FALL PREVENTION AND RISK FACTORS – HAWAI'I 2014

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Abstract

This study is based on self reported information from the Behavioral Risk Factor Surveillance System – Hawaiʻi 2014. A perspective of current prevention measures is presented and the association to demographics, behavioral and health conditions were unveiled to determine risk groups to target for prevention. The study examined current status of fall prevention programs, behavioral, demographic, and health factors associated with falls and fall-related injuries in adults 45 years of age and older. A total of 4614 respondents 45 years of age and older participated in the fall prevention measures survey. The year 2014 BRFSS – Hawaiʻi survey indicates an overall survey's response of 84.1% for landline and cell phones. Results of the study indicate that the prevalence of falls and injuries related to fall were higher for the following groups: women, age groups 55-64 and 45-54, White and Japanese ethnic groups, those with income equal or higher than $75,000 or less than $35,000, college 1 to 3 years, and those with specific health conditions or behavior. The increased odds for falling for certain health conditions or behaviors can increase as high as 6.2 times (95% CI 4.3-8.8) and as high as 2.9 times (95% CI 1.8-4.7) for injury related to fall. Older groups had increasingly higher odds for falls after adjusting for sex, ethnicity, education level, and annual household income while 65-74 and 85 and older age groups had higher adjusted odds for injuries related to fall. Other information useful to guide and help better customize combination of evidence-based preventive intervention to the local population of Hawaiʻi is also presented. Results on specific preventive measures of the program indicate that about 90% of the respondents selected at least one prevention intervention to reduce the risk of falls emphasizing the interest of the community in general in the fall prevention program but also showing warning signs for disparities in knowledge translation.

INTRODUCTION

Falls and fall related injuries are major causes for increasing morbidity and mortality in adults. The elderly are particularly at risk with severe consequences such as lost of self-confidence, depression, social isolation, decreasing physical activity, fear of falling, institutionalization, financial strain, and decreased overall quality of life (CDCa, 2015; DOH, 2013; WHO, 2007).

Information at a local, national and international level states that 30-35% or 1 in 3 adults over the age of 65 fall every year ending in hospitalization, long term care institutionalization or death (DOH, 2013; CDCb, 2015; WHO, 2007). They are 2-3 times more likely to have a repeat fall. Of those who fall, 20-30% of them have injuries that make it difficult to get around or live independently (CDCb, 2015). In Hawaiʻi, there were 195,138 adults over 60 years old in 2010. Approximately 65,000 of them fell. About 1 in 5 fallen persons result in a significant injury with hip fractures being the most common nonfatal injury. Falls are the leading cause of death and nonfatal injuries among older adults. In 2011, there were 2.4 million non-fatal injuries in the US, and 689,000 of which required hospitalization. Although falls are the leading cause of death and nonfatal injuries, they can be prevented (DOH, 2013).

The cost of fall related injuries among community dwellers is one of the 20 most expensive medical conditions (WHO, 2007). In 2010, it cost the US healthcare system $30 billion. The costs included hospital fees, physician and other professional services, rehabilitation services, medical equipment, medications, changes that were made for the home, and insurance fees. Hawaiʻi alone spent over $112 million in medical expenses (DOH, 2013). By 2040, it is

expected that the treatment for falls worldwide would cost $240 billion dollars annually if fall prevention is not improved (WHO, 2007).

In Hawaiʻi, the Executive Office on Aging is working on a multidisciplinary strategy to prevent falls among the older adults and this study is part of that effort. The objectives of the study are to measure current fall prevention interventions and to determine potential risk factors associated with falls and injury related to falls for the adult population in Hawaiʻi. Four foundation pillars are included in the Hawaiʻi Fall Prevention State Plan and Fall Prevention Consortium: medication review, vision check up, home safety, and exercise, and will be considered in the analysis of this study.

METHODS

The Hawaiʻi Behavioral Risk Factor Surveillance System (HBRFSS) is a cross-sectional survey of a disproportionate stratified sampling of participants from houses with listed and unlisted landline telephone numbers and cell phone numbers by counties. The program estimates the quarterly telephone samples needed to attain a completion interview quota for landline and cell phone frames by county, does mid-month and end of the month data quality control of collected information including screening information prior to actual survey health questions, and analyzes annually the health questions collected. A random sample of the non-institutionalized adult population is obtained and then weighted for the distribution of the adult population of the state 18 years and older. The focus for this report is set on questions related to the fall and injury prevention program of the State of Hawaiʻi, Department of Health corresponding to year 2014 addressing the population 45 years of age and older.

A response rate represents a weighted response out of the total number of respondents contacted who answering the particular question. Therefore, a total number of respondents do not correspond to the total number of adults that completed the fall prevention questions in the survey.

Univariate and bivariate analysis were conducted for descriptive measurements. Multivariate analysis was used for logistic regression models to estimate odds ratios for the association of each risk factor with the outcome, controlling for the influence of the other factors in the model. To this aim, a statistical analysis creates a dichotomous fall and injury variables to use as an outcome for multivariate regression models.

Results from regression models are showed as odds ratios with their 95% confidence intervals. Test of statistical significant differences with alpha = 5% were used in all comparative analyses. All statistical tests were 2-tailed.

Statistical analysis for univariate, bivariate and multivariate models with falls and injury associated falls as the outcomes of interest were performed with SAS 9.4 (SAS institute, Cary, NC) and SUDAAN stratification analysis software. Stratification analysis was performed to assess the prevalence of responses by selected demographic characteristics such as gender, age group, ethnic group, education level, and annual household income level. Specifically, gender refers to 'Men' and 'Women'. The age groups used are 45-54, 55-64, 64-74, 75-84 and 85 years of age and older to follow standards set by the CDC BRFSS program and give continuity for comparisons with that database (BRFSS, 2014). Ethnic groups are based on self-reported best ethnicity, or combined best ethnicities due to small number of respondents for the group. The ethnic groups were categorized as Whites, Hawaiians, Filipino, Japanese, Other Asians, Other Pacific Islanders, and Others (aggregates of several small numbers of ethnicities). Education

level refers to the highest grade completed, grouped into four categories, as no education/elementary or some high school, grade 12 or high school graduate, college 1 year to 3 years (some college or technical school), and college 4 years or more (college graduate). Annual household income levels refers to annual household income from all sources categorized into four groups, as below $35,000, $35,000 - $49,999, $50,000 - $74,999, and $75,000 and above. All of the percentages presented in the results section were weighted to the adult population of the state 45 years and older following the Center for Disease Control (CDC) standards (BRFSS, 2014).

A fall was defined as when a person unintentionally comes to rest on the ground or another lower level. An injury associated to fall was defined as a fall that limits your regular activities for at least a day or causes one to see a doctor. The number of falls were grouped as fallen at least once, and not fallen. Injuries related to fall was one group with two categories yes or no injury.

To understand the rest of the data, the various health conditions are described. Health conditions included physical health conditions: heart attack or myocardial infarction, angina or coronary heart disease, stroke, other cancer meaning any other cancer different from skin cancer, chronic obstructive pulmonary diseases, some forms of arthritis, overweight or obese, trouble seeing, kidney disease, and diabetes. Mental health conditions included depressive disorder. Disability included activity limitation, limitation dressing, limitation walking, and use of equipment due to health problem. Health-related quality of life within the past 30 days included poor physical health, poor mental health, being kept from doing usual activities due to poor physical or mental health. Unhealthy behavior included physical inactivity. General health status included fair or poor general health. General questions related to fall prevention survey are

included in the Appendix as Table 11 Risk Communication Questions for further detail on the BRFSS survey. Two specific messages were read before reading questions about medication and exercising as follows: "Some medications cause dizziness, which can lead to falls. Be proactive and prevent a fall. Simply make an appointment with your doctor or pharmacist today to review your medications, including any over- the- counter drugs and supplements" and " Balance and strength are essential to preventing falls—be active and do simple movements every day– walk, garden, do yoga, swim, dance, or start a program like Tai Chi" (BRFSS, 2014).

RESULTS

The overall response rate for year 2014 Hawai'i BRFSS was 84.1 % for landline and cell phones with area code 808 (BRFSS, 2014). A total of 4614 respondents 45 years of age and older participated in the preventive measures survey.

The study results are presented in two parts. The first part describes sample characteristics in Table 1 by age, gender, ethnicity, annual household income, and educational level; Table 2 shows the distribution of participants by health conditions or behavior; Table 3 shows the number of participants fallen by age, gender, ethnicity, annual household income, and education level; Table 4 show the number of participants injured among fallen participants by age, gender, ethnicity, annual household income, and educational level; Table 5 shows the prevalence of fallen at least once during the last 12 months among participants with certain health conditions or behavior. Bolded values are shown for results with statistical significant differences comparing those falling with the health conditions or behavior versus not falling with the health conditions or behavior are presented as well; Table 6 shows the prevalence of injury related to fall with certain health conditions or behavior. Bolded values for those with statistical significant differences comparing those injured with the health conditions or behavior versus not

injured without the health conditions or behavior are presented as well; Table 8 shows the association between fallen at least once, and injury related to fall during the last 12 months by age groups controlling for demographic factors such as gender, age, ethnicity, educational level, and income level..

Part II of this study shows results for fall and injury related to fall survey questions in the state of Hawaii as an overview of the current fall prevention program. The results are summarized in the appendix section. Table 9 shows a survey directed only to the population 60 years of age and older to determine the preferred term to be used for this population in future preventive activities in the state followed by information pertinent to risk communication questions for all participants 45 years of age and older. Figures 1 to 6 show the prevalence of positive responses for fall prevention interventions to reduce the risk of falls for all adults and by age, gender, ethnicity, annual household income, and educational level.

PART I

Table 1 shows the sample characteristics of the participants with greater representation for age groups 45-54, 55-64, and 65-74. The age group of 85 and older corresponds to the 4.4 % of the sample. Gender groups show a slight difference favoring women representation. By ethnic groups White and Japanese are the major groups followed by Filipino, Hawaiian and Other Asian groups. Income groups are almost 68% represented by the two most extreme income levels. Education levels are 90% high school graduate through college graduate.

Table 2 shows the distribution of participants by health condition or behavior. In general a major representation is shown for those without the health conditions or behavior. Major represented groups include participants classified as "being kept from doing usual activities due

to poor physical or mental health" behavior, overweight or obese, with some forms of arthritis, with poor physical health or poor mental health, followed by those physically inactive, with fair or poor general health or diabetes. The least represented group is those with limitation dressing or having trouble seeing.

Table 3 shows the distribution of participants fallen and not fallen. The highest prevalence for falls is observed in the oldest age groups 75-84 and 85 and older, 24.6% and 21.4% respectively. Other age groups show similar prevalence for falls. The prevalence for falls by gender shows that women have slightly higher prevalence of falls than men, 21.0% and 17.8% respectively. By ethnic groups, the highest prevalence for falls corresponds to White 24.8%, followed by Other Pacific Islanders 18.3%, Hawaiians 17.5%, and Japanese 16.7% as the main identified ethnic groups. Income groups shows that the highest prevalence for falls corresponds to those at the lowest level of less than 35,000 23.9% and those at the highest income level equal or greater than 75,000 18.2%. The lowest prevalence for falls corresponds to those at the second highest income level between 50,000 and 75,000 16.1%. By education levels, the prevalence for falls is similar ranging from 18.2% for high school graduates to 21.4% for some college or technical school.

The prevalence for injury related to fall is presented in Table 4. By age groups, the highest prevalence corresponds to groups 55-64 and 65-74, 40.6 % and 38.8 % respectively, and the lowest prevalence for those 85 years of age or older 19.9%. The prevalence for injury related to fall is also higher for women than for men 37.9 % and 30.9 % respectively. Hawaiian ethnic group has the highest prevalence for injury related to fall 52.3 %, followed by Whites 39.3%, and Other Pacific Islanders 35.8%. The lowest prevalence for injury related to fall corresponds to Other Asians at 21.9%. By income level, the lowest level had the highest prevalence for injury

related to fall at 43.0%. The other income levels have similar prevalence of injury related to fall. By education level, the lowest prevalence of injury related to fall corresponds to those with the highest level of education of college 4 years or more 30.7%.

Table 5 shows the prevalence of fallen at least once during the last 12 months among participants with certain health conditions or behavior with those statistically significant differences in bolded font. Most of the health conditions and behavior were significantly associated with falling except for those overweight or obese, and those "being kept from doing usual activities due to poor physical or mental health". The highest prevalence are shown for those with limitation dressing 64.9 %, activity limitation 54.6 %, using equipment due to health problem 50.9 %, limitation walking 42.4 %, and depressive disorder 41.4 %. The lowest prevalence is shown for "being kept from doing usual activities due to poor physical or mental health" 19.2%, overweight or obese 19.3%, diabetes 20.8%, some forms of arthritis 26.1%, and heart attack or myocardial infarction 27.7%.

The prevalence of injury related to fall with certain health conditions or behavior during the last 12 months is shown in Table 6. Bolded values indicate those conditions or behavior with significant differences. The majority of conditions or behaviors are significant except for angina or coronary heart disease, other than skin cancer, chronic obstructive pulmonary disease, overweight or obese, trouble seeing, kidney disease, diabetes, and "being kept from doing usual activities due to poor physical or mental health." The highest prevalence is shown for those with limitation dressing, activity limitation, stroke, physical inactive, limitation walking and use of equipment due to health problem. The lowest prevalence corresponds to those with angina or coronary heart disease, diabetes, and "being kept from doing usual activities due to poor physical or mental health."

Table 7 shows the adjusted odds ratio controlling for demographic factors such as gender, age, ethnicity, educational level, and income level for fallen at least once and injury related to fall during the last 12 months for those with health conditions or behavior. Significant values are highlighted in bold font. The significant increased odds ratios for falling having the health condition or behavior ranges from 1.37 (95% CI 1.1-1.7) for diabetes to 6.17 (95% CI 4.3-8.8) for limitation dressing. The highest odds for falling correspond to the disability group, use of equipment due to health problem and depressive disorder. The significant increased odds ratios for injury related to falls for those having the health condition or behaviors ranges from 1.48 (95% CI 1.1-2.0) for depressive disorder to 2.9 (95% CI 1.8-4.7) for limitation dressing.

Table 8 shows increased adjusted odds ratio for falling comparing oldest age groups to age group 45 to 64 with incremental increased (albeit insignificant) values as age increases. The adjusted odds ratio for injury related to fall is less than one (and again insignificant) with all three age groups 64 to 74, 75 to 84, and 85 and older when compared to 45 to 64 age group.

Part I - Tables

Table 1. Sample Characteristics.

Characteristics	N	%	C.I. (95%)		Estimated number of adults
Age group					
45-54	1063	30.0	28.0	32.0	166863
55-64	1511	31.4	29.6	33.2	174717
65-74	1246	21.7	20.1	23.2	120639
75-84	590	12.5	11.2	13.8	69632
85-plus	204	4.4	3.5	5.3	24404
Total	4614	100.0			556255
Gender	N	%	C.I. (95%)		
Male	2153	47.8	45.8	49.9	266081
Female	2461	52.2	50.1	54.2	290174
Total	4614	100.0			556255
Ethnicity	N	%	C.I. (95%)		
White	2114	34.7	32.9	36.5	192213
Hawaiian	530	9.1	8.1	10.1	50436
Filipino	465	15.2	13.5	16.9	84280
Japanese	937	27.0	25.2	28.9	149664
Other Asians	256	7.7	6.5	8.9	42589
Other PI	54	1.0	0.6	1.3	5379
Others	225	5.3	4.3	6.2	29127
Total	4581	100.0			553688
Income	N	%	C.I. (95%)		
<35,000	1495	32.4	30.4	34.4	163635
35,000 - 49,999	608	14.1	12.6	15.5	71139
50,000 - 74,999	744	18.7	17.1	20.4	94689
>=75,000	1317	34.8	32.7	36.8	175771
Total	4164	100.0			505234
Education	N	%	C.I. (95%)		
No education/elementary or some HS	233	9.8	8.2	11.4	54147
Grade 12 or GED (High school graduate)	1104	26.1	24.3	27.9	144937
College 1 year to 3 years (Some college or technical school)	1322	33.6	31.6	35.5	186222
College 4 years or more (College graduate)	1944	30.5	28.9	32.2	169361
Total	4603	100.0			554667

Note: CI = confidence interval

Table 2. Distribution of Participants by Health Condition or Behavior (Yes/No).

Health conditions or behavior	Yes			No			Total N	Estimated number of adults
	N	%	C.I. (95%)	N	%	C.I. (95%)		
Physical health conditions								
Heart attack or myocardial infarction (MI)	269	4.9	4.2 5.7	4326	95.1	94.3 95.8	4595	553787
Angina or coronary heart disease (CHD)	260	6.0	4.9 7.1	4323	94.0	92.9 95.1	4583	553094
Stroke	227	4.9	4.1 5.8	4376	95.1	94.2 95.9	4603	555348
Other cancer	461	9.5	8.3 10.6	4144	90.5	89.4 91.7	4605	554921
Chronic obstructive pulmonary disease (COPD)	296	5.9	4.9 6.8	4298	94.1	93.2 95.1	4594	554358
Some forms of arthritis	1587	32.3	30.4 34.2	3005	67.7	65.8 69.6	4592	554455
Overweight or obese	2593	58.0	56.0 60.0	2021	42.0	40.0 44.0	4614	556254
Trouble seeing	231	4.3	3.5 5.1	4379	95.7	94.9 96.5	4610	555949
Kidney disease	276	6.0	5.1 7.0	4325	94.0	93.0 94.9	4601	555095
Diabetes	660	15.0	13.6 16.5	3947	85.0	83.5 86.4	4607	555531
Mental health conditions								
Depressive disorder	630	11.3	10.2 12.5	3963	88.7	87.5 89.8	4593	554652
Disability								
Activity limitation	292	5.4	4.6 6.3	4313	94.6	93.7 95.4	4605	555575
Limitation dressing	147	2.6	2.1 3.1	4463	97.4	96.9 97.9	4610	555719
Limitation walking	649	12.4	11.1 13.6	3948	87.6	86.4 88.9	4597	554026
Use equipment due to health problem	475	8.6	7.6 9.6	4136	91.4	90.4 92.4	4611	555838
Health related quality of life within the past 30 days								
Poor physical health	1533	31.7	29.8 33.6	3053	68.3	66.4 70.2	4586	552616
Poor mental health	1112	23.5	21.8 25.3	3470	76.5	74.7 78.2	4582	553525

Being kept from doing usual activities due to poor physical or mental health	3503	76.6	74.9	78.3	1088	23.4	21.7	25.1	4591	553110
Unhealthy behavior										
Physical inactive	1062	19.3	17.8	20.8	3531	80.7	79.2	82.2	4593	553279
General health status										
Fair or poor general health	859	18.3	16.7	19.9	3753	81.7	80.1	83.3	4612	555923

Note: CI = confidence interval

Table 3. Number of Participants Fallen (Yes/No).

Age group	Fallen Yes				Fallen No				Total N	Estimated number of adults
	N	%	C.I. (95%)		N	%	C.I. (95%)			
45-54	185	18.1	14.7	21.4	797	81.9	78.6	85.3	982	154300
55-64	319	19.1	16.5	21.6	1067	80.9	78.4	83.5	1386	161066
65-74	253	18.6	15.7	21.5	917	81.4	78.5	84.3	1170	112264
75-84	142	24.6	19.5	29.7	415	75.4	70.3	80.5	557	65630
85-plus	47	21.4	13.7	29.1	147	78.6	70.9	86.3	194	23597
Total	946	19.5	17.9	21.1	3343	80.5	78.9	82.1	4289	516856
Gender	N	%	C.I. (95%)		N	%	C.I. (95%)			
Male	382	17.8	15.5	20.0	1598	82.2	80.0	84.5	1980	244577
Female	564	21.0	18.7	23.3	1745	79.0	76.7	81.3	2309	272279
Total	946	19.5	17.9	21.1	3343	80.5	78.9	82.1	4289	516856
Ethnicity	N	%	C.I. (95%)		N	%	C.I. (95%)			
White	536	24.8	22.3	27.4	1429	75.2	70.5	75.7	1965	179101
Hawaiian	95	17.5	13.5	21.6	389	82.5	71.2	80.1	484	46555
Filipino	67	14.3	9.9	18.7	371	85.7	79.2	86.1	438	81321
Japanese	147	16.7	13.6	19.9	734	83.3	77.4	83.6	881	137422
Other Asians	36	14.5	9.0	20.0	198	85.5	80.5	89.4	234	39568
Other PI	10	18.3	5.4	31.2	41	81.7	74.8	91.0	51	5284
Others	49	24.6	14.5	34.6	156	75.4	61.3	77.6	205	25179
Total	940	19.5	17.9	21.1	3318	80.5	78.9	82.1	4258	514431
Income	N	%	C.I. (95%)		N	%	C.I. (95%)			
<35,000	365	23.9	20.7	27.1	1027	76.1	72.9	79.3	1392	152496
35,000 - 49,999	111	17.4	13.3	21.4	447	82.6	78.6	86.7	558	66256
50,000 - 74,999	134	16.1	12.6	19.5	564	83.9	80.5	87.4	698	88657
>=75,000	245	18.2	15.3	21.2	979	81.8	78.8	84.7	1224	162323
Total	855	19.5	17.8	21.2	3017	80.5	78.8	82.2	3872	469733

Education	N	%	C.I. (95%)		N	%	C.I. (95%)			
No education/elementary or some HS	53	18.6	12.5	24.7	172	81.4	75.3	87.5	225	52751
Grade 12 or GED (High school graduate)	208	18.2	15.2	21.3	829	81.8	78.7	84.8	1037	135030
College 1 year to 3 years (Some college or technical school)	298	21.4	18.3	24.5	927	78.6	75.5	81.7	1225	171529
College 4 years or more (College graduate)	384	18.5	16.3	20.8	1410	81.5	79.2	83.7	1794	156259
Total	943	19.4	17.8	21.0	3338	77.5	75.9	79.0	4281	515571

Note: CI = confidence interval

Table 4. Number of Participants Injured (Yes/No) among Fallen Participants.

			Injury Yes			Injury No			Total N	Estimated number of adults
Age group		N	%	C.I. (95%)	N	%	C.I. (95%)			
	45-54	75	30.7	22.4	38.9	109	69.3	61.1	77.6	184	27497
	55-64	134	40.6	33.8	47.5	184	59.4	52.5	66.2	318	30669
	65-74	98	38.8	30.3	47.3	154	61.2	52.7	69.7	252	20848
	75-84	48	30.7	19.9	41.5	93	69.3	58.5	80.1	141	16055
	85-plus	15	19.9	6.9	33.0	32	80.1	67.0	93.1	47	5046
	Total	370	34.9	30.8	38.9	572	65.1	61.1	69.2	942	100115
Gender		N	%	C.I. (95%)	N	%	C.I. (95%)			
	Male	128	30.9	24.9	36.9	252	69.1	63.1	75.1	380	43353
	Female	242	37.9	32.4	43.5	320	62.1	56.5	67.6	562	56762
	Total	370	34.9	30.8	38.9	572	65.1	61.1	69.2	942	100115
Ethnicity		N	%	C.I. (95%)	N	%	C.I. (95%)			
	White	220	39.3	30.0	40.2	315	60.7	55.1	66.3	535	44428
	Hawaiian	53	52.3	26.7	46.8	40	47.7	35.3	60.1	93	7726
	Filipino	27	32.6	20.0	37.9	39	67.4	53.3	81.5	66	11559
	Japanese	37	26.7	15.7	31.7	110	73.3	64.1	82.4	147	23005
	Other Asians	8	21.9	12.8	42.8	28	78.1	62.3	93.9	36	5750
	Other PI	5	35.8	6.3	49.9	5	64.2	31.4	97.0	10	967
	Others	18	27.4	9.7	31.8	31	72.6	55.3	90.0	49	6188
	Total	368	34.9	30.8	38.9	568	65.1	61.1	69.2	936	99623
Income		N	%	C.I. (95%)	N	%	C.I. (95%)			
	<35,000	173	43.0	35.8	50.3	191	57.0	49.7	64.2	364	36033
	35,000 - 49,999	40	30.8	19.5	42.1	71	69.2	57.9	80.5	111	11508
	50,000 - 74,999	46	29.6	19.9	39.3	88	70.4	60.7	80.1	134	14233
	>=75,000	86	32.3	24.6	40.1	158	67.7	59.9	75.4	244	29564
	Total	345	35.9	31.6	40.3	508	64.1	59.7	68.4	853	91338

Education	N	%	C.I. (95%)		N	%	C.I. (95%)			
No education/elementary or some HS	20	32.3	17.0	47.7	31	67.7	52.3	83.0	51	9353
Grade 12 or GED (High school graduate)	93	38.6	30.0	47.3	115	61.4	52.7	70.0	208	24632
College 1 year to 3 years (Some college or technical school)	128	36.8	29.4	44.1	170	63.2	55.9	70.6	298	36758
College 4 years or more (College graduate)	129	30.7	24.7	36.6	253	69.3	63.4	75.3	382	28878
Total	370	35.1	31.0	39.1	569	64.9	60.9	69.0	939	99621

Note: CI = confidence interval

Table 5. Prevalence of Fallen at Least Once during the Last 12 Months among Participants with Certain Health Conditions or Behavior.

Health conditions or behavior	WITH CONDITION									
FALLS	Yes				No				Total N	Estimated number of adults
	N	%	C.I. (95%)		N	%	C.I. (95%)			
Physical health conditions										
Heart attack or myocardial infarction (MI)	77	**27.7**	**20.3**	**35.0**	176	72.3	65.0	79.7	253	25087
Angina or coronary heart disease (CHD)	73	**29.4**	**20.0**	**38.9**	171	70.6	61.1	80.0	244	31094
Stroke	83	**36.8**	**27.9**	**45.7**	129	63.2	54.3	72.1	212	25524
Other cancer	138	**31.1**	**25.0**	**37.3**	297	68.9	62.7	75.0	435	48578
Chronic obstructive pulmonary disease (COPD)	100	**32.7**	**25.2**	**40.1**	177	67.3	59.9	74.8	277	30349
Some forms of arthritis	444	**26.1**	**23.1**	**29.0**	1056	73.9	71.0	76.9	1500	170027
Overweight or obese	521	19.3	17.2	21.5	1883	80.7	78.5	82.8	2404	299739
Trouble seeing	86	**32.4**	**23.8**	**40.9**	132	67.6	59.1	76.2	218	23107
Kidney disease	106	**37.9**	**29.9**	**45.8**	160	62.1	54.2	70.1	266	32216
Diabetes	152	**20.8**	**16.6**	**24.9**	468	79.2	75.1	83.4	620	78360
Mental health conditions										
Depressive disorder	256	**41.4**	**35.8**	**46.9**	331	58.6	53.1	64.2	587	58672
Disability										
Activity limitation	149	**54.6**	**46.7**	**62.6**	130	45.4	37.4	53.3	279	29406
Limitation dressing	88	**64.9**	**54.9**	**74.8**	53	35.1	25.2	45.1	141	13810
Limitation walking	274	**42.4**	**37.0**	**47.7**	338	57.6	52.3	63.0	612	65400
Use equipment due to health problem	221	**50.9**	**44.3**	**57.4**	225	49.1	42.6	55.7	446	44835
Health related quality of life within the past 30 days										

Poor physical health	491	**30.8**	**27.5**	**34.2**	939	69.2	65.8	72.5	1430	162956
Poor mental health	348	**31.0**	**26.9**	**35.1**	691	69.0	64.9	73.1	1039	122166
Being kept from doing usual activities due to poor physical or mental health	707	19.2	17.4	21.0	2541	80.8	79.0	82.6	3248	392768
Unhealthy behavior										
Physical inactive	386	**37.9**	**33.8**	**42.0**	608	62.1	58.0	66.2	994	100638
General health status										
Fair or poor general health	286	**30.4**	**26.1**	**34.8**	524	69.6	65.2	73.9	810	96605

CI = confidence interval

Bolded numbers indicate significant difference compared to referent

Table 6. Prevalence of Injury Related to Fall with Certain Health Conditions or Behavior during the Last 12 Months.

Health conditions or behavior				WITH CONDITION					
INJURY	Yes			No			Total N	Estimated number of adults
	N	%	C.I. (95%)		N	%	C.I. (95%)		
Physical health conditions									
Heart attack or myocardial infarction (MI)	41	**45.6**	**30.6**	**60.6**	35	54.4	39.4	69.4	76	6549
Angina or coronary heart disease (CHD)	29	23.8	11.1	36.5	43	76.2	63.5	88.9	72	8760
Stroke	46	**51.2**	**36.2**	**66.3**	37	48.8	33.7	63.8	83	9395
Other cancer	60	39.4	27.5	51.3	77	60.6	48.7	72.5	137	14738
Chronic obstructive pulmonary disease (COPD)	50	48.3	35.0	61.6	49	51.7	38.4	65.0	99	9524
Some forms of arthritis	208	**42.8**	**36.6**	**49.0**	235	57.2	51.0	63.4	443	44250
Overweight or obese	211	36.1	30.6	41.6	308	63.9	58.4	69.4	519	57766
Trouble seeing	43	41.8	28.2	55.4	42	58.2	44.6	71.8	85	7091
Kidney disease	44	43.2	30.0	56.3	61	56.8	43.7	70.0	105	12151
Diabetes	57	31.7	22.3	41.1	94	68.3	58.9	77.7	151	16225
Mental health conditions									
Depressive disorder	127	**45.2**	**36.72**	**53.7497**	128	54.8	46.25	63.28	255	23875
Disability									
Activity limitation	92	**57.4**	**45.9**	**68.8**	55	42.6	31.2	54.1	147	15601
Limitation dressing	54	**62.8**	**49.7**	**76.0**	33	37.2	24.0	50.3	87	8876
Limitation walking	133	**49.0**	**40.7**	**57.2**	139	51.0	42.8	59.3	272	27230
Use equipment due to health problem	115	**48.4**	**38.8**	**58.0**	105	51.6	42.0	61.2	220	22737
Health related quality of life within the past 30 days									

	N	%	CI	CI	N	%	CI	CI	N	N
Poor physical health	243	**44.9**	**38.6**	**51.2**	246	55.1	48.8	61.4	489	49797
Poor mental health	166	**41.5**	**34.1**	**49.0**	180	58.5	51.0	65.9	346	37453
Being kept from doing usual activities due to poor physical or mental health	277	34.5	29.9	39.2	427	65.5	60.8	70.1	704	74879
Unhealthy behavior										
Physical inactive	195	**51.0**	**44.2**	**57.7**	189	49.0	42.3	55.8	384	37695
General health status										
Fair or poor general health	146	**46.3**	**38.4**	**54.2**	138	53.7	45.8	61.6	284	28915

CI = confidence interval

Bolded numbers indicate significant difference compared to referent

Falls, injury related to fall and associations with health conditions and behavior.

Table 7. Adjusted Odds Ratio for Fallen at Least Once and Injury Related to Fall during the Last 12 Months for those with Health Conditions or Behavior.

Health conditions or behavior	AOR for fallen at least once (95% CI)	AOR for injury related to fall (95% CI)
CHRONIC CONDITION OR BEHAVIOR	Yes	Yes
Physical health conditions		
Heart attack or myocardial infarction (MI)	**1.62 (1.2-2.2)**	**1.92 (1.2-3.1)**
Angina or coronary heart disease (CHD)	**1.60 (1.2-2.1)**	1.19 (0.7-2.0)
Stroke	**2.27 (1.7-3.0)**	**1.80 (1.1-2.9)**
Other cancer	**1.62 (1.3-2.0)**	1.40 (1.0-2.0)
Chronic obstructive pulmonary disease (COPD)	**1.97 (1.5-2.5)**	1.44 (0.9-2.2)
Some forms of arthritis	**1.80 (1.5-2.1)**	**1.72 (1.3-2.3)**
Overweight or obese	1.05 (0.9-1.2)	1.08 (0.8-1.4)
Trouble seeing	**2.35 (1.8-3.1)**	1.47 (0.9-2.3)
Kidney disease	**2.56 (2.0-3.3)**	1.17 (0.8-1.8)
Diabetes	**1.37 (1.1-1.7)**	0.93 (0.6-1.3)
Mental health conditions		
Depressive disorder	**3.24 (2.7-3.9)**	**1.48 (1.1-2.0)**
Disability		
Activity limitation	**4.53 (3.5-5.8)**	**2.87 (2.0-4.2)**
Limitation dressing	**6.17 (4.3-8.8)**	**2.90 (1.8-4.7)**
Limitation walking	**3.54 (2.9-4.3)**	**1.67 (1.2-2.3)**
Use equipment due to health problem	**3.92 (3.2-4.8)**	**2.09 (1.5-2.9)**

Health related quality of life within the past 30 days		
Poor physical health	**2.68 (2.3-3.1)**	**2.37 (1.8-3.1)**
Poor mental health	**2.20 (1.9-2.6)**	**1.55 (1.2-2.1)**
Being kept from doing usual activities due to poor physical or mental health	0.91 (0.8-1.1)	0.93 (0.7-1.3)
Unhealthy behavior		
Physical inactive	**2.85 (2.4-3.3)**	**2.23 (1.7-3.0)**
General health status		
Fair or poor general health	**2.42 (2.0-2.9)**	**2.01 (1.5-2.7)**

AOR = adjusted odds ratio (odds ratio adjusted for sex, ethnicity, education levels, and annual household income levels)
CI = confidence interval
Bolded numbers indicate significant difference compared to referent

Table 8. Association between Fallen at Least Once or Injury Related to Fall during the Last 12 Months by Age Groups.

Age groups comparison	AOR for fallen at least once		AOR for injury related to fall	
	(95% CI) Yes	p-value	(95% CI) Yes	p-value
65 to 74 vs 45 to 64	1.020 (0.862 – 1.208)	0.8178	0.865 (0.632 – 1.183)	0.3634
75 to 84 plus vs 45 to 64	1.206 (0.969 – 1.501)	0.0940	0.777 (0.515 – 1.172)	0.2293
85 + plus vs 45 to 64	1.247 (0.883 – 1.763)	0.2106	0.798 (0.421 –1.511)	0.4883

AOR = adjusted odds ratio (odds ratio adjusted for sex, ethnicity, education levels, and annual household income levels)
CI = confidence interval
Bolded numbers indicate significant difference compared to referent

PART II

Table 9 shows percentages for risk communication questions included in the survey. The preferred self-identifying term for respondents 60 years of age and older is "Senior" representing 35.2% of responses. Other potential identifiers include 60 plus, baby boomers, and others showing significantly lower preference by participants. About 27 % of the participants stated receiving information on preventing falls for the elderly during the past 30 days. Among the different sources of information the main reported are television, magazines, health care providers, newspaper, and internet. About 84 % of the participants stated that the medication message was easy to understand. The majority of participants stated also their willingness (extremely likely or somewhat likely) to pursue medication reviews and maintain a physical active lifestyle (57.2 % and 79.1 % respectively). Those who stated being unlikely to have a medication review indicated major reasons such as not taking medications, having enough knowledge about their medications or the lack of side effects. Major reasons to not becoming more active or exercising was stated as being already active, dislike of exercising, and being disable or too sick.

Figures 1 through 5 show the prevalence of affirmative responses for current interventions being used to reduce risk of falls. The specific question was stated as "What are some actions seniors can do to reduce their risk of falls?" Multiple choices are allowed per each respondent; therefore, the summation of all answers may be more than 100%.

Figure 1 shows that most of the preventive measures selected by the respondents are exercise/maintaining good physical condition as 37.7% followed by installing home safety features as 36.5 %, reducing clutter/tripping and slipping hazards as 32.4 %, and ensuring adequate lighting as 22.4 %. In contrast, health promotion measures' response rates are lowest

for regular vision check as 20.1 %, consulting their physician for prevention advice as 16.8 % and prescription reviews by their physicians or pharmacist as 16.5 %.

Age groups answers to the preventive measures are shown in Figure 2. In general the oldest group, aged 85 and older, has the lowest prevalence of affirmative responses for all preventive measures. The oldest age group has also the highest prevalence of affirmative responses for 'Do not know' option compare to other age groups. All age groups have the highest prevalence of affirmative responses to 'Other' possible preventive measures. Also, all age groups have the next highest prevalence of affirmative responses for exercise/maintaining good physical condition. Age groups 75-84 and 65-74 have high affirmative response prevalence for exercise regularly/maintain good physical condition. After exercise regularly, the next highest affirmative response prevalence is stated as reduce clutter, tripping and slipping hazards in and outside their home and ensure adequate lighting in and outside their home. The lowest affirmative response prevalences were stated as review/change their prescription medicines with guidance from their doctor or pharmacist, consult their physicians for general fall prevention advice, and have their vision regularly checked with minimum differences among age groups. The lowest affirmative response prevalence to review/change their prescription medicines with guidance from their doctor or pharmacist is shown for the oldest age group of 85 years of age and older.

Gender differences with respect to fall preventions measures are shown in Figure 3. Women have the lowest number of 'Do not know' answers. Women as well have higher affirmative response prevalence for Other preventive measures, exercise regularly/maintain good physical condition, and reduce clutter/tripping and slipping hazards in and outside their home. Men in contrast have higher affirmative response prevalence for consult their physicians for

general fall prevention advice, review/change their prescription medicines with guidance from their doctor or pharmacist, have their vision regularly checked, install home safety features such as shower grab bars, hand rails, and others, and ensure adequate lighting in and outside their home. Although gender-based differences are only significantly different for reduce clutter.

Figure 4 shows the prevalence of affirmative responses to preventive interventions for all participants by ethnic groups. All ethnic groups have the highest affirmative prevalence for Other prevention measures. The highest affirmative response prevalence for 'Don't know' is noticeable greater for Filipino group followed by Other Asians. The lowest affirmative response prevalence for 'Don't know' corresponds to White, followed by Others ethnic group. The next highest affirmative response prevalence for exercise regularly/maintain good physical condition is shown for Other Asian, Japanese and Whites. Affirmative response prevalence for home environment measures is high for Other Pacific Islanders, Japanese and Whites. Most of the ethnic groups have the lowest affirmative responses for consulting their physicians for general fall prevention advice and reviewing/changing their prescription medicines with guidance from their doctor or pharmacist.

Survey data on preventive measures related to household income is shown in Figure 5. All income levels have the lowest affirmative response prevalence for 'Don't know' and refuse preventive measures. The highest affirmative response prevalence for 'Don't know' answer is shown for the lowest two income levels as 10.7% and 11.3% respectively in contrast to the highest income level group as 6.1% but insignificant due to overlap of their confidence intervals. The highest affirmative response prevalence for all income levels corresponds to Other, exercise regularly/maintain good physical condition, and install home safety features such as shower grab bars, hand rails, and others. The highest income level has the highest affirmative response

prevalence for most of the preventive measures and the lowest affirmative response prevalence for 'Don't know' category.

The affirmative response prevalence for educational levels is shown in Figure 6. Most of the education levels show that 'Don't know' and refuse have the lowest affirmative response prevalence. In contrast, most of the education levels show that the highest affirmative response prevalence corresponds to Other preventive measures, and exercise regularly/maintain good physical condition. The next highest affirmative response prevalence for preventive measures correspond to home environment related as install home safety features such as shower grab bars, hand rails, and others; reduce clutter/tripping and slipping hazards in and outside their home; and ensure adequate lighting in and outside their home for all education levels. The highest overall affirmative response prevalence for all preventive measures is shown for the highest education level and the lowest overall affirmative response prevalence corresponds to the lowest education level.

DISCUSSION

Falls and injuries related to fall are a significant threat to the ability to continue an independent life at home and the quality of life in general for the elderly (Faul et al., 2015; MMWR, 2008).

Part I of this study is focused on the prevalence of falls and injury related to fall for those 45 years of age and older. Overall, sample characteristics of participants are representative of the population in Hawaii as determined by CDC standards for weighting.

The distribution of health conditions and behavior represented in the sample indicates lowest prevalence of limitation dressing, stroke, trouble seeing, angina or coronary heart disease,

heart attack or myocardial infarction, kidney disease, activity limitation and chronic obstructive pulmonary disease. In contrast, there are high prevalence proportions for "Being kept from doing usual activities due to poor physical or mental health" (76.6%), overweight or obese (58%), some forms of arthritis (32.3%), poor physical health (31.7%), poor mental health (23.5%), and physical inactivity (19.3%)

The highest prevalence for falls is shown for age groups 75-84, and 85 and older as 24.6% and 21.4% levels which are below the stated prevalence of 30-35% for those 65 years of age and older at local, national and international studies (DOH, 2013; CDCb, 2015; WHO, 2007). These contrasting results may be associated to the lack of inclusion of the institutionalized elderly population in the study's design. Women have a higher prevalence for falls compared to men but the difference is not statistically significant. A report from MMWR (2008) also found a higher risk of falls for women. It is important to compensate for gender differences of risk for knowledge translation strategies to target specific preventive measures. Other results on ethnic groups show high prevalence for fall among White and Other Pacific Islanders, the lowest income level, and college 1 to 3 years. These findings are important to consider for future changes and feedback related to fall prevention programs in the state. Also, these findings indicate the importance of locally tailored preventive programs to target the unique characteristics of the population in Hawaiʻi and limitations on generalizing findings in this study to the U.S. population. The MMWR, 2008 report found higher risk for falls within American Indians/Alaska natives and the most injuries associated to fall within Hispanics. A lack of representativeness of those ethnic groups in Hawaiʻi may account for those differences.

In contrast, the prevalence for injury associated to fall is greater for age groups 55-64 and 65-74, females as well, Hawaiians and Whites ethnic groups, lowest income level, and high

school graduate level of education. The prevalence for injuries is well above the 20-30% prevalence found in other studies (CDCb, 2015), except for the 85 and older age group of 19.9% in this study.

Also important to state is that the prevalence for injury related to fall increases the most from age group 45-54 to 55-64 which could represent a particular age transition to a higher risk level. This finding requires further analysis in future studies. Overall, these results are in contrast to Grundstrom, Guse, and Layde (2012) findings of adults 85 years and older at a greater risk for falls and injuries associated to fall. This counterintuitive evidence might be related to the lack of institutionalized population not included in this study.

The prevalence of fall and injury related to fall is consistently highest for those with lowest income level highlighting the role of social disparities in knowledge translation. Also, the prevalence of injuries related to fall is higher for Hawaiians well above that for White and Other Pacific Islanders. Further study on these and other socio-economic factors are needed to validate these findings.

The prevalence of fallen at least once during the past 12 months among Hawaiʻi adults was higher for most of the chronic conditions and behaviors, except for overweight/obesity, and those "being kept from doing usual activities due to poor physical or mental health." These findings also contribute to the understanding of the threat of falls on the population having underlying health issues which is mostly the elderly with special emphasis on those having limitations on daily living activities such as dressing, walking, activity limitations, using equipment due to health problem, and depressive disorders. Confirmation of these findings is stressed by results on adjusted odds ratio for fallen at least once as presented in Table 9.

Prevalence of injuries related to fall during the past 12 months among Hawaiʻi adults and adjusted odds results in Table 9 are consistently higher for those with disabilities such as limitation dressing, walking, use of equipment due to health problem, and depressive disorder and varies for some of the other chronic conditions and behaviors. These findings make disability and depression disorders the best markers to determine the risk for fall and possibly injury, issues that need further validation in future studies.

Adjusted odds ratio results for fallen at least once and injury related to fall provides novel information on many potential chronic conditions or behavior associated to increase odds for those risks in the population 45 years of age and older, previously unexplored for fall prevention programs in the state. Older groups had increasingly higher odds for falls after adjusting for sex, ethnicity, education level, and annual household income while 65-74 and 85 and older age groups had higher adjusted odds for injuries related to fall.

The findings in this study are in agreement with those of Spoeltra et al., 2013 for the elderly with cancer where the rates of falling were higher for those with cancer. Future studies are needed in order to clarify other associated characteristics as risk factors for falls and injuries in the older population to provide feedback to preventive programs.

Findings for activity issues as significant risk factors for fall and injury associated to fall are also consistent with other studies on the issue (Ambrose et al., 2013; Robertson, & Gillespie, 2013). Also, the study of Heslop et al. (2012) is in accordance with results of this study on mental health issues in relation to fall and injury associated to fall.

Hawaiʻi is a multicultural environment requiring specific information on the proper way to address and direct preventive programs for the elderly. One important finding was that the

preferred name to address those age 60 years and older in Hawaiʻi is 'Senior.' About 27 % of the respondents stated receiving information on preventive falls for the elderly during the past 30 days before the survey. This finding indicates the need to continue to improve communication strategies for the fall and injury related to fall prevention program. The issue of knowledge translation is an important step for future activities in the program sharing concerns pointed out elsewhere in other studies (Noonan, Sleet, & Stevens, 2011 ; Sleet et al., 2008; Tetroe, Graham, & Scott, 2011).

The main source of information on prevention of falls and injury related to fall is television, followed by magazines and health care providers. These results highlight the importance of mass media communication as an education tool and the need to continue to expand the preventive role of health care providers on fall and injury prevention programs.

The great majority of the respondents expressed their willingness to pursue medication review and maintain a physical active lifestyle. These findings are concrete evidence highlighting the level of engagement with the fall prevention program in the state and the major successes in the state's interventions related to knowledge translation. Responses to questions about reasons not to pursue a medication review included having enough knowledge about their medication or lack of side effects. This prompts a warning to prevention programs to test the level of understanding of the risk and expected effects of medications suspected to influence the risk of falls and/or injuries. Misunderstandings or false beliefs on the issue can have devastating consequences on the health and overall quality of life of the elderly and their families, aggravated by the fact that the great majority received fall related information from other sources different from a knowledgeable health care provider.

About 90% of the respondents selected at least one prevention intervention to reduce the risk of falls emphasizing again the interest of the community in general on the program.

The main preventive measures stated by the respondents were health promotion measures such as maintaining regular exercise/good physical condition and other measures, followed by home environment related with the lowest responses for regular vision checks, consulting their physicians for advice and prescription reviews by their physician or pharmacist. These risk factors are also consistent with those pointed out by other studies (Ambrose, Paul, & Hausdorff, 2013) emphasizing the accuracy of knowledge translation on preventive measures.

Findings on age distribution of reported affirmative responses for all preventive measures indicate a great knowledge translation process since all age groups indicate having preferences of at least one of the preventive measures with low prevalence of 'Do not know' or refuse answers, and high affirmative response prevalence to most of the preventive measures in conjunction to preventive programs in the state. Also a matter of great interest should be future exploration of "Other preventive measures" stated by all age groups since all of them have high affirmative response prevalence in the survey. On the negative side, the oldest age group has the lowest affirmative response prevalence for all preventive measures, and specifically for review/change their prescription medicines with guidance from their doctor or pharmacist.

There were no major differences by gender. Women are more prone to choose reduce clutter/tripping and slipping hazards in and outside their home preventive measures than men; the latter being statistically significant. These findings are important to consider during knowledge translation strategies to improve outcomes.

By ethnic groups high affirmative prevalence for 'Don't know' preventive measures of Filipino, and Other Asian groups indicate the need to increase efforts on knowledge translation as well. Since most of the ethnic groups have the lowest response rates for consulting their physicians for general fall prevention advice and reviewing/changing their prescription medicines with guidance from their doctor or pharmacist, this is again a major warning for planning of fall prevention interventions in the state.

Income level shows potential differences in knowledge translation as contrasting response prevalence of 'Don't know' responses indicates almost twice the difference comparing those in the lowest income level to those in the highest income group but overlap of confidence intervals fail to state a statistically significant difference. Those with the highest income have the highest affirmative response prevalence for most of the preventive measures and the lowest lack of information. Further preventive strategies need to assess and correct for the causes of these disparities in knowledge translation

Inequalities in knowledge translation are also shown by education levels in general; the groups with the lowest level of education have the highest response prevalence for 'Don't know' response and the lowest affirmative response prevalence for most of the questions on preventive measures for falls. In contrast, the highest level of education group has consistently the highest affirmative response prevalence for most of the preventive measures and the lowest overall affirmative response prevalence corresponds to the lowest education level. These findings highlight the importance of knowledge translation directed to compensate for those disparities and to extend research for their causes.

Strengths and Limitations.

Strengths of this study are centered on a large sample database covering the entire state of Hawai'i to assure representativeness of the local population. The study designed has been validated in multiple studies throughout the U.S. on BRFSS data (BRFSS, 2014). For this specific study the population 45 years of age and older was selected to understand age related risk factors associated to fall and injury related to fall. To the best knowledge of the author of this study, there is not similar comprehensive data analysis on the adult population in the state of Hawaii using the BRFSS database.

Limitations of the study are associated to the nature of the BRFSS survey as it is based on landline and cell phone data, therefore, households without access to service are excluded and should be considered a source for selection bias. Also, self reporting surveys are subject to recall biases. Information on falls and injury related to falls in the previous 12 months before the survey may challenge the cognitive abilities of the older adult. Mackenzie, Byles, and D'Este (2006) found an overall agreement of responses of 84% between a prospective versus 6 months retrospective study in older adults.

The limitation of sampling with some group for fall or injury with low sample size and the no inclusion of non institutionalized population might affect results such as health condition and behavior toward a more healthy population missing the real effect of them on fall and injury associated to fall risk factors. Also, a higher risk for falls and injuries among institutionalized populations is missing in the study. Finally, the results of this study are applicable to the non-institutionalized adult population of Hawai'i for the year 2014 and are not representative of other populations in the U. S.

SUMMARY

Fall prevention and injury related to fall prevention program require local information on risk factors and population characteristics to refine the focus and intensity of those evidence-based interventions being used by Hawaii Fall Prevention Consortium. Further research is required to expand our understanding on the causes, and risk factors targeting high risk populations to customize new combination of intervention approaches.

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Appendix

Table 9. Risk Communication Questions.

Miscellaneous questions	Items	Percentage (%)
Of the following terms, which would you say you most identify with as it applies to yourself?	Senior 60 plus Baby boomers Auntie/Uncle Older adult Ku'puna Other Don't know Refuse	35.2 16.5 16.4 11.9 8.4 6.1 4.8 0.5 0.2
In the past 30 days, have you seen, heard, or read any information on preventing falls for the elderly?	No Yes Don't know	72.9 26.7 0.4
Do you recall the source of that information? (multiple responses allowed)	Television Magazines Other Health care provider Newspaper Internet Printed materials from stores/pharmacies Don't know Family member Friend/acquaintance Radio	29.1 23.8 20.1 18.2 15.6 14.2 5.9 5.0 4.9 4.3 2.0
After hearing the medication message, would you say the medication message is?	Somewhat easy to understand Extremely easy to understand Somewhat hard to understand Extremely hard to understand Don't know Refused	42.2 41.8 11.1 2.4 2.3 0.2
After hearing the		

medication message, how likely would you be to have a medication review?	Somewhat likely	31.7
	Extremely likely	25.5
	Not at all likely	24.2
	Not very likely	15.9
	Don't know	2.5
	Refused	0.2
After hearing the medication message, why would you be unlikely to have a medication review?	Do not take any medications	30.4
	Already knowledgeable about my meds	23.9
	Other	15.7
	Medicines do not make me dizzy/lose balance	8.5
	Medication reviewed already	8.5
	I read the included literature	5.1
	Don't know	4.1
	Not at risk for falls from medication	2.0
	Medication review not possible/convenient	0.8
	Medication review is not effective	0.7
	Refused	0.3
After hearing the exercise message, would you say the message is....	Extremely easy to understand	58.8
	Somewhat easy to understand	34.7
	Somewhat hard to understand	3.5
	Extremely hard to understand	1.5
	Don't know	1.2
	Refused	0.3
After hearing the exercise message, how likely would you be to become more active or exercise?	Somewhat likely	42.2
	Extremely likely	36.9
	Not very likely	10.3
	Not at all likely	9.1
	Don't know	1.3
	Refused	0.2
After hearing the exercise message, why would you unlikely to be more active or exercise?	Already exercise/physically active	57.5
	Other	23.2
	Do not like to exercise	9.7
	Disabled or too sick	3.5
	Cannot exercise	2.5
	Don't know	1.6
	Do not believe exercise will help prevent falls	1.4
	Refused	0.5

Figure 1. Prevalence of Fall Prevention Interventions Responses to Reduce Risk of Falls.

Figure 1. Prevalence of Fall Prevention Intervention Responses to Reduce Risk of Falls forAdults in Hawaii, HBRFSS 2014
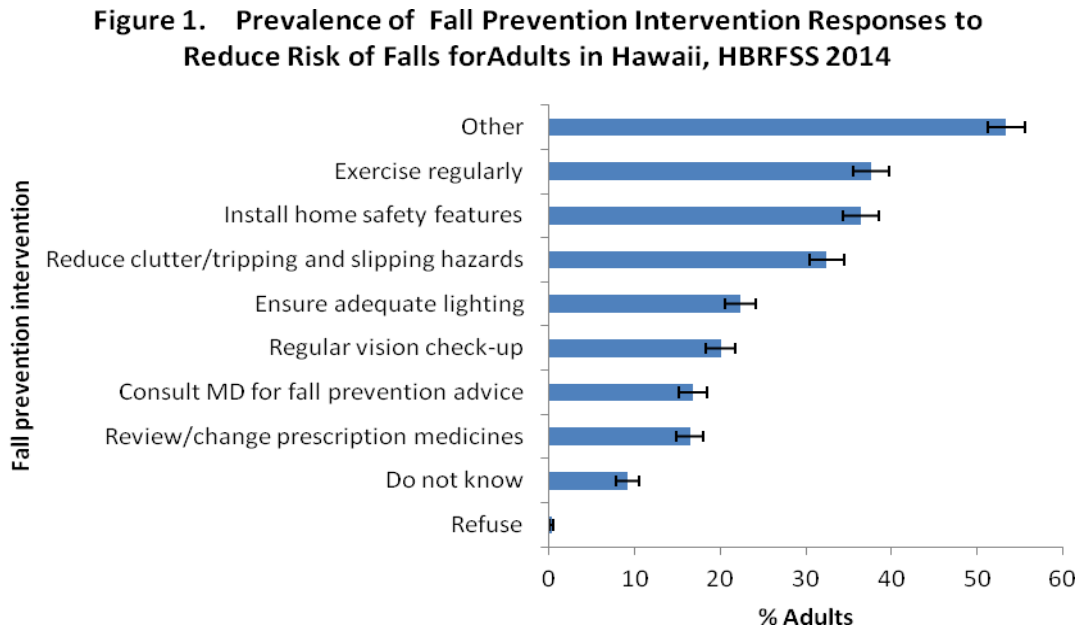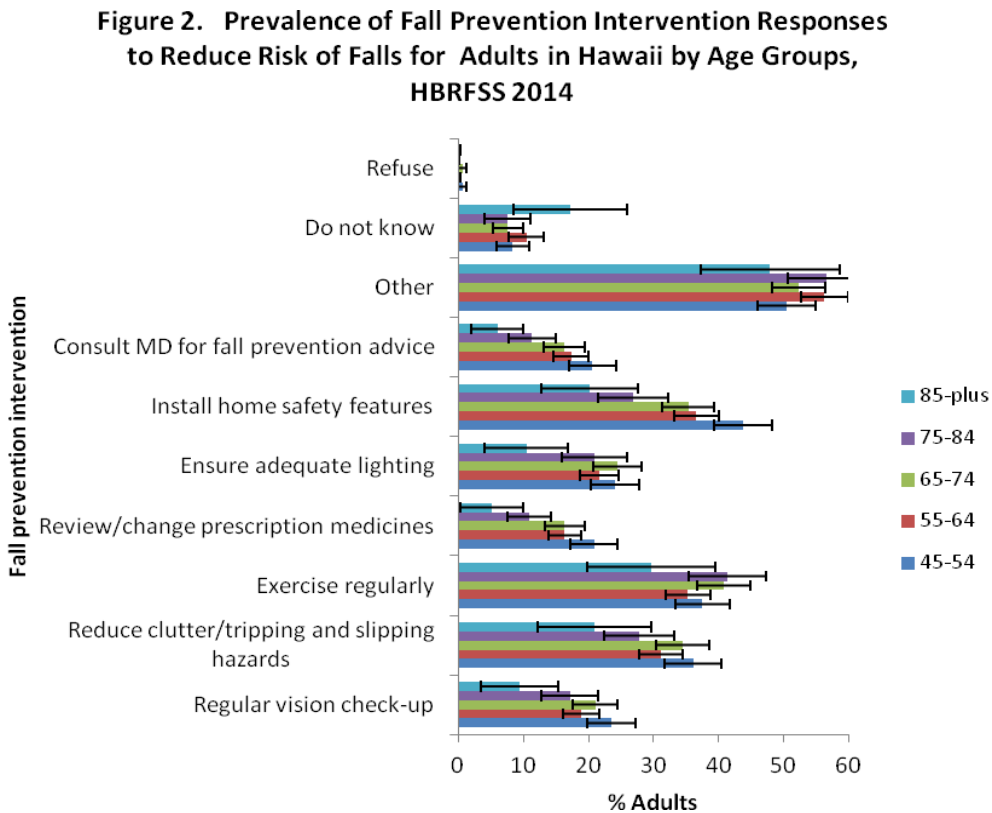
Figure 2. Prevalence of Fall Prevention Intervention Responses by Age Groups.

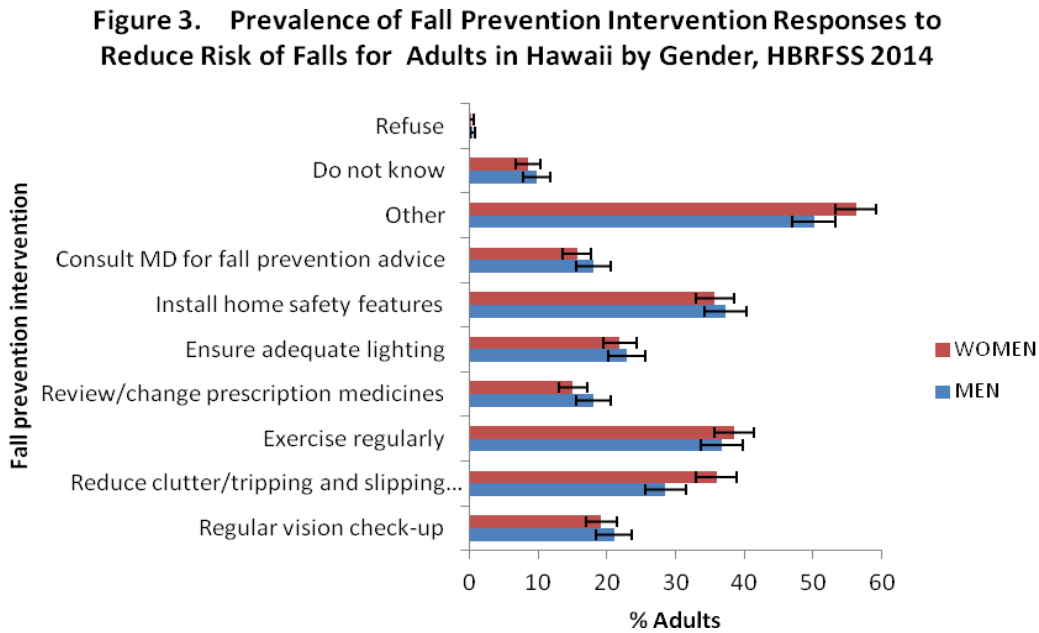Figure 2. Prevalence of Fall Prevention Intervention Responses to Reduce Risk of Falls for Adults in Hawaii by Age Groups, HBRFSS 2014

Figure 3. Prevalence of Fall Prevention Intervention Responses by Gender.

Figure 3.   Prevalence of Fall Prevention Intervention Responses to Reduce Risk of Falls for Adults in Hawaii by Gender, HBRFSS 2014

Figure 4. Prevalence of Fall Prevention Intervention Responses by Ethnicity.

Figure 4.   Prevalence of Fall Prevention Intervention Responses to Reduce Risk of Falls for Adults in Hawaii by Ethnicity, HBRFSS 2014
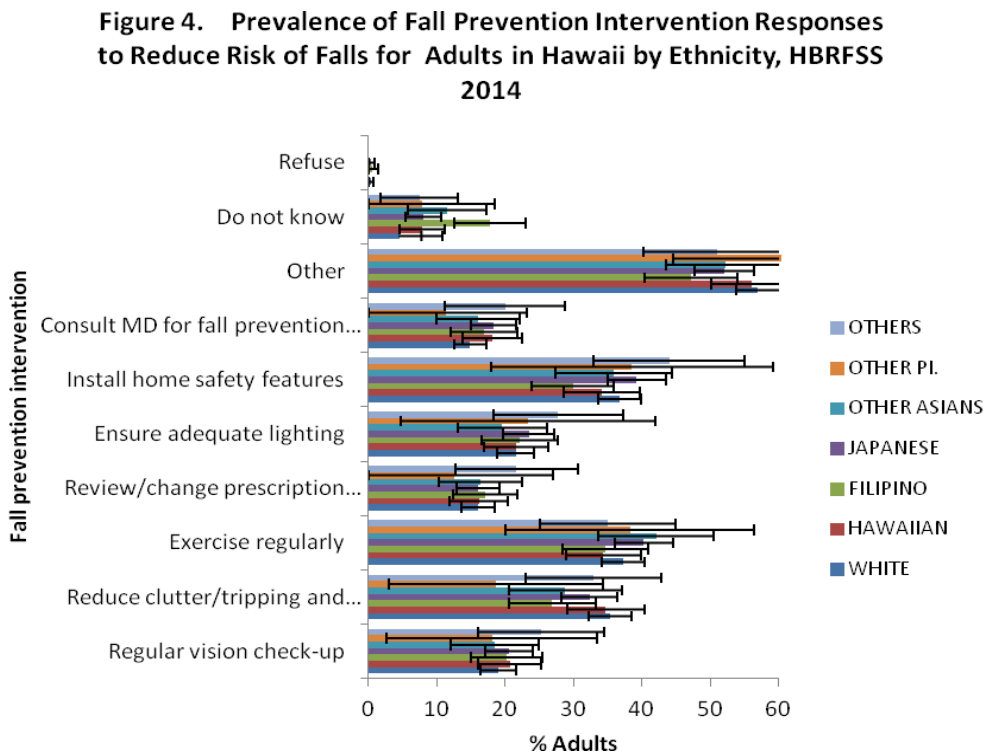
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Figure 5. Prevalence of Fall Prevention Intervention Responses by Income.

Figure 5. Prevalence of Fall Prevention Intervention Responses to Reduce Risk of Falls for Adults in Hawaii by Income, HBRFSS 2014
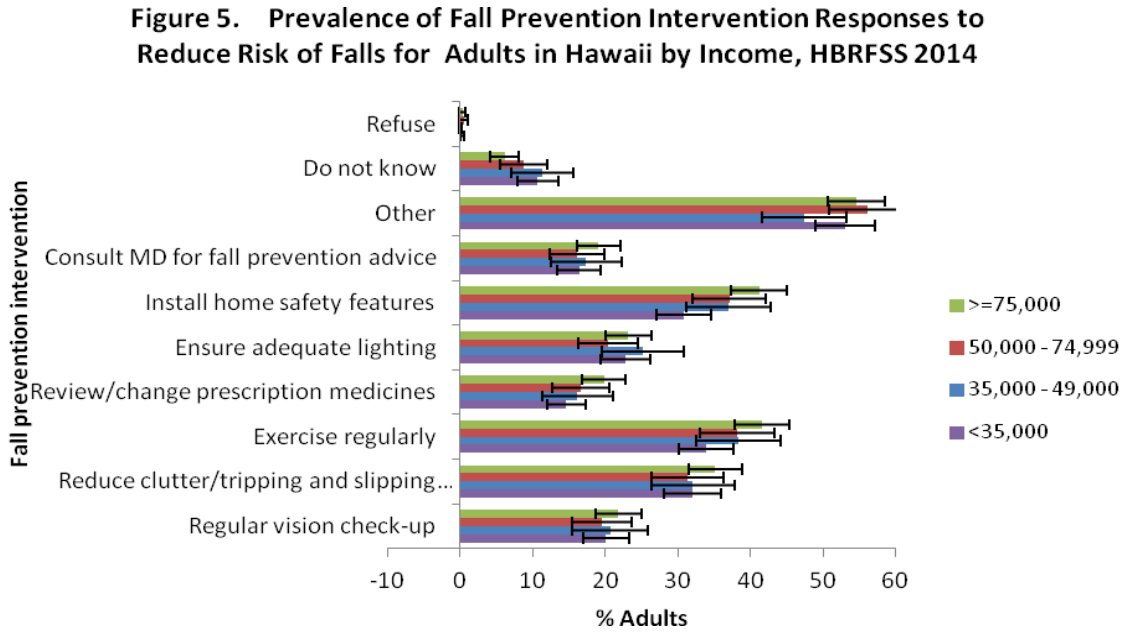
Figure 6. Prevalence of Fall Prevention Intervention Responses by Education level.

Figure 6. Prevalence of Fall Prevention Intervention Responses to Reduce Risk of Falls for Adults in Hawaii by Education level, HBRFSS 2014