.43
Angina Pectoris	2.34	1.36	0.90	0.35	3.87	**.00**	1.45
Anemia	0.84	0.55	0.90	0.39	-0.32	.75	-0.13
Diabetes	3.60	7.44	1.64	3.31	1.92	**.07**	0.34
Convulsion/Epilepsy	2.18	1.07	2.82	0.73	-2.38	**.03**	-0.70

Acute ACSC hospitalization

The mean hospitalization rates for gastroenteritis and dehydration were found to be statistically significant with FFS plan showing a higher rate in hospitalization in comparison to APP plan ($t(16) = -4.34$, $p = .00$, $d = 0.49$) (see Table 16). The other acute conditions did not show statistical significant difference in either remuneration plans. The summary of the means and standard deviations can be found on Table 16.

The hospitalization rates for gastroenteritis and dehydration showed an upward trend of 0.28 and 0.31 per year per 1000 persons for the APP and FFS plans respectively, Other

acute conditions (not statistically significant) dental conditions, cellulitis showed upward trend; anemia and heart failure showed both showed upward trend for APP and a downward trend for FFS; bronchitis showed a downward trend for APP and an upward trend for FFS.

Table 16

Contrast of APP Communities with FFS Communities in Hospitalization for Acute ACSC

	APP		FFS				Cohen's
ACSC conditions	*M*	*SD*	*M*	*SD*	*t*(16)	*p*	*d*
Dental Condition	4.98	1.51	4.68	1.09	1.25	.23	0.23
Pelvic inflammatory disease	2.12	1.19	1.79	0.83	1.67	.11	0.32
Gastroenteritis & Dehydration	2.70	1.61	3.59	2.00	-4.34	**.00**	-0.49
Severe ENT infection	2.61	0.71	2.64	1.40	-0.11	.91	-0.03
Cellulitis	1.55	0.6	1.47	0.48	0.37	.71	0.15

Vaccine preventable ACSC hospitalization

There was no statistical significant difference in the hospitalization rates for vaccine preventable conditions, as shown on Table 17. The summary of the means and standard deviations can be found on Table 17. All vaccine preventable conditions had a downward trend in hospitalization for ACSC, with the exception of tuberculosis.

Table 17

Contrast of APP Communities with FFS Communities in Hospitalization for Vaccine Preventable ACSC

	APP		FFS				Cohen's
ACSC conditions	*M*	*SD*	*M*	*SD*	*t*(16)	*P*	*D*
Influenza	0.32	0.27	0.23	0.18	1.40	.18	0.39
Pneumococcal	0.19	0.51	0.25	0.27	-0.63	.54	-0.15
Rubella	0.29	0.50	0.17	0.20	1.04	.31	0.32

Length of Hospital Stay in APP and FFS Communities

The length of stay involves the total number of days a patient was hospitalized for a particular condition. The conditions not reported in this analysis are conditions that have irregular data patterns. These conditions include heart failure, diphtheria, hemophilus influenza Type B, hepatitis A, hepatitis B, measles, meningitis, mumps, pertussis, pneumococcal, poliomyelitis, tuberculosis, and tetanus. A difference in length of hospitalization may indicate systemic or administrative default as well as difficulty in discharge planning, coordination of primary care providers, comorbidites and late diagnosis.

Length of hospital stay in APP and FFS communities for chronic ACSC

Table 18 summarizes the mean length of hospitalizations for various chronic ACSC in 1992/93 - 2008/09. The mean length of hospitalization varied in each payment plans and conditions during the period of study. Of all chronic ACSC hospitalization, convulsion and epilepsy is the only condition with a statistical significant difference in the length of hospitalization ($t(16) = -4.34$, $p = .00$), with Cohen d = 0.49; mean of 1.77 (0.55) and 2.29

(1.01) for APP and FFS plan respectively. Thus, the length of hospitalization for convulsion and epilepsy is higher under the FFS plan in comparison to the APP plan.

Table 18

Contrast of APP Communities with FFS Communities in Length of Hospital Stay for Chronic ACSC

	n	*M*	*SD*	95% CI	*t*(16)	*p*	Cohen's *d*
Asthma							
APP	319	1.90	1.08	[1.78, 2.01]	-1.14	.27	-0.41
FFS	1360	2.25	0.59	[2.22, 2.28]			
Convulsion and Epilepsy							
APP	221	1.77	0.55	[1.69, 1.84]	-2.17	**.05**	-0.64
FFS	1417	2.29	1.01	[2.23, 2.34]			
Hypertension							
APP	50	1.36	2.37	[0.64, 1.92]	-1.11	.28	-0.39
FFS	140	2.13	1.42	[1.76, 2.25]			
Bronchitis*							
APP	232	2.61	1.95	[2.36, 2.86]	1.48	.16	0.18
FFS	701	2.31	1.18	[2.22, 2.40]			
Pneumonia							
APP	646	4.12	2.99	[3.89, 4.35]	-0.37	.71	-0.14
FFS	1570	4.45	1.38	[4.38, 4.52]			
COPD							
APP	149	2.77	2.93	[1.98, 2.91]	-0.85	.40	-0.23
FFS	266	3.49	3.26	[2.69, 3.47]			
Diabetes*							
APP	97	3.14	1.15	[2.91, 3.37]	-1.10	.12	-1.64
FFS	329	5.95	2.12	[5.72, 6.18]			
Angina Pectoris							
APP	245	2.06	1.28	[1.90, 2.22]	-0.53	.60	-0.20
FFS	322	2.27	0.72	[2.19, 2.35]			
Anemia*							
APP	13	0.79	1.16	[0.16, 1.42]	-1.56	.15	-0.59
FFS	53	2.03	2.72	[1.29, 2.76]			

Note: The degree of freedom for bronchitis, diabetes & anemia are 15, 4 and 11 respectively.

Length of hospital stays in APP and FFS communities for acute ACSC

Table 19 summarizes the mean length of hospitalizations for various acute ACSC in 1992/93 - 2008/09. The mean length of hospitalization varied in each payment plans and conditions during the period of study. Of all acute ACSC, dental conditions is the only condition with a statistically significant difference in the length of hospitalization (t (16) = 2.31, p = .03), with Cohen d = 0.64; mean of 0.31 (0.34) and 0.14 (0.16) for APP and FFS plan respectively. Thus, this evidence suggests that a patients length of hospitalization for a dental condition is higher under the APP plan in comparison to the FFS plan. This disparity in length of hospitalization between the APP and FFS communities may be as a result of the lack of dental care in remote and rural areas.

Table 19

Contrast of APP Communities with FFS Communities in Length of Hospital Stay for Acute ACSC

	N	*M*	*SD*	*95% CI*	*t*(16)	*p*	Cohen's *d*
Dental conditions							
APP	105	0.31	0.34	[0.24, 0.37]	2.31	**.03**	0.64
FFS	200	0.14	0.16	[0.12, 0.16]			
Pelvic inflammatory disease							
APP	195	1.54	1.11	[1.39. 1.70]	-0.24	.81	-0.08
FFS	456	1.63	0.87	[1.55, 1.71]			
Dehydration							
APP	214	2.00	1.61	[1.78, 2.21]	0.11	.92	0.04
FFS	645	1.95	0.94	[1.87, 2.02]			
Severe ENT Infection							
APP	151	1.79	1.75	[1.51, 2.07]	1.15	.27	0.40
FFS	591	1.28	0.44	[1.25, 1.32]			
Cellulitis							
APP	287	3.67	2.10	[3.43, 3.92]	0.07	.94	0.03
FFS	1154	3.63	1.12	[3.56, 3.69]			

Length of hospital stays in APP and FFS communities for vaccine preventable ACSC

Table 20 summarizes the mean length of hospitalizations for various vaccine preventable ACSC in 1992/93 - 2008/09. The mean length of hospitalization varied in each payment plans and ACSC conditions during the period of study. There were no statistical differences in the length of hospitalization for vaccine preventable conditions in APP and FFS plans with an exception of influenza and rubella as shown on Table 20 below.

Table 20

Contrast of APP Communities with FFS Communities in Length of Hospital Stay for Vaccine ACSC

	M	*SD*	95% CI	*t*(16)	*p*	Cohen's *d*
Influenza						
APP	1.23	1.27	[0.81, 1.64]	-1.43	**.08**	-0.35
FFS	1.63	1.03	[1.47, 1.80]			
Rubella						
APP	1.60	1.64	[1.02, 1.83]	-2.30	**.04**	-1.31
FFS	3.68	1.52	[2.14, 1.32]			

Summary of Finding.

Overall, the APP communities showed higher rates of hospitalization for ACSC (t = 1.83, *df* = 16, p = .08), with Cohen's d = 0.48. Chronic conditions such as asthma, pneumonia, COPD, diabetes, and angina showed a higher rate hospitalization in APP communities, while epilepsy and convulsion, and dehydration showed a higher ration of hospitalization in the FFS communities in comparison to their counterparts. Some conditions such as diphtheria, hepatitis A, hepatitis B, and tuberculosis were unsuitable for statistical testing because of irregular data patterns and very low incidence. The hospitalization rates

for all vaccine preventable and acute conditions, with the exception of dehydration, were statistically non-significant in both APP and FFS communities. Furthermore, the length of hospitalization for most chronic, acute and vaccine preventable conditions in APP and FFS plans were not different. Notable exceptions included convulsion and epilepsy, dental conditions, influenza and rubella which indicated statistically significant differences between APP and FFS. The APP had a higher longer hospital stay for dental conditions in comparison to the FFS plan, whereas the FFS had a longer hospital stay for convulsion and epilepsy, influenza and rubella in comparison to the APP plan.

Table 21

Summary of Finding

	APP	FFS
Overall ACSC rate	↑	↓
ACSC Specific Condition		
Chronic ACSC		
Asthma	↑	↓
Pneumonia	↑	↓
COPD	↑	↓
Angina Pectoris	↑	↓
Diabetes	↑	↓
Convulsion & Epilepsy	↓	↑
Acute ACSC		
Gastroenteritis & Dehydration	↓	↑
Length of Hospitalization		
Chronic ACSC		
Convulsion & Epilepsy	↓	↑
Acute ACSC		
Dental Conditions	↑	↓
Vaccine Preventable ACSC		
Influenza	↑	↓
Rubella	↑	↓

Chapter Five: Discussion

Key Findings and Contribution

This study is the first to compare the rates in hospitalization of ambulatory care sensitive conditions for persons accessing the care of a general practitioner remunerated under the alternative payment plan and fee-for-service remuneration in Northern British Columbia, Canada. Improving access to primary care is one principal objective of healthcare policy makers to improve the health of Canadians, since access to primary care is widely considered to be a necessary building block of an effective health care delivery system. However the literature is inconsistent as to any one measure of access as the best possible indicator of system performance in the primary care settings (Ricketts et al., 2001). Over the past decade, one tool established for analyzing access to care, has been hospitalization rates for ACSC. The findings from ACSC hospitalization rates has being significant, as it provides a practical way of evaluating care delivered in the primary care settings, as well as identifying appropriate areas for improving access and quality of care.

The decision to use alpha at .10 in this study, was to ensure no possible difference was missed. While this admittably increases the likelihood of more Type I errors (claims of difference that might not exist), I was more concerned about lessening the Type II errors (capturing all possible differences). Furthermore, having a small sample size ($df = 16$) poses problems with Type I and II errors. For this study, we included 17 years of data. Increasing the sample size to other communities was not practical. This is one limitation of using an administrative data since analysis is limited to what is provided. Hence, a particular strength

of this study is to use alpha-level of .10 for statistical testing, so as to capture all differences that may not have been identified with alpha-level of .05.

The analysis applied an interpolation and extrapolation procedure to estimate population size in between census years. This allowed me to complete a population based analysis of ACSC, a widely used indicator for measuring of access and quality of primary care (Ansari et al. 2006; Caminal et al. 2004; Pappas et al., 1997). The definition of ACSC used for this study was adapted from Lavoie et al. (2010), using ten chronic conditions (asthma, angina pectoris, heart failure, convulsion and epilepsy, diabetes, hypertension, COPD, pneumonia, bronchitis and anemia); five acute conditions (dental condition, cellulitis, pelvic inflammatory disease, gastroenteritis and dehydration, severe ENT infections); and fourteen vaccine preventable conditions (diphtheria, hemophilus influenza type B, hepatitis A, hepatitis B, influenza, measles, meningitis, mumps, pertussis, pneumococcal, poliomyelitis, tuberculosis, rubella and tetanus). The major contribution of the study is to provide some insights into how different modes of GPs remuneration can translate into better outcomes for patients, and presumably improve provider satisfaction, as well as decrease costs.

Hospitalization rates are often associated with several factors that include personal income and the relative wealth of a person's community, healthcare coverage, race, region, and gender, as well as the correlation among those factors and incidence of the underlying disease (Ricketts et al., 2001). Variations in hospitalization rates for ACSC conditions over time among the APP and FFS communities could prompt further studies as to why these discrepancies occurred. Variation may arise due to changes in reporting or method of delivery care, systemic problems and several confounding factors like physician supply,

'social admission', where patient travel longer distance for care and are often hospitalized to precipitate care, hospital bed supply, etc. The reason for the discrepancies as to why certain conditions will be reported in certain calendar year under a particular payment option and not in the following year, are unknown. Possibilities include, for example, an epidemic or mild flu season in one community versus the other. Variations for chronic conditions require further investigation. Other determinants of these variations could be improved vaccination coverage or better recruitment of health professional in one community in comparison to the other. The overarching importance of the ACSC is to showcase these conditions that are thought to be avoidable if patients have timely care. Factors associated with preventable hospitalization or ACSC rates have specifically been examined by a number of researchers (Billings et al., 1993; Pappas et al., 1997; Ricketts et al., 2001).

This study is not intended to address the appropriateness of hospitalization or quality of care. This is because diagnoses are not certain until discharge from hospital and abstracts are completed. The assertion remains one of the primary limitations of using administrative hospitalization data to ascertain appropriateness of care.

Rates of hospitalization and ACSC

Overall there was a statistical significant difference between the two the payment plan ($t(16) = 1.83$, $p = .08$), with Cohen's $d = 0.48$, particularly in four chronic conditions (asthma, COPD, pneumonia and convulsion and epilepsy) and one acute condition (gastroenteritis and dehydration). This is an important addition to the literature, as no study has examined the effectiveness of the GPs payment plans using hospitalization for ACSC.

In Table 12, the mean and standard deviation of all hospitalization for ACSC in FFS and APP communities are shown. The figure indicates that the rates of hospitalization for ACSC were higher among the APP communities in comparison to their FFS counterpart, particularly among chronic conditions. Previously the prevalence of hospitalization for conditions thought to be avoidable was calculated and compared between the two groups and the findings recorded in Tables 10 - 15. For the chronic conditions asthma, pneumonia, and COPD, there were statistically significant differences found, with the APP showing a higher rate of hospitalization in comparison to the FFS plans. Also important was higher rates of hospitalization for convulsion and epilepsy, gastroenteritis and dehydration in the FFS community in comparison to the APP communities.

For chronic conditions of hypertension, bronchitis, diabetes, heart failure, and anemia there was no statistically significant difference between the two payment plans. In the larger part, this speaks to management of these chronic conditions. In part, several environmental factors like tobacco smoke, allergens, occupational and indoor pollutants may have also contributed to these differences in hospitalization rates for asthma, pneumonia, COPD, angina, diabetes and convulsion in both payment plans. In addition, I could not control for prevalence of diseases in certain communities.

For acute conditions of dental conditions, cellulitis, pelvic inflammatory disease, and severe ENT infections there were no statistically significant differences in the hospitalization rates between two payment plans. For vaccine preventable conditions there was no statistically significant difference between the two plan options. This is not surprising following the innovations and health promotion and education around vaccinations.

One possible explanation of the difference reported here is that only those diagnoses confirmed by GPs and do not include individual with certain symptoms still to be diagnosed. Thus, the rates of ACSC may have being underestimated. Although there is no significant difference in hospitalizations for several conditions thought to be avoidable between the two payment options, it is noteworthy that the prevalence of certain conditions is dependent on the demographic composition of the population. Thus a community with younger or older population may influence the prevalence of the certain conditions classified as ACSC.

Statistical analysis

Overall, the mean rates in hospitalization for conditions classified as ACSC were found to have statistically important differences between APP and FFS communities. The APP communities had an increasing rate of 2.13 per year per 1000 population while the FFS had a slight increase of 0.20 per year per 1000 population. These findings suggest that the rate of ACSC hospitalization in the APP communities is significantly higher in comparison to the FFS communities. Further, from Table 15, five chronic conditions showed significant differential trends in hospitalization for ACSC include asthma, convulsion, pneumonia, angina pectoris and COPD. Gastroenteritis and dehydration also showed differential statistical trend in rate of hospitalizations.

The overarching objective of exploring rates of hospitalization for ACSC has been that increased rates of these conditions thought to be avoidable via timely access to care may indicate potential problems with the health delivery system. This study compares the rate of ACSC for communities under GPs remunerated with either APP or FFS payment schemes. Specifically, I compared GP remuneration plans using hospitalization for ACSC. The

findings from this study showed statistical differences in hospitalization rate for ACSC between both remuneration plans with the higher rate leaning toward the APP plan as compared to the FFS community. The statistical analysis focuses on conditions that had the trend lines running in both the same direction and opposite direction as shown on Figures 2 - 21. Conditions that had trend lines for only one conditions or irregular pattern were excluded from statistical analysis as shown on Tables 15 – 17.

Length of hospital stay

There was no significant difference in length of stay for conditions classified as ACSC in this study. However, there were statistical differences in length of hospitalization for convulsion and epilepsy with the FFS plan showing a longer stay in comparison to the APP plan (see Table 16); and dental conditions where the length of hospitalization was longer under the APP plan as compared to the FFS plan (see Table 17). The literature suggests that several factors have been responsible for prolonged length of stay for ACSC. One such contributor includes re-hospitalization as related to access to care barriers and post discharge follow-up (Porter, Herring, Lacroix, & Levinton, 2007). While not all re-hospitalizations are avoidable, certain factors contribute to repeated admissions among patients hospitalized for ACSC. These factors include discharge planning, non-compliance with treatment, family history (nature causes), coordination of primary care professionals (Porter et al., 2007).

Chapter Six: Conclusion

Hospitalization rates for ambulatory care sensitive conditions (ACSC) are widely used as an indicator of access and the quality of primary care delivered. This study examines the effectiveness of primary care interventions provided by general practitioners (GP) remunerated under the fee-for-service (FFS) or alternative payment plan (APP), using health service utilization data for ACSC. The main goal of this study was to examine how GP remuneration and incentive contribute to the core objective of a public funded health system like Canada's; i.e., reduce cost of care, improve patient outcome and providers' satisfaction (Berwick et al., 2008; Beasley, 2009). The hospital separation data used for this study was provided by BC Ministry of Health, held at Population Data BC. The Population Data BC maintains comprehensive, longitudinal, population-based administrative database containing all physician billings files and hospitalization also required in this study.

The result of this study illustrates the importance of physician remuneration, particularly with regard to hospitalization for ACSC. Increase rates in hospitalization for ACSCs are correlated with inadequate access and delivery of primary care, which leads to deterioration of health conditions and to over utilization of hospitals (Delvin & Sarma, 2008), since proactive utilization health care services is thought to be better use of health care. This study is timely particularly for development of initiatives that will improve access, reduce cost, and improve patients' outcome and providers' satisfaction.

Returning to the Conceptual Model

In the introduction, a conceptual model was proposed regarding the difference in rates of hospitalizations for ACSC in select communities where general practitioners are remunerated by FFS or APP. This model appeared as follows:

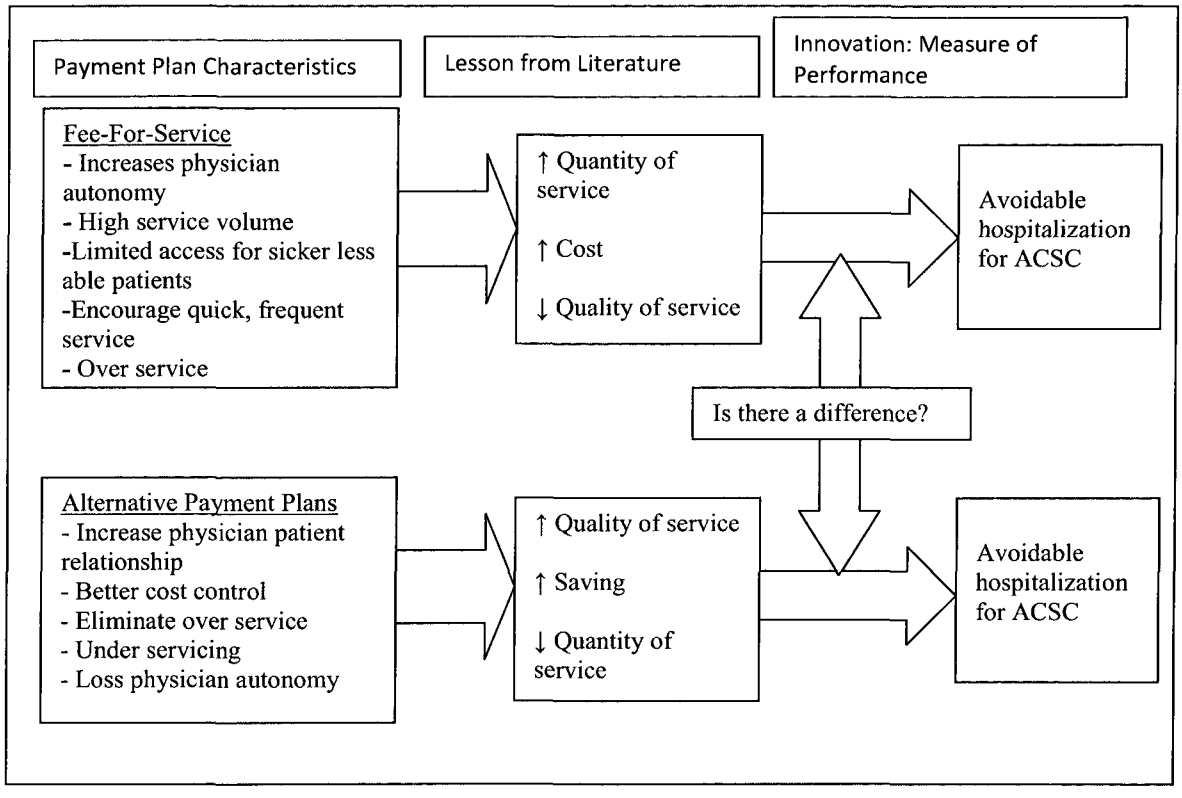

Figure 30. Conceptual model for comparison of general practitioner remunerations.

In this thesis, administrative data were analysed to examine the difference in health service utilization for ACSC in select Northern BC communities served by GP under the FFS and APP remuneration. In doing so, this thesis has informed the conceptual model and has provided insights into the difference in hospitalization rates for ACSC in both APP and FFS communities. At the conclusion of this thesis the below were the hypothesis results.

Hypothesis results.

The hypothesis *H1a, that there no difference in the rates of avoidable hospitalization for ACSC between communities with FFS payment plan and APP for the general practitioner* is not supported as there are differences in rate of hospitalization for ACSC in APP and FFS communities. Likewise, the hypothesis *H1b, that there is no difference in rates of hospitalization for diagnosis classified as ACSC in APP communities and FFS communities* is not supported for the chronic conditions of asthma, pneumonia, convulsion and epilepsy, angina pectoris, and chronic obstructive pulmonary disease (COPD), and acute condition gastroenteritis and dehydration. Based on the findings in this study, there are significant differences in hospitalization rates for the above mentioned chronic conditions in the APP and FFS communities.

The hypothesis *H2a, that there is no difference in trends in rates of hospitalization for ACSC between communities with FFS payment plan and APP for the general practitioner*. Based on data erratic patterns rate of change analysis is not useful.

The hypothesis *H3, that there is no difference in length of hospitalizations of diagnoses classified as ACSC between communities with FFS payment plan and APP plans for the general practitioner* is not supported as there are statistical differences in length of

hospitalization rate for chronic and acute conditions of convulsion and epilepsy and dental conditions respectively.

In sum, the results from this study include the following; first, overall hospitalization rates for ACSC were significantly different between remuneration plans, with the APP plan showing a higher rate of hospitalization for ACSC in comparison to the FFS plan. Furthermore, rates in hospitalization for most chronic conditions (asthma, convulsion and epilepsy, angina pectoris, pneumonia, COPD) and acute conditions (gastroenteritis and dehydration) were found to be different in the two payment plans with the asthma, angina pectoris, pneumonia and COPD showing higher rates of hospitalization in the APP communities compared to FFS communities, while (convulsion and epilepsy) and (gastroenteritis and dehydration) showed higher rates of hospitalization in the FFS communities than APP communities.

Second, overall trends in hospitalization rates for ACSC appear to show important differences for between remuneration plans, with the APP plan showing an upward trend in rate of hospitalization for ACSC in comparison to the FFS plan. Furthermore, rates of hospitalization for most chronic condition (asthma, convulsion and epilepsy, angina pectoris, pneumonia, COPD) and acute condition (gastroenteritis and dehydration) were found to be statistically different in both payment plans with the asthma, angina pectoris, pneumonia and COPD showing higher rates of hospitalization in the APP communities than FFS communities, while (convulsion and epilepsy) and (gastroenteritis and dehydration) showed higher rates in hospitalization in the FFS communities than APP communities.

Third the length of hospitalization was different in one chronic (convulsion and epilepsy) and acute (dental conditions) conditions. The hospitalization for convulsion and

epilepsy was found to be longer for the FFS communities in comparison to APP communities, while there was more lengthy stay for dental condition in the APP communities in comparison to FFS communities.

Study limitations.

First, this study only examined people aged 65 years and younger. It is possible to arrive at different conclusions when all age groups are examined. However, the under 65 population is an interesting one for the purposes of studying ACSC as the entire population is insured, which reduces insurance as a reason for problems with access to care.

Second, this study used administrative health data mandated by the Government of British Columbia for monitoring and financial purposes. One potential limitation of using these data is that they are collected for non-research purposes, and thus may result in possible lack of modification of the variables, missing information and coding errors. However the importance of using administrative data is that they require fewer resources than primary data collection, as well as allow for longitudinal follow-up of individuals. Still, the benefits of using administrative data for specific project outweigh the limitations since using readily available data to measure ACSC is a pragmatic strategy for assessing the performance of the primary care system.

Third, in assessing the validity and characteristic of the ACSC measure, this study was restricted by the content of the administrative data available. Using the hospital separation data, I have not control on physician practices and availability, local health practices, severity of illness, area of residence and other social and economic factors that

could be responsible for differential rates. Subsequent studies will be required to address these limitations.

Fourth, this is an ecological study, in which the unit of analysis is population based rather than individual member of the population. One limitation of this study design is the potential for leakages, where patients from FFS communities receive services from APP GPs and vice versa. Moreover, registry records on patients' may not have been updated at the point of hospitalization However, I will assume the two groups are separate that there were no diffusions across communities, since six digits postal codes for both communities were used in tracking hospitalizations. Further, I reasonable assume that the leakage is on biased in one group than the other.

Fifth, this study used the linear interpolation technique to estimate the study population of calendar years 1992 – 2006 and assumed that the community groups were equal for calendar years 2007-2008. Thus the hospitalization rates for ACSC and community population may have been underestimated or overestimated. In spite of this, the bias was not in one community than the other.

Sixth, the APP was established in rural and remote communities as a recruitment and retention tool for GPs. However, obtaining data on when the APP was implemented in the APP communities was challenging, as it varied per community. Hence, the study assumed that all GPs in the APP communities were paid under the APP during the period. This may have resulted in a 'mix bag' where GPs may have being remunerated under the FFS plan during the period of study in the APP communities. While possible, this remains unlikely as GPs funded under the APP model were provided with this opportunity because recruitment

of GPs under FFS was challenging, leaving the same communities with no local access to GPs.

Seventh, my analysis, I used aggregate measures, thereby introducing potential limitations in the analysis of long-term practical use of measures as well as contributing to aggregation bias. However, comparison of rates also focused on individual ACSC conditions, which is very beneficial for targeted interventions and policy making. Finally, this study measured hospitalizations for a population with higher rates ACSC along with an equivalent risk of hospitalization per person; as such the rate of hospitalization will appear greater for those rural communities.

Implication of this study

Further research.

This study is based on data from individual hospitalized for conditions that are thought to be sensitive to primary care to draw an inference about quality of preventive care, management of chronic conditions and access to care. However, further research in this area is required to further validate of the findings of this study by exploring the effect of all confounding factors that may have contributed to the differences in hospitalization rates for ACSC found in both payment plans. The most pressing need for future research in this area is to further validate the odds that a person be hospitalized for ACSC under the APP or FFS remuneration plans.

Policy and practice.

Hospitalization rates can be used to examine health system performance, evaluate policy changes, as well as assessment of quality preventive care (Lavoie et al., 2010). This study is focused on flagging potential barriers to accessing quality preventive care in primary care settings using physician remuneration plan. This study is based on the assumption that physician remuneration plans and its embedded incentives have an influence on their output. Hence the results of this study are beneficial to stakeholder and policy makers as to the most effective way of remunerating and incentivizing general practitioners so the core goals the health system (reduce cost, improve patient and provider satisfaction) can be achieved. Further, this study explored the rates in hospitalization for individual ACSC hospitalizations, which is very beneficial for targeted interventions and policy making.

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Appendix A: Conditions Suggesting Potentially Avoidable Hospitalizations, with Corresponding ICD-9 and ICD-10-CA Codes

Chronic Conditions		
ANEMIAS	**280** IRON DEFICIENCY ANAEMIAS **280.0** SECONDARY TO BLOOD LOSS (CHRONIC) **280.1** SECONDARY TO INADEQUATE DIETARY IRON INTAKE **280.8** OTHER SPECIFIED IRON DEFICIENCY ANEMIAS **280.9** IRON DEFICIENCY ANEMIA, UNSPECIFIED **281** OTHER DEFICIENCY ANAEMIAS **281.0** PERNICIOUS ANAEMIA **281.1** OTHER VITAMIN-'B12'-DEFICIENCY ANAEMIA **281.2** FOLATE-DEFICIENCY ANAEMIA **281.3** OTHER SPECIFIED MEGALOBLASTIC ANAEMIAS, NOT ELSEWHERE CLASSIFIED **281.4** PROTEIN-DEFICIENCY ANAEMIA **281.8** ANAEMIA ASSOCIATED WITH OTHER SPECIFIED NUTRITIONAL DEFICIENCY **281.9** UNSPECIFIED	**D50** IRON DEFICIENCY ANAEMIA **D50.0** IRON DEFICIENCY ANAEMIA SECONDARY TO BLOOD LOSS (CHRONIC) **D50.1** SIDEROPENIC DYSPHAGIA **D50.8** OTHER IRON DEFICIENCY ANAEMIAS **D50.9** IRON DEFICIENCY ANAEMIA, UNSPECIFIED
ANGINA PECTORIS	**411.1** INTERMED CORONARY SYND **411.8** ACUTE COR OCCLSN W/O MI AC ISCHEMIC HRT DIS NEC **413** ANGINA DECUBITUS PRINZMETAL ANGINA ANGINA PECTORIS NEC/NOS	**I20** ANGINA PECTORIS **I20.0** UNSTABLE ANGINA **I20.1** ANGINA PECTORIS WITH DOCUMENTED SPASM **I20.8** OTHER FORMS OF ANGINA PECTORIS **I20.80** ATYPICAL ANGINA **I20.88** OTHER FORMS OF ANGINA PECTORIS **I20.9** ANGINA PECTORIS, UNSPECIFIED **I23.82** POSTMYOCARDIAL INFARCTION ANGINA AS CURRENT COMPLICATION FOLLOWING ACUTE MYOCARDIAL INFARCTION **I24.0** CORONARY THROMBOSIS NOT RESULTING IN MYOCARDIAL INFARCTION **I24.8** OTHER FORMS OF ACUTE ISCHAEMIC HEART DISEASE

		I24.9 ACUTE ISCHAEMIC HEART DISEASE, UNSPECIFIED
ASTHMA	**493** ASTHMA **493.0** EXTRINSIC ASTHMA **493.1** INTRINSIC ASTHMA **493.9** ASTHMA, UNSPECIFIED	**J45** ASTHMA **J45.0** PREDOMINANTLY ALLERGIC ASTHMA **J45.00** PREDOMINANTLY ALLERGIC ASTHMA WITHOUT STATED STATUS ASTHMATICUS **J45.01** PREDOMINANTLY ALLERGIC ASTHMA WITH STATED STATUS ASTHMATICUS **J45.1** NONALLERGIC ASTHMA **J45.10** NONALLERGIC ASTHMA WITHOUT STATED STATUS ASTHMATICUS **J45.11** NONALLERGIC ASTHMA WITH STATED STATUS ASTHMATICUS **J45.8** MIXED ASTHMA **J45.80** MIXED ASTHMA WITHOUT STATED STATUS ASTHMATICUS **J45.81** MIXED ASTHMA WITH STATED STATUS ASTHMATICUS **J45.9** ASTHMA, UNSPECIFIED **J45.90** ASTHMA, UNSPECIFIED, WITHOUT STATED STATUS ASTHMATICUS **J45.91** ASTHMA, UNSPECIFIED, WITH STATED STATUS ASTHMATICUS
BRONCHITIS	**466** ACUTE BRONCHITIS AND BRONCHIOLITIS **466.0** ACUTE BRONCHITIS **466.1** ACUTE BRONCHIOLITIS	**J20** ACUTE BRONCHITIS **J20.0** ACUTE BRONCHITIS DUE TO MYCOPLASMA PNEUMONIAE **J20.1** ACUTE BRONCHITIS DUE TO HAEMOPHILUS INFLUENZAE **J20.2** ACUTE BRONCHITIS DUE TO STREPTOCOCCUS **J20.3** ACUTE BRONCHITIS DUE TO COXSACKIEVIRUS **J20.4** ACUTE BRONCHITIS DUE TO PARAINFLUENZA VIRUS **J20.5** ACUTE BRONCHITIS DUE TO RESPIRATORY SYNCYTIAL VIRUS **J20.6** ACUTE BRONCHITIS DUE TO RHINOVIRUS **J20.7** ACUTE BRONCHITIS DUE TO ECHOVIRUS **J20.8** ACUTE BRONCHITIS DUE TO OTHER SPECIFIED ORGANISMS **J20.80** ACUTE BRONCHITIS DUE TO HUMAN METAPNEUMOVIRUS **J20.88** ACUTE BRONCHITIS DUE TO OTHER SPECIFIED ORGANISMS **J20.9** ACUTE BRONCHITIS,

		UNSPECIFIED
CONVULSION & EPILEPSY	**345** EPILEPSY **345.0** GENERALIZED NONCONVULSIVE EPILEPSY **345.1** GENERALIZED CONVULSIVE EPILEPSY **345.2** PETIT MAL STATUS **345.3** GRAND MAL STATUS **345.4** PARTIAL EPILEPSY, WITH IMPAIRMENT OF CONSCIOUSNESS **345.5** PARTIAL EPILEPSY, WITHOUT MENTION OF IMPAIRMENT OF CONSCIOUSNESS **345.6** INFANTILE SPASMS **345.7** EPILEPSIA PARTIALIS CONTINUA 345.8 OTHER **345.9** UNSPECIFIED **780.3** CONVULSIONS **642.6** ECLAMPSIA	**G40** EPILEPSY **G40.0** LOCALIZATION-RELATED (FOCAL)(PARTIAL) IDIOPATHIC EPILEPSY AND EPILEPTIC SYNDROMES WITH SEIZURES OF LOCALIZED ONSET **G40.00** LOCALIZATION-RELATED (FOCAL) (PARTIAL) IDIOPATHIC EPILEPSY AND EPILEPTIC SYNDROMES WITH SEIZURES OF LOCALIZED ONSET, NOT STATED AS INTRACTABLE **G40.01** LOCALIZATION-RELATED (FOCAL) (PARTIAL) IDIOPATHIC EPILEPSY AND EPILEPTIC SYNDROMES WITH SEIZURES OF LOCALIZED ONSET, INTRACTABLE **G40.1** LOCALIZATION-RELATED (FOCAL)(PARTIAL) SYMPTOMATIC EPILEPSY AND EPILEPTIC SYNDROMES WITH SIMPLE PARTIAL SEIZURES **G40.10** LOCALIZATION-RELATED (FOCAL) (PARTIAL) SYMPTOMATIC EPILEPSY AND EPILEPTIC SYNDROMES WITH SIMPLE PARTIAL SEIZURES, NOT STATED AS INTRACTABLE **G40.11** LOCALIZATION-RELATED (FOCAL) (PARTIAL) SYMPTOMATIC EPILEPSY AND EPILEPTIC SYNDROMES WITH SIMPLE PARTIAL SEIZURES, INTRACTABLE **G40.2** LOCALIZATION-RELATED (FOCAL)(PARTIAL) SYMPTOMATIC EPILEPSY AND EPILEPTIC SYNDROMES WITH COMPLEX PARTIAL SEIZURES **G40.20** LOCALIZATION-RELATED (FOCAL) (PARTIAL) SYMPTOMATIC EPILEPSY AND EPILEPTIC SYNDROMES WITH COMPLEX PARTIAL SEIZURES, NOT STATED AS INTRACTABLE **G40.21** LOCALIZATION-RELATED (FOCAL) (PARTIAL) SYMPTOMATIC EPILEPSY AND EPILEPTIC SYNDROMES WITH COMPLEX PARTIAL SEIZURES, INTRACTABLE **G40.3** GENERALIZED IDIOPATHIC

	EPILEPSY AND EPILEPTIC SYNDROMESG40.30O **G40.30** GENERALIZED IDIOPATHIC EPILEPSY AND EPILEPTIC SYNDROMES, NOT STATED AS INTRACTABLE **G40.31** GENERALIZED IDIOPATHIC EPILEPSY AND EPILEPTIC SYNDROMES, INTRACTABLE **G40.4** OTHER GENERALIZED EPILEPSY AND EPILEPTIC SYNDROMES **G40.40** OTHER GENERALIZED IDIOPATHIC EPILEPSY AND EPILEPTIC SYNDROMES, NOT STATED AS INTRACTABLE **G40.41** OTHER GENERALIZED IDIOPATHIC EPILEPSY AND EPILEPTIC SYNDROMES, INTRACTABLE **G40.5** SPECIAL EPILEPTIC SYNDROMES **G40.50** SPECIAL EPILEPTIC SYNDROMES, NOT STATED AS INTRACTABLE **G40.51** SPECIAL EPILEPTIC SYNDROMES, INTRACTABLE **G40.6** GRAND MAL SEIZURES, UNSPECIFIED (WITH OR WITHOUT PETIT MAL) **G40.60** GRAND MAL SEIZURES, UNSPECIFIED (WITH OR WITHOUT PETIT MAL), NOT STATED AS INTRACTABLE **G40.61** GRAND MAL SEIZURES, UNSPECIFIED (WITH OR WITHOUT PETIT MAL), INTRACTABLE **G40.7** PETIT MAL, UNSPECIFIED, WITHOUT GRAND MAL SEIZURES **G40.70** PETIT MAL, UNSPECIFIED, WITHOUT GRAND MAL SEIZURES, NOT STATED AS INTRACTABLE **G40.71** PETIT MAL, UNSPECIFIED, WITHOUT GRAND MAL SEIZURES, INTRACTABLE **G40.8** OTHER EPILEPSY **G40.80** OTHER EPILEPSY, NOT STATED AS INTRACTABLE ***G40.81*** *OTHER EPILEPSY*, INTRACTABLE **G40.9** EPILEPSY, UNSPECIFIED **G40.90** EPILEPSY, UNSPECIFIED, NOT STATED AS INTRACTABLE **G40.91** EPILEPSY, UNSPECIFIED, INTRACTABLE

		G41 STATUS EPILEPTICUS **G41.0** GRAND MAL STATUS EPILEPTICUS **G41.1** PETIT MAL STATUS EPILEPTICUS **G41.2** COMPLEX PARTIAL STATUS EPILEPTICUS **G41.8** OTHER STATUS EPILEPTICUS **G41.9** STATUS EPILEPTICUS, UNSPECIFIED **R56** CONVULSIONS, NOT ELSEWHERE CLASSIFIED **R56.0** FEBRILE CONVULSIONS **R56.01** COMPLEX FEBRILE CONVULSIONS **R56.09** FEBRILE CONVULSIONS, UNSPECIFIED **R56.8** OTHER AND UNSPECIFIED CONVULSIONS **R56.80** SEIZURE DISORDER, SO DESCRIBED **R56.88** OTHER AND UNSPECIFIED CONVULSIONS **O15** ECLAMPSIA **O15.0** ECLAMPSIA IN PREGNANCY **O15.1** ECLAMPSIA IN LABOUR **O15.2** ECLAMPSIA IN THE PUERPERIUM **O15.9** ECLAMPSIA, UNSPECIFIED AS TO TIME PERIOD
CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) AND ALLIED CONDITIONS	**490** BRONCHITIS, NOT SPECIFIED AS ACUTE OR CHRONIC **491** CHRONIC BRONCHITIS **491.0** SIMPLE CHRONIC BRONCHITIS **491.1** MUCOPURULENT CHRONIC BRONCHITIS **491.2** OBSTRUCTIVE CHRONIC BRONCHITIS **491.8** OTHER CHRONIC BRONCHITIS **491.9** UNSPECIFIED **492** EMPHYSEMA **494** BRONCHIECTASIS **496** CHRONIC AIRWAYS OBSTRUCTION, NOT ELSEWHERE CLASSIFIED	**J41** SIMPLE AND MUCOPURULENT CHRONIC BRONCHITIS **J41.0** SIMPLE CHRONIC BRONCHITIS **J41.1** MUCOPURULENT CHRONIC BRONCHITIS **J41.8** MIXED SIMPLE AND MUCOPURULENT CHRONIC BRONCHITIS **J42** UNSPECIFIED CHRONIC BRONCHITIS **J43** EMPHYSEMA **J43.0** MACLEOD'S SYNDROME **J43.1** PANLOBULAR EMPHYSEMA **J43.2** CENTRILOBULAR EMPHYSEMA **J43.8** OTHER EMPHYSEMA **J43.9** EMPHYSEMA, UNSPECIFIED **J44** OTHER CHRONIC OBSTRUCTIVE PULMONARY DISEASE **J44.0** CHRONIC OBSTRUCTIVE PULMONARY DISEASE WITH ACUTE LOWER RESPIRATORY INFECTION **J44.1** CHRONIC OBSTRUCTIVE PULMONARY DISEASE WITH ACUTE

		EXACERBATION, UNSPECIFIED **J44.8** OTHER SPECIFIED CHRONIC OBSTRUCTIVE PULMONARY DISEASE **J44.9** CHRONIC OBSTRUCTIVE PULMONARY DISEASE, UNSPECIFIED **J47** BRONCHIECTASIS
DIABETES WITH COMPLICATIONS	**250** DIABETES MELLITUS **250.0** DIABETES MELLITUS WITHOUT MENTION OF COMPLICATION **250.1** DIABETES WITH KETOACIDOSIS **250.2** DIABETES WITH COMA **250.3** DIABETES WITH RENAL MANIFESTATIONS **250.4** DIABETES WITH OPHTHALMIC MANIFESTATIONS **250.5** DIABETES WITH NEUROLOGICAL MANIFESTATIONS **250.50** DIABETES WITH OCULAR INVOLVMENT, ADULT **250.51** DIABETES WITH OCULAR INVOLVMENT, JUVENILE **250.6** DIABETES WITH PERIPHERAL CIRCULATORY DISORDERS **250.7** DIABETES WITH OTHER SPECIFIED MANIFESTATIONS **250.8** DIABETES WITH OTHER SPECIFIED MANIFESTATIONS **250.9** DIABETES WITH UNSPECIFIED COMPLICATIONS	**E10** TYPE 1 DIABETES MELLITUS **E10.1** TYPE 1 DIABETES MELLITUS WITH ACIDOSIS **E10.10** TYPE 1 DIABETES MELLITUS WITH KETOACIDOSIS **E10.11** TYPE 1 DIABETES MELLITUS WITH LACTIC ACIDOSIS **E10.12** TYPE 1 DIABETES MELLITUS WITH KETOACIDOSIS WITH LACTIC ACIDOSIS **E10.6** TYPE 1 DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATIONS **E10.60** TYPE 1 DIABETES MELLITUS WITH MUSCULOSKELETAL AND CONNECTIVE TISSUE COMPLICATION **E10.61** TYPE 1 DIABETES MELLITUS WITH SKIN AND SUBCUTANEOUS TISSUE COMPLICATION **E10.62** TYPE 1 DIABETES MELLITUS WITH PERIODONTAL COMPLICATION **E10.63** TYPE 1 DIABETES MELLITUS WITH HYPOGLYCAEMIA **E10.64** TYPE 1 DIABETES MELLITUS WITH POOR CONTROL, SO DESCRIBED **E10.68** TYPE 1 DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATION, NOT ELSEWHERE CLASSIFIED **E10.7** TYPE 1 DIABETES MELLITUS WITH MULTIPLE COMPLICATIONS **E10.70** TYPE 1 DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC) (NEUROPATHIC) **E10.71** TYPE 1 DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC) (NEUROPATHIC) WITH GANGRENE **E10.78** TYPE 1 DIABETES MELLITUS WITH MULTIPLE OTHER COMPLICATIONS **E10.9** TYPE 1 DIABETES MELLITUS WITHOUT (MENTION OF) COMPLICATION **E11** TYPE 2 DIABETES MELLITUS **E11.0** TYPE 2 DIABETES MELLITUS WITH COMA **E11.1** TYPE 2 DIABETES MELLITUS

	WITH ACIDOSIS **E11.10** TYPE 2 DIABETES MELLITUS WITH KETOACIDOSIS **E11.11** TYPE 2 DIABETES MELLITUS WITH LACTIC ACIDOSIS **E11.12** TYPE 2 DIABETES MELLITUS WITH KETOACIDOSIS WITH LACTIC ACIDOSIS **E11.6** TYPE 2 DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATIONS **E11.60** TYPE 2 DIABETES MELLITUS WITH MUSCULOSKELETAL AND CONNECTIVE TISSUE COMPLICATION **E11.61** TYPE 2 DIABETES MELLITUS WITH SKIN AND SUBCUTANEOUS TISSUE COMPLICATIONE11.9 **E11.62** TYPE 2 DIABETES MELLITUS WITH PERIODONTAL COMPLICATION **E11.63** TYPE 2 DIABETES MELLITUS WITH HYPOGLYCAEMIA **E11.64** TYPE 2 DIABETES MELLITUS WITH POOR CONTROL, SO DESCRIBED **E11.68** TYPE 2 DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATION, NOT ELSEWHERE CLASSIFIED **E11.7** TYPE 2 DIABETES MELLITUS WITH MULTIPLE COMPLICATIONS **E11.70** TYPE 2 DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC)(NEUROPATHIC) **E11.71** TYPE 2 DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC) (NEUROPATHIC) WITH GANGRENE **E11.78** TYPE 2 DIABETES MELLITUS WITH MULTIPLE OTHER COMPLICATIONS **E11.9** TYPE 2 DIABETES MELLITUS WITHOUT (MENTION OF) COMPLICATIONS **E13** OTHER SPECIFIED DIABETES MELLITUS **E13.0** OTHER SPECIFIED DIABETES MELLITUS WITH COMA **E13.1** OTHER SPECIFIED DIABETES MELLITUS WITH ACIDOSIS **E13.10** OTHER SPECIFIED DIABETES MELLITUS WITH KETOACIDOSIS **E13.11** OTHER SPECIFIED DIABETES MELLITUS WITH LACTIC ACIDOSIS **E13.12** OTHER SPECIFIED DIABETES MELLITUS WITH KETOACIDOSIS WITH

	LACTIC ACIDOSISE13.7 **E13.6** OTHER SPECIFIED DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATIONS **E13.60** OTHER SPECIFIED DIABETES MELLITUS WITH MUSCULOSKELETAL AND CONNECTIVE TISSUE COMPLICATION **E13.61** OTHER SPECIFIED DIABETES MELLITUS WITH SKIN AND SUBCUTANEOUS TISSUE COMPLICATION **E13.62** OTHER SPECIFIED DIABETES MELLITUS WITH PERIODONTAL COMPLICATION **E13.63** OTHER SPECIFIED DIABETES MELLITUS WITH HYPOGLYCAEMIA **E13.64** OTHER SPECIFIED DIABETES MELLITUS WITH POOR CONTROL, SO DESCRIBED **E13.68** OTHER SPECIFIED DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATION, NOT ELSEWHERE CLASSIFIED **E13.7** OTHER SPECIFIED DIABETES MELLITUS WITH MULTIPLE COMPLICATIONS **E13.70** OTHER SPECIFIED DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC) (NEUROPATHIC) **E13.71** OTHER SPECIFIED DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC) (NEUROPATHIC) WITH GANGRENE **E13.78** OTHER SPECIFIED DIABETES MELLITUS WITH MULTIPLE OTHER COMPLICATIONS **E13.9** OTHER SPECIFIED DIABETES MELLITUS WITHOUT (MENTION OF) COMPLICATION **E14** UNSPECIFIED DIABETES MELLITUS **E14.0** UNSPECIFIED DIABETES MELLITUS WITH COMA **E14.1** UNSPECIFIED DIABETES MELLITUS WITH ACIDOSIS **E14.10** UNSPECIFIED DIABETES MELLITUS WITH KETOACIDOSIS **E14.11** UNSPECIFIED DIABETES MELLITUS WITH LACTIC ACIDOSIS **E14.12** UNSPECIFIED DIABETES MELLITUS WITH KETOACIDOSIS WITH LACTIC ACIDOSIS

		E14.6 UNSPECIFIED DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATIONS **E14.60** UNSPECIFIED DIABETES MELLITUS WITH MUSCULOSKELETAL AND CONNECTIVE TISSUE COMPLICATION **E14.61** UNSPECIFIED DIABETES MELLITUS WITH SKIN AND SUBCUTANEOUS TISSUE COMPLICATION **E14.62** UNSPECIFIED DIABETES MELLITUS WITH PERIODONTAL COMPLICATION **E14.63** UNSPECIFIED DIABETES MELLITUS WITH HYPOGLYCAEMIA **E14.64** UNSPECIFIED DIABETES MELLITUS WITH POOR CONTROL, SO DESCRIBED **E14.68** UNSPECIFIED DIABETES MELLITUS WITH OTHER SPECIFIED COMPLICATION, NOT ELSEWHERE CLASSIFIED **E14.7** UNSPECIFIED DIABETES MELLITUS WITH MULTIPLE COMPLICATIONS **E14.70** UNSPECIFIED DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC) (NEUROPATHIC) **E14.71** UNSPECIFIED DIABETES MELLITUS WITH FOOT ULCER (ANGIOPATHIC) (NEUROPATHIC) WITH GANGRENE **E14.78** UNSPECIFIED DIABETES MELLITUS WITH MULTIPLE OTHER COMPLICATIONS **E14.9** UNSPECIFIED DIABETES MELLITUS WITHOUT (MENTION OF) COMPLICATION
HEART FAILURE AND PULMONARY EDEMA	**428** HEART FAILURE **428.0** CONGESTIVE HEART FAILURE **428.1** LEFT HEART FAILURE **428.9** UNSPECIFIED **518.4** ACUTE OEDEMA OF LUNG, UNSPECIFIED	**I50** HEART FAILURE **I50.0** CONGESTIVE HEART FAILURE **I50.1** LEFT VENTRICULAR FAILURE **I50.9** HEART FAILURE, UNSPECIFIED **J81** PULMONARY OEDEMA **I11.0** HYPERTENSIVE HEART DISEASE WITH (CONGESTIVE) HEART FAILURE
HYPERTENSION	**401** ESSENTIAL HYPERTENSION **401.0** SPECIFIED AS MALIGNANT **401.1** SPECIFIED AS BENIGN **401.9** NOT SPECIFIED AS	**I10** ESSENTIAL (PRIMARY) HYPERTENSION **I10.0** BENIGN HYPERTENSION **I10.1** MALIGNANT HYPERTENSION **I11** HYPERTENSIVE HEART DISEASE

	MALIGNANT OR BENIGN **402** HYPERTENSIVE HEART DISEASE **402.0** SPECIFIED AS MALIGNANT **402.1** SPECIFIED AS BENIGN **402.9** NOT SPECIFIED AS MALIGNANT OR BENIGN **403** HYPERTENSIVE RENAL DISEASE **403.0** SPECIFIED AS MALIGNANT **403.1** SPECIFIED AS BENIGN **403.9** NOT SPECIFIED AS MALIGNANT OR BENIGN **404** HYPERTENSIVE HEART AND RENAL DISEASE **404.0** SPECIFIED AS MALIGNANT **404.1** SPECIFIED AS BENIGN **404.9** NOT SPECIFIED AS MALIGNANT OR BENIGN **405** SECONDARY HYPERTENSION **405.0** SPECIFIED AS MALIGNANT **405.1** SPECIFIED AS BENIGN **405.9** NOT SPECIFIED AS MALIGNANT OR BENIGN	
PNEUMONIA	**480** VIRAL PNEUMONIA **480.0** PNEUMONIA DUE TO ADENOVIRUS **480.1** PNEUMONIA DUE TO RESPIRATORY SYNCYTIAL VIRUS **480.2** PNEUMONIA DUE TO PARAINFLUENZA VIRUS **480.8** PNEUMONIA DUE TO OTHER VIRUS, NOT ELSEWHERE CLASSIFIED **480.9** VIRAL PNEUMONIA, UNSPECIFIED **481** PNEUMOCOCCAL PNEUMONIA **482** OTHER BACTERIAL PNEUMONIA **482.0** PNEUMONIA DUE TO KLEBSIELLA PNEUMONIAE **482.1** PNEUMONIA DUE TO PSEUDOMONAS **482.2** PNEUMONIA DUE TO HAEMOPHILUS INFLUENZAE (H.INFLUENZAE)	**J12** VIRAL PNEUMONIA, NOT ELSEWHERE CLASSIFIED **J12.0** ADENOVIRAL PNEUMONIA **J12.1** RESPIRATORY SYNCYTIAL VIRUS PNEUMONIA **J12.2** PARAINFLUENZA VIRUS PNEUMONIA **J12.3** HUMAN METAPNEUMOVIRUS PNEUMONIA **J12.8** OTHER VIRAL PNEUMONIA **J12.9** VIRAL PNEUMONIA, UNSPECIFIED **J13** PNEUMONIA DUE TO STREPTOCOCCUS PNEUMONIA **J14** PNEUMONIA DUE TO HAEMOPHILUS INFLUENZA **J15** BACTERIAL PNEUMONIA, NOT ELSEWHERE CLASSIFIED **J15.0** PNEUMONIA DUE TO KLEBSIELLA PNEUMONIA **J15.1** PNEUMONIA DUE TO PSEUDOMONAS **J15.2** PNEUMONIA DUE TO STAPHYLOCOCCUS

482.3 PNEUMONIA DUE TO STREPTOCOCCUS
482.30 STREPTOCOCCUS, UNSPECIFIED
482.31 GROUP A
482.32 GROUP B
482.39 OTHER STREPTOCOCCU
482.4 PNEUMONIA DUE TO STAPHYLOCOCCUS
482.40 PNEUMONIA DUE TO STAPHYLOCOCCUS, UNSPECIFIED
482.41 METHICILLIN SUSCEPTIBLE PNEUMONIA DUE TO STAPHYLOCOCCUS AUREUS
482.42 METHICILLIN RESISTANT PNEUMONIA DUE TO STAPHYLOCOCCUS AUREUS
482.49 OTHER STAPHYLOCOCCUS PNEUMONIA
482.8 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA
482.81 ANAEROBES
482.82 ESCHERICHIA COLI [E. C
482.83 OTHER GRAM-NEGATIVE BACTERIA
482.84 LEGIONNAIRES' DISEASE
482.89 OTHER SPECIFIED BACTERIA
482.9 BACTERIAL PNEUMONIA, UNSPECIFIED
483 PNEUMONIA DUE TO OTHER SPECIFIED ORGANISM
483.0 MYCOPLASMA PNEUMONIAE
483.1 CHLAMYDIA
483.8 OTHER SPECIFIED ORGANISM
484 PNEUMONIA IN INFECTIOUS DISEASES CLASSIFIED ELSEWHERE
484.0 MEASLES
484.1 CYTOMEGALIC INCLUSION DISEASE
J15.3 PNEUMONIA DUE TO STREPTOCOCCUS, GROUP B
J15.4 PNEUMONIA DUE TO OTHER STREPTOCOCCI
J15.5 PNEUMONIA DUE TO ESCHERICHIA COLI
J15.6 PNEUMONIA DUE TO OTHER AEROBIC GRAM-NEGATIVE BACTERIA
J15.7 PNEUMONIA DUE TO MYCOPLASMA PNEUMONIA
J15.8 OTHER BACTERIAL PNEUMONIA
J15.9 BACTERIAL PNEUMONIA, UNSPECIFIED
J16 PNEUMONIA DUE TO OTHER INFECTIOUS ORGANISMS, NOT ELSEWHERE CLASSIFIED
J16.0 CHLAMYDIAL PNEUMONIA
J16.8 PNEUMONIA DUE TO OTHER SPECIFIED INFECTIOUS ORGANISMS
J18 PNEUMONIA, ORGANISM UNSPECIFIED
J18.0 BRONCHOPNEUMONIA, UNSPECIFIED
J18.1 LOBAR PNEUMONIA, UNSPECIFIED
J18.2 HYPOSTATIC PNEUMONIA, UNSPECIFIED
J18.8 OTHER PNEUMONIA, ORGANISM UNSPECIFIED
J18.9 PNEUMONIA, UNSPECIFIED

	484.2 ORNITHOSIS **484.3** WHOOPING COUGH **484.4** TULARAEMIA **484.5** ANTHRAX **484.6** ASPERGILLOSIS **484.7** PNEUMONIA IN OTHER SYSTEMIC MYCOSES **484.8** PNEUMONIA IN OTHER INFECTIOUS DISEASES **485** BRONCHOPNEUMONIA, ORGANISM UNSPECIFIED **486** PNEUMONIA, ORGANISM UNSPECIFIED	
Vaccine Preventable Conditions		
DIPTHERIA	**032** DIPHTHERIA **032.0** FAUCIAL DIPHTHERIA **032.1** NASOPHARYNGEAL DIPHTHERIA **032.2** ANTERIOR NASAL DIPHTHERIA **032.3** LARYNGEAL DIPHTHERIA **032.8** OTHER **032.81** CONJUNCTIVAL DIPHTHERIA **032.82** DIPHTHERITIC MYOCARDITIS **032.83** DIPHTHERITIC PERITON **032.84** DIPHTHERITIC CYSTITIS **032.85** CUTANEOUS DIPHTHERI **032.89** OTHER **032.9** DIPHTHERIA, UNSPECIFIED	**A36** DIPHTHERIA **A36.0** PHARYNGEAL DIPHTHERIA **A36.1** NASOPHARYNGEAL DIPHTHERIA **A36.2** LARYNGEAL DIPHTHERIA **A36.3** CUTANEOUS DIPHTHERIA **A36.8** OTHER DIPHTHERIA **A36.9** DIPHTHERIA, UNSPECIFIED
HEMOPHILUS INFLUENZA TYPE B	**320.0** HEMOPHILUS MENINGITIS	**G00** BACTERIAL MENINGITIS, NOT ELSEWHERE CLASSIFIED **G00.0** HAEMOPHILUS MENINGITIS
HEPATITIS A	**070.0** VIRAL HEPATITIS A WITH HEPATIC COMA **070.1** VIRAL HEPATITIS A WITHOUT MENTION OF HEPATIC COMA	**B15** ACUTE HEPATITIS A **B15.0** HEPATITIS A WITH HEPATIC COMA **B15.9** HEPATITIS A WITHOUT HEPATIC COMA
HEPATITIS B	**070.2** VIRAL HEPATITIS B	**B16** ACUTE HEPATITIS B

	WITH HEPATIC COMA **070.3** VIRAL HEPATITIS B *WITHOUT MENTION OF* HEPATIC COMA	**B16.0** ACUTE HEPATITIS B WITH DELTA-AGENT (COINFECTION) WITH *HEPATIC COMA* **B16.1** ACUTE HEPATITIS B WITH DELTA-AGENT (COINFECTION) WITHOUT HEPATIC COMA **B16.2** ACUTE HEPATITIS B WITHOUT DELTA-AGENT WITH HEPATIC COMA **B16.9** ACUTE HEPATITIS B WITHOUT *DELTA-AGENT AND WITHOUT* HEPATIC COMA
INFLUENZA	**487** INFLUENZA **487.0** WITH PNEUMONIA **487.1** WITH OTHER RESPIRATORY MANIFESTATIONS **487.8** WITH OTHER MANIFESTATIONS	**J10** INFLUENZA DUE TO OTHER IDENTIFIED INFLUENZA VIRUS **J10.0** INFLUENZA WITH PNEUMONIA, OTHER INFLUENZA VIRUS IDENTIFIED **J10.1** INFLUENZA WITH OTHER RESPIRATORY MANIFESTATIONS, OTHER INFLUENZA VIRUS IDENTIFIED **J10.8** INFLUENZA WITH OTHER MANIFESTATIONS, OTHER INFLUENZA VIRUS IDENTIFIED **J11** INFLUENZA, VIRUS NOT IDENTIFIED **J11.0** INFLUENZA WITH PNEUMONIA, VIRUS NOT IDENTIFIED **J11.1** INFLUENZA WITH OTHER RESPIRATORY MANIFESTATIONS, VIRUS NOT IDENTIFIED **J11.8** INFLUENZA WITH OTHER MANIFESTATIONS, VIRUS NOT IDENTIFIED
MEASLES	**055** MEASLES **055.0** POSTMEASLES ENCEPHALITIS **055.1** POSTMEASLES PNEUMONIA **055.2** POSTMEASLES OTITIS **055.7** WITH OTHER COMPLICATIONS **055.71** KERATOCONJUNCTIVITIES, MEASLES **055.79** OTHER **055.8** WITH UNSPECIFIED COMPLICATION **055.9** MEASLES WITHOUT MENTION OF COMPLICATION	**B05** MEASLES **B05.0** MEASLES COMPLICATED BY ENCEPHALITIS **B05.1** MEASLES COMPLICATED BY MENINGITIS **B05.2** MEASLES COMPLICATED BY PNEUMONIA **B05.3** MEASLES COMPLICATED BY OTITIS MEDIA **B05.4** MEASLES WITH INTESTINAL COMPLICATIONS **B05.8** MEASLES WITH OTHER COMPLICATIONS **B05.9** MEASLES WITHOUT COMPLICATION
MENINGOCOCCAL *DISEASE(MENINGITIS*)	**036** MENINGOCOCCAL *INFECTION* **036.0** MENINGOCOCCAL	**A39** MENINGOCOCCAL INFECTION **A39.0** *MENINGOCOCCAL MENINGITIS* **A39.1** WATERHOUSE-FRIDERICHSEN

	MENINGITIS **036.1** MENINGOCOCCAL ENCEPHALITIS **036.2** MENINGOCOCCAEMIA **036.3** WATERHOUSE-FRIDERICHSEN SYNDROME, MENINGOCOCCAL **036.4** MENINGOCOCCAL CARDITIS **036.40** MENINGOCOCCAL CARDITIS, UNSPECIFIED **036.41** MENINGOCOCCAL PERICARDITIS **036.42** MENINGOCOCCAL ENDOCARDITIS **036.43** MENINGOCOCCAL MYOCARDITIS **036.8** OTHER **036.81** MENINGOCOCCAL OPTIC NEURITIS **036.82** MENINGOCOCCAL ARTHROPATHY **036.89** OTHER **036.9** UNSPECIFIED	SYNDROME **A39.2** ACUTE MENINGOCOCCAEMIA **A39.3** CHRONIC MENINGOCOCCAEMIA **A39.4** MENINGOCOCCAEMIA, UNSPECIFIED **A39.5** MENINGOCOCCAL HEART DISEASE **A39.8** OTHER MENINGOCOCCAL INFECTIONS **A39.9** MENINGOCOCCAL INFECTION, UNSPECIFIED
MUMPS	**072** MUMPS **072.0** MUMPS ORCHITIS **072.1** MUMPS MENINGITIS **072.2** MUMPS ENCEPHALITIS **072.3** MUMPS PANCREATITIS **072.71** MUMPS HEPATITIS **072.72** MUMPS POLYNEUROPAT **072.79** OTHER **072.8** MUMPS WITH UNSPECIFI COMPLICATION **072.9** MUMPS WITHOUT MENTI OF COMPLICATION	**B26** MUMPS **B26.0** MUMPS ORCHITIS **B26.1** MUMPS MENINGITIS **B26.2** MUMPS ENCEPHALITIS **B26.3** MUMPS PANCREATITIS **B26.8** MUMPS WITH OTHER COMPLICATIONS **B26.9** MUMPS WITHOUT COMPLICATION
PERTUSSIS	**033** WHOOPING COUGH **033.0** BORDETELLA PERTUSSIS (B.PERTUSSIS) **033.1** BORDETELLA PARAPERTUSSIS (B.PARAPERTUSSIS) **033.8** OTHER SPECIFIED ORGANISM **033.9** WHOOPING COUGH,	**A37** WHOOPING COUGH **A37.0** WHOOPING COUGH DUE TO BORDETELLA PERTUSSIS **A37.1** WHOOPING COUGH DUE TO BORDETELLA PARAPERTUSSIS **A37.8** WHOOPING COUGH DUE TO OTHER BORDETELLA SPECIES **A37.9** WHOOPING COUGH, UNSPECIFIED

	UNSPECIFIED ORGANISM	
PNEUMOCOCCAL	**038.2** PNEUMOCOCCAL SEPTICAEMIA **041.2** PNEUMOCOCCUS **320.1** PNEUMOCOCCAL MENINGITIS **481** PNEUMOCOCCAL PNEUMONIA [STREPTOCOCCUS PNEUMONIAE PNEUMONIA] **567.1** PNEUMOCOCCAL PERITONITIS **711.0** PYOGENIC ARTHRITIS	**G00** BACTERIAL MENINGITIS, NOT ELSEWHERE CLASSIFIED **G00.1** PNEUMOCOCCAL MENINGITIS **A40.3** SEPSIS DUE TO STREPTOCOCCUS PNEUMONIA **J13** PNEUMONIA DUE TO STREPTOCOCCUS PNEUMONIA
POLIOMYELITIS	**045** ACUTE POLIOMYELITIS **045.0** ACUTE PARALYTIC POLIOMYELITIS SPECIFIED AS BULBAR **045.1** ACUTE POLIOMYELITIS WITH OTHER PARALYSIS **045.2** ACUTE NONPARALYTIC POLIOMYELITIS **045.9** ACUTE POLIOMYELITIS, UNSPECIFIED	**A80** ACUTE POLIOMYELITIS **A80.0** ACUTE PARALYTIC POLIOMYELITIS, VACCINE-ASSOCIATED **A80.1** ACUTE PARALYTIC POLIOMYELITIS, WILD VIRUS, IMPORTED **A80.2** ACUTE PARALYTIC POLIOMYELITIS, WILD VIRUS, INDIGENOUS **A80.3** ACUTE PARALYTIC POLIOMYELITIS, OTHER AND UNSPECIFIED **A80.4** ACUTE NONPARALYTIC POLIOMYELITIS **A80.9** ACUTE POLIOMYELITIS, UNSPECIFIED
TUBERCULOSIS	**010** PRIMARY TUBERCULOUS INFECTION **010.0** PRIMARY TUBERCULOUS COMPLEX **010.1** TUBERCULOUS PLEURISY IN PRIMARY PROGRESSIVE TUBERCULOSIS **010.8** OTHER PRIMARY PROGRESSIVE TUBERCULOSIS **010.9** UNSPECIFIED **011** PULMONARY TUBERCULOSIS **011.0** TUBERCULOSIS OF LUNG, INFILTRATIVE **011.1** TUBERCULOSIS OF LUNG, NODULAR **011.2** TUBERCULOSIS OF LUNG WITH CAVITATION **011.3** TUBERCULOSIS OF BRONCHUS	**A15** RESPIRATORY TUBERCULOSIS, BACTERIOLOGICALLY AND HISTOLOGICALLY CONFIRMED **A15.0** TUBERCULOSIS OF LUNG, CONFIRMED BY SPUTUM MICROSCOPY WITH OR WITHOUT CULTURE **A15.00** TUBERCULOSIS OF LUNG, CONFIRMED BY SPUTUM MICROSCOPY WITH OR WITHOUT CULTURE, WITH **A15.01** TUBERCULOSIS OF LUNG, CONFIRMED BY SPUTUM MICROSCOPY WITH OR WITHOUT CULTURE, WITHOUT **A15.1** TUBERCULOSIS OF LUNG, *CONFIRMED BY CULTURE ONLY* **A15.2** TUBERCULOSIS OF LUNG, CONFIRMED HISTOLOGICALLY **A15.20** TUBERCULOSIS OF LUNG,

011.4 TUBERCULOUS FIBROSIS OF LUNG
011.5 TUBERCULOUS BRONCHIECTASIS
011.6 TUBERCULOUS PNEUMONIA (ANY FORM)
011.7 TUBERCULOUS PNEUMOTHORAX
011.8 OTHER PULMONARY TUBERCULOSIS
011.9 UNSPECIFIED
012 OTHER RESPIRATORY TUBERCULOSIS
012.0 TUBERCULOUS PLEURISY
012.1 TUBERCULOSIS OF INTRATHORACIC LYMPH NODES
012.2 ISOLATED TRACHEAL OR BRONCHIAL TUBERCULOSIS
012.3 TUBERCULOUS LARYNGITIS
012.8 OTHER
013 TUBERCULOSIS OF MENINGES AND CENTRAL NERVOUS SYSTEM
013.0 TUBERCULOUS MENINGITIS
013.1 TUBERCULOMA OF MENINGES
013.2 TUBERCULOMA OF BRAIN
013.3 TUBERCULOUS ABSCESS OF BRAIN
013.4 TUBERCULOMA OF SPINAL CORD
013.5 TUBERCULOUS ABSCESS OF SPINAL CORD
013.6 TUBERCULOUS ENCEPHALITIS OR MYELITIS
013.8 OTHER
013.9 UNSPECIFIED
014 TUBERCULOSIS OF INTESTINES, PERITONEUM AND MESENTERIC GLANDS
014.0 TUBERCULOUS PERITONITIS
014.8 OTHER
015 TUBERCULOSIS OF BONES AND JOINTS
015.0 VERTEBRAL COLUMN
015.1 HIP

CONFIRMED HISTOLOGICALLY, WITH CAVITATION
A15.21 TUBERCULOSIS OF LUNG, CONFIRMED HISTOLOGICALLY, WITHOUT CAVITATION OR UNSPECIFIED
A15.3 TUBERCULOSIS OF LUNG, CONFIRMED BY UNSPECIFIED MEANS
A15.30 TUBERCULOSIS OF LUNG, CONFIRMED BY UNSPECIFIED MEANS, WITH CAVITATION
A15.31 TUBERCULOSIS OF LUNG, CONFIRMED BY UNSPECIFIED MEANS, WITHOUT CAVITATION OR UNSPECIFIED
A15.4 TUBERCULOSIS OF INTRATHORACIC LYMPH NODES, CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY
A15.5 TUBERCULOSIS OF LARYNX, TRACHEA AND BRONCHUS CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY16.21O
A15.6 TUBERCULOUS PLEURISY, CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY
A15.7 PRIMARY RESPIRATORY TUBERCULOSIS, CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY
A15.8 OTHER RESPIRATORY TUBERCULOSIS, CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY
A15.9 RESPIRATORY TUBERCULOSIS UNSPECIFIED, CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY
A15.90 RESPIRATORY TUBERCULOSIS UNSPECIFIED, CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY WITH CAVITATION
A15.91 RESPIRATORY TUBERCULOSIS UNSPECIFIED, CONFIRMED BACTERIOLOGICALLY AND HISTOLOGICALLY, WITHOUT CAVITATION OR UNSPECIFIED
A16 RESPIRATORY TUBERCULOSIS, NOT CONFIRMED BACTERIOLOGICALLY OR HISTOLOGICALLY
A16.0 TUBERCULOSIS OF LUNG,

015.2 KNEE
015.7 OTHER BONE
015.8 OTHER JOINT
015.9 UNSPECIFIED
016 TUBERCULOSIS OF GENITOURINARY SYSTEM
016.0 KIDNEY
016.1 BLADDER
016.2 URETER
016.3 OTHER URINARY ORGANS
016.4 EPIDIDYMIS
016.5 OTHER MALE GENITAL ORGANS
016.6 TUBERCULOUS OOPHORITIS AND SALPINGITIS
016.7 FEMALE GENITAL ORGANS
016.9 UNSPECIFIED
017 TUBERCULOSIS OF OTHER ORGANS
017.0 SKIN AND SUBCUTANEOUS CELLULAR TISSUE
017.1 ERYTHEMA NODOSUM WITH HYPERSENSITIVITY REACTION IN TUBERCULOSIS
017.2 PERIPHERAL LYMPH NODES
017.3 EYE
017.4 EAR
017.5 THYROID GLAND
017.6 ADRENAL GLANDS
017.7 SPLEEN
017.8 ESOPHAGUS
017.9OTHER
018 MILIARY TUBERCULOSIS
018.0 ACUTE
018.8 OTHER
018.9 UNSPECIFIED

BACTERIOLOGICALLY AND HISTOLOGICALLY NEGATIVE
A16.1 TUBERCULOSIS OF LUNG, BACTERIOLOGICAL AND HISTOLOGICAL EXAMINATION NOT DONE
A16.10 TUBERCULOSIS OF LUNG, BACTERIOLOGICAL AND HISTOLOGICAL EXAMINATION NOT DONE, WITH CAVITATION
A16.11 TUBERCULOSIS OF LUNG, BACTERIOLOGICAL AND HISTOLOGICAL EXAMINATION NOT DONE, WITHOUT CAVITATION OR UNSPECIFIED
A16.2 TUBERCULOSIS OF LUNG, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION
A16.20 TUBERCULOSIS OF LUNG, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION, WITH CAVITATION
A16.21 TUBERCULOSIS OF LUNG, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION, WITHOUT CAVITATION OR UNSPECIFIED3
A16.3 TUBERCULOSIS OF INTRATHORACIC LYMPH NODES, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION
A16.4 TUBERCULOSIS OF LARYNX, TRACHEA AND BRONCHUS, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION
A16.5 TUBERCULOUS PLEURISY, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION
A16.7 PRIMARY RESPIRATORY TUBERCULOSIS WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION
A16.8 OTHER RESPIRATORY TUBERCULOSIS, WITHOUT MENTION OF BACTERIOLOGICAL OR

	HISTOLOGICAL CONFIRMATION **A16.9** RESPIRATORY TUBERCULOSIS UNSPECIFIED, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION **A16.90** RESPIRATORY TUBERCULOSIS *UNSPECIFIED, WITHOUT MENTION OF* BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION, WITH CAVITATION **A16.91** RESPIRATORY TUBERCULOSIS UNSPECIFIED, WITHOUT MENTION OF BACTERIOLOGICAL OR HISTOLOGICAL CONFIRMATION, WITHOUT CAVITATION OR UNSPECIFIEDA18.3 **A17** TUBERCULOSIS OF NERVOUS SYSTEM **A17.0** TUBERCULOUS MENINGITIS **A17.1** MENINGEAL TUBERCULOMA **A17.8** OTHER TUBERCULOSIS OF NERVOUS SYSTEM **A17.9** TUBERCULOSIS OF NERVOUS SYSTEM, UNSPECIFIED **A18** TUBERCULOSIS OF OTHER ORGANS **A18.0** TUBERCULOSIS OF BONES AND JOINTS **A18.1** TUBERCULOSIS OF GENITOURINARY SYSTEM **A18.2** TUBERCULOUS PERIPHERAL LYMPHADENOPATHY **A18.3** TUBERCULOSIS OF INTESTINES, PERITONEUM AND MESENTERIC LYMPH NODES8.4 **A18.4** TUBERCULOSIS OF SKIN AND SUBCUTANEOUS TISSUE **A18.5** TUBERCULOSIS OF EYE **A18.6** TUBERCULOSIS OF EAR **A18.7** TUBERCULOSIS OF ADRENAL GLANDS **A18.8** TUBERCULOSIS OF OTHER SPECIFIED ORGANS **A19** MILIARY TUBERCULOSIS **A19.0** ACUTE MILIARY TUBERCULOSIS OF A SINGLE SPECIFIED SITE **A19.1** ACUTE MILIARY TUBERCULOSIS OF MULTIPLE SITES **A19.2** ACUTE MILIARY TUBERCULOSIS, UNSPECIFIED **A19.8** OTHER MILIARY TUBERCULOSIS **A19.9** MILIARY TUBERCULOSIS,

		UNSPECIFIED
RUBELLA	**056.0** WITH NEUROLOGICAL COMPLICATIONS **056.00** WITH UNSPECIFIED NEUROLOGICAL COMPLICATION **056.01** ENCEPHALOMYELITIS DUE TO RUBELLA **056.09** OTHER **056.7** WITH OTHER SPECIFIED COMPLICATIONS **056.71** ARTHRITIS DUE TO RUBELLA **056.79** OTHER **056.8** WITH UNSPECIFIED COMPLICATIONS **056.9** RUBELLA WITHOUT MENTION OF COMPLICATION	**B06** RUBELLA [GERMAN MEASLES] **B06.0** RUBELLA WITH NEUROLOGICAL COMPLICATIONS **B06.8** RUBELLA WITH OTHER COMPLICATIONS **B06.9** RUBELLA WITHOUT COMPLICATION
TETANUS	037 TETANUS	A34 OBSTETRICAL TETANUS A35 OTHER TETANUS
Acute Conditions		
DENTAL CONDITIONS	**521** DISEASES OF HARD TISSUES OF TEETH **521.0** DENTAL CARIES **521.00** DENTAL CARIES, UNSPECIFIED **521.01** DENTAL CARIES LIMITED TO ENAMEL **521.02** DENTAL CARIES EXTENDING INTO DENTINE **521.03** DENTAL CARIES EXTENDING INTO PULP **521.04** ARRESTED DENTAL CARIES **521.05** ODONTOCLASIA **521.06** DENTAL CARIES PIT AND FISSURE **521.07** DENTAL CARIES OF SMOOTH SURFACE **521.08** DENTAL CARIES OF ROOT SURFACE **521.09** OTHER DENTAL CARIES **521.1** EXCESSIVE ATTRITION **521.10** EXCESSIVE ATTRITION, UNSPECIFIED **521.11** EXCESSIVE ATTRITION,	**K02** DENTAL CARIES **K02.0** CARIES LIMITED TO ENAMEL **K02.1** CARIES OF DENTINE **K02.2** CARIES OF CEMENTUM **K02.3** ARRESTED DENTAL CARIES **K02.4** ODONTOCLASIA **K02.8** OTHER DENTAL CARIES **K02.9** DENTAL CARIES, UNSPECIFIED **K03** OTHER DISEASES OF HARD TISSUES OF TEETH **K03.0** EXCESSIVE ATTRITION OF TEETH **K03.1** ABRASION OF TEETH **K03.2** EROSION OF TEETH **K03.3** PATHOLOGICAL RESORPTION OF TEETH **K03.4** HYPERCEMENTOSIS **K03.5** ANKYLOSIS OF TEETH **K03.6** DEPOSITS [ACCRETIONS] ON TEETH **K03.7** POSTERUPTIVE COLOUR CHANGES OF DENTAL HARD TISSUES **K03.8** OTHER SPECIFIED DISEASES OF HARD TISSUES OF TEETH **K03.9** DISEASE OF HARD TISSUES OF TEETH, UNSPECIFIED

LIMITED TO ENAMEL	**K04** DISEASES OF PULP AND PERIAPICAL TISSUES
521.12 EXCESSIVE ATTRITION, EXTENDING INTO DENTINE	**K04.0** PULPITIS
	K04.1 NECROSIS OF PULP
521.13 EXCESSIVE ATTRITION, EXTENDING INTO PULP	**K04.2** PULP DEGENERATION
	K04.3 ABNORMAL HARD TISSUE FORMATION IN PULP
521.14 EXCESSIVE ATTRITION, LOCALIZED	**K04.4** ACUTE APICAL PERIODONTITIS OF PULPAL ORIGIN
	K04.5 CHRONIC APICAL PERIODONTITIS
521.15 EXCESSIVE ATTRITION, GENERALIZED	**K04.6** PERIAPICAL ABSCESS WITH SINUS
521.2 ABRASION	**K04.7** PERIAPICAL ABSCESS WITHOUT SINUS
521.20 ABRASION, UNSPECIFIEI	**K04.8** RADICULAR CYST
521.21 ABRASION, LIMITED TO ENAMEL	**K04.9** OTHER AND UNSPECIFIED DISEASES OF PULP AND PERIAPICAL TISSUES
521.22 ABRASION, EXTENDING INTO DENTINE	**K05** GINGIVITIS AND PERIODONTAL DISEASES
521.23 ABRASION, EXTENDING INTO PULP	**K05.0** ACUTE GINGIVITIS
	K05.1 CHRONIC GINGIVITIS5.2
521.24 ABRASION, LOCALIZED	**K05.2** ACUTE PERIODONTITIS
	K05.3 CHRONIC PERIODONTITIS
521.25 ABRASION, GENERALIZI	**K05.4** PERIODONTOSIS
521.3 EROSION	**K05.5** OTHER PERIODONTAL DISEASES
521.30 EROSION, UNSPECIFIED	**K05.6** PERIODONTAL DISEASE, UNSPECIFIED
521.31 EROSION, LIMITED TO ENAMEL	**K06** OTHER DISORDERS OF GINGIVA AND EDENTULOUS ALVEOLAR RIDGE
	K06.0 GINGIVAL RECESSION
521.32 EROSION, EXTENDING IN DENTINE	**K06.1** GINGIVAL ENLARGEMENT
	K06.2 GINGIVAL AND EDENTULOUS ALVEOLAR RIDGE LESIONS
521.33 EROSION, EXTENDING IN PULP	ASSOCIATED WITH TRAUMA
	K06.8 OTHER SPECIFIED DISORDERS OF GINGIVA AND EDENTULOUS ALVEOLAR RIDGE
521.34 EROSION, LOCALIZED	
521.35 EROSION, GENERALIZEI	**K06.9** DISORDER OF GINGIVA AND EDENTULOUS ALVEOLAR RIDGE, UNSPECIFIED7.6
521.4 PATHOLOGICAL RESORPTION	**K08** OTHER DISORDERS OF TEETH AND SUPPORTING STRUCTURES
521.40 PATHOLOGICAL RESORPTION, UNSPECIFIED	**K08.0** EXFOLIATION OF TEETH DUE TO SYSTEMIC CAUSES
521.41 PATHOLOGICAL RESORPTION, INTERNAL	**K08.1** LOSS OF TEETH DUE TO ACCIDENT, EXTRACTION OR LOCAL PERIODONTAL DISEASE
521.42 PATHOLOGICAL RESORPTION, EXTERNAL	**K08.2** ATROPHY OF EDENTULOUS ALVEOLAR RIDGE
521.49 OTHER PATHOLOGICAL RESORPTION	**K08.3** RETAINED DENTAL ROOT
	K08.8 OTHER SPECIFIED DISORDERS

521.5 HYPERCEMENTOSIS
521.6 ANKYLOSIS OF TEETH
521.7 POSTERUPTIVE COLOUR CHANGES
521.8 OTHER DISEASES OF HARD TISSUES OF TEETH
521.81 CRACKED TOOTH
521.89 OTHER SPECIFIED DISEASES OF HARD TISSUES OF TEETH

521.9 UNSPECIFIED
522 DISEASES OF PULP AND PERIAPICAL TISSUES
522.0 PULPITIS
522.1 NECROSIS OF THE PULP
522.2 PULP DEGENERATION
522.3 ABNORMAL HARD TISSUE FORMATION IN PULP
522.4 ACUTE APICAL PERIODONTITIS OF PULPAL ORIGIN
522.5 PERIAPICAL ABSCESS WITHOUT SINUS
522.6 CHRONIC APICAL PERIODONTITIS
522.7 PERIAPICAL ABSCESS WITH SINUS
522.8 RADICULAR CYST
522.9 OTHER AND UNSPECIFIED
523 GINGIVAL AND PERIODONTAL DISEASES
523.0 ACUTE GINGIVITIS
523.00 ACUTE GINGIVITIS, PLAQUE INDUCED
523.01 ACUTE GINGIVITIS, NON-PLAQUE INDUCED
523.1 CHRONIC GINGIVITIS
523.10 CHRONIC GINGIVITIS, PLAQUE INDUCED
523.11 CHRONIC GINGIVITIS, NON-PLAQUE INDUCED
523.2 GINGIVAL RECESSION
523.20 GINGIVAL RECESSION, UNSPECIFIED

523.21 GINGIVAL RECESSION, MINIMAL

523.22 GINGIVAL RECESSION, MODERATE

523.23 GINGIVAL RECESSION, OF TEETH AND SUPPORTING STRUCTURES
K08.80 MAXILLARY ALVEOLAR RIDGE HYPERPLASIA
K08.81 MANDIBULAR ALVEOLAR RIDGE HYPERPLASIA
K08.82 MAXILLARY ALVEOLAR RIDGE HYPOPLASIA10.1
K08.83 MANDIBULAR ALVEOLAR RIDGE HYPOPLASIA
K08.87 TOOTHACHE NOS
K08.88 OTHER SPECIFIED DISORDERS OF TEETH AND SUPPORTING STRUCTURES
K08.9 DISORDER OF TEETH AND SUPPORTING STRUCTURES, UNSPECIFIED
K09.8 OTHER CYSTS OF ORAL REGION, NOT ELSEWHERE CLASSIFIED
K09.9 CYST OF ORAL REGION, UNSPECIFIED
K12 STOMATITIS AND RELATED LESIONS
K12.0 RECURRENT ORAL APHTHAE
K12.1 OTHER FORMS OF STOMATITIS
K12.2 CELLULITIS AND ABSCESS OF MOUTH
K12.3 ORAL MUCOSITIS (ULCERATIVE)
K13 OTHER DISEASES OF LIP AND ORAL MUCOSA
K13.0 DISEASES OF LIPS
K13.1 CHEEK AND LIP BITING
K13.2 LEUKOPLAKIA AND OTHER DISTURBANCES OF ORAL EPITHELIUM, INCLUDING TONGUE
K13.3 HAIRY LEUKOPLAKIA
K13.4 GRANULOMA AND GRANULOMA-LIKE LESIONS OF ORAL MUCOSA
K13.5 ORAL SUBMUCOUS FIBROSIS
K13.6 IRRITATIVE HYPERPLASIA OF ORAL MUCOSA
K13.7 OTHER AND UNSPECIFIED LESIONS OF ORAL MUCOSA

SEVERE

523.24 GINGIVAL RECESSION, LOCALIZED

523.25 GINGIVAL RECESSION, GENERALIZED

523.3 ACUTE PERIODONTITIS
523.30 AGGRESSIVE PERIODONTITIS, UNSPECIFIED
523.31 AGGRESSIVE PERIODONTITIS, LOCALIZED

523.32 AGGRESSIVE PERIODONTITIS, GENERALIZEI

523.33 ACUTE PERIODONTITIS

523.4 CHRONIC PERIODONTITIS

523.40 CHRONIC PERIODONTIT UNSPECIFIED

523.41 CHRONIC PERIODONTIT LOCALIZED

523.42 CHRONIC PERIODONTIT GENERALIZED

523.5 PERIODONTOSIS
523.6 ACCRETIONS ON TEETH
523.8 OTHER PERIODONTAL DISEASES
523.9 UNSPECIFIED
525 OTHER DISEASES AND CONDITIONS OF THE TEETH AND SUPPORTING STRUCTURES
525.0 EXFOLIATION OF TEETH DUE TO SYSTEMIC CAUSES
525.1 LOSS OF TEETH DUE TO ACCIDENT, EXTRACTION OR LOCAL PERIODONTAL DISEASE
525.10 ACQUIRED ABSENCE OF TEETH, UNSPECIFIED

525.11 LOSS OF TEETH DUE TO TRAUMA

525.12 LOSS OF TEETH DUE TO PERIODONTAL DISEASE

525.13 LOSS OF TEETH DUE TO CARIES

525.19 OTHER LOSS OF TEETH

525.2 ATROPHY OF EDENTULOUS ALVEOLAR RIDGE
525.20 UNSPECIFIED ATROPHY OF EDENTULOUS ALVEOLAR RIDGE

525.21 MINIMAL ATROPHY OF MANDIBLE

525.22 MODERATE ATROPHY O THE MANDIBLE

525.23 SEVERE ATROPHY OF TH MANDIBLE

525.24 MINIMAL ATROPHY OF MAXILLA

525.25 MODERATE ATROPHY O THE MAXILLA

525.26 SEVERE ATROPHY OF TH MAXILLA

525.3 RETAINED DENTAL ROOT
525.4 COMPLETE EDENTULISM
525.40 COMPLETE EDENTULISM, UNSPECIFIED

525.41 COMPLETE EDENTULISM CLASS I

525.42 COMPLETE EDENTULISM CLASS II

525.43 COMPLETE EDENTULISM CLASS III

525.44 COMPLETE EDENTULISM CLASS IV

525.5 PARTIAL EDENTULISM
525.50 PARTIAL EDENTULISM, UNSPECIFIED

525.51 PARTIAL EDENTULISM, CLASS I

525.52 PARTIAL EDENTULISM, CLASS II

525.53 PARTIAL EDENTULISM, CLASS III

525.54 PARTIAL EDENTULISM, CLASS IV
525.6 UNSATISFACTORY RESTORATION OF TOOTH

525.60 UNSPECIFIED UNSATISFACTORY RESTORATION OF TOOTH
525.61 OPEN RESTORATION MARGINS
525.62 UNREPAIRABLE OVERHANGING OF DENTAL RESTORATIVE MATERIALS
525.63 FRACTURED DENTAL RESTORATIVE MATERIAL WITHOUT LOSS OF MATERIAL
525.64 FRACTURED DENTAL RESTORATIVE MATERIAL WITH LOSS OF MATERIAL
525.65 CONTOUR OF EXISTING RESTORATION OF TOOTH BIOLOGICALLY INCOMPATIBLE WITH ORAL HEALTH
525.66 ALLERGY TO EXISTING DENTAL RESTORATIVE MATERIAL
525.67 POOR AESTHETICS OF EXISTING RESTORATION
525.69 OTHER UNSATISFACTORY RESTORATION OF EXISTING TOOTH
525.7 ENDOSSEOUS DENTAL IMPLANT FAILURE
525.71 OSSEOINTEGRATION FAILURE OF DENTAL IMPLANT
525.72 POST-OSSEOINTEGRATION BIOLOGICAL FAILURE OF DENTAL IMPLANT
525.73 POST-OSSEOINTEGRATION MECHANICAL FAILURE OF DENTAL IMPLANT
525.79 OTHER ENDOSSEOUS DENTAL IMPLANT FAILURE
525.8 OTHER
525.9 UNSPECIFIED
528 DISEASES OF THE ORAL SOFT TISSUES, EXCLUDING LESIONS SPECIFIC FOR GINGIVA AND TONGUE
528.0 STOMATITIS
528.00 STOMATITIS AND MUCOSITIS, UNSPECIFIED
528.01 MUCOSITIS (ULCERATIVE) DUE TO ANTINEOPLASTIC THERAPY
528.02 MUCOSITIS (ULCERATIVE) DUE TO OTHER DRUGS

	528.09 OTHER STOMATITIS AND MUCOSITIS (ULCERATIVE) **528.1** CANCRUM ORIS **528.2** ORAL APHTHAE **528.3** CELLULITIS AND ABSCESS **528.4** CYSTS **528.5** DISEASES OF LIPS **528.6** LEUKOPLAKIA OF ORAL MUCOSA, INCLUDING TONGUE **528.7** OTHER DISTURBANCES OF ORAL EPITHELIUM, INCLUDING TONGUE **528.71** MINIMAL KERATINIZED RESIDUAL RIDGE MUCOSA **528.72** EXCESSIVE KERATINIZED RESIDUAL RIDGE MUCOSA **528.79** OTHER DISTURBANCES OF ORAL EPITHELIUM, INCLUDING TONGUE **528.8** ORAL SUBMUCOUS FIBROSIS, INCLUDING OF TONGUE **528.9** OTHER AND UNSPECIFIED	
CELLULITIS	**681** CELLULITIS AND ABSCESS OF FINGER AND TOE **681.0** FINGER **681.00** CELLULITIS AND ABSCESS, UNSPECIFIED **681.01** FELON **681.02** ONYCHIA AND PARONYCHIA OF FINGER **681.1** TOE **681.10** CELLULITIS AND ABSCESS, UNSPECIFIED **681.11** ONYCHIA AND PARONYCHIA OF TOE **681.9** CELLULITIS AND ABSCESS OF UNSPECIFIED DIGIT **682** OTHER CELLULITIS AND ABSCESS **682.0** FACE **682.1** NECK **682.2** TRUNK **682.3** UPPER ARM AND FOREARM **682.4** HAND, EXCEPT FINGERS **682.5** BUTTOCK	**L03** CELLULITIS **L03.0** CELLULITIS OF FINGER AND TOE **L03.00** CELLULITIS OF FINGER **L03.01** CELLULITIS OF TOE **L03.1** CELLULITIS OF OTHER PARTS OF LIMB **L03.10** CELLULITIS OF UPPER LIMBL03.11O **L03.11** CELLULITIS OF LOWER LIMB **L03.2** CELLULITIS OF FACE **L03.3** CELLULITIS OF TRUNK **L03.30** CELLULITIS OF CHEST WALL **L03.31** CELLULITIS OF ABDOMINAL WALL **L03.32** CELLULITIS OF UMBILICUS **L03.33** CELLULITIS OF GROIN **L03.34** CELLULITIS OF BACK [ANY PART EXCEPT BUTTOCK] **L03.35** CELLULITIS OF BUTTOCK **L03.36** CELLULITIS OF PERINEUM **L03.39** CELLULITIS OF TRUNK, UNSPECIFIED **L03.8** CELLULITIS OF OTHER SITES **L03.9** CELLULITIS, UNSPECIFIED **L04** ACUTE LYMPHADENITIS

	682.6 LEG, EXCEPT FOOT **682.7** FOOT, EXCEPT TOES **682.8** OTHER SPECIFIED SITE **682.9** UNSPECIFIED SITE **683** ACUTE LYMPHADENITIS **686** OTHER LOCAL INFECTIONS OF SKIN AND SUBCUTANEOUS TISSUE **686.0** PYODERMA **686.00** PYODERMA, UNSPECIFIED **686.01** PYODERMA GANGRENOSUM **686.09** OTHER PYODERMA **686.1** PYOGENIC GRANULOMA **686.8** OTHER LOCAL INFECTIONS OF SKIN AND SUBCUTANEOUS TISSUE **686.9** UNSPECIFIED LOCAL INFECTIONS OF SKIN AND SUBCUTANEOUS TISSUE	**L04.0** ACUTE LYMPHADENITIS OF FACE, HEAD AND NECK **L04.1** ACUTE LYMPHADENITIS OF TRUNK **L04.2** ACUTE LYMPHADENITIS OF UPPER LIMB **L04.3** ACUTE LYMPHADENITIS OF LOWER LIMB **L04.8** ACUTE LYMPHADENITIS OF OTHER SITES **L04.9** ACUTE LYMPHADENITIS, UNSPECIFIED **L08** OTHER LOCAL INFECTIONS OF SKIN AND SUBCUTANEOUS TISSUE **L08.0** PYODERMA **L08.1** ERYTHRASMA **L08.8** OTHER SPECIFIED LOCAL INFECTIONS OF SKIN AND SUBCUTANEOUS TISSUE **L08.9** LOCAL INFECTION OF SKIN AND SUBCUTANEOUS TISSUE, UNSPECIFIED **L44.4** INFANTILE PAPULAR ACRODERMATITIS [GIANNOTTI-CROSTI] **L88** PYODERMA GANGRENOSUM **L92.2** GRANULOMA FACIALE [EOSINOPHILIC GRANULOMA OF SKIN] **L98.0** PYOGENIC GRANULOMA **L98.3** EOSINOPHILIC CELLULITIS [WELLS]
PELVIC INFLAMMATORY DISEASE	**614** INFLAMMATORY DISEASE OF OVARY, FALLOPIAN TUBE, PELVIC CELLULAR TISSUE AND PERITONEUM **614.0** ACUTE SALPINGITIS AND OOPHORITIS **614.1** CHRONIC SALPINGITIS AND OOPHORITIS **614.2** SALPINGITIS AND OOPHORITIS, NOT SPECIFIED AS ACUTE, SUBACUTE OR CHRONIC **614.3** ACUTE PARAMETRITIS AND PELVIC CELLULITIS **614.4** CHRONIC OR UNSPECIFIED PARAMETRITIS AND PELVIC CELLULITIS **614.5** ACUTE OR UNSPECIFIED PELVIC PERITONITIS, FEMALE **614.6** PELVIC PERITONEAL ADHESIONS, FEMALE	**N70** SALPINGITIS AND OOPHORITIS **N70.0** ACUTE SALPINGITIS AND OOPHORITIS **N70.1** CHRONIC SALPINGITIS AND OOPHORITIS **N70.9** SALPINGITIS AND OOPHORITIS, UNSPECIFIED **N73** OTHER FEMALE PELVIC INFLAMMATORY DISEASES **N73.0** ACUTE PARAMETRITIS AND PELVIC CELLULITIS **N73.1** CHRONIC PARAMETRITIS AND PELVIC CELLULITIS **N73.2** UNSPECIFIED PARAMETRITIS AND PELVIC CELLULITIS **N73.3** FEMALE ACUTE PELVIC PERITONITIS **N73.4** FEMALE CHRONIC PELVIC PERITONITIS **N73.5** FEMALE PELVIC PERITONITIS, UNSPECIFIED

	614.7 OTHER CHRONIC PELVIC PERITONITIS, FEMALE **614.8** OTHER SPECIFIED INFLAMMATORY DISEASE OF FEMALE PELVIC ORGANS AND TISSUES **614.9** UNSPECIFIED INFLAMMATORY DISEASE OF FEMALE PELVIC ORGANS AND TISSUES	**N73.6** FEMALE PELVIC PERITONEAL ADHESIONS **N73.8** OTHER SPECIFIED FEMALE PELVIC INFLAMMATORY DISEASES **N73.9** FEMALE PELVIC INFLAMMATORY DISEASE, UNSPECIFIED **N99.4** POSTPROCEDURAL PELVIC PERITONEAL ADHESIONS
SEVERE EAR, NOSE AND THROAT (ENT) INFECTIONS	**382** SUPPURATIVE AND UNSPECIFIED OTITIS MEDIA **382.0** ACUTE SUPPURATIVE OTITIS MEDIA **382.00** ACUTE SUPPURATIVE OTITIS MEDIA WITHOUT SPONTANEOUS RUPTURE OF EAR DRUM **382.01** ACUTE SUPPURATIVE OTITIS MEDIA WITH SPONTANEOUS RUPTURE OF EAR DRUM **382.02** ACUTE SUPPURATIVE OTITIS MEDIA IN DISEASES CLASSIFIED ELSEWHERE **382.1** CHRONIC TUBOTYMPANIC SUPPURATIVE OTITIS MEDIA **382.2** CHRONIC ATTICOANTRAL SUPPURATIVE OTITIS MEDIA **382.3** UNSPECIFIED CHRONIC SUPPURATIVE OTITIS MEDIA **382.4** UNSPECIFIED SUPPURATIVE OTITIS MEDIA **382.9** UNSPECIFIED OTITIS MEDIA **462** ACUTE PHARYNGITIS **463** ACUTE TONSILLITIS **465** ACUTE UPPER RESPIRATORY INFECTIONS OF MULTIPLE OR UNSPECIFIED SITE **465.0** ACUTE LARYNGOPHARYNGITIS **465.8** OTHER MULTIPLE SITES **465.9** UNSPECIFIED SITE **472.1** CHRONIC PHARYNGITIS	**H66** SUPPURATIVE AND UNSPECIFIED OTITIS MEDIA **H66.0** ACUTE SUPPURATIVE OTITIS MEDIA **H66.1** CHRONIC TUBOTYMPANIC SUPPURATIVE OTITIS MEDIA **H66.2** CHRONIC ATTICOANTRAL SUPPURATIVE OTITIS MEDIA **H66.3** OTHER CHRONIC SUPPURATIVE OTITIS MEDIA **H66.4** SUPPURATIVE OTITIS MEDIA, UNSPECIFIED **H66.9** OTITIS MEDIA, UNSPECIFIED **H67** OTITIS MEDIA IN DISEASES CLASSIFIED ELSEWHERE **H67.0** OTITIS MEDIA IN BACTERIAL DISEASES CLASSIFIED ELSEWHERE **H67.1** OTITIS MEDIA IN VIRAL DISEASES CLASSIFIED ELSEWHERE **H67.8** OTITIS MEDIA IN OTHER DISEASES CLASSIFIED ELSEWHERE **J02** ACUTE PHARYNGITIS **J02.0** STREPTOCOCCAL PHARYNGITIS **J02.8** ACUTE PHARYNGITIS DUE TO OTHER SPECIFIED ORGANISMS **J02.9** ACUTE PHARYNGITIS, UNSPECIFIED **J03** ACUTE TONSILLITIS **J03.0** STREPTOCOCCAL TONSILLITIS **J03.8** ACUTE TONSILLITIS DUE TO OTHER SPECIFIED ORGANISMS **J03.9** ACUTE TONSILLITIS, UNSPECIFIED **J06** ACUTE UPPER RESPIRATORY INFECTIONS OF MULTIPLE AND UNSPECIFIED SITES **J06.0** ACUTE LARYNGOPHARYNGITIS **J06.8** OTHER ACUTE UPPER RESPIRATORY INFECTIONS OF MULTIPLE SITES **J06.9** ACUTE UPPER RESPIRATORY

		INFECTION, UNSPECIFIED **J31.2** CHRONIC PHARYNGITIS
GASTROENTERITIS & DEHYDRATION	**558.9** OTHER AND UNSPECIFIED NONINFECTIOUS GASTROENTERITIS AND COLITIS **276.5** VOLUME DEPLETION **276.50** VOLUME DEPLETION, UNSPECIFIED **276.51** DEHYDRATION **276.52** HYPOVOLEMIA	**K52.2** ALLERGIC AND DIETETIC GASTROENTERITIS AND COLITIS **K52.8** OTHER SPECIFIED NONINFECTIVE GASTROENTERITIS AND COLITIS **K52.9** NONINFECTIVE GASTROENTERITIS AND COLITIS, UNSPECIFIED **E86** VOLUME DEPLETION **E86.0** DEHYDRATION **E86.8** OTHER VOLUME DEPLETION

Appendix B: APP and FFS Communities, and Flags

Alternative Payment Plan (APP) Communities	Postal Codes	Flag
McBride	V0J 2E0	APP
Dunster	V0J 1J0	APP
Fraser Lake	V0J 1S0	APP
Valemount	V0E 2Z0	APP
Robson	V0G 1X0	APP
Haida Gwaii (Queen Charlotte)	V0T 1S0, V0T 1S1;	APP
Sandspit	V0T 1T0	APP
Stewart	V0T 1W0	APP
Fee for Service (FFS) Communities	Postal Codes	Flag
Prince Rupert	V8J 0A1 – V8J 4S4	FFS
Tumbler Ridge	V0C 2W0	FFS
Smithers	V0J 2N0 – V0J 2N7	FFS
Telkwa	V0J 2X0 – V0J 2X3	FFS
3. Other		Flag
Postal Codes NOT listed above		N/A

Appendix C: Ethics Approval from the UNBC Research Ethics Board

UNIVERSITY OF NORTHERN BRITISH COLUMBIA

RESEARCH ETHICS BOARD

MEMORANDUM

To Ukeme Eka
CC Josée Lavoie
Peter MacMillan

From Henry Harder, Chair
Research Ethics Board

Date: November [illegible]

Re: **E2009.1130.194**
Impact of General Practitioner Payment Scheme on Health Care System [illegible] Avoidable Hospitalization for Ambulatory Care Sensitive Conditions [illegible]

Thank you for submitting the above noted request to the Research Ethics Board. Your proposal has been approved.

We are pleased to issue approval for the above named study for a period of [illegible] months from the date of this letter. Continuation beyond that date will require further review and renewal of REB approval. Any changes or amendments to the protocol or consent form must be approved by the Research Ethics Board.

Good luck with your research.

Sincerely,

Henry Harder