International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319 – 6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 6; June 2017; Page No. 4316-4326
DOI: http://dx.doi.org/10.24327/ijcar.2017.4326.0491

Research Article

THE INCIDENCE RATE OF INVASIVE PROSTATE CANCER IN THE UNITED STATES OF AMERICA: AN OBSERVATIONAL DESCRIPTIVE EPIDEMIOLOGICAL ANALYSIS OF DATA FROM THE CENTERS FOR DISEASE CONTROL AND PREVENTION 1999-2014

Ibrahim G. Alghamdi[1*] and Ghanem M. Al-Ghamdi[2]

[1]University of Al-Baha, College of Applied Medical Sciences, Saudi Arabia
[2]University of Al-Baha, College of Science, Saudi Arabia

A R T I C L E I N F O

Article History:
Received 29th March, 2017
Received in revised form 8th April, 2017
Accepted 24th May, 2017
Published online 28th June, 2017

Key words:

Cancer epidemiology; Invasive prostate cancer; the United States of America; Age adjusted Incidence rate.

A B S T R A C T

Background: This study provides descriptive epidemiological data of invasive prostate cancer cases diagnosed from 1999 to 2014 in the United States of America.
Methods: This is a retrospective descriptive epidemiological analysis of invasive prostate cancer cases recorded in the Centres for Disease Control and Prevention from 1999 to 2014.
Results: The state of Detroit, New Jersey, Utah, Seattle, Atlanta and Delaware had the highest overall age-adjusted incidence rate of invasive prostate cancer in the United States of America, from 1999 to 2014.The state of Alaska had the highest overall age-adjusted incidence rate (290.5 per 100,000 persons) of invasive prostate cancer among black men only. The state of Arizona had the lowest overall age-adjusted incidence rate (111.9 per 100,000 persons) of invasive prostate cancer among men across all races (white, black, and Hispanic).
Conclusion: This study revealed that the best geographic areas in the United States of America to study the most important risk factors of invasive prostate cancer among men across all races are the state of Detroit, New Jersey, Utah, Seattle, Atlanta and Delaware. The state of Alaska was the highest area affected by invasive prostate cancer among black men in the United States of America, from 1999 to 2014.The most important protective factors against prostate cancer can be found in the state of Arizona.

INTRODUCTION

Prostate cancer is the most common cancer among men, and it is the sixth leading cause of mortality worldwide.[1-5] It is considered a major health problem in both developed and developing countries.[2-5]The incidence rates of prostate cancer throughout the world will continue to increase.[5] In 2008, it was estimated that nearly 903,500 new prostate cancer cases were diagnosed internationally. The number of deaths from prostate cancer has also increased globally with an estimated 258,400.[2] In the United States of America, the International Agency for Research on Cancer estimated that the age-adjusted incidence rate for prostate cancer was 98.2 per 100,000 population in 2012, and the age-adjusted mortality rate was 9.8 per 100,000 population.[8-9] The purpose of this study is to describe the pattern of invasive prostate cancer in the United States of America from 1999 to 2014, while focusing on the age adjusted incidence rate, stratified by state and race.

MATERIALS AND METHODS

This is a retrospective descriptive epidemiological study of Invasive prostate cancer cases diagnosed between 1999 and 2014 in the United States of America. The data were available and easily accessible from the website of the Centres for Disease Control and Prevention, through the Official Federal Statistics on cancer incidence registries. Based on these data, there are comprehensive cancer data for the 50 States in the United States of America from 1999 to 2014, exploring the age-adjusted incidence rate stratified by race and state. For data analysis, the Statistical Pa ckage for the Social Sciences version 20.0 (SPSS) was used. The descriptive statistics of the data were performed by calculating the mean age-adjusted incidence rate stratified by race, and state.

RESULTS

Invasive Prostate Cancer in the North East of the United States of America

The overall age-adjusted incidence rate of invasive prostate cancer cases, from 1999 to 2014 per 100,000 persons was calculated from the Centres for Disease Control and Prevention. The highest overall age-adjusted incidence rate of invasive prostate cancer cases was documented in the state of New Jersey, with an estimated average of (170.9 per 100,000

Corresponding author:* **Ibrahim G. Alghamdi
University of Al-Baha, College of Applied Medical Sciences, Saudi Arabia

persons). The estimated overall age-adjusted incidence rates in the state of New Jersey, from 1999 to 2014 were higher among white, black and Hispanic men compared to other states in the North East and Middle Atlantic of the United States. **(Table 1)**.

Table 1 Overall age-adjusted incidence rate of invasive prostate cancer in the north east of the United States from 1999 to 2014

	Overall age-adjusted incidence rate of invasive prostate cancer in the North East of the United States from 1999 to 2014			
Geographic Area	**All Races**	**White**	**Black**	**Hispanic**
United States	146.3	137.5	224.8	127.5
Northeast	157.9	149.4	242.6	165.3
New England	152.5	147.4	222.6	167.4
Connecticut	155.9	149.8	224.5	158.3
Maine	145.0	143.1	-	-
Massachusetts	154.3	148.1	230.1	-
New Hampshire	151.8	148.7	-	-
Rhode Island	149.7	144.6	181.8	131.2
Vermont	140.6	140.3	-	-
Middle Atlantic	159.8	150.2	245.3	165.0
New Jersey	**170.9**	**164.0**	**250.4**	**171.1**
New York	162.3	152.8	250.3	166.0
Pennsylvania	149.6	139.3	228.9	142.6

(-) Means in all tables: Rates are suppressed if fewer than 16 cases were reported in a specific category (area, race, ethnicity)

Invasive Prostate Cancer in the Midwest of the United States of America

The highest overall age-adjusted incidence rate of invasive prostate cancer cases was observed in the state of Detroit, with an estimated average of (192.2 per 100,000 persons). The estimated overall age-adjusted incidence rates of invasive prostate cancer in the state of Detroit, from 1999 to 2014 were higher among white, black and Hispanic men compared to other states of Midwest United States. **(Table 2)**.

Invasive Prostate Cancer in the West of the United States of America

The highest overall age-adjusted incidence rate of invasive prostate cancer cases was recorded in the state of Utah and Seattle, with an estimated average of (168.2 and 159.1 per 100,000 persons). The estimated overall age-adjusted incidence rates of invasive prostate cancer in the state of Utah and Seattle were higher among white, black, and Hispanic men compared to other states in the west of the

Table 2 Overall age-adjusted incidence rate of invasive prostate cancer in the Midwest of the United States from 1999 to 2014

	Overall age-adjusted of invasive prostate cancer in the Midwest of the United States from 1999 to 2014			
Geographic Area	**All Races**	**White**	**Black**	**Hispanic**
United States	146.3	137.5	224.8	127.5
Midwest	146.8	138.3	218.8	116.9
East North Central	147.5	136.9	222.5	120.2
Illinois	150.4	140.4	223.0	125.3
Indiana	124.9	119.1	182.4	105.8
Michigan	166.9	151.1	249.2	128.5
Detroit	**192.2**	**171.8**	**269.1**	**161.2**
Ohio	139.6	127.7	208.0	98.3
Wisconsin	148.4	144.3	232.7	113.9
West North Central	145.1	141.2	198.3	103.9
Iowa	137.4	135.0	200.6	88.8
Kansas	150.3	144.0	216.0	115.8
Minnesota	163.8	160.5	198.2	124.9
Missouri	126.7	120.6	193.7	87.4
Nebraska	148.2	144.5	205.5	111.9
North Dakota	159.7	159.9	-	127.5
South Dakota	155.0	154.4	-	116.9

InvasiveProstate Cancer in the South of the United States of America

The highest overall age-adjusted incidence rate of invasive prostate cancer cases was observed in the state of Atlanta and Delaware, with an estimated average of (176.9 and 169.7 per 100,000 persons). The estimated overall age-adjusted incidence rates of invasive prostate cancer in the state of Atlanta and Delaware, from 1999 to 2014 were higher among white and black men compared to other parts of the south of the United States. However, black American men had a higher incidence rate of prostate cancer than white men. **(Table 3)**.

United States. However, the state of Alaska was the highest area affected by invasive prostate cancer among black men living in America, from 1999 to 2014 **(Table 4)**. The lowest overall age-adjusted incidence rate of invasive prostate cancer cases was observed in the state of Arizona, with an estimated average of (111.9 per 100,000 persons).The estimated overall age-adjusted incidence rates of invasive prostate cancer in the state of Arizona were lower among white, black, and Hispanic men compared to other states of northeast, south, west, and Midwest of the United States of America.

Table 3 Overall age-adjusted incidence rate of invasive prostate cancer in the south of the United States from 1999 to 2014

	Overall age-adjusted of invasive prostate cancer in the south of the United States from 1999 to 2014			
Geographic Area	All Races	White	Black	Hispanic
United States	146.3	137.5	224.8	127.5
South	136.7	123.3	214.8	112.7
South Atlantic	146.2	131.1	229.4	135.8
Delaware	**169.7**	**154.1**	**262.3**	-
District of Columbia		129.0	216.0	Data not completed
Florida	135.4	126.6	214.3	140.7
Georgia	157.6	135.9	246.4	111.1
Atlanta	**176.9**	**152.6**	**257.2**	120.5
Maryland	160.0	142.5	222.6	128.2
North Carolina	150.9	133.0	234.4	96.6
South Carolina	158.4	135.0	239.5	127.8
Virginia	144.5	128.4	224.0	121.9
West Virginia	129.6	127.6	204.6	-
East South Central	138.6	124.4	215.8	74.5
Alabama	145.7	124.6	222.5	104.9
Kentucky	137.6	131.7	209.9	-
Mississippi	155.8	129.3	230.3	-
Tennessee	127.6	120.0	189.1	78.5
West South Central	141.2	132.4	213.9	110.0
Arkansas	144.4	133.5	210.2	117.8
Louisiana	166.0	148.2	227.5	132.9
Oklahoma	138.4	129.5	230.8	111.4
Texas	138.4	132.3	208.4	111.0

Table 4 Overall age-adjusted incidence rate of invasive prostate cancer in the west of the United States from 1999 to 2014

	Overall age-adjusted of invasive prostate cancer in the west of the United States from 1999 to 2014			
Geographic Area	All Races	White	Black	Hispanic
United States	146.3	137.5	224.8	127.5
West	140.6	138.1	208.2	122.3
Mountain	137.6	134.8	173.2	114.4
Arizona	**111.9**	**108.3**	**156.4**	**95.6**
Colorado	149.1	140.0	203.8	119.0
Idaho	155.2	152.9	-	123.8
Montana	157.3	155.7	-	-
Nevada	133.1	131.9	164.6	123.6
New Mexico	131.0	133.2	161.3	120.1
Utah	**168.2**	**169.6**	**209.7**	**138.4**
Wyoming	151.4	152.8	-	Data not completed
Pacific	141.0	139.0	214.2	124.1
Alaska	137.7	146.1	**290.5**	-
California	140.1	136.7	214.4	124.4
San Francisco-Oakland	146.1	149.3	215.9	131.9
San Jose-Monterey	150.0	159.5	196.9	143.3
Los Angeles	139.5	130.2	219.6	123.6
Hawaii	117.7	126.0	203.6	126.1
Oregon	139.5	136.8	193.0	117.4
Washington	152.4	151.4	221.5	121.7
Seattle-Puget Sound	**159.1**	**160.3**	**229.8**	**137.0**

DISCUSSION

This descriptive epidemiological study of invasive prostate cancer among men in the United States of America explores a valuable information about the pattern of the disease in the entire population. It focuses on the age-adjusted incidence rate of invasive prostate cancer stratified by state and race. The result of the study is based on the data recorded in the Centres for Disease Control and Prevention, from 1999 to 2014.

In the North East of the United States, we have observed that the highest overall age-adjusted incidence rates of invasive prostate cancer cases among white, black, and Hispanic men were documented in the state of New Jersey, from 1999 to 2014. The most likely reason for this rising age-adjusted incidence rate is that most men across all races were sharing the same risk factor of invasive prostate cancer. Figure 1, shows how one can identify the most important risk factor for invasive prostate cancer among white, black, and Hispanic men living in the state of New Jersey. The risk factor can be identified by conducting three (3) case-control studies among men across all races (white, black, and Hispanic).

In the Midwest of the United States, the overall age-adjusted incidence rates of invasive prostate cancer, from 1999 to 2014 were the highest among white, black, and Hispanic men living in the state of Detroit compared to other parts of the Midwest of the United States. The most likely reason for this rising age-adjusted incidence rate is that most men across all races were sharing the same risk factor of invasive prostate cancer. Figure 2, shows how one can identify the most important risk factor for invasive prostate cancer among white, black, and Hispanic men living in the state of Detroit. The risk factor can be identified by conducting three (3) case-control studies among men across all races (white, black, and Hispanic).

In the South of the United States, the overall age-adjusted incidence rates of invasive prostate cancer, from 1999 to 2014 were higher among white and black men living in the state of Atlanta and Delaware compared to other parts of the south of the United States (Figure 3).

incidence rates of invasive prostate cancer, from 1999 to 2014 were higher among white, black, and Hispanic men living in the state of Utah and Seattle compared to other parts of the

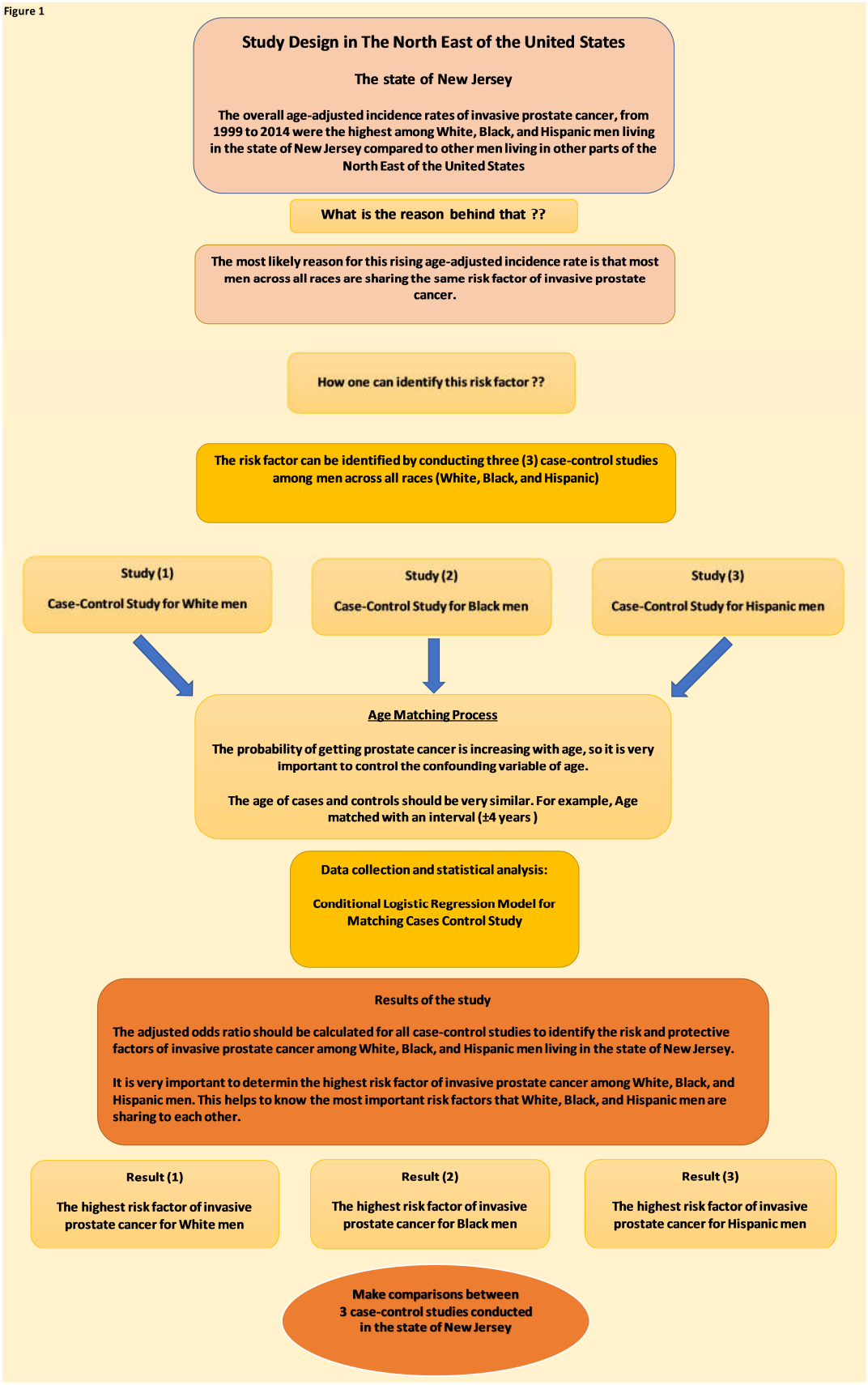

Figure 1 Study Design in The North East of the United States

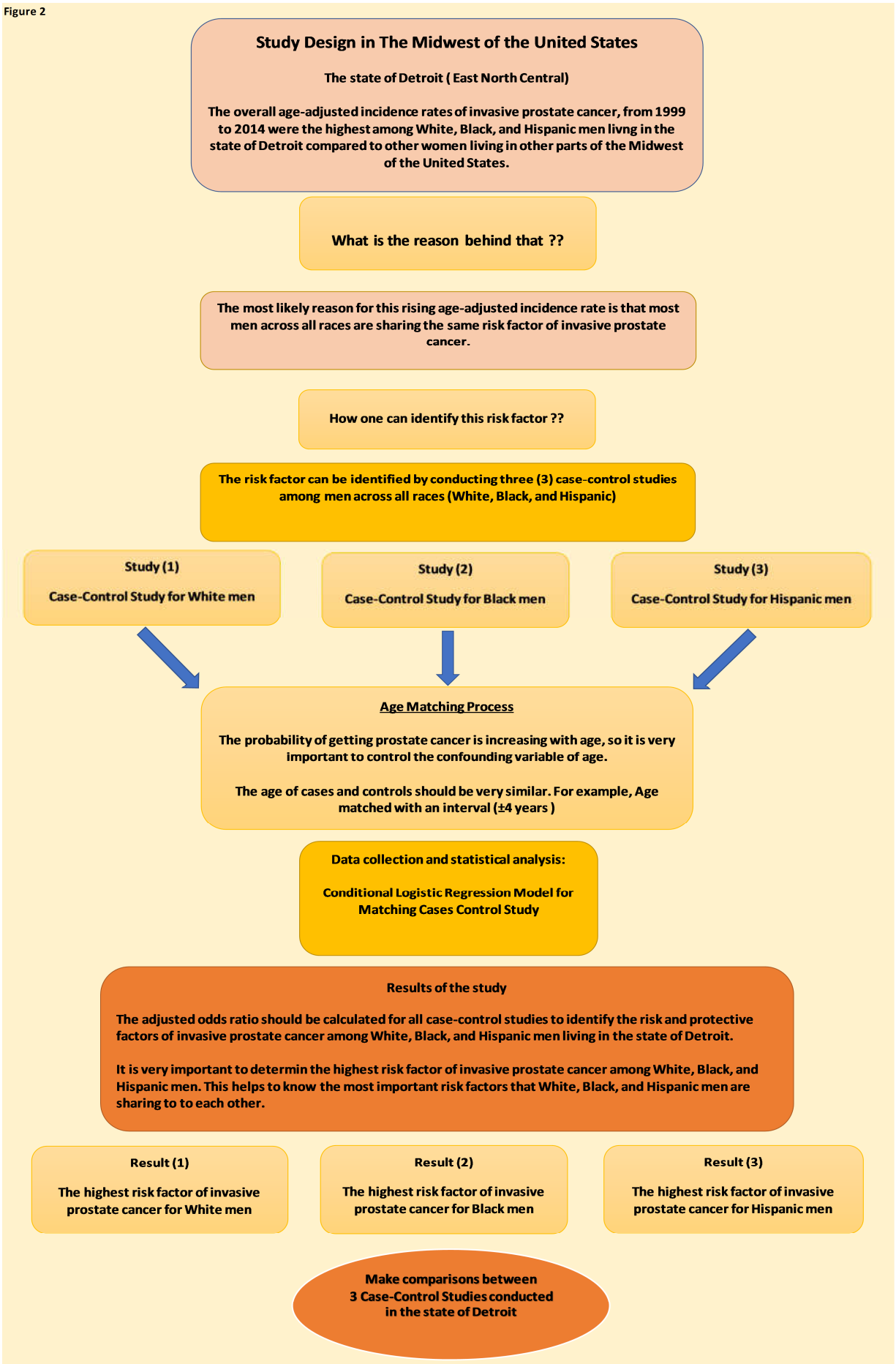

Figure 2 Study Design in The Midwest of the United States

Figure 3

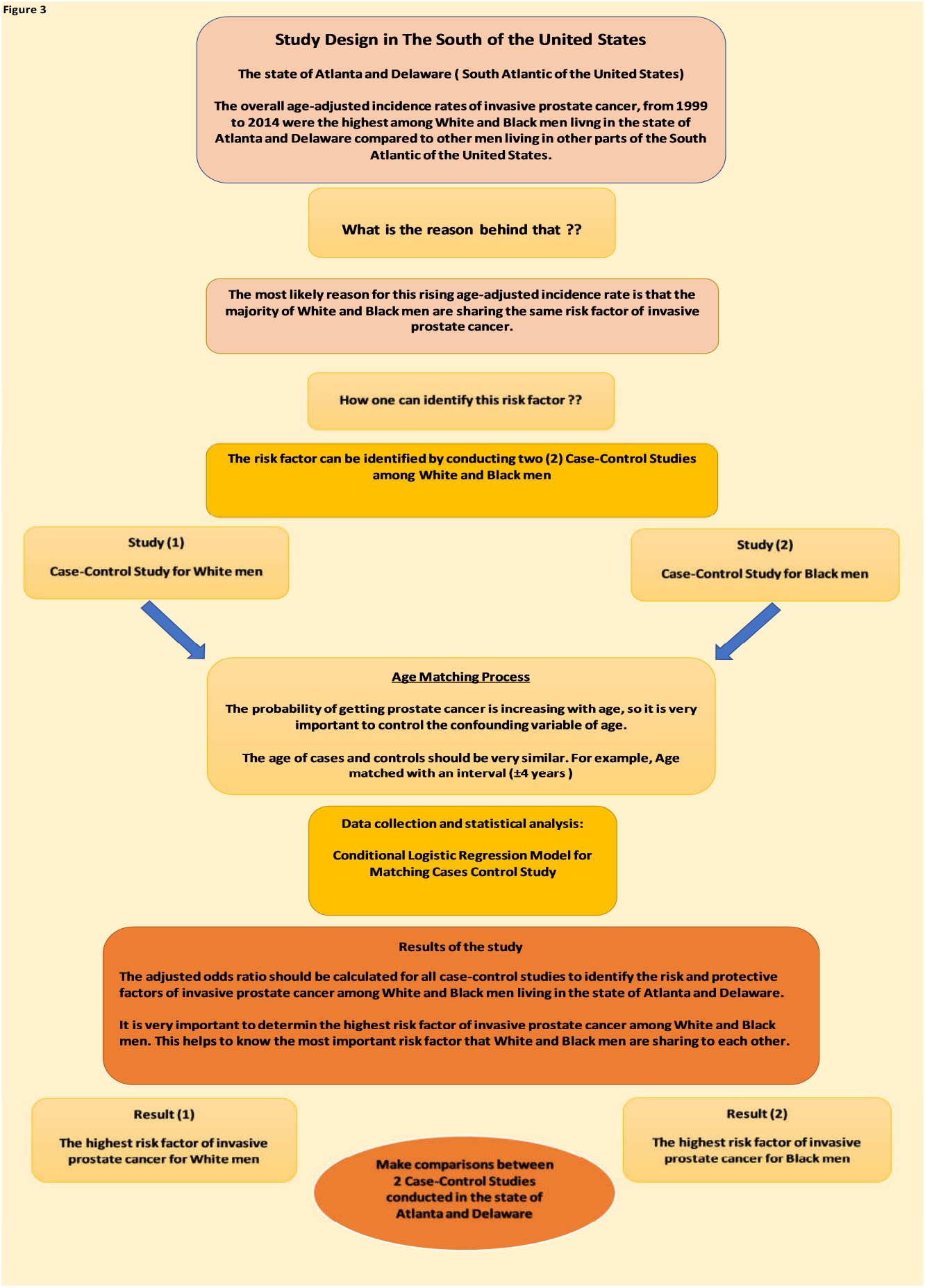

Figure 3 Study Design in The South of the United States

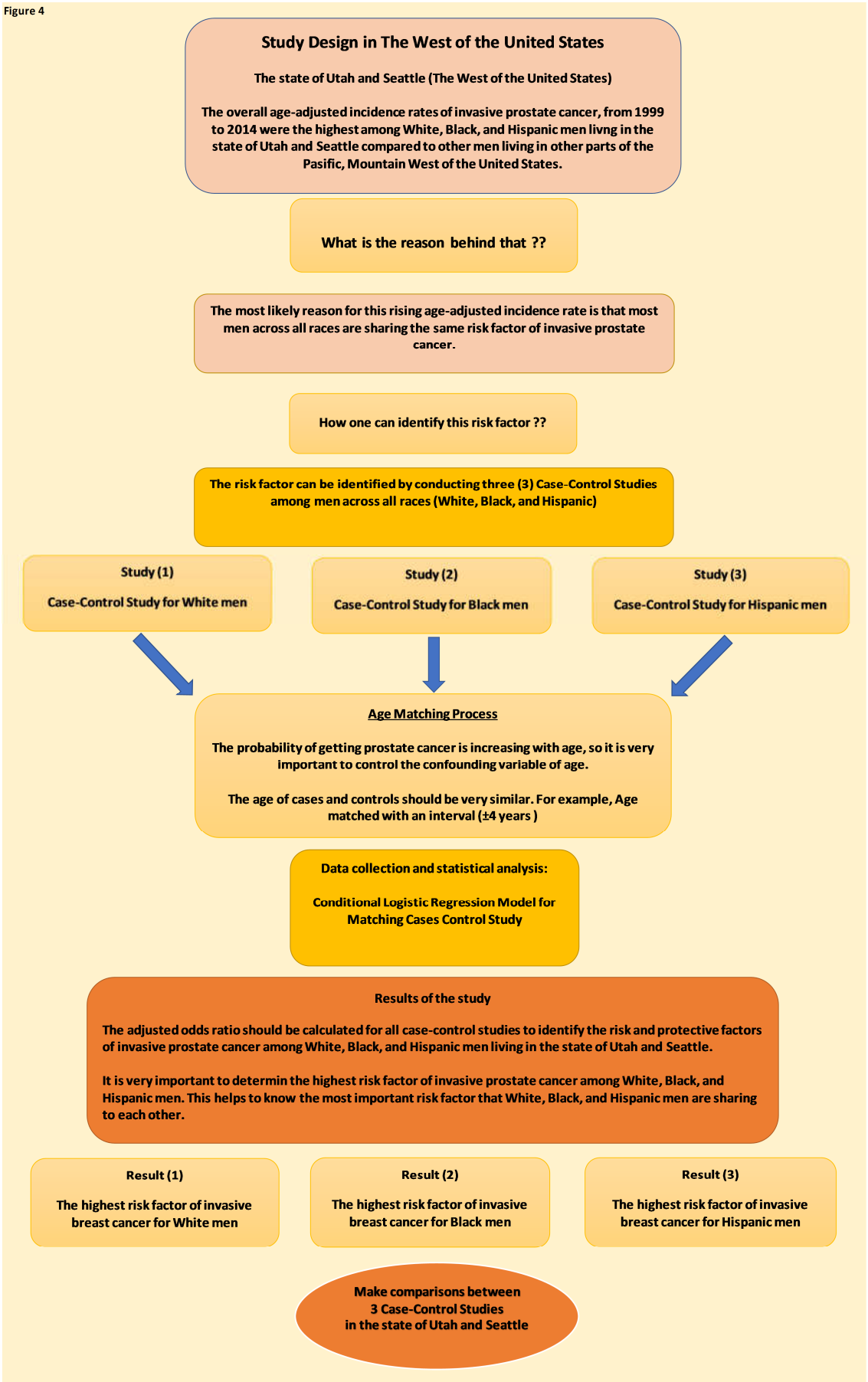

Figure 4 Study Design in the state of Utah and Seattle (The West of the United States)

Figure 5

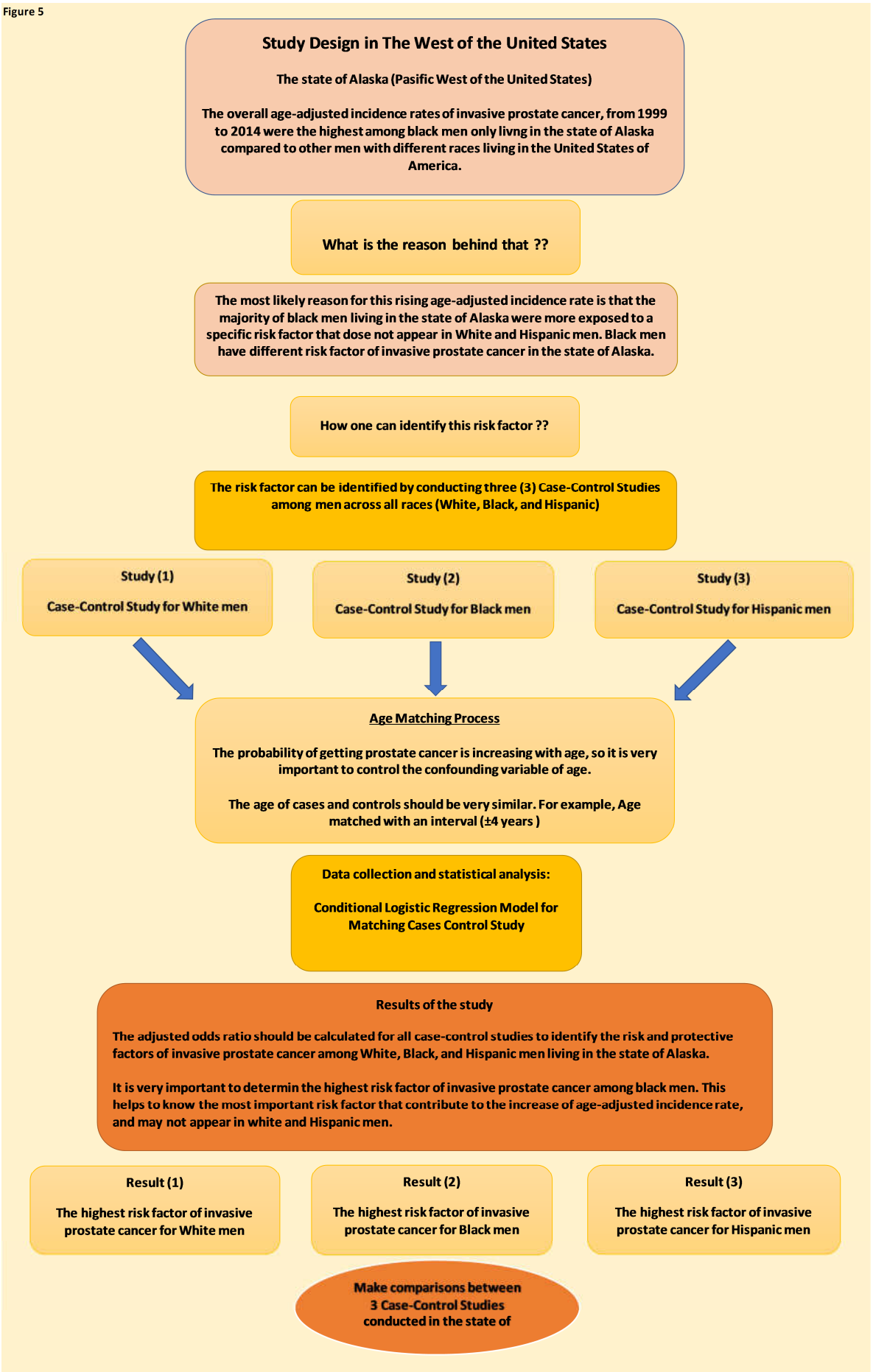

Figure 5 Study Design in the state of Alaska (Pacific West of the United States)

Figure 6

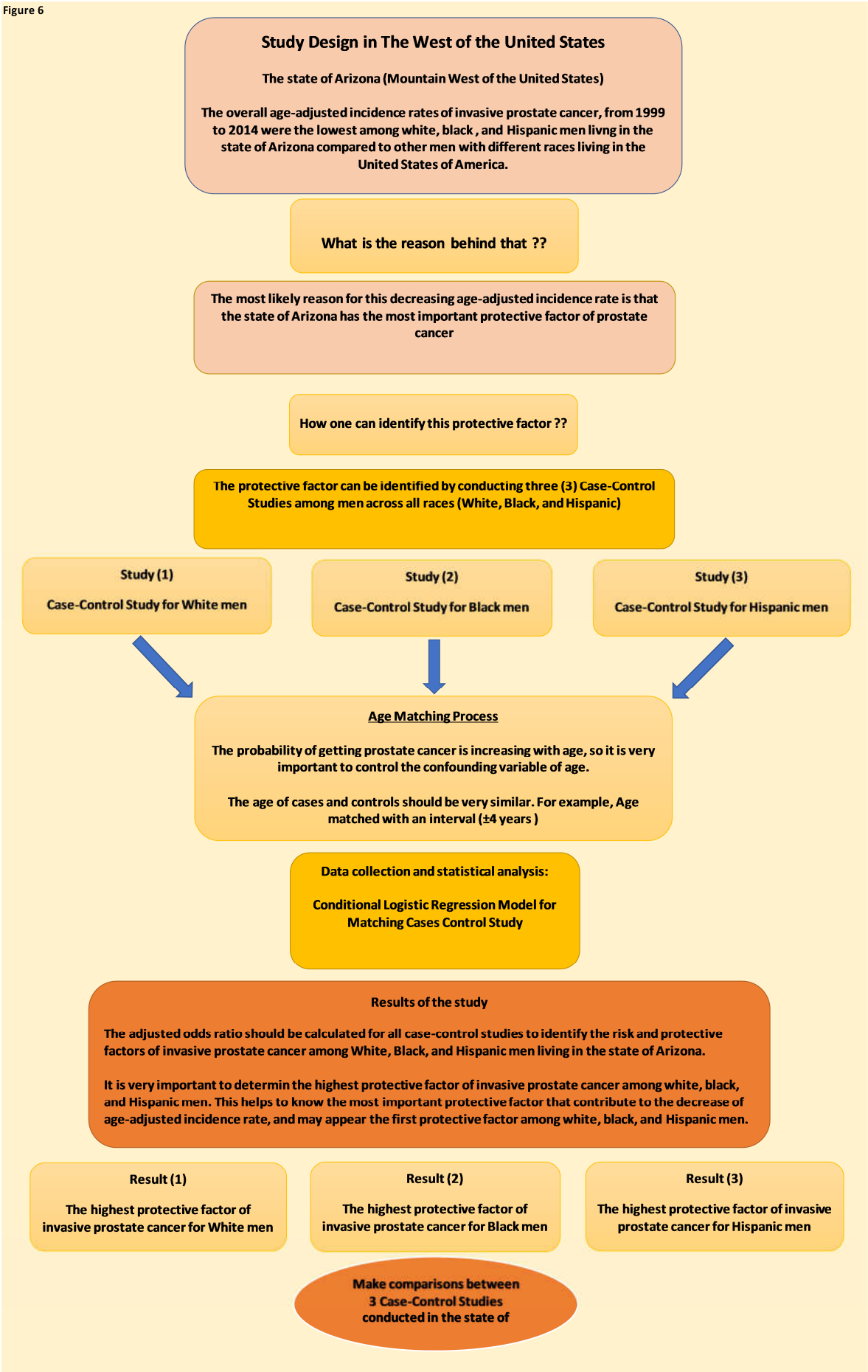

Figure 6 Study Design in the state of Arizona (Mountain West of the United States)

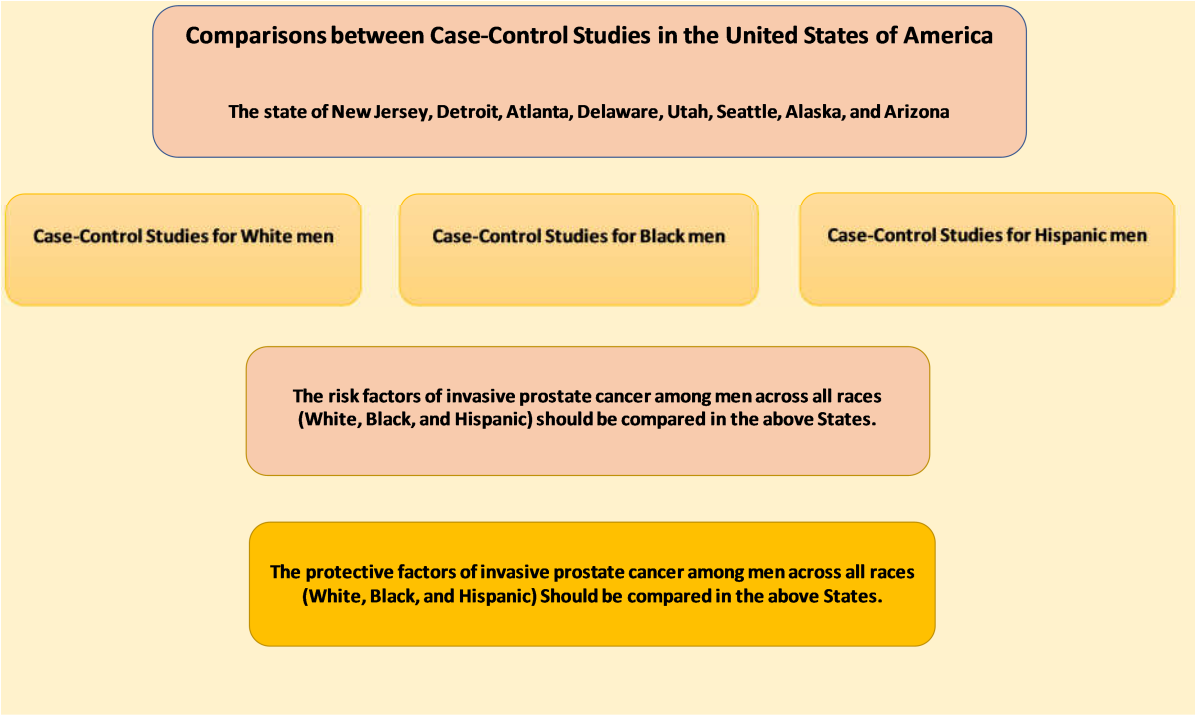

Figure 7 Comparisons between Case-Control Studies in the United States of America

west of the United States (Figure 4). In addition, the state of Alaska was the highest area affected by invasive prostate cancer among black men compared to other parts of the United States of America, from 1999 to 2014. The most likely reason for this rising age-adjusted incidence rate is that most of black men in the state of Alaska were more exposed to a specific risk factor that does not appear in white and Hispanic men (Figure 5). Black men living in the state of Alaska may have different risk factors of invasive prostate cancer. The lowest overall age-adjusted incidence rate of invasive prostate cancer cases was observed in the state of Arizona. The most likely reason for this decreasing age-adjusted incidence rate is that the state of Arizona has the most important protective factor against prostate cancer. Figure 6, shows how one can identify the most important protective factor for invasive prostate cancer among white, black, and Hispanic men living in the state of Arizona. The risk and protective factors can be identified by conducting three (3) case-control studies among men across all races (white, black, and Hispanic).

Finally, it is very important to conduct multiple case-control studies in the highest area affected by invasive prostate cancer adjusted by race. This procedure helps to make a good comparison between the risk factors of prostate cancer across all races in the state of New Jersey, Detroit, Atlanta, Delaware, Utah, Seattle and Alaska (Figure 7).

CONCLUSION

Our study revealed that the State of New Jersey, Detroit, Utah, and Seattlehad the highest overall age-adjusted incidence rate of invasive prostate cancer among white, black, and Hispanic men from 1999 to 2014. Those men across all races living in the mentioned states share the most important risk factor of invasive prostate cancer that contributing to the increase of age-adjusted incidence rate. The state of Atlanta and Delaware had the highest overall age-adjusted incidence rate of invasive prostate cancer among white and black men from 1999 to 2014. Therefore, a multiple case-control studies should be conducted to identify the major risk factors that can be controlled. In addition, the state of Alaska was the highest area affected by invasive prostate cancer among blackmen in the United States of America, from 1999 to 2014, therefore, most of the black men in the state of Alaskaare more exposed to a specific risk factor that may does not appear in white and Hispanic men, however black men living in the state of Alaska may have a different risk factors for invasive prostate cancer. The most important protective factors against prostate cancer can be found in the state of Arizona. It is the best geographic area in the United States of America to study the real protective factors of prostate cancer.

References

1. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. *CA Cancer J Clin*. 2011; 61(2):69-90.
2. Alghamdi IG, Hussain II, Alghamdi MS, El-Sheemy MA. 2013. The incidence rate of prostate cancer in Saudi Arabia: an observational descriptive epidemiological analysis of data from the Saudi Cancer Registry 2001-2008. *Hematology Oncology and Stem Cell Therapy journal*, 2013; 7(1):18–26. http://dx.doi.org/10.1016/j.hemonc.2013.10.001
3. Siegel R, Ward E, Brawley O, Jemal A. Cancerstatistics, 2011: the impact of eliminating
4. socioeconomic and racial disparities on premature cancer deaths. *CA Cancer J Clin* 2011;61(4): 212-36.
5. Baade PD, Youlden DR, Krnjacki LJ. International epidemiology of prostate cancer: geographical distribution and secular trends. *MolNutr Food Res* 2009;53(2):171-84
6. Edwards BK, Brown ML, Wingo PA, Howe HL, Ward E, Ries LA, et al. Annual report to the nation on the

status of cancer, 1975–2002, featuring population-based trends in cancer treatment. *J Natl Cancer Inst* 2005;97(19):1407-27

7. American Cancer Society. Global Cancer Facts and Figures. Estimated number of new cancer cases by world area, 2012. Available from: https://www.cancer.org/research/cancer-facts-statistics/global.html. Accessed April 11, 2017.
8. International Agency for Research on Cancer. GLOBOCAN. Estimated cancer incidence, mortality and prevalence worldwide in 2012. Available from: http://globocan.iarc.fr/Pages/summary_table_site_sel.aspx. Accessed April 11, 2017.

How to cite this article:

Ibrahim G. Alghamdi and Ghanem M. Al-Ghamdi (2017) ' The Incidence Rate Of Invasive prostate Cancer In The United States Of America: An Observational Descriptive Epidemiological Analysis Of Data From The Centers For Disease Control And Prevention 1999-2014', *International Journal of Current Advanced Research,* 06(06), pp. 4316-4326.
DOI: http://dx.doi.org/10.24327/ijcar.2017.4326.0491

****