

Review Article

Prevalence and Risk Factors of Cancer among Pacific Islanders: A Systematic Review Study

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Keywords

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Abstract

Background: Cancer is known as one of the leading causes of mortality in both developed and developing countries, however, the majority of it is preventable if healthy lifestyles are adopted. Cancer is increasing significantly in Pacific countries but its trend and risk factors are not studied well. This systematic review is aimed to understand the prevalence and determinants of cancer in Pacific countries.

Methods: This systematic review study was conducted based on Cochrane library guideline and using databases such as Medline, Cinahl, Embase, Scopus, PsycINFO, and Web of Science. Two coders reviewed articles which were located by using keywords such as cancer, Pacific, prevalence and risk factors. Articles included in the search were published between 1st January 2000 to 1st January 2017. Thirty-three studies were found and a data extraction sheet was made. A descriptive analysis was used to analyze the data and frequency of studies was reported using tables and figures.

Results: South Pacific countries had the highest number of published articles on cancer (42.2%). The results of the study showed the majority of studies were conducted among patients (66.7%), and most studies were community based studies (70%). Twelve studies (out of 33) focused on the prevalence of cancer, which ranges from 1.3% to 87%. Smoking was reported as the more frequent risk factor (12 studies, 52%) for cancer, followed by higher BMI (7 studies, 30.4%), and alcohol consumption (5 studies, 22%).

Conclusion: The results of this study showed cancer as one of the biggest health challenges for Pacific people and giving specific attention to its prevention is highly recommended. Developing different preventive strategies that focus on the factors highlighted in this study can help Pacific countries control this issue.

INTRODUCTION

Cancer remains one of the leading causes of morbidity and mortality worldwide [1]. It is predicted that by 2020, the number of new cases of cancer in the world will increase to more than 15 million, with deaths increasing to 12 million [2]. Much of the burden of cancer incidence, morbidity, and mortality will occur in the developing world, compared to the existing burden present in developed nations [3]. In Europe, the estimated numbers of new cases of cancer since 2012 were approximately 1.4 million in males and 1.2 million in females, and around 707,000 men and 555,000 women died from cancer in the same year [4]. Additionally, in the United States of America, cancer accounted for 14.3 million death in 2014 and is expected to increase by the year 2018 [5]. In accordance to the World Health Organization (WHO) reports, 2014 depicted that more than 60% of world's total new annual cases of cancers occurred in Africa, Asia and Central and South America, with these regions accounting for 70% of the world's cancer deaths [2]. The major cause of cancer is still unknown, however, there are some identified risk factors of cancer in the world which are chiefly: a diet high in saturated fats, physical inactivity, alcohol consumption, exposure to high radiation, biologically inherited, obesity and some of which are attributed to infectious diseases like cervical cancer, to name a few [2,6-8].

In the Pacific, cancer is also an alarming issue with an existing prevalence of 315 per 100,000 population in females and 379 in males, in 2014. The cancer incidence rate in the Pacific is 195 and 151 per 100,000 populations for females and males in Tonga, Fiji, Cook Islands and Niue [9]. In Samoa, cancer is the second leading cause of death among Samoans and breast cancer and cervical cancer are among the most common types of cancer affecting Samoan women [10]. Some of the identified risk factors of cancer in the Pacific are: smoking, alcohol consumption, diet high in saturated fats, multiple sexual partners, betel nut chewing, and obesity [11-14].

Based on the literature review done on cancer, there are no systematic review studies being carried out in the Pacific identifying the prevalence and risk factors of cancer. This systematic review aims to identify the prevalence and risk factors of cancer present in the Pacific regions which will fill the gap, as well as provide baseline information for public health officers in the Pacific to develop health promotion strategies that will reduce the prevalence of cancer in the future.

METHODS

This systematic review study was conducted using Cochrane Library guideline to find the prevalence and determinants of

cancer in Pacific countries. Six databases frequently used by previous, similar studies focusing on cancer were used to find relevant articles. They included: Medline, Cinahl, Embase, Scopus, PsycINFO, and Web of Science.

Relevant keywords were used to search articles and they included: “(risk OR determinant OR predisposing”, “prevalence”, “(cancer OR tumor)”, and “Pacific”. We also used synonyms of keywords to locate all the potential eligible articles. The searched keywords were combined using AND and OR. Studies published between 1st January 2000 to 1st January 2017, and published in the English language were searched. Studies not published in English and if their full text was not available, were excluded. All types of studies including quantitative, qualitative and mixed method study designs were included. To prevent bias, the review of studies was conducted by two coders, separately. After removing the studies duplicated in different databases, three steps were done to achieve the relevant studies. At the first step, the titles of all studies were scanned and those not relevant were excluded. At the second step, the abstract of the remaining studies was reviewed and studies not related were omitted. The full text of the remaining studies was reviewed and studies which met the study inclusion and exclusion criteria were chosen. Overall, 28 studies were found (Figure 1).

To make sure that all studies were included, the bibliography of the remaining studies were searched and relevant studies that did not come up in the database were added to the final list of articles. Five studies were added and the total number of 33 studies was considered for making an extraction sheet. The final studies (33) were printed and an extraction sheet was made (Table 2) and information related to the studies, population, methodology, and results for further analysis were extracted.

A descriptive analysis was used to analyze the results and the frequency of the studies was showed in the form of tables and graphs.

RESULTS

As (Table 1) show, most of studies (54.5%) were conducted after 2010, while only 21% were conducted between 2000 and

Variables	Frequency	Percentage
Year of the studies		
2000-2004	7	21.2
2005-2009	8	24.3
2010<	18	54.5
Region		
South Pacific	14	42.4
American Pacific	10	30.3
Asia Pacific	9	27.3
Studies based on gender		
Male	1	3
Female	2	6.1
Male and female	13	39.4
Not reported	17	51.5
Type of participants		
Patients	22	66.7
Health workers	2	6.1
Healthy people	6	18.2
Not mentioned	3	9

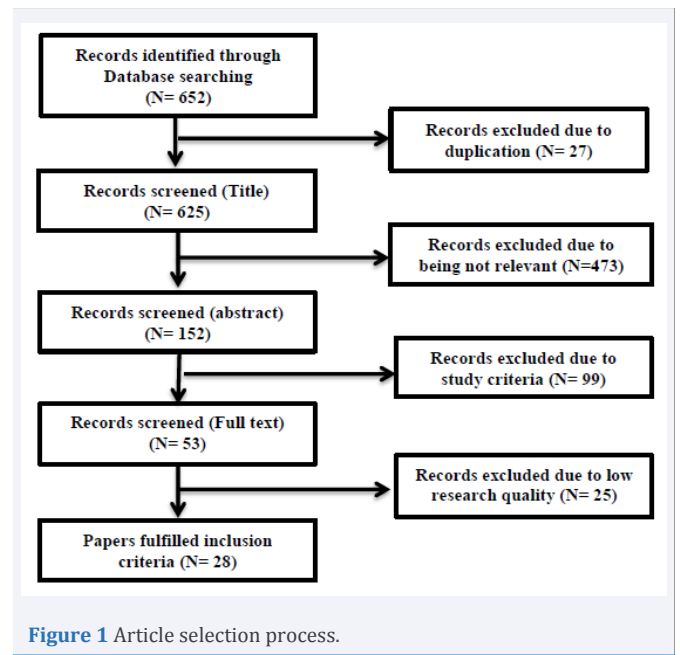


Figure 1 Article selection process.

2004. Most studies (42.4%) were conducted in South Pacific countries which were followed by American Pacific countries (30.3%), and Asia Pacific countries (27.3%). Most of the studies were conducted among both males and females (39.4%), however more than half of the studies did not mention the participants' gender. Many studies (66.7%) were conducted among patients, while only 6.1% were conducted among health care workers.

The results of the article search showed that majority of the studies were conducted in New Zealand (10 studies), followed by Hawaii (7 studies), Japan (4 studies), Australia (3 studies), and Taiwan (1 study). The pooled number of participants reported in 21 studies was 5,532,993 people, while 12 studies didn't report the number of participants. The results also showed that among 14 studies out of 33 which reported the age of participants, most studies were conducted among adults (6 studies), followed by adults and older (3 studies), and adolescents (2 studies).

The results also revealed that many studies were community-based studies (70%), which were followed by health care-based studies (24%) and hospital-based studies (6%) (Figure 2).

Prevalence of cancer

Twelve studies (out of 33) focused on the prevalence of cancer, which ranges from 1.3% to 87%. The high rate of cancer prevalence had been reported among those who attended for cancer screening. French Polynesian Rapa had the highest prevalence of cancer 87%, followed by the US associated Pacific islands (Marshall Island, Palau, and FSM) with 60.5%, Kiribati with 37.3%, and Nauru 37.2%. The lowest prevalence of cancer was related to community-based studies. The results revealed that Japan (2.4%) had the lowest prevalence of cancer, followed by China (1.3%).

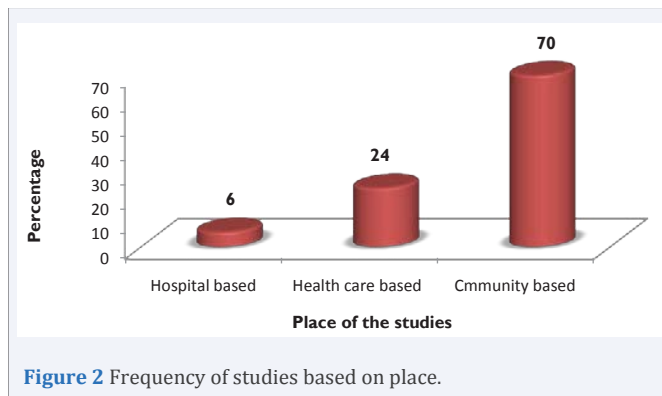
Risk factors of cancer

On the other hand, regarding the risk factors, only 23 out of 33 articles focused on risk factors for cancer. Smoking was reported

1	Ou et al. [33]. Year : 2004 Type Of Study: Descriptive study Country : Kiribati	Population: 237 Cases # Of Male: 93 # Of Female: 144 Age Group : 41-50 yrs.	Place: Hospital Sampling Method: Not Stated Data collection tools: Interview	Prevalence: -Breast and Gastrointestinal cancer (37.3%).
2	Ou et al. [34]. Year ; 2004 Types Of Study: Descriptive study Country : Nauru	Population : 124 # Of Male : 46 # Of Female: 78 Age Group : Ranges from 10 -86 yrs.	Place: Hospital Sampling Method: Not Stated Data collection tools: Interview	Prevalence: -The cervical cancer N= 23 (37.2%).
3	Foliaki et al. [35]. Year : 2014 Type Of Study: Cross-Sectional study (Survey) Country: Fiji	Population: 1261 Cases # Male: # Female: 1261 Age Group: Age ranges 16-64yrs.	Place: Health Sub district (Health care) Sampling Method: Not Stated Data collection tools: Not stated	Prevalence: -The prevalence of high-risk HPV types was 13.6%. Risk Factors: -Age -Husband's Extramarital Sexual Relationships -High risk sexual behaviour
4	Geoff Farrel and Chan, [36] Year: 2009 Type Of Study: Descriptive Country: Asia Pacific	Population: Not Stated # Male: Not stated #Female: Not stated Age Group: Not stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Obesity -Hepatitis C -Excessive alcohol intake, -Cigarette smoking, -Fungal toxins contaminating -Grain and ground crops (peanut, corn), -Algal toxins -Low selenium
5	Tajima and Moore, [37] Year: 2002 Type Of Study: Descriptive Country: Asia Pacific	Population: Not stated # Male: Not stated # Female: Not stated Age Group: Not stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Survey	Risk Factors: -Processed Food
6	Garland et al. [38]. Year: 2008 Type Of study: Case Studies Country: Asia Pacific Regions	Population: 3332258 # Male: Not Stated # Female: Not stated Age Group: Not stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Prevalence: -Cervical cancer (52%)
7	Tsark,[39] Year :2007 Type Of Study: Descriptive Country : US-associated Pacific Island Countries	Population: Not stated # Male: Not stated # Female: Not stated Age Group: Not stated	Place: Community (4 states) Sampling Method: Not stated Data collection tools: Survey	Prevalence: -Cervix cancer in RMI, 60.5/per 100000 -Breast cancer in RMI, 36/per 100000 Lung cancer, 39.6/per 100000, Oral cancer, 22.1/per 100000
8	Garland et al.[40]. Year : 2006 Type Of Study: Descriptive Countries: 175 countries world wide	Population: 175 countries #Male: Not stated # Female: Not stated Age Group:15-19	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Prevalence: - High Ovarian cancer
9	Chelimo and Elwood, [41] Year: 2015 Type Of Study: Descriptive Country: New Zealand	Population : 6820 # Male : 2050 # Female: 4770 Age Group : Not stated	Place: Health care centres Sampling Method: Not stated Data collection tools: Not stated	Prevalence: -Oropharyngeal cancers, 34.2% -Oral cancer, 65.8% was oral cavity cancers. -For oral cavity cancer, 2.68 per 100,000 in males and 1.46 per 100,000 in Women.
10	Lee et al. [42]. Year:2009 Type Of study : Descriptive Country : Taiwan	Population : 33787 Cases # Male: 30176 # Female: 3611 Age Group : 20-98 years	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Age -Alcohol consumption -Cigarette smoking -Betel nut chewing Prevalence: -Hypopharyngeal cancer (71/4,218 = 1.68%, SIR = 22.76) -Oropharyngeal cancer (30/3,403= 0.88%, SIR = 14.29) -Oral cavity cancer (99/26,166 = 0.38%, SIR = 5.57).

11	Mohr et al.[43]. Year : 2010 Type Of study : Descriptive Countries : 174 countries world wide	Population: Data from 174 countries globally # Male: Not Stated # Female: Not Stated Age Group: Not Stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Smoking
12	Jongudomkarn et al.[44]. Year: 2015 Type Of Study: Qualitative Cross-sectional (Focus Group) Country: Thailand	Population: 45 participant #Male: 14 # Female: 31 Age Group: 32-70	Place: Village Sampling Method: Not Stated Data collection tools: Focus Group & Interview	Risk Factors: -Alcohol consumption
13	Arbyn et al.[45]. Year : 2011 Type Of Study: Descriptive Country: Worldwide 182 countries	Population: 182 Countries #Male: Not stated #Female: Not stated Age Group: Not stated	Place: Not stated Sampling Method: Not stated Data collection tools: Not stated	Prevalence: -Cervical cancer rates ranging from <1 to >50 per 100 000.
14	Brindel et al.[46]. Year: 2009 Type Of Study: Case-Control study Country: French Polynesia	Population: 359 # Male: 44 # Female: 315 Age Group: 18	Place: Not stated Sampling method: Not stated Data collection tools: Not stated	Risk Factors: -BMI -Tallness -Excess body weight
15	Parr et al.[47]. Year: 2010 Type Of Study: Cohort Country: Asia- Pacific	Population: 424519 # Male: 250467 # Female: 174052 Age Group: 48yrs	Place: Not Stated Sampling Method: Not Stated Data collection tools: Survey	Risk Factors: -Leukaemia -BMI
16	Shin et al.[48]. Year: 2012 Type Of Study: Case Study Country: Asia Pacific Region	Population: 1526778 # Male: 471289 # Female: 1055489 Age Group: Not stated	Place: Not Stated Sampling Method: Not stated Data collection tools: Not stated	Risk Factors: -Tobacco -Alcohol -Over-weight and obesity -Unhealthy Diet
17	Meredith et al.[49]. Year: 2012 Type Of Study: Descriptive Country: New-Zealand	Population: Not stated # Male: Not stated # Female: Not stated Age Group: 22-65+ yrs.	Place: Not Stated Sampling Method: Not stated Data collection tools: Not stated	Risk Factors: -Smoking -Over- weight -Renal disease -Obesity -Physical inactivity
18	Miller et al.[50]. Year: 2008 Type Of Study: Descriptive Country: America	Population: Not stated # Male: Not Stated # Female: Not stated Age Group: (1-4, 5-9, 80-84, 85+).	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Prevalence: -All cancers rate = 488.5 per 100,000 vs. 448.5 for non-Hispanic white women). Risk Factors: -Risk factor for liver and stomach cancer -Hep. B & C -Helicobacter pylori -Dietary factors -Lower tobacco consumption.
19	Huang et al.[51]. Year: 2013 Type Of Study: Descriptive Country: America	Population: Not stated # Male: Not stated # Female: Not stated Age Group: Not stated	Place: Community Sampling Method: Not Stated Data collection tools: Survey	Risk Factors: -Tobacco use -Exposure to infectious agents -Diet
20	Sneyd and Cox, [52] Year: 2011 Type Of Study: Descriptive Country: New Zealand	Population: 14802 # Male: 5935 # Female:8867 Age Group: 40-80 Yrs.	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Body site -Pacific people, melanoma thickness is associated with body site.
21	Lee et al.[53], Year: 2011 Type Of Study: Cross-sectional Country: U.S	Population: 52491 # Male: # Female: Age Group: 50 & older	Place: Health Care center Sampling Method: Not Stated Data collection tools: Interview & Survey	Risk Factors: -Palpable disease
22	Biggar et al.[54]. Year: 2011 Type Of Study: Retrospective case Country: New Zealand	Population: 133 # Male: 79 -49 pacific ethnicity -34 Maori # Female: Not stated Age Group: Not stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Prevalence: -Proximal tumours (in Pacific 10% and Maori 12% patients) - Gastric cancer (in Pacific 51% and Maori 62% patients)

23	Pokorny and Scott,[55] Year: 2011 Type Of Study: Retrospective Study Country: New Zealand	Population: 486 # Men: Not Stated #Female: 486 Age Group : 41-96	Place: Health care center Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Thicker Melanoma with poor prognosis Prevalence: -Total cancer 0.37 per 100,000 - 0.20per 100,000 in Maori Nodular melanoma in -Maori 15.9% -Pacific peoples (17.1%) -New Zealand Europeans (10.5%).
24	Cheng et al.[56]. Year: 2014 Type Of Study: descriptive Country: U.S	Population: Not Stated # Men: Not stated #Female: Not Stated Age Group : 21 years old	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Prevalence: -Adenocarcinoma for Chinese, 1.3%. -Squamish cell carcinoma (SCC) in Japanese women, 2.4%
25	Katz et al.[57]. Year: 2004 Study: Country: Freely associated U.S Pacific islands jurisdiction	Total: Not Stated Male: Not Stated Female: Not Stated Age: Not Stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Lifestyles practices
26	Foliaki et al.[58]. Year: 2004 Study: Descriptive New Zealand	Total: 2, 837 Male: 904 (Incidence) Female: 940 (Incidence) Male: 535 (Mortality) Female: 458 (Mortality) Age: Not Stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Ethnicity
27	Kroon et al.[59]. Year: 2004 Study: Descriptive Country: Republic of the Marshall Islands	Total: 65 Male: 29 Female: 36 Age: Not stated	Place: Community Sampling Method: Purposive Data collection tools: Not Stated	Prevalence: -Cancer higher in women than men (17% men & 28% female)
28	Rius et al.[60]. Year: 2013 Study: Retrospective Country: Easter Island	Total: 49 Male: 28.6% Female: 71.4% Age: Not stated	Place: Hospital Sampling Method: Not Stated Data collection tools: Not stated	Prevalence: -Cervical cancer among Rapa Nui, 87% -Skin cancer occurred in non-Rapa Nui patients, 75%
29	Torre et al.[61]. Year: 2016 Study: Cross-sectional Country: Hawaii	Total: 16,910 Male: 8,440 Female: 8,470 Age: Not stated	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Cigarette smoking -Excess body weight -Physical inactivity -Alcohol consumption
30	Pobutsky et al.[62]. Year: 2004 Study: Cross-Sectional Country: Hawaii	Total: Not stated Male: not Stated Female: Not Stated Age: Not Stated	Place: Communities Sampling Method: Not Stated Data collection tools: Land based telephone survey	Risk Factors: -Tobacco smoking
31	Hill et al.[63]. Year: 2010 Study: Cohort Country: New Zealand	Total: 629 Male: Not Stated Female: Not stated Age: 25 and older	Place: Hospital and Health care center Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Smoking
32	Huxley et al.[64]. Year: 2007 Study: Cohort Study Country: Asia Pacific Region	Total: 480,125 Male: 66% Female: 34% Age:35-69	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Age -Smoking -Diabetes -High blood glucose -High BMI greater than 25
33	Ansary-Moghaddam et al.[65]. Year: 2006 Study: Cohort Country: Asia Pacific Region	Total: 3,558,733 Male: Not Stated Female: Not stated Age: over 25 years	Place: Not Stated Sampling Method: Not Stated Data collection tools: Not stated	Risk Factors: -Smoking -Physical Inactivity -Obesity -Type 2 Diabetes



as the utmost risk factor (12 studies, 52%) for cancer, followed by higher BMI (7 studies, 30.4%), alcohol consumption (5 studies, 22%), physical inactivity (3 studies 13.0%), age (2 studies 8.7%), and the least mentioned risk factors were exposure to nuclear radiation or contamination and ethnicity (1 study 4.3%).

DISCUSSION

The results of the study depicted that the prevalence of cancer in the Pacific ranges from 1.3% (China) to 87% (French Polynesian). The high prevalence rate of cancer was due to that majority of the studies focused on the patients that attended a cancer screening. As revealed in the study, the high prevalence rate of cancer in French Polynesian was due to changes in life style associated with the changing socio-economic environment or geographical environment that may result in changing disease patterns, including cancer. This is well supported by Siegel et al., (2013), which stated that cancer prevalence changes according to the geographical areas, where highest prevalence records of cancer are found in places with warmer climate that allows them to do more outdoor activities [15]. Furthermore, another factor that increases the prevalence rate of cancer, in Rapa, is access to screening tests. Most of the cancer patients that are not going for cancer screening tests at an earlier stage usually difficult to treat and prevent because the cancer tumor has spread to other body parts [16]. Likewise, a study conducted in America reveals that cancer screening must be effectively done to identify risk patients so as to treat and prevent them from developing to stage 4, which is difficult to control [17]. On the other hand, the study also shows that China has the lowest cancer prevalence due to improvement in health technological services. According to a study done in China, it shows that prevalence rates of cancer last year (2015) have declined, greatly due to reduction in the risk factors of cancer, for instance, smoking and alcohol to name a few, as well as effective clinical health care services delivery to rural areas and the disadvantaged population [18]. There is a need for decent quality health service delivery to remote areas, along with strengthening primary health care [19]. Another study done in Spain, concerning the introduction of primary health care strategy programs policy in rural areas, shows that patients are more talkative to nurses about their disease and thus, there is a decline in disease prevalence [20].

On the opposing side, with respect to the risk factors or hazard components, just 23 out of 33 concentrated on risk variables for cancer. Smoking was the highest risk factor (12 studies, 52%) for cancer, followed by an increased BMI (7 studies, 30.4%).

Smoking harms nearly every organ and system in the body and has been linked to many types of cancer [21]. The prevalence rate of smoking in the Pacific is high, with a rate of 59.3% in women and 75% in men [16]. This shows that Pacific males are more likely to develop cancer than their female counterparts [22]. Some factors mentioned in the studies that lead to Pacific islanders getting involved with smoking, are that it is a social norm with men's position in the community, and social environments, as the majority of people are smokers they influence others to smoke, also [23]. On the same note, parental style is an example of a social norm whereby children imitate what they see from their parents or people around them and develop that risky behavior [24] as following older people in the Pacific men are highly respected [25]. Additionally, based on our study findings on smoking as the main risk factor for cancer, it is consistent with studies in China, USA and Europe [26-28].

Moreover, a high BMI is another risk factor of cancer depicted in our study finding. The study found that Pacific islanders consumed more imported goods and less locally grown food. For instance, consuming high saturated fatty foods and high salt content foods, without much outdoor physical activity hence, led to the development tumors. Additionally, because of the industrial revolution in the Pacific, people are adopting the Western cultural way of preparing food. For instance, changing from local to imported goods that are high in saturated fats [29]. Furthermore, Pacific people are very good eaters, meaning they love eating without getting involved in sports or other outdoor activities, which is a risky behavior for diseases development [30]. Moreover, foods that are high in saturated fats and salt can disturb the normal function of the cells in the human body, resulting in overweight people thus, cancer develops [31]. According to a study in New Zealand, most Pacific islanders are more obese, as compared to the Maori people, due to the fact that they eat a lot without getting involved in sports thus, a higher risk for cancer development [32].

As the results of this study highlighted the most common risk factors of cancer among Pacific countries, developing preventive strategies based on these risk factors can help health care systems to reduce the prevalence of cancer. Encouraging people towards choosing healthy lifestyle through developing supportive healthy policy is an important role of Pacific health systems. Hence the results of this study provide a glimpse into the areas that can be targeted for the development of health policy.

This review study included studies which were published from the years 2000 to 2017 to provide a larger scope of the situation and focus more on the recent published articles. Our study also had a few limitations such as not including studies that were published in non-English and also not including gray literatures.

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