

**WHAT IS THE PREVALENCE OF CHRONIC PELVIC PAIN AMONGST THE
VARIOUS ETHNICITIES IN HAWAII?**

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ABSTRACT

Objective: The primary objective of this study was to examine the prevalence of chronic pelvic pain (CPP) amongst various ethnic groups in the state of Hawai`i. A second objective was a secondary analysis of the data to identify any factors that may increase the risk of chronic pelvic pain.

Methods: From 2005-2006, the annual Hawai`i Health Survey was administered to residents of the state of Hawai`i, by a third party vendor contracted with the Hawai`i Department of Health, to households with landline phones. Survey data were gathered on 24,642 people in 8503 households statewide. Questions about pelvic pain were added to the annual Hawaii Health Survey. Non-pregnant women household responders, over the ages of 18, were surveyed to assess the 3 month cross-sectional prevalence of chronic pelvic pain. Chronic pelvic pain is defined as pain below the belly button or in the female organs for more than 6 months. Those who reported chronic pelvic pain were surveyed on severity, frequency, diagnosis, and treatment. The data were weighted to account for age, gender, island location, and ethnicity.

Results: All data is reported weighted to represent the general population. The survey data were weighted to represent 957,540 household members, reflecting the general population of Hawai`i. Forty-nine percent were male and 51.1% were female. The mean age of non-pregnant female adult respondents was 49.7 years old (SD 18.0). Of the 488,833 adult women, 10,404 (2.1%) were pregnant and 477,996 (97.8%) were not pregnant. In the last 3 months, 34,210 (7.2%) of the non-pregnant adult women surveyed responded yes to having pelvic pain. Of

these, 13,449 of women responded yes to having the pain for more than 6 months. The prevalence of chronic pelvic pain was 2.8%. The mean pain score was 5.95 out of 10 (SD 2.50). Most women were not given a diagnosis, but the most common pathological diagnosis cited was endometriosis (11.3%). Though most women 10,553 (79.9%) did not miss any work, 9.1% missed less than 5 days of work, and 10.7% missed from 5 days to more than 15 days of work due to pelvic pain the previous 3 months. Twenty percent (2,580) rated themselves as fully productive, but 21% rated themselves with very low productivity, when having pelvic pain. African-American/Black (10.4%), Hawaiian (5.0%), and Caucasian/white (3.4%) were the ethnicities with the highest prevalence of chronic pelvic pain. And Chinese (1.7%), Japanese (1.1%), Other (1.3%), Asian (0.6%), and Samoan (0.4%) were below the mean prevalence of CPP. Vietnamese, Other Pacific Islander, Korean, and Asian Indian had no primary respondents who had CPP. When adjusting for age, marital status, weight, and menopausal status, African Americans (332% increased risk) and Hawaiians (27.5% increased risk) had the highest increased risk of CPP compared to Caucasians. Being in an unmarried relationship or divorced increased a woman's risk of having CPP by 8% and 10%, respectively. Being menopausal had a variable impact on risk of CPP depending on other confounding factors, and educational status was not significant for CPP.

Conclusions: Chronic pelvic pain has a lower rate of prevalence at 2.8% than found nationally. African Americans and Hawaiians are at a greater risk of having CPP in the state of Hawaii. CPP results in missed days from work and adversely

impacts work productivity. Hawaiians appear to be at greater risk of using more health care resources when having CPP. Additional investigations are needed to develop management approaches for this health disparity.

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ABBREVIATIONS

CAM Complementary & Alternative Medicine

CPP Chronic Pelvic Pain

HHS Hawai`i Health Survey

CHAPTER 1: INTRODUCTION

Definition

While chronic pelvic pain (CPP) has varying definitions in the literature, the most common definition has been characterizing the pain by location, between the umbilicus and pubic bone and defining the pain by duration, lasting greater than 6 months. This definition was used in the only existing prevalence study of the general female population in the United States.[1] The American College of Obstetricians and Gynecologists defines chronic pelvic pain as “noncyclical pain of at least 6 months’ duration that appears in locations such as the pelvis, anterior abdominal wall, lower back, or buttocks, and that is serious enough to cause disability or leads to medical care.”[2] Noncyclic chronic pelvic pain excludes pain limited to dysmenorrhea (pain with menstruation), dyspareunia (pain with intercourse), dyschesia (pain with bowel movement), or dysuria (pain with urination).[3] Some of the many ways that chronic pelvic pain can be defined include, duration of pain, location of pain, exclusion of pathology, and even the requirement of a negative pelvic laparoscopy. But using the definition which specifies the location (in the pelvis) and duration of greater than 6 months, is the most common component of the differing definitions in the literature.[4]

Disease Condition

Chronic pelvic pain (CPP) is a common problem and significant cause of morbidity in women, greatly affecting a woman's quality of life, as well as a large societal cost by impacting work productivity. Though an individual woman's experience with chronic pelvic pain will differ based on her combination of physical, psychological and social factors, most women will have lower general physical health and quality of life scores compared to women without CPP.[5-8] Differences in its prevalence in various ethnic populations are not well established. In a study by Mathias et al, a Gallop Poll of the general population of the US found the prevalence of chronic pelvic pain to be as high as 15%, amongst women ages 18-50 years old.[1]

Population Affected

Women of reproductive age are most commonly affected. The prevalence varies due to the lack of established definitions.

Cost

There is an estimated 1.4 billion per year spent in today's dollars on outpatient management of CPP in the US, when adjusting for inflation from \$882 million cost found in Mathias' study in 1996. Additionally, there's a total indirect cost due

from lost time at work estimated at \$760 million per year after adjusting for inflation. Of those women reporting chronic pelvic pain, 15% reported lost time from paid work and 45% reported decreased work productivity.[1]

Background:

Chronic pelvic pain (CPP) is a common problem which compromises quality of life and results in significant numbers of days lost from productive work. Patients and providers report frustration resulting from unsuccessful attempts at implementing multiple treatment modalities. This is a common problem, with numerous etiologies of pain, ranging from no identifiable cause to specific pathologic causes of gynecologic or non-gynecologic origin. Chronic pelvic pain is responsible for 10% of all gynecologic office consultations and 15-40% of all gynecologic laparoscopic surgeries.[9]

Some studies have found the prevalence of CPP to be as high 24% (3 month prevalence) in the U.K. & New Zealand [1, 6, 7]. Both of these studies included cyclic pelvic pain and ovulatory pain in the prevalence, but these types of pelvic pain were excluded in Mathias' study. Mathias et al found the prevalence of CPP to be 15% in the U.S. Though Mathias' study was an important general population survey of CPP, ethnic diversity was limited, with a significant majority of those surveyed being Caucasian/white (86%), and a small representation of other ethnicities, with 7.2% being African American and 4.2% being Hispanic. With small populations of limited ethnic groups, true population differences in

pelvic pain are difficult to analyze. Overall, Mathias found no difference between age, race/ethnicity, and education with regards to risk of CPP. Mathias also reported in 1996, that medical costs for chronic pelvic pain in the U.S. amounted to \$881.5 million per year, resulted in 45% who had reduced work productivity, and 15% of women reported lost time from work. Reiter also found no significant ethnic differences in the incidence of chronic pelvic pain among women presenting to a naval hospital. However, there were only 198 patients in the 1990 study and only approximately 25% were African-American or Hispanic.[10] In all of these studies, there were too few Asians to evaluate any differences in chronic pelvic pain.

Some of the challenges involved in evaluating the epidemiology of chronic pelvic pain include varying definitions in the literature, as well as other complicating conditions, such as interstitial cystitis, irritable bowel syndrome, and psychological etiologies of pain. The most commonly associated pathology with chronic pelvic pain is endometriosis.[1] History of sexual or physical abuse has been correlated with chronic pelvic pain.[11] Ovarian remnant and ovarian congestion syndrome has also been suggested as causes of CPP in some patients. [12] One investigator also found that multiparity was associated with chronic pelvic pain.[13] Aside from these associated risks, few other factors have been associated with CPP. While there have been a few epidemiologic studies on chronic pelvic pain in the U.S. and U.K., there have not been many studies evaluating the ethnic differences regarding this complex symptomatology,

and none have been published specifically evaluating chronic pelvic pain in the ethnically diverse State of Hawai`i.

In order to adequately design studies to evaluate the treatment of chronic pelvic pain, the epidemiology of the CPP and the varied impact on different ethnic groups need to be assessed.

SPECIFIC AIMS:

The primary objective of this study was to examine the differences in prevalence of chronic pelvic pain amongst various ethnic groups in the state of Hawai'i. A second objective was the secondary analysis of the data to identify any factors that may increase the risk of chronic pelvic pain.

CHAPTER 3: METHODS

From 2005-2006, the annual Hawai`i Health Survey (HHS) was administered to households in the state of Hawai`i, and non-pregnant women over the ages of 18 years old were surveyed to assess the 3 month cross-sectional prevalence of chronic pelvic pain (pelvic pain for 6 months or more) amongst the various ethnicities in Hawai`i.

Hawai`i Health Telephone Survey:

The telephone pelvic pain survey was administered using a third party vendor, SMS Hawaii, by adding questions to the annual Hawai`i Health Survey (HHS). SMS Hawaii is a private full service research and marketing company, who is contracted by the Hawai`i Department of Health to administer the survey annually. The Hawai`i Health Survey (HHS), managed by the Office of Health Status Monitoring (OHSM), is a survey conducted to provide the Hawai`i Department of Health (DOH) with statistics for planning and evaluating health services and programs, while also providing health information for public use. The HHS is a continuous statewide reliable and valid household survey on health and socio-demographic data modeled after the National Interview Health Survey. The survey was first conducted in 1968 as a household interview survey and has been a telephone survey since 1996, which is used to collect and analyze data on health and social conditions that affect all age groups in Hawai`i's population. The objective of the Hawai`i Health Survey is to collect demographic information

for measuring population changes during intercensal years. It is the primary source of statewide estimates of gender, age, ethnicity, education, household size, insurance status, and health status. From year to year, various individual topics are surveyed, in addition to general demographic and health status questions. Various issues from child care, depression, tobacco usage, and health care access are also addressed in the survey. The questions on the survey are read to respondents by a trained administrator. The survey questions specific for this study were embedded in the Hawai`i Health Survey. The survey administrators read the script of pelvic pain questions, which were integrated into the Hawai`i Health Survey in a hierarchical manner.

Study Population:

The qualifying population was first screened to be non-pregnant women over the age of 18 years old, who were the primary respondents to the telephone survey. Women who were administered the survey were asked, "In the past 3 months, have you ever had pelvic pain, either constantly or off and on? By pelvic pain, I mean pain below the belly button or in the female organs?" Those women who answered yes, were then asked, "Have you had this pain for greater than 6 months?" Those answering yes to both questions were considered the study population for the chronic pelvic pain survey questions. The female respondents were weighted to represent the larger population of women in Hawaii.

Sample Size:

In 2005-2006, HHS gathered data on 24,642 people in 8503 households statewide. The survey targeted people living in non-institutionalized housing units in the State of Hawai`i and having working telephone service at the time of the survey. The survey excluded residents of Ni`ihau, households without phones, the homeless, and persons in group quarters.

Procedures:

The sampling method was a random digit dialing (RDD) and the sample was disproportionately selected by island. Slightly larger proportions of interviews were conducted on islands with smaller populations. The objective was to adequately represent all island populations. The data was weighted to account for age, gender, number in household, and island location. Data weighting were required for statewide population estimates.

Subjects (Exclusion/Inclusion Criteria):

The Hawai`i Health Survey was randomly administered by telephone to households in Hawai`i, but non-pregnant women in the household over the age of 18 years old were specifically asked questions relating to chronic pelvic pain (see Data Producing Instruments) in 2005-2006

Variables:

Logistic regression models were developed to assess factors which may increase the risk of chronic pelvic pain. An initial binary logistic regression model iteration was developed with the dependent variable being chronic pelvic pain and the only independent variable being ethnicity. Additional iterations of the logistic regression model encompassed more comprehensive factors, which included the following independent variables: ethnicity, age, marital status, education level, weight, and menopausal (or surgical menopausal) status. The ethnicity categories were compared to the White/Caucasian as the reference category.

Data Producing Instruments:

Figure 1 below demonstrates the pelvic pain questions and response answers integrated in the Hawai'i Health Survey.

Figure 1: Pelvic Pain Questionnaire Embedded in Hawai'i Health Survey

Questions:	Answers:
1. Are you pregnant?	1) Yes...if yes, then stop here. 2) No
2. **Have you gone through menopause? That is, have your menstrual periods stopped for over a year or have both your ovaries been removed	1) Yes 2) No
3. **In the past 3 months, have you ever had pelvic pain, either constantly or off and on? By pelvic pain, I mean pain below the belly button or in the female organs?	1) Yes 2) No...if No, then stop here.
4. If answered "yes" to above, then have you had this pain for greater than 6 months?	1) Yes 2) No...if No, then stop here.
5. On average rate the severity of your pelvic pain on a scale of 0-10 with 0 being no pain and 10 being the worst pain you have ever experienced.	0-10
6. Have you ever seen a doctor for your pain? (If no, then skip to question # 13)	1) Yes 2) No
7. If yes to above, what diagnosis were you given?	
8. If you have seen a doctor for your pain, how many visits have you had for the pain	1) less than 3 2) 3-6 visits

over the last 3 months?	3) more than 6 visits
9. **In the past 3 months, have you been hospitalized for your pelvic pain condition?	1) Yes 2) No
10. **In the past 3 months have you had surgery for your pelvic pain condition?	1) Yes 2) No
11. **In the past 3 months, how many times have you been to the emergency room for your pelvic pain condition?	___#
12. **In the past 3 months, how satisfied have you been with the medical care you have received for your pelvic pain?	1) very satisfied 2) somewhat satisfied 3) neither satisfied nor dissatisfied 4) somewhat satisfied 5) very dissatisfied 6) Does not apply/have not received any medical care in the past 3 months
13.** Have you needed to take prescription pain medications in the past 3 months to control you pelvic pain? 13 a. If yes, what did you take?	1) Yes 2) No 1. Vicodin 2. Anaprox 3. Motrin 4. Demerol 5. Tylenol #3 with Codein 6. Percocet 7. Celebrex 8. Vioxx 9. Bextra 10. Other_____
14. **In the past 3 months how many times have you seen an alternative health professional for your pelvic pain (such as an acupuncturist, herbalist, massage therapist, or chiropractor)? 14 a. If yes, what type of professional did	1) ___# of times 2) _____

you see?	
15. **How many days did you lose from work because of your pelvic pain over the past 3 months?	<ul style="list-style-type: none"> 1) I don't work 2) none 3) less than 5 days 4) 5-10 days 5) 11-15 6) greater than 15 days
16. **On a scale from 0 to 10, with 0 being not at all productive and 10 being fully productive, please rate how productive you are at work on a typical day when you are having pelvic pain.	<ul style="list-style-type: none"> 0-not productive at all 10-Fully productive

Statistical Analysis:

SPSS v18 software was used for statistical analysis. Descriptive statistics were used to quantify the characteristics of the population surveyed and the population with chronic pelvic pain. Student t tests and ANOVA were used for comparison of continuous variables. Chi square and logistic regression modelings were used to assess independent variables, which may contribute to increased risk of chronic pelvic pain.

CHAPTER 4: RESULTS

Basic Frequencies-Qualifying Population

The Hawaii Health Survey, which included the pelvic pain questionnaire, was conducted using a landline phone survey of 8503 households in the state of Hawai'i. Items were weighted to represent 957,540 household members.

Table 1, provides information on basic frequency qualifiers of the chronic pelvic pain population studied.

Table 1: Frequencies - Basic Qualifiers

		Count	Col %
Gender in Household	Male	468707	48.9%
	Female	488833	51.1%
Group Total		957540	100.0%
Now, i would like to ask you some other questions about pain. But first i need to verify -- Are you pregnant?	Yes	10,404	2.1%
	No	477,996	97.8%
	DON'T KNOW/NOT SURE/Refused	276	.06%
Group Total		488,675	100.0%
Have you gone through menopause? That is, have your menstrual periods stopped for over a year? or Have both your ovaries been removed?	Yes	211,003	44.1%
	No	260,596	54.5%
	DON'T KNOW/NOT SURE/Refused	6396	1.3%
Group Total		477,996	100.0%
Full year 2006 dataset, weighted to Hawaii adults			

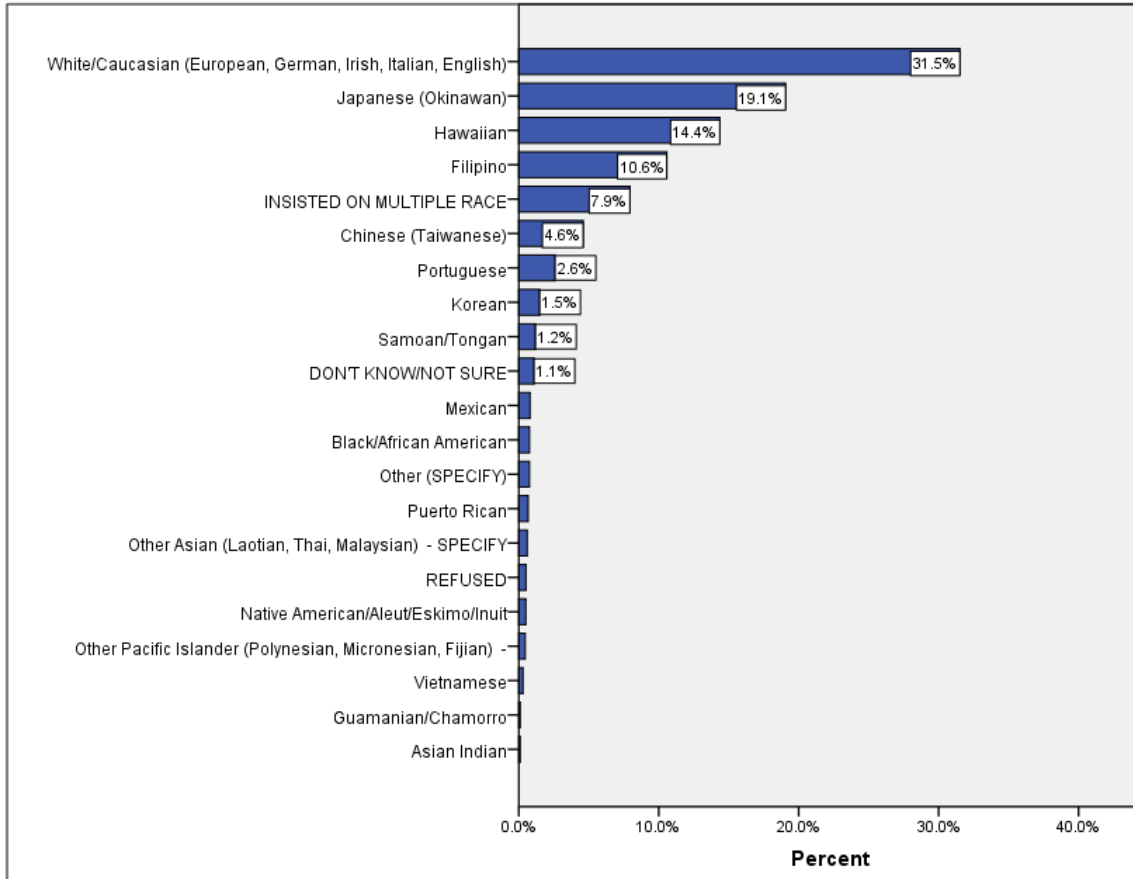
Forty-nine percent of respondents were male and 51.1% were female. The mean age of non-pregnant respondents were 49.7 years old (SD 18.0).

The survey data were collected from all primary respondents. Only adult non-pregnant women respondents were asked the questions regarding pelvic pain. Those respondents' answers were weighted to reflect the population of the state of Hawai'i. All data presented are data weighted to the primary adult women respondents.

Of the 488,833 females surveyed (51.1% of the household members surveyed), 10,404 (2.1%) were pregnant, 477,996 (97.8%) were not pregnant, and 276 (<0.1%) did not know or were not sure if they were pregnant. Forty-four percent of all the women surveyed (44.1%) had gone through menopause or had both ovaries removed.

The state of Hawai'i has a diverse ethnic population, which was also reflected in this survey. These data are shown in Figure 2 Ethnicities of Population Surveyed.

Figure 2: Ethnicities of Population Surveyed



Caucasians were the most frequent at 31.5%, followed by Japanese 19.1%, Hawaiian 14.4%, Filipino 10.6%, and multiple race 7.9%. The non-white population represented a majority at 68.5%.

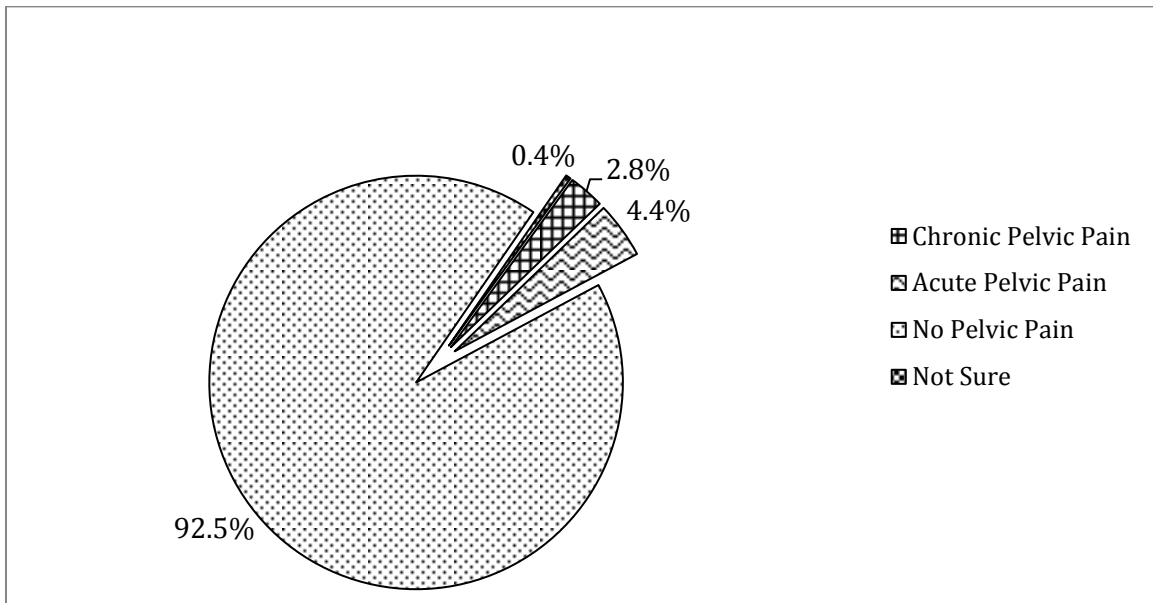
Prevalence of Chronic Pelvic Pain & Pain Measures

Study Population: Those women, who answered yes to both of the following questions, were considered to be the study population:

- 1) In the past 3 months, have you ever had pelvic pain, either constantly or off and on? By pelvic pain, I mean pain below the belly button or in the female organs?
- 2) Have you had this pain for greater than 6 months?

For the first question assessing if they had pelvic pain within the last 3 months, 34,210 (7.2%) of the non-pregnant women surveyed responded yes, and 92.5% had no pelvic pain. And for the second question, 13,449 (39.3%) of women with recent pelvic pain in the last 3 months, responded yes to having the pain for more than 6 months. These data are described in Figure 3 Acute and Chronic Pelvic Pain Distribution.

Figure 3: Acute and Chronic Pelvic Pain Distribution



Therefore, a total amount of 13,449 (2.8%) out of 477,996 non pregnant, adult women were found to have chronic pelvic pain in the state of Hawaii .

When comparing CPP vs. the No CPP, there were significant differences in age, weight, and BMI. The mean age of those with chronic pelvic pain were younger at 44.6 years old (SD 14.8) vs. 49.4 years old (SD 18.2) ($p < 0.001$). Those with CPP had a higher mean weight of 150.4 lbs vs. 143.4 lb in the non CPP group. This was a mean difference of 6.5 lbs greater for the CPP group ($p < 0.001$). The mean BMI for the CPP group was 25.4 (SD 37.5) vs. 25.1 (SD 34.7), which was a small difference of 0.32 but still significant ($p < 0.001$).

Table 2: below provides information regarding the frequencies of pain measures.

Table 2: Frequencies - Pain Measures

		Count	Col %
In the past 3 months, have you ever had pelvic pain, either constantly or off and on? By pelvic pain, i mean pain below the belly button or in the female organs?	Yes	34210	7.2%
	No	441993	92.5%
	NOT SURE	1686	.4%
	REFUSED	107	.0%
Group Total		477996	100.0%
Have you had this pain for greater than 6 months?	Yes	13449	38.8%
	NO	21086	60.9%
	NOT SURE	113	.3%
Group Total		34648	100.0%
On average, rate the severity of your pelvic pain on a scale of 0-10 with 0 being no pain and 10 being the worst pain you have ever experienced.	0 - NO PAIN	177	1.3%
	1	492	3.7%
	2	675	5.1%
	3	1455	11.0%
	4	1044	7.9%
	5	2253	17.1%
	6	1560	11.8%
	7	1454	11.0%
	8	2102	15.9%
	9	429	3.2%
	10 - WORST PAIN	1563	11.8%
Group Total		13203	100.0%

The mean pain score was 5.95 out of 10 (SD 2.50) in the CPP group, and over half (53.7%) reported having severe pain (pain score of 6-10) (Table 2).

Treatment Frequencies for Chronic Pelvic Pain

Table 3 and Figure 4 provide a summary of the frequencies for the treatment measures employed. The frequency of a doctor's visit for CPP is described in Figure 4, which shows that almost all women (88.6%) with CPP visited a doctor for their pain.

Table 3: Frequencies - Treatment Measures

		Count	Percent
Have you ever seen a doctor for your pain?	Yes	11698	88.6
	No	1505	11.4
	Total	13203	100.0

		Count	Percent
How many visits have you had for the pain over the last 3 months?	Less than 3	7305	62.4
	3-6 visits	2860	24.5
	More than 6 visits	1533	13.1
	Total	11698	100.0

		Count	Percent
In the past 3 months, have you been hospitalized for your pelvic pain condition?	Yes	891	7.6
	No	10808	92.4
	Total	11698	100.0

		Count	Percent
In the past 3 months, have you had surgery for your pelvic pain condition?	Yes	1412	12.1
	No	10287	87.9
	Total	11698	100.0

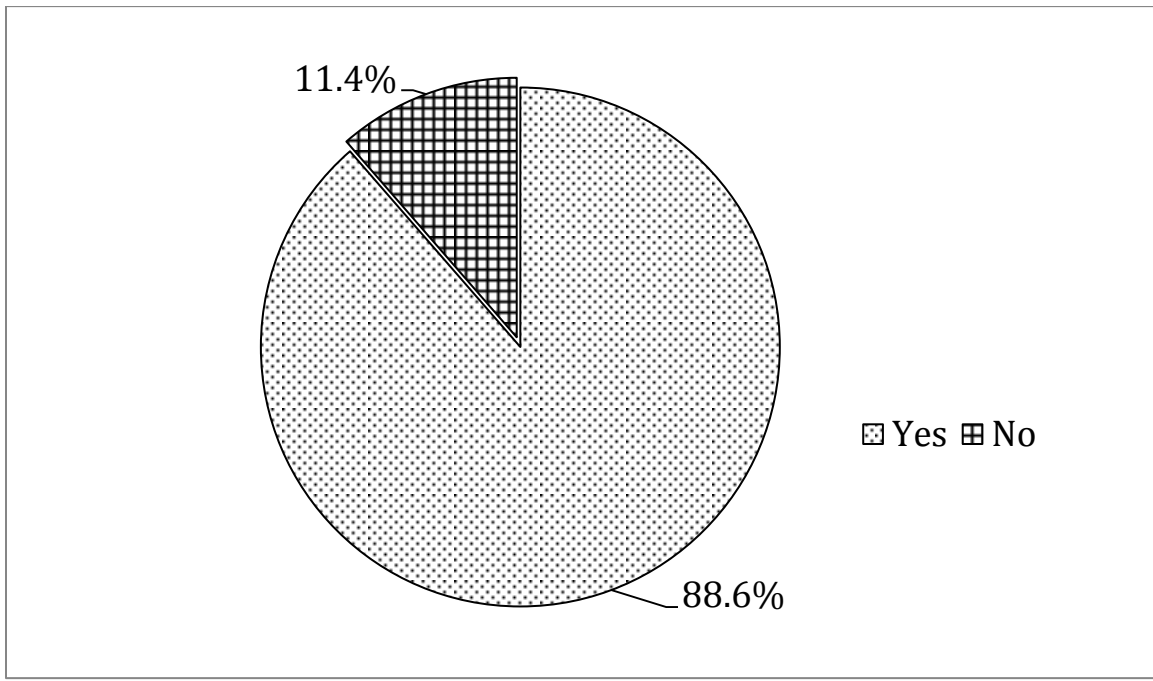
		Count	Percent
In the past 3 months, how many times have you been to the emergency room for your pelvic pain condition?	0	9993	85.4
	1	801	6.8
	2	322	2.8

	4	256	2.2
	Don't Know	326	2.8
	Total	11698	100.0

Have you needed to take prescription pain medications in the past 3 months to control your pelvic pain?		Count	Percent
	Yes	4628	35.1
	No	8575	64.9
	Total	13203	100.0

In the past 3 months, how satisfied have you been with the medical care you have received for your pelvic pain?		Count	Valid Percent
	very satisfied	3292	28.1
	somewhat satisfied	3682	31.5
	neither satisfied nor dissatisfied	1390	11.9
	somewhat dissatisfied	1046	8.9
	very dissatisfied	647	5.5
	Does not apply	1641	14.0
	Total	11698	100.0

Figure 4: Frequency of doctor's visit for CPP. Have you ever seen a doctor for your pain?



Women with CPP were asked about the kind of treatments they pursued. They were surveyed how frequently they visited a physician, been hospitalized, had surgery, been to the emergency room, over a 3 month period. Additionally, their satisfaction with the medical care they received for the pelvic pain, along the need for pain medications were surveyed.

While most of the women, 7305 (62.4%), with chronic pelvic pain had less than 3 physician office visits, a noticeable portion of women, 1533 (13.1%), had more than 6 visits. About 7.6% of the women had been hospitalized, 12.1% had surgery, and 5% had been to the emergency room two times or more, in the past 3 months. Sixty percent were satisfied with their medical treatment for their pelvic pain. But about 14% were dissatisfied with their care (Table 3).

Diagnosis Given for Chronic Pelvic Pain: In Figure 5 the frequency of the diagnosis given by their physicians for their chronic pain is provided. And the most frequent categories of diagnosis for the pain were Other (31.7%), Unidentified (17.9%), Can't Remember (11.9%), and Endometriosis (11.3). Nearly 50% of the women reported no or other diagnosis.

Figure 6 summarizes the most frequently cited prescription pain medications given for their CPP.

Figure 5 Frequency of Diagnosis Given for Chronic Pelvic Pain

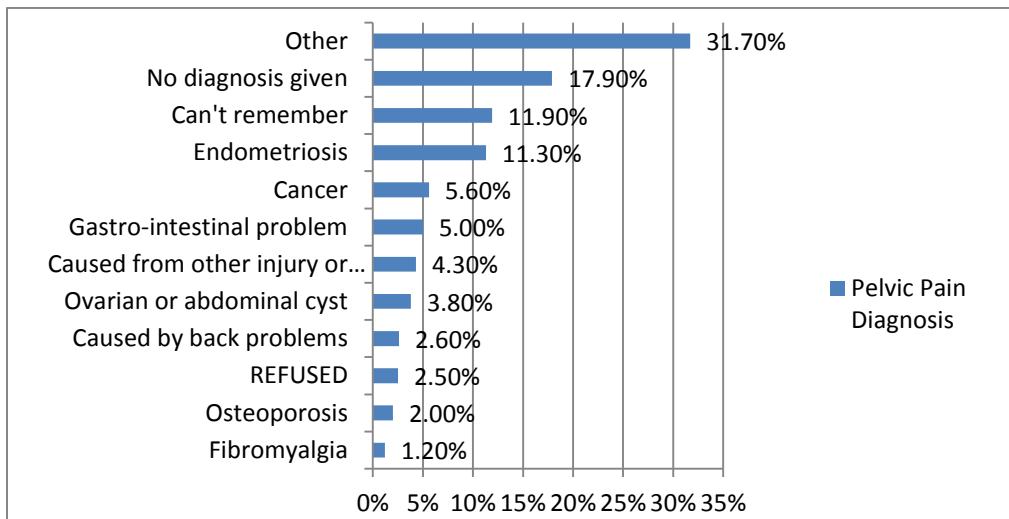
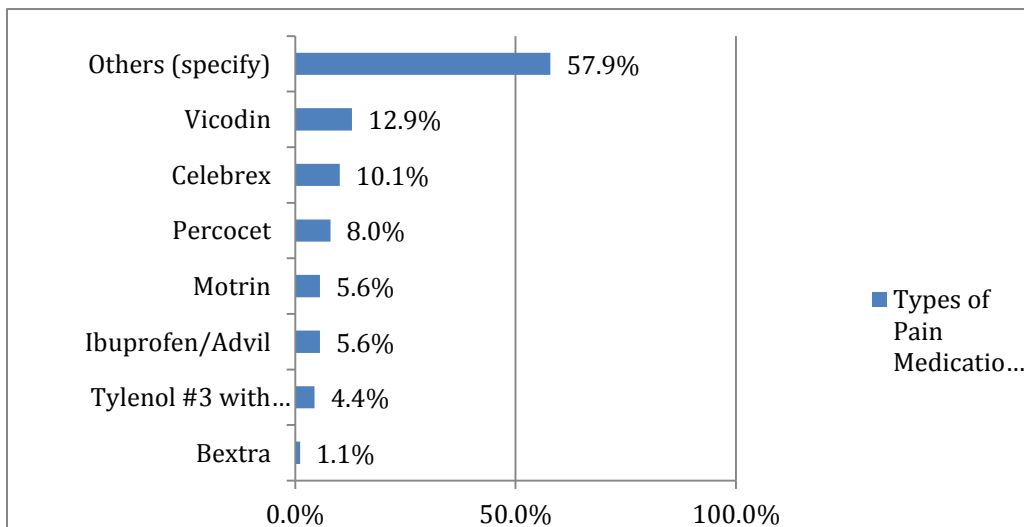


Figure 6: Types of Pain Medications



Thirty-five percent of the women needed prescription pain medications in the recent 3 months for their pelvic pain. The pain medications most commonly taken were Other (57.9%), Vicodin (hydrocodone/acetaminophen) (12.9%), Celecoxib (Celebrex 10.1%), Percocet (oxycodone/acetaminophen) (8%), and Ibuprofen (5.6%) (Figure 5).

Complementary and Alternative Medicine Treatments

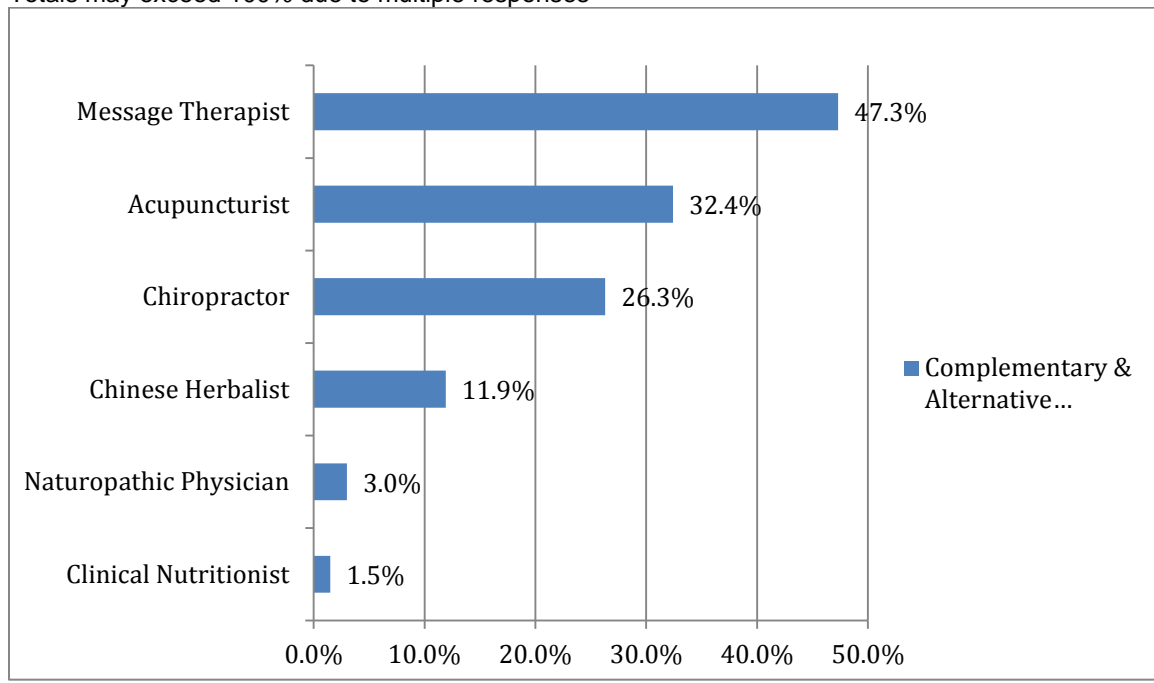
In addition to traditional treatments, some women sought out complementary and alternative medicine treatments (CAM). Table 4 and Figure 7 summarize these data. Most women surveyed did not utilize CAM (71%), but there was a noticeable portion of women, 3,312 (25.1%) who had visited a CAM provider. In the frequency of usage of CAM for CPP, there appears to be a binary response. Women either chose not to be treated with CAM, or those that did, went for many visits, with 42.1% of the women using CAM having greater than 4 visits.

Table 4: Usage of Complementary & Alternative Medicine

	Count	Col %
In the past 3 months, how many times have you seen an alternative health professional for your pelvic pain (such as an acupuncturist, herbalist, massage therapist, or chiropractor)?	0	9376 71.0%
	1	994 7.5%
	2	590 4.5%
	3	316 2.4%
	4 or more	1412 10.7%
	Not Sure	515 3.9%
Group Total	13203	100.0%
Full year 2006 dataset, weighted to Hawaii adults		

Figure 7: Complementary & Alternative Medicine

Full year 2006 dataset, weighted to Hawaii adults
Totals may exceed 100% due to multiple responses



The most popular CAM treatment providers were massage therapists (47.3%), acupuncturists (32.4%), chiropractors (26.3%), and Chinese herbalists (11.9%) (Figure 7).

Chronic Pelvic Pain Impact on Daily Activities

Women were asked about the impact of CPP on their daily work activities. Though most women 10,553 (79.9%) did not miss any work, 9.1% missed less than 5 days from work, 10.7% missed 5 days to more than 15 days of work due to pelvic pain the previous 3 months. These data are shown in Table 5.

Table 5: Frequencies - Impact on Daily Activities

		Count	Col %
How many days did you lose from work because of your pelvic pain over the past 3 months?	I don't know	27	.2%
	none	10553	79.9%
	less than 5 days	1197	9.1%
	5 - 10 days	505	3.8%
	11-15 days	44	.3%
	greater than 15 days	877	6.6%
Group Total		13203	100.0%
On a scale from 0 to 10, with 0 being not at all productive and 10 being fully productive, please rate how productive you are at work on a typical day when you are having pelvic pain.	0- NOT AT ALL PRODUCTIVE	1188	9.1%
	1	348	2.7%
	2	498	3.8%
	3	730	5.6%
	4	871	6.7%
	5	1523	11.7%
	6	931	7.2%
	7	1776	13.6%
	8	1773	13.6%
	9	794	6.1%
	10 - FULLY PRODUCTIVE	2580	19.8%
Group Total		13012	100.0%
Full year 2006 dataset, weighted to Hawaii adults			

Women were also surveyed on their productivity at work, on a typical day with pelvic pain, on a 0-10 scale of productivity (with 0 being not at all productive and 10 fully productive at work). Twenty percent (2,580) rated themselves as fully productive, but 59.8% reported reduced productivity of 7 or less score. And 21.2% had very low productivity (0-3 out of 10) (Table 5).

Pain Measures by County:

When analyzing the prevalence of CPP by counties, the location of residence did have an impact. Honolulu County had the most frequent prevalence of chronic pelvic pain at 2.9%, followed by Hawaii and Maui County both at 2.6%, and Kauai with the least at 2.3%. Table 6 summarizes the differences in prevalence of CPP by county of residence.

Table 6: County of Residence-Have you had this pain for greater than 6 months?

			Have you had this pain for greater than 6 mo? (No/Yes)		Total
			No	Yes	
County of Residence	City and County of Honolulu	Count % within County of Residence	329087 97.1%	9850 2.9%	338937 100.0%
	Hawaii County	Count % within County of Residence	61364 97.4%	1628 2.6%	62992 100.0%
	Kauai County	Count % within County of Residence	23344 97.7%	549 2.3%	23893 100.0%
	Maui County	Count % within County of Residence	50639 97.4%	1422 2.6%	52061 100.0%
Total		Count % within County of Residence	464434 97.3%	13449 2.7%	477883 100.0%

Table 7 summarizes the results of the logistic regression analysis of CPP by residence of county.

Table 7: Risk of Chronic Pelvic Pain Depending on County of Residence

	B	P value	OR-reduced risk by	Exp(B)	95% CI	Prevalence of Chronic Pelvic Pain
Honolulu						2.9%
Hawaii	-.120	<0.001	-11.3%	0.887	.841-.935	2.6%
Kauai	-.241	<0.001	-21.4%	0.786	.721-.857	2.3%
Maui	-.064	.026	-6.2%	0.938	.886-.992	2.6%

A binary logistic regression model was developed comparing the overall prevalence of chronic pelvic pain by counties with the dependent variable being chronic pelvic pain (yes/no), and the independent variable being the residing county. There appeared to be subtle differences in the residing county and the risk of having chronic pelvic pain.

From the logistic regression, (and similar results found on Chi Square analysis) where Honolulu County was set as the reference county, there appeared a small but significant less risk of having chronic pelvic pain for women who resided in neighboring counties, outside of Honolulu County. The risk reduction ranged from 6%-11%, if women lived on the neighboring counties compared to Honolulu County (Table 7).

Pain Measures by Ethnicity

Figure 8 and Table 8 depicts pain measures by ethnicity. African-American/Black (10.4%), Hawaiian (5.0%), Native American (3.5%), and Caucasian/white (3.4%) were the ethnicities with the highest prevalence of chronic pelvic pain. The overall average prevalence rate for the whole population was 2.8%.

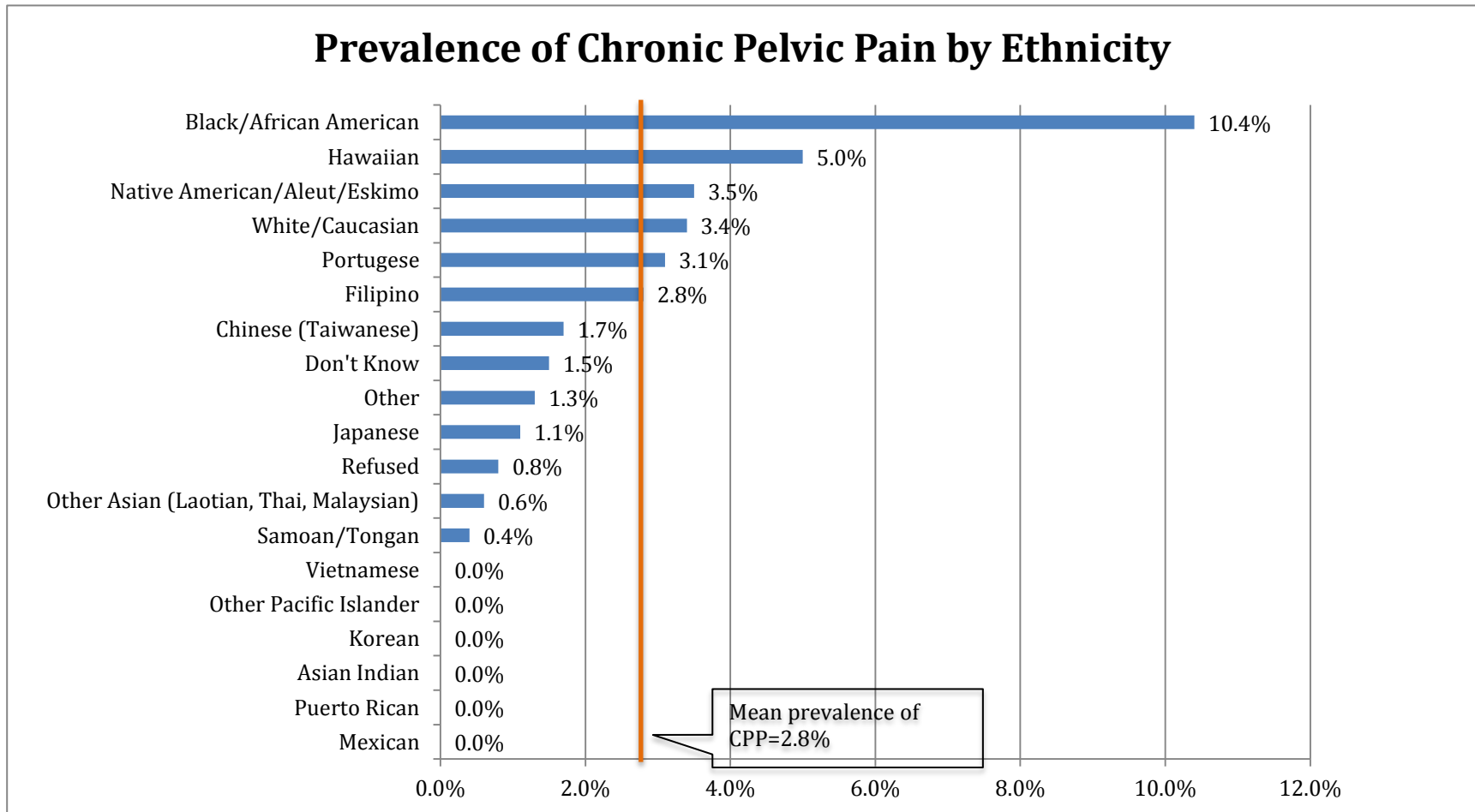
Table 8: Chronic Pelvic Pain Categorized by Ethnicity?

		Have you had this pain for greater than 6 mo? (No/Yes)		Total
		No	Yes	
White/Caucasian (European, German, Irish, Italian, English)	Count %	93673 96.6%	3321 3.4%	96994 100.0%
Hawaiian	Count %	42007 95.0%	2189 5.0%	44196 100.0%
Chinese (Taiwanese)	Count %	13916 98.3%	236 1.7%	14152 100.0%
Filipino	Count %	31624 97.2%	913 2.8%	32537 100.0%
Japanese (Okinawan)	Count %	57995 98.9%	672 1.1%	58667 100.0%
Korean	Count %	4598 100.0%	0 .0%	4598 100.0%
Vietnamese	Count %	934 100.0%	0 .0%	934 100.0%
Asian Indian	Count %	291 100.0%	0 .0%	291 100.0%
Other Asian (Laotian, Thai, Malaysian) - SPECIFY	Count %	1856 99.4%	11 .6%	1867 100.0%
Samoan/Tongan	Count %	3658 99.6%	14 .4%	3672 100.0%
Black/African American	Count %	2119 89.6%	245 10.4%	2364 100.0%
Native American/Aleut/Eskimo/I nuit	Count %	1475 96.5%	54 3.5%	1529 100.0%
Puerto Rican	Count %	2016 100.0%	0 .0%	2016 100.0%
Mexican	Count %	2461 100.0%	0 .0%	2461 100.0%
Portuguese	Count	7739	245	7984

	%	96.9%	3.1%	100.0%
Guamanian/Chamorro	Count	311	0	311
	%	100.0%	.0%	100.0%
Other Pacific Islander (Polynesian, Micronesian, Fijian) -	Count	1439	0	1439
	%	100.0%	.0%	100.0%
Other (SPECIFY)	Count	2322	31	2353
	%	98.7%	1.3%	100.0%
DON'T KNOW/NOT SURE	Count	3305	52	3357
	%?	98.5%	1.5%	100.0%
REFUSED	Count	1572	13	1585
	%	99.2%	.8%	100.0%
INSISTED ON MULTIPLE RACE	Count	24118	298	24416
	%	98.8%	1.2%	100.0%
Total	Count	299429	8294	307723
	%	97.3%	2.7%	100.0%

Portuguese (3.1%) and Filipinos (2.8%) were close to the overall mean prevalence. And Chinese (1.7%), Japanese (1.1%), Samoan (0.4%), and Other Asian (0.3%), were below the mean prevalence of CPP. Vietnamese, Mexican/Puerto Rican, Korean, Asian Indian, and Other Pacific Islander were amongst the lowest prevalence of CPP, where no primary respondents had admitted to CPP (Table 8).

Figure 8: Prevalence of Chronic Pelvic Pain by Ethnicity



Logistic Regression Model of Prevalence of Chronic Pelvic Pain Amongst Different Ethnicities in Hawaii

The following Tables 9, 10, and 11 describe the findings from implementation of the logistic regression model to identify risks for CPP. The initial binary logistic model iteration developed evaluated ethnicities as the only independent variable and CPP as the dependent variable. Designating White/Caucasian as the reference variable, Hawaiian and African Americans both had increased risks of CPP of 47% and 326%, respectively. Other ethnicities, such as Chinese, Filipino, Japanese, Other Asian (Laotian, Thai, Malaysian), and Samoan/Tongan had significantly reduced risk of CPP compared to White/ Caucasians. Korean, Vietnamese, Asian Indian, Native American, Portuguese, Puerto Rican, Mexican, Guamanian, and other Pacific Islander groups were not significant for CPP (Table 9).

Crosstabs using chi square was done with various independent variables to search for those most likely to contribute risk to CPP. Since menopausal/ovary removal status is thought to reduce pelvic pain, and on crosstabs found to be significant, this variable was included with ethnicity in the second iteration of this logistic regression model. Menopausal/ovary removal status was set as the reference variable. Being premenopausal increased a woman's risk by 13% of having CPP (Table 10). With respect to ethnicities and the risk of CPP in this model, there were only minimal changes to the odds ratios, but the same ethnicities were found to be significant, as in the first iteration.

In the final iteration of the binary logistic model, ethnicity, age, marital status, weight, and menopausal status were included as the independent variables, and the prevalence of CPP as the dependent variable. While other factors were considered for the model, such as smoking, BMI, and household income, the number of primary survey respondents included in analysis would have increased the missing cases (due to missing data) from 37% to a very large 74%. A large population of missing respondents would not have been considered in the case analysis, thus creating a specialized subpopulation to be analyzed, which may not likely have accurately represented the CPP population. Due to this consideration, the final model was decided on to include only ethnicity, age, marital status, weight, and menopausal status, keeping the integrity of the CPP population data.

The final model iteration in Table 11 (ethnicity, menopausal status, age, marital status, education, and weight as independent variables), still demonstrated the same ethnic groups to have significantly increased risk of CPP, compared to Whites/Caucasians: Hawaiian (27.5% increased risk), African American/Black (332% increased risk). The same ethnic groups from the initial logistic regression with the ethnicity only model had the similar reduced risk of CPP in the final model: Chinese (-43.3%), Filipino (-27.3%), Japanese (-61.0%), Other Asian (Laotian, Thai, Malaysian) (-82.1%), and Samoan/Tongan (-91.4%). And the same ethnic groups which were not significant for CPP in the initial ethnicity only model were also not significant in the final model. Marital status has some impact on risk of CPP. Compared to married women, unmarried women in

a relationship and divorced women had an 86% and 10% increased chance of CPP, respectively. Widowed and never married women were at a reduced risk by -54.2% and -40.3%, respectively. Weight contributed a minimal but significant increased risk of CPP by 0.1%. Educational status was not significant. And though being premenopausal increased the risk of CPP in the initial model, in the final model, being premenopausal was found to be protective by 20%.

Tables 9, 10 and 11 provide a summary of logistic regressions models for risk factors for CPP.

Table 9: CPP Risk by Ethnicity Only

Ethnicity	B	p value	OR risk	Exp(B)	95% CI
White/Caucasian					
Hawaiian	.385	<0.001	47%	1.47	1.39-1.55
Chinese	-.737	<0.001	-55.2%	.479	.419-.547
Filipino	-.206	<0.001	-18.6%	.814	.756-.877
Japanese	-1.12	<0.001	-67.3%	.327	.300-.355
Other Asian (Laotian, Thai, Malaysian)	-1.82	<0.001	-83.8%	.162	.088-.296
Samoan/Tongan	-2.19	<0.001	-88.8%	.112	.067-.187
African American/Black	1.18	<0.001	326%	3.26	2.85-3.74

Table 10: CPP risk by Ethnicity and Menopausal Status

Ethnicity	B	p value	OR risk	Exp(B)	95% CI
Yes Menopausal/Ovaries removed					
No Menopausal/Ovaries removed	.125	<0.001	13%	1.13	1.08-1.19

Table 11: CPP Risk by Ethnicity + Menopausal Status + Age + Marital Status + Education + Weight

	B	p value	OR risk	Exp(B)	95% CI
Ethnicity					
White/Caucasian					
Hawaiian	.243	<0.001	28%	1.28	1.20-1.35
Chinese	-.567	<0.001	-43.3%	.567	.496-.649
Filipino	-.319	<0.001	-27.3%	.727	.672-.786
Japanese	-.939	<0.001	-61.0%	.391	.359-.426
Other Asian (Laotian, Thai, Malaysian)	-1.72	<0.001	-82.1%	.179	.098-.328
Samoan/Tongan	-2.45	<0.001	-91.4%	.086	.051-.146
African American/Black	1.20	<0.001	332%	3.32	2.88-3.83
Menopausal Status					
Postmenopausal					
Premenopausal	-.221	<0.001	-20.0%	.801	.750-.857
Age	-.014	<0.001	-0.10%	.986	.983-.988
Education Level		NS			
Marital Status					
Married					
Unmarried couple	.619	<.001	86%	1.86	1.66-2.07
Widow	-.781	<.001	-54.2%	.458	.410-.511
Divorce	.099	.008	10%	1.10	1.03-1.19
Never Married	-.516	<.001	-40.3%	.597	.559-.637.
Weight	.001	.001	.1%	1.001	1.00-1.002

CPP Treatments by Ethnic Groups:

Tables 12-15 describe the treatment utilization (office visits, hospitalizations, surgeries, and emergency room visits) when analyzed by ethnic groups.

Table 12: Ethnicity and Number of Office Visits for Pelvic Pain

Ethnicity	How many visits have you had for the pain over the last 3 months?			Total
	< 3 visits	3-6 visits	>6 visits	
White/Caucasian	2138 73.8%	590 20.4%	168 5.8%	2896 100%
Hawaiian	1460 71.6%	315 15.4%	265 13%	2040 100%
Chinese (Taiwanese)	236 100%	0	0	395 100%
Filipino	226 29.5%	508 66.7%	33 4.3%	767 100%
Japanese (Okinawan)	245 36.5%	256 38.1%	171 25.4%	672 100%
Other Asian (Laotian, Thai, Malaysian)	11 100%	0	0	11 100%
Samoan/Tongan	14 100%	0	0	14 100%
African American/Black	245 100%	0	0	245 100%
Native American/Aleut/Eskimo	0	0	54 100%	54 100%
Portuguese	47 19.1%	65 26.4%	134 54.5%	246 100%
Other	31 100%	0	0	31 100%

P<0.001

When evaluating the number of office visits by ethnicity, Caucasian, Hawaiian, Japanese, Native American, and Portuguese had much higher percentage of women with greater than 6 office visits for their CPP (p<0.001). Portuguese and Native Americans had the highest percent requiring more than 6 visits at 54.5% and 100%, respectively (Table 13, p<0.001). So while, Portuguese and Native American groups were not at higher risk of having CPP, when they did have CPP, they utilized physician office visits often for their pain.

Table 13: Ethnicity and Hospitalization for Pelvic Pain in Last 3 Months

Ethnicity	In the past 3 months have you been hospitalized for your pelvic pain condition?		
	Yes	No	Total
White/Caucasian	0	2897 100%	2897 100%
Hawaiian	309 15.1%	1731 84.9%	2040 100%
Chinese (Taiwanese)	0	236 100%	236 100%
Filipino	0	766 100%	766 100%
Japanese (Okinawan)	97 14.4%	575 85.6%	672 100%
Other Asian (Laotian, Thai, Malaysian)	0	11 100%	11 100%
Samoan/Tongan	0	14 100%	14 100%
African American/Black	0	245 100%	245 100%
Native American/Aleut/Eskimo	0	54 100%	54 100%
Portuguese	0	245 100%	245 100%
Other	0	31 100%	31 100%

p<0.001

With regards to pelvic pain requiring hospitalization, 15.1% of Hawaiians and 14.4% of Japanese had recent hospitalization in the last 3 months (Table 13, p<0.001). These two ethnic groups were the only ones requiring hospitalization for their chronic pelvic pain.

Table 14: Ethnicity and Surgery in the Past 3 Months for Pelvic Pain

Ethnicity	In the past 3 months have you had surgery for your pelvic pain condition?		
	Yes	No	Total
White/Caucasian	272 9.4%	2625 90.6%	2897 100%
Hawaiian	358 17.6%	1681 82.4%	2039 100%
Chinese (Taiwanese)	0	236 100%	236 100%
Filipino	0	766 100%	766 100%
Japanese (Okinawan)	97 14.4%	575 85.6%	672 100%
Other Asian (Laotian, Thai, Malaysian)	0	11 100%	11 100%
Samoan/Tongan	0	14 100%	14 100%
African American/Black	0	245 100%	245 100%
Native American/Aleut/Eskimo	0	54 100%	54 100%
Portuguese	0	245 100%	245 100%
Other	0	31 100%	31 100%

P<0.001

Surgery is often times a last resort for evaluation and treatment, after medical management has failed. When reviewing the number of women who have had surgery, Caucasians (9.4%), Hawaiians (17.6%), and Japanese (14.4%) were the only groups to report having had surgery in the past 3 months for their pelvic pain (Table 14, p<0.001).

Table 15: Ethnicity and ER Visits in the Past 3 Months for Pelvic Pain

Ethnicity	In the past 3 months, how many times have you been to the emergency room for your pelvic pain condition?			
	0	1	2	4
White/Caucasian	2854 98.5%	0 0%	44 1.5%	0 0%
Hawaiian	1234 60.7%	274 13.4%	0	256 12.6%
Chinese (Taiwanese)	236 100%	0 0%	0 0%	0 0%
Filipino	626 81.7%	140 16.1%	0 0%	0 0%
Japanese (Okinawan)	939 83.5%	186 18.3%	0	0
Other Asian (Laotian, Thai, Malaysian)	11 100%	0 0%	0 0%	0 0%
Samoan/Tongan	14 100%	0 0%	0 0%	0 0%
African American/Black	245 100%	0 0%	0 0%	0 0%
Native American/Aleut/Eskimo	54 100%	0 0%	0 0%	0 0%
Portuguese	111 45.3%	134 54.7%	0 0%	0 0%
Other	31 100%	0 0%	0 0%	0 0%

P<0.001

In reviewing the number of emergency room (ER) visits for women’s chronic pelvic pain, most women did not require any ER visits, but Hawaiian’s (12.6%) were the only group that had ER visits of 4 or more (Table 15, p<0.001).

Percent with Health Insurance Coverage

In the initial survey, all of the female respondents were asked if they had health insurance. Understanding what percent of the population has health care insurance is important in understanding the health care treatment utilization, since limited insurance could potentially limit treatment access. Table 16 summarizes the percentage of population with health insurance, grouped by ethnicities.

Table 16: Percentage of Women with Health Insurance by Ethnic Group

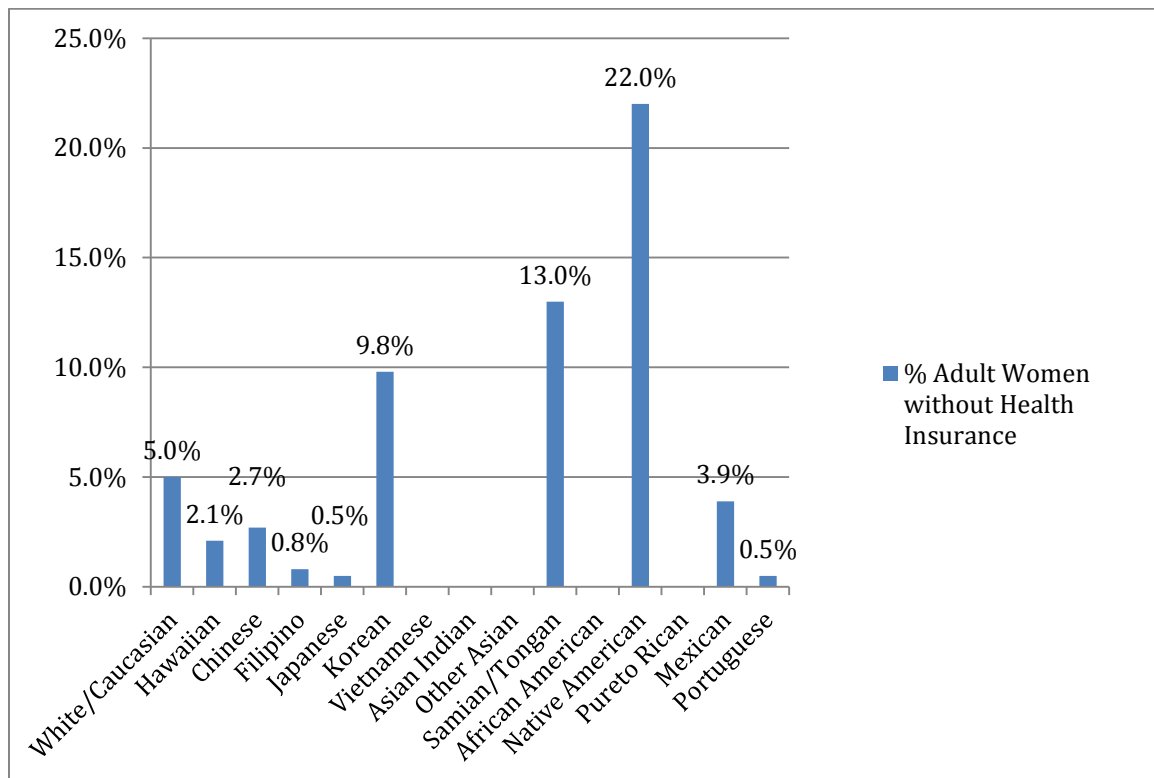
		Has Medical Insurance		Total
		Yes	No	
White/Caucasian (European, German, Irish, Italian, English)	Count %	91320 94.4%	5388 5.6%	96708 100.0%
Hawaiian	Count %	43091 97.9%	913 2.1%	44004 100.0%
Chinese (Taiwanese)	Count %	13763 97.3%	389 2.7%	14152 100.0%
Filipino	Count %	32072 99.2%	244 .8%	32316 100.0%
Japanese (Okinawan)	Count %	57993 99.5%	311 .5%	58304 100.0%
Korean	Count %	4149 90.2%	449 9.8%	4598 100.0%
Vietnamese	Count %	934 100.0%	0 .0%	934 100.0%
Asian Indian	Count %	291 100.0%	0 .0%	291 100.0%
Other Asian (Laotian, Thai, Malaysian) - SPECIFY	Count %	1866 100.0%	0 .0%	1866 100.0%
Samoan/Tongan	Count %	3194 87.0%	479 13.0%	3673 100.0%
Black/African American	Count %	2364 100.0%	0 .0%	2364 100.0%
Native American/Aleut/E skimo/Inuit	Count %	1193 78.0%	336 22.0%	1529 100.0%
Puerto Rican	Count %	2063 100.0%	0 .0%	2063 100.0%
Mexican	Count	2364	97	2461

	%	96.1%	3.9%	100.0%
Portuguese	Count	7945	40	7985
	%	99.5%	.5%	100.0%
Guamanian/Chamorro	Count	311	0	311
	%	100.0%	.0%	100.0%
Other Pacific Islander (Polynesian, Micronesian, Fijian) -	Count	1386	53	1439
	%	96.3%	3.7%	100.0%
Other (SPECIFY)	Count	2352	0	2352
	%	100.0%	.0%	100.0%
DON'T KNOW/NOT SURE	Count	3357	0	3357
	%	100.0%	.0%	100.0%
REFUSED	Count	1247	112	1359
	%	91.8%	8.2%	100.0%
INSISTED ON MULTIPLE RACE	Count	22866	1527	24393
	%	93.7%	6.3%	100.0%
Total	Count	296121	10338	306459
	%	96.6%	3.4%	100.0%

Since Hawaii is a state with near universal health insurance coverage, even in 2005-2006, most of the residents had health insurance, which the survey confirmed. When breaking down health insurance by ethnicity most groups had greater than 94% of the population with health insurance, except for Koreans (90.2%), Samoan/Tongan (87%), and Native Americans (78%) (Table 16). Figure 9 graphs the rate of the population without health insurance, grouped by ethnicity. Native Americans, Samoans/Tongan, and Koreans were the highest groups without health insurance (Figure 9). A binary logistic regression model with having health insurance as the independent variable and ethnicity as the

dependent variable showed an OR risk of not having health insurance coverage, compared to white/Caucasians as, 83% for Koreans, 254% for Samoans/Tongan, and 477% for Native Americans ($p < 0.001$). All of the other ethnic groups were less likely than whites/Caucasians of not having health insurance coverage.

Figure 9: Percent Adult Women without Health Insurance



CHAPTER 5: DISCUSSION

This study represents the first prevalence study for chronic pelvic pain in women, with a large diversity of ethnic groups. The first paper to evaluate the prevalence of chronic pelvic pain was by Mathias, et al in 1996, and her study was a survey of 17,927 US households aged 18-50 years, through a Gallop Poll via telephone landlines. The same pelvic pain questions used in the Gallop Poll study was used in this study.

In Mathias' survey, they found a 15% prevalence of CPP in the general population, where our study found the prevalence to be much smaller at 2.8% of the general population. The mean pain score amongst those women with CPP in this study was 5.95, similar to Mathias' study with mean pain score of 5.0.

The large differences in the prevalence of CPP between these studies may be due to surveying a different population. There are some key differences in the population surveyed between this study and Mathias' survey. In Mathias' survey, the women had a mean age of 35.7 years old, 37% of women had less than a high school education, 86% were Caucasian/white, 7% were African American, and 4% were Latino. The non CPP population in her study had similar profiles.

In this survey, women surveyed were not limited to those aged 18-50. Any non-pregnant adult woman over the age of 18 years old was able to respond to our pelvic pain survey. In this study, the women had a mean age of 49.7 years old (45.7 years in CPP, 49.8 in No CPP group), which is older than the Gallop

Poll mean age group. Additionally, Mathias' study excluded women who were post-menopausal, whereas this study included post-menopausal women. Also there was a greater diversity of ethnicities studied, which was the key objective of this study. Whereas in the Mathias study, only 14% of those surveyed were the non-Caucasian/White, in this survey 67.7% were self-identified as non-Caucasian/Whites. This diversity of this survey population is representative of the diversity of ethnic groups in the state of Hawai'i. After Caucasians, there were a large percentage of other ethnic groups in the surveyed population: Caucasian (32.3%), Japanese (19.9%), Hawaiian (13.9%), and Filipino (10.7%). In the Mathias survey, there were too few Asians surveyed to be included in their data analysis.

Mathias' survey population also had less education (37% with less than high school education). In this population, only less than 2% had less than a high school education, and most respondents 65.4% were college graduates or had some level of college education. As in the Mathias' study, educational status was not significant for risk of CPP, and there appeared to be a small but significant increased risk of CPP in those women who were divorced compared to the married reference group, but in contrast to her study, widowed women in this survey had a reduced chance of having CPP, whereas in her study they had a higher chance of CPP compared to married women.

In terms of diagnoses attributed to be the cause of CPP, Mathias found the most frequent etiology was Unknown 61%, endometriosis 25% of the time,

compared to this survey where the most frequent diagnoses were Other 31.7%, Unknown 17.9%, and endometriosis 11.3% of the time.

In terms of treatments pursued by women with CPP, most had seen their physicians (88.6%) with 38% having had 3 or more visits. Many required prescription pain medications, with the category of Other Pain Medications being most common (57.9%) and Vicodin being second most common at 12.9%. While most of these women have not required hospitalization or surgery for their condition, there was a noticeable segment of the group (8-12%) who needed hospitalization, ER visits, or surgery. Most women with CPP (71%) did not pursue CAM, but about a quarter of the women did. Of the group that pursued CAM, many had frequent treatments of 4 or more visits, 42% of the time. The most frequently pursued CAM treatment providers were massage therapist, acupuncturist, and chiropractor (in that order). The data suggests that CAM is popular amongst a subset of the population.

Not only was the impact of CPP seen in health care treatment utilization, there was also a significant impact on daily functions. Twenty percent of the women missed some days of work, and 21% reported having very low productivity (0-3 out of 10), when they had pelvic pain. In Mathias' study, 45% had a productivity of 7 or lower, but this study reflected 60% to have 7 or lower.

When comparing risk of CPP by location, there seemed to be a slight protective effect of those residents who lived in counties outside of Honolulu County. But this correlation may not be a cause and effect. Given that Honolulu County has more health resources, such as specialists, larger hospitals, and more physicians

in general, the confounder could be that those women with CPP will seek out these health care resources and move to Honolulu County.

Though previous studies have not found health disparities of CPP based on ethnicity, this study has found significant variations of risk. In this study, Hawaiians and African American/Blacks were found to have significantly higher risk of CPP, compared to White/Caucasians. Hawaiians as a group consistently had greater risk of CPP and greater utilization of office visits, hospitalizations, emergency room visits, and surgeries for treatments for the pelvic pain. Though African Americans had the highest prevalence at 10.4% and a 332% risk of CPP compared to White/Caucasians on logistic regression analysis, they did not have much utilization of treatments (office visits, hospitalizations, ER visits, and surgeries). Since all of the ethnic groups had high rates of health insurance coverage, healthcare access probably did not contribute significantly to the variations of healthcare utilization in those with CPP. The groups that have lower rates of health insurance coverage Koreans, Samoans, and Native Americans, also generally had lower rates of CPP and as a result had less treatment for CPP. Therefore, health insurance probably was not a confounding factor in the significant variation of CPP treatment utilization amongst the different ethnic groups. Contrary findings compared to Mattias' study could be due to the larger population of ethnic groups studied and wider age range included in the study. Curiously, there were some instances where ethnic populations with a very low risk of CPP had relatively higher utilization of treatments, such as Native Americans (100% having >6 office visits) and Japanese (14% requiring

hospitalization and 14% requiring surgery), when they had CPP. There is not a good explanation as to why African Americans who had a higher risk of CPP did not have as high of a percent of treatment utilization.

Strengths & Limitations

One limitation of this study includes the method of using a random telephone survey, which excludes households without a telephone, as well as those who do not have a stable housing situation. Another weakness is that the Hawai'i Health Survey is skewed with an older population who usually takes the time to answer the Health Survey. This bias was corrected by weighing the data to reflect the normal distribution of age in the state population. Another limitation is in the inherent reporting of pelvic pain. Variations in cultural norms and attitudes by different ethnic groups, could impact on whether or not reporting pain is over reported or under reported.

The strength of this study includes the diversity of population to survey in the State of Hawai'i. Only one other epidemiological survey of chronic pelvic pain has been done in the general population in the U.S., and Mathias survey had a small number of varying ethnic groups.

Future studies to understand why Hawaiians and African Americans have higher risks of CPP are needed, as well as why some ethnic groups have much greater utilization of treatment options than others.

Conclusion

A disparity in the prevalence of chronic pelvic pain seems to exist in the state of Hawai`i, with African Americans and Hawaiians having a greater risk of having CPP compared to Caucasians/Whites. CPP results in missed days from work and adversely impacts work productivity. Hawaiians appear to be at risk for greater utilization of health care resources when they have CPP.

Recommendations

Further investigation into the reasons for this disparity is warranted. Given this disparity, more education and outreach regarding chronic pelvic pain should be addressed specifically to these communities.

APPENDIX A: LITERATURE REVIEW

Models of Pain Perception

Before exploring the various management options for chronic pelvic pain, a review of the models of pain perception will be provided in the context to examine the current therapeutic options.

The classic medical model, or Cartesian model, views the perception of pain as a direct result of organic injury with the severity of pain directly proportional to the severity of insult.[14] With this point of view, the medical model emphasizes technological diagnostic and therapeutic procedures to search for a single biological cause and to find a quick cure.

While the Cartesian model is appropriate for some medical conditions causing acute pain, this model does not accommodate the data found by many trials, in which psychosocial conditions of the patient are better predictors of chronic pain severity and treatment outcomes.[15]

The gate-control theory of pain by Melzack describes the integration of peripheral stimuli with cortical variables, such as mood, in the perception of pain. [16, 17] The model postulates that both somatic and psychogenic factors potentiate or moderate effects on pain perception. The two factors are seen as

evolving simultaneously. This has been termed reciprocal determinism. But this model does not consider social variables.

Studies have found that social environmental factors, such as a history of abuse, spouse responses to pain, and chronic pain experience among first-degree female relatives to be predictive of adverse outcomes, such as depression, pain severity, and sexual dysfunction. Incorporating this data has developed into the biopsychosocial model for chronic pain. In this model, the maintenance of adverse clinical and social outcomes creates a complex interaction between chronic nociceptive stimuli and psychological and social factors. For example, while gastrointestinal dysmotility may be prevalent and in a normal person have no adverse effect, those with risk factors for adverse psychosocial variables may perceive the nociceptive stimuli as severe pain. Even with eradication of the nociceptive stimuli, without alteration of the predisposing psychosocial state, may lead to a future alternate site, in which a different nociceptive stimuli initiates pain. This biopsychosocial model is the basis for multidisciplinary pain management.

Treatment and Management Options for Chronic Pelvic Pain without Identifying Cause

Current treatments can be classified as pharmacological, psychologic, neuromodulating, surgical/neuroablative, or complementary/alternative. It is important for the patient to understand that the key in treatment is the management of pain, rather than the curing of pain.

Traditionally pharmacological management has always involved analgesics. In general, it is important to try at least three different NSAID's before abandoning or adding medications. Although NSAID use and efficacy has been studied in dysmenorrhea, there have been no specific trials in chronic pelvic pain.

When NSAID's do not effectively control pain, most physicians use opioid medications. Chronic use of opioid medications for pain management is controversial, but chronic opioid therapy may allow return of normal function, for those whom have failed other treatments.[18, 19] Portenoy and Foley in 1985, reviewed retrospectively 38 patients maintained on chronic opioid analgesics for non-malignant chronic pain of various origins. None of the patients had any toxic complications, and only 2 patients became management problems both of whom had a history of substance abuse. The authors argue that surgery was avoided in their series of patients managed with chronic opioids. Three to sixteen percent of chronic pelvic pain patients experienced addiction to opioids, but 55-71% of patients referred to chronic pelvic pain centers were already taking opioids regularly.[18]

Antidepressants have been used in combination with opioids to improve pelvic pain. They are thought to improve pain tolerance, restore sleep patterns, and reduce depressive symptoms. Few controlled studies have been published. There is one study on Nortriptyline, which is the only published study of tricyclic antidepressants employed in the treatment of chronic pelvic pain in women. Some subjects had decreased intensity and duration of pain, but only 14 women were studied and seven dropped out because of side effects.[20, 21] One

hundred mg/day tablets were given daily and 6 of the 7 women in trial were pain free at 1 year. The Nortriptyline study had a high attrition rate of 50%. Interestingly, the 7 women who dropped out of the study due to side effects, also had a history of childhood sexual abuse. Whereas, the 7 subjects who continued with the study denied a history of childhood sexual abuse. In the 7 subjects who completed the study, 4 of the 7 had pain and a diagnosis of major depression. Sertraline (an SSRI anti-depressant) was evaluated in a double-blinded, crossover study of 50 mg PO bid vs. placebo. Those on Sertraline showed no improvement in pain scores.[22]

Gabapentin, which is an antiepileptic drug, has been investigated for use in the management of chronic pain syndromes. The mechanism by which gabapentin exerts its analgesic action is unknown, but in animal models of analgesia, gabapentin prevents allodynia (pain-related behavior in response to a normally innocuous stimulus) and hyperalgesia (exaggerated response to painful stimuli).

Gabapentin seems effective in managing neuropathic pain states, such as postherpetic neuralgia, trauma to the central nervous system, and the management of neuropathic cancer pain.[23-25] But there have been no studies on the evaluation of this class of antiepileptics for chronic pelvic pain.

One study examined the use of lofexidine hydrochloride for chronic pelvic pain. The authors hypothesized that lofexidine, an adrenoceptor agonist, might reduce pain by acting as a sympatholytic drug to prevent vasospasm in the utero-ovarian vascular bed, and therefore, prevent the release of substances with

algesic and vasodilator properties, such as substance P. The study was a randomized placebo controlled trial with lofexidine hydrochloride, but the study showed no benefit following the use of the medication.[26]

Many women with a history of chronic pelvic pain also have a history of psychosexual trauma. A history of molestation, incest, or rape was reported in 48% of women with chronic pelvic pain.[9] Ideally, all women with chronic pelvic pain should undergo psychiatric evaluation. Women with psychosocial problems such as sexual abuse, marital discord, mild personality disorder may have more problems with nociceptive signals and unable to deal with uncomfortable somatic sensations associated with a disease process. There are limited studies evaluating the value of psychological therapy alone. There have been some studies using the psychological treatment as part of a multidisciplinary approach to chronic pelvic pain, but the data are limited. One study by Caudill in 1991, did demonstrate a significant improvement in coping ability, reduction in pain severity, and a decrease in pain-related physical and psychosocial dysfunction, using cognitive behavioral pain management. Caudill also demonstrated a 36% reduction in clinic visits in the first year following the 10-session outpatient program.[27, 28]

There were two neuromodulating studies found in the literature search. Both studies had small numbers and were both observational studies without controls. Both showed some modest benefit in pain improvement in patients with chronic pelvic pain, but further studies are needed. In the study by Siegel et al, the transforaminal sacral nerve stimulation by a neuroprosthetic device, had 27

adverse events in 10 patients, ranging from wound implantation infections to surgical revisions of the device.[28, 29]

Interventions with neuroablative treatments have also been used with mixed success. Neuroablative treatments can be done by surgical excision of nerves, injection of neurotoxic chemicals or destruction of neural tissue with heat/cold/laser. Prior to the discovery of NSAID's, presacral neurectomy, excision of superior hypogastric plexus (presacral nerve), was a common management approach for unretractable pelvic pain. Studies suggest that presacral neurectomy may help with dysmenorrhea or endometriosis associated midline pelvic pain. The details of the studies will be discussed under the discussion on endometriosis, since most of the studies were evaluating endometriosis related pain. Superior hypogastric nerve blocks may assist with the identification of candidates for presacral neurectomy. Bourke et al, found 10 of 11 pts with pain relief after superior hypogastric plexus nerve block had greater than 50% pain relief with subsequent presacral neurectomy.[30] Laparoscopic uterosacral nerve ablation has also been suggested as a form of neuroablative treatment that is more conservative than presacral neurectomy. In uterosacral nerve ablation, the afferent nerves following the uterosacral ligaments are either transected or destroyed. In one randomized trial, double blind study of 21 patients with primary dysmenorrhea, 81% (9 of 11) reported significant relief from menstrual pain and 5 of these 9 (or 50% of the group) reported continued relief of menstrual pain at 12 months. No patient in the

laparoscopic control group (diagnostic laparoscopy) reported any relief from dysmenorrheic pain at 3 or 12 months after surgery.[31]

Nonsurgical neurolytic treatment can be performed with cryoablation, thermocoagulation, or injection of chemical agents such as alcohol, phenol, and hypertonic solutions. In one study using 10% phenol ablation for superior hypogastric plexus with cancer pain had 69% (18 of 26 pts) success rate at 6 months.[32] A case report indicates alcohol injection has been used for inferior hypogastric plexus ablation for dysmenorrhea.[33]

Conscious pain mapping or “office laparoscopy” had been used as a tool by some providers as a way of determining, which patients are suitable candidates for surgery for chronic pelvic pain. Conscious pain mapping is a laparoscopic technique conducted under local anesthesia to aid in the diagnosis of localized areas of tenderness. The technique was first described for use in chronic pelvic pain by Palter and Olive in 1996, for the purported advantage of adding information of specific localized areas or lesions which may be the cause of the patient’s pain.[34] Prospective studies by Palter & Olive in 1996, Alemeida et al in 1996 &1998, and Demco LA in 2000 were small studies designed as feasibility studies.[34-36] While these authors suggest that laparoscopic conscious pain mapping can aid the physician with specific locations of pathologies causing the pain, these studies do not measure long term outcomes of pain relief. One study by Howard et al. in 2000, does review the pain outcomes at 1 year follow-up, but none of these studies use controls to see if there is additional benefit over the long term when conscious pain mapping is added to traditional operative

laparoscopy under general anesthesia. In his study, a review over a 3 year period, Howard et al. found that conscious pain mapping was successful in 35 of 50 cases (70%). Adhesions and endometriosis accounted for 56% of the positive lesion sites. Using a visual analog scale to measure pain preoperatively and postoperatively, there was a statistically significant change of a mean value of a score of 8.7 preoperatively down to 5.5 (change of 3.2) postoperatively. Twenty-two women (44%) had decreased pain postoperatively and 8 (16%) were pain free at an average follow up at 12.6 months. Further studies are needed to explore the possible additional benefits of preceding operatively laparoscopy with pain mapping.

As a last resort, physicians and patients have chosen hysterectomy as a solution for treating chronic pelvic pain. While, this solution may be appealing after failure of other treatments, patients should be cautioned that their pelvic pain may persist despite surgery. In the analysis of prospective data in patients undergoing hysterectomy for chronic pelvic pain, 25% reported persistent pain after surgery.[37, 38] In some subgroups, such as women with no identified pelvic pathology, uninsured or Medicaid patients, or experienced two pregnancies, Hillis study of her 308 women cohort had an odds ratio of 1.9-2.3 of having persistent chronic pelvic pain. Up to 40% of women in these subgroups experienced long-term pain, despite hysterectomy.[38]

Many physicians caring for chronic pelvic pain patients advocate the use of multidisciplinary pain centers. Currently, there is little data related specifically to the use of this approach and chronic pelvic pain relief. But Peter et al, from a

randomized study suggests multidisciplinary modality more beneficial than by gynecologist alone.[39]

The use of alternative or complementary medicine has not been systematically studied in the management of chronic pelvic pain. While there have been herbal and nutritional studies related to dysmenorrhea, there have been none in the area of chronic pelvic pain management. There is one case report on the use of acupuncture for the management of chronic pelvic pain in a 27 week pregnant women.[40] The author reported successful use of acupuncture to reduce narcotic dependence for pain control. There have been two studies evaluating the benefits of chiropractic care in women with chronic pelvic pain. The two studies were both pilot studies to assess how to set up a randomized controlled trial of chiropractic care.[41, 42] In the study by Hawk et al. 1997, an improvement was demonstrated, but the number in the study was small (n=19) and no control group was utilized. The second study by also by Hawk et al in 2002 used a sham intervention and found no improvement in pain in 2 of 3 three test sites with chiropractic intervention. The authors do not try to assess the efficacy of chiropractic intervention but instead embarked on the study to see if designing a placebo controlled trial was feasible. The authors believe that since there is a lack of knowledge about the active agent in manual chiropractic procedures, that any physical touch or manipulation of the musculoskeletal system may be a positive intervention, despite it being a sham arm of the study. They argue that placebo-controlled trials are not feasible as a result.

There was also an investigation on the use of magnetic field therapy on chronic pelvic pain, which showed some benefit, but the study was weakened by a high attrition rate of 41% and compromised blinding of the intervention group. [43] After 2 weeks of double-blind treatment with active magnets, 92.3% of the active treatment group correctly guessed they were wearing the active magnet and not the placebo. And after 4 weeks of double-blind treatment, 100% subjects in the active group correctly guessed they were wearing the active magnet. There were two other studies evaluating the use of magnets in chronic pelvic pain, but both papers were observational studies without any controls. While these papers demonstrated modest improvements in pain, no conclusions or relationships can be drawn, since neither study had any controls. The patients may simply have shown improvement due to placebo effect or simply improved over time, regardless of the intervention.[44, 45]

Other interventions that have been published include the use of an intravaginal stimulator for levator ani spasm and surgical ventrosuspension of the uterus for a retroverted uterus. Though both studies showed improvement of pain, both were retrospective studies with methodological flaws. The intravaginal stimulator study lacked a consistent time frame for follow up and no standardized instruments for pain measurement, as well as no controls. The ventrosuspension study also lacked matched controls.[46, 47]

Treatment and Management Options for Disease Specific Causes of Chronic Pelvic Pain

Endometriosis

Though chronic pelvic pain commonly does not have an identifiable cause, there are some specific disorders that can cause chronic pelvic pain. In these cases, focusing on treatment of these disorders would be prudent.

Endometriosis has been commonly associated with chronic pelvic pain, though many women with endometriosis do not experience chronic pelvic pain. Twenty-five percent of women with pelvic pain are diagnosed with endometriosis. Of women undergoing laparoscopic sterilization, Mahmood found the prevalence of endometriosis varies between 1-43%.[48] If endometriosis was directly a cause of pelvic pain, then one would expect to find a greater prevalence of the population with pelvic pain. But once a patient with pelvic pain has been diagnosed with endometriosis, the common practice is to treat the endometriosis. In fact, the pain resulting may be a nociceptive abnormality amongst the patients pain fibers, and the endometriosis may be exacerbating the pain conduction abnormality that already exists. There are two methods of treatment for endometriosis-medical and surgical.[49]

Leuprolide acetate has been found to improve pelvic pain symptoms and dysmenorrhea compared to placebo controls at 1-3 months. Interpretation of

their results is complicated by the large number of placebo patients who withdrew from the study prematurely.[50] And though the leuprolide intervention group had significant decreased pain at 1-3 months, 54% had pelvic pain return to their prestudy baseline by the third post-treatment month. Thirty-seven percent had improved pelvic pain at 1 year follow-up. No comparison follow-up data of the control group was mentioned.

In most cases, a diagnostic laparoscopy has been the standard procedure for chronic pelvic pain and for the diagnosis of endometriosis. Ling et al. proposed the idea of empiric treatment of pelvic pain, even prior to the visual/histologic diagnosis of endometriosis. For medical management, Ling et al. found that empirically treating patients suspected of pain due to endometriosis origin with Depot Leuprolide (a GnRH agonist) was safe and beneficial compared to placebo.[51] Interestingly 78% of the leuprolide and 87% of the placebo group were found to have endometriosis laparoscopically after 12 weeks of treatment. Additionally, some subjects that were not found to have endometriosis, also experienced pain relief. This may be suggest that some aspect of pain perception may be modified hormonally, since depot leuprolide medically induces menopause. Oral contraceptive have been found to be as effective for pelvic pain from endometriosis but in both GnRH agonists and oral contraceptives pain as been found to resume once medications have been withdrawn.[52]

For surgical management, the standard for treatment of endometriosis has been the resection or ablation of peritoneal endometriosis implants. The only randomized double-blind controlled trial of surgical intervention for the removal of

endometriosis implants showed marked relief of pain in the surgical intervention group.[53] In this study Sutton randomized 63 patients with pelvic pain and minimal to moderate endometriosis to a laser laparoscopy with ablation of endometriosis implants and laparoscopic uterine nerve ablation or a sham surgery. At 3 months there were no differences in relief of pain, 56% in the laser-treated group reported improvement compared to 45% in the control group. This study demonstrates that a sham surgery can have a placebo effect. But at 6 months, 62.5% of the intervention group experienced improvement or resolution of symptoms compared with 22.6% of the control group. Since this study included laparoscopic uterine nerve ablation (LUNA) in addition to the endometriosis ablation, there has been debate as to which intervention contributed to relief of pelvic pain due to endometriosis. Sutton followed with a second study to examine this question. He randomized 51 women with pelvic pain with endometriosis to either LUNA or no LUNA. Both groups received laser ablation of the endometriosis implants.[53] His study found no benefit to adding uterine nerve ablation.

For more aggressive surgical treatment, some have used presacral neurectomies in patients unresponsive to pain medications. A study by Tjanden was the first prospective study on presacral neurectomy for endometriosis and dysmenorrhea.[54] In the study only 8 patients were randomized, 4 into presacral neurectomy and 4 into non-presacral neurectomy group. Patients were blinded until they completed their 6 month post operative questionnaire. Eighteen patients declined randomization and were either placed into presacral

neurectomy or non presacral neurectomy group as per patient preference. Thirteen of the 18 were placed in presacral neurectomy group, and 5 of 13 were in the non presacral neurectomy group. All four patients enrolled in randomized protocol were free of midline pain at 6 months and none of the non-presacral neurectomy were free of midline pain at 6 months. The other outcomes for back, lateral, and dyspareunia pain were not statistically significant. The authors combined the protocol group with the prospective group to achieve similar statistical outcomes. The authors believed midline pain relief would make sense with the presacral neurectomy resection because they innervate the central pelvic organs, while the lateral portions of the pelvis are innervated by nerve fibers traversing the infundibulopelvic ligaments. A larger study done by Candiani also utilized presacral neurectomy for endometriosis. This was a controlled study that randomized 71 patients with moderate or severe endometriosis and midline dysmenorrhea assigned to conservative surgery versus conservative surgery and presacral neurectomy. They reported a reduction in the midline component of menstrual pain but no differences in frequency and severity of dysmenorrhea, pelvic pain, and dyspareunia. The authors encountered some adverse effects of constipation in 13 patients with presacral neurectomy and urinary urgency in 3 patients.[55] A weakness in the study was the premature unblinding of patients right after the procedure, prior to the reevaluation of pain.

Adhesions

Attributing adhesions as a possible cause of pelvic pain has been tempting, and they are diagnosed in about 25% of women with chronic pelvic pain. The role of adhesions as a cause of pelvic pain is controversial. From pain mapping studies by Howard et al. in 2000, 27 of 50 patients (54%) had adhesions. Twenty-one patients were successfully pain mapped laparoscopically and adhesion were mapped as painful in 7 of the 21 cases (47%).[55, 56] Howard suggests that adhesions may be the cause of chronic pelvic pain in some women. But the only randomized trial of adhesionlysis for pelvic pain demonstrated no benefit to adhesionlysis.[57] Peters et al. randomized 48 women known by laparoscopy to have stage II-IV pelvic adhesions to either midline laparotomy with surgical adhesionlysis or expectant management. The authors had a large enough sample size to detect a difference of 5 points in the mean delta score. These authors measured pain using the McGill Pain scoring system. After a 9-12 month evaluation, there was no difference in mean pain scores.[58]

Irritable Bowel Syndrome

Irritable bowel syndrome is another common cause of pelvic pain. Irritable bowel syndrome is a gastrointestinal functional disorder characterized by a group

of symptoms in which abdominal pain or discomfort is associated with a change in bowel pattern, such as loose or more frequent bowel movements, diarrhea, and/or constipation. Symptoms suggestive of irritable bowel syndrome are present in 50-80% of women with chronic pelvic pain. Dietary treatment is first line, but there is little evidence regarding its efficacy. Elimination of lactose, sorbitol, caffeine, and fructose is advised.

Patients can have one of three subclassifications of irritable bowel syndrome depending on which symptom is dominant. These subclassifications include three main categories of abdominal pain (gas & bloating), constipation, and diarrhea. For symptoms that present as abdominal pain, gas, bloating, antispasmodics, such as dicyclomine (Bentyl), hyoscyamine (Levsin), atropine-hyoscyamine-phenobarbital-scopolamine (Donnatal), or chlordiazepoxide with clidinium (Librax) may be helpful. If gas is the primary symptom, a trial of simethicone is useful.

For symptoms presenting primarily as constipation, increased roughage/psyllium or stool softener can be initially tried. Cisapride may be helpful, but two randomized clinical trials showed differing results.[59] Tegaserod (Zelnorm) is used for the short-term treatment of women with IBS when constipation is the predominant symptom. Tegaserod is a selective partial agonist of the serotonin-4 (5HT₄) receptor and possesses gastrointestinal prokinetic activity.

When diarrhea is the primary symptom, a trial of loperamide (Immodium) is often prescribed. In a double-blind, placebo-controlled trial of loperamide with

IBS, there was a significant improvement in stool consistency, pain, and urgency.[60]

Peppermint oil has been found to be effective in several randomized clinical trials for the improvement of abdominal distension, reduced stool frequency, and reduced flatulence.[61, 62]

In addition to medical therapies, psychological treatments have been found to improve IBS symptoms when compared with medications alone.[63, 64]

Interstitial Cystitis

Interstitial cystitis, which is a chronic inflammatory condition of the bladder, commonly causes chronic pelvic pain. This definition is imprecise, but the triad of irritation with voiding, absence of other disease, glomerulations on cystoscopy of bladder wall is often used as a defining parameters. Some authors have advocated the use of potassium chloride intravesically, to test for sensitivity to help with the diagnosis.[65, 66]

The traditional treatment for interstitial cystitis has always been hydrodistension of the bladder at time of cystoscopy.[65, 67] But there are other treatment modalities that have been studied. Dimethylsulfoxide (FDA approved indication for interstitial cystitis) can be administered intravesically to treat interstitial cystitis. It is repeated 4-8 times in 1-2 week intervals. Intravesical capsaicin in a randomized trial showed improvement in frequency and nocturia but none in pain.[68] Sodium pentosan polysulfate (Elmiron), the only FDA

approved oral medication for interstitial cystitis is a polyanionic analogue of heparin. Studies have found a 50% response rate compared to placebo of 23%. Pain was decreased 45% vs. 18% in patients taking pentosan polysulfate compared to placebo.[69]

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