EXAMINING THE ASSOCIATIONS BETWEEN RACIAL DEMOGRAPHICS, HEALTH INDICATORS, AND CHRONIC DISEASE AMONG ASIAN AMERICAN PATIENTS

By

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ABSTRACT

There are millions of diseases in the world; in fact, since the 1970s, 40 new infectious diseases have been discovered.[1] While some have been dominant in specific geographical regions for decades, others have only recently appeared in other parts of the world. These new outbreaks can easily be written off as sporadic; however, further research shows that the origin of diseases is systematic with influence from demographic and cultural factors such as population density and adequate access to resources.[2] If that is so, what influence does racial demographics have on public health?

Through the analysis of data from Bhagat Puran Singh Health Initiative's various free health clinics throughout the city of Riverside, this research project will provide insight on the correlation between various racial groups and health illnesses. Specifically, this study will focus on the Thai community at the Suddhavasa Buddist Meditation Center and South Asian community at the Riverside Gurdwara and Walnut Temple, in comparison to the White American community in Riverside. Through this study, readers will gain knowledge of the health trends present in two Asian American minority groups in Riverside, and, as a result, gain insight on the influence cultural background has on health.

[1] "Emerging Infectious Diseases," *Baylor College of Medicine*.
[2] O'Neil, Dennis, "Culture Specific Diseases," *Medical Anthropology: Culture Specific Diseases*, 7 Oct. 2010.

ACKNOWLEDGEMENTS

I would like to give a special thanks to my Faculty Mentor, Dr. Andrew Subica of the UCR School of Medicine Center for Health Communities, for guiding me throughout this entire process since it first began with an idea in 2019. Without his guidance, this project would not have been possible, and I have gained invaluable research experience working with him both on this project.

Alongside him, I would like to thank the Bhagat Puran Singh Health Initiative for the opportunity to learn more about the various cultures present within the Inland Empire, and their healthcare experiences. Throughout my four years volunteering with the free mobile health clinic, I have experienced and internalized the importance of cultural understanding in order to provide quality healthcare.

I would also like to recognize the UCR University Honors Program for providing me with the opportunity to pursue a research question I have been passionate to learn more about and consistently providing me with support and opportunities throughout my four years in undergraduate university. As I graduate and pursue the path to becoming a healthcare physician, this research experience has taught me a skillset I will continue to take with me.

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INTRODUCTION

BACKGROUND & SIGNIFICANCE

Currently, there is an imbalance of research present in studies that compare racial demographics and health, specifically within the Asian community. Historically, research categorizes the over 40 Asian subgroups under one general name: Asian.[3] Even though the American demographic includes over 3 million South Asians, this racial group is analyzed alongside over 4 million Chinese-Americans and nearly 3.5 million Filipino-Americans.[4] By combining these subgroups together, research studies not only lose valuable information about differing health trends within the Asian community, but also receive an unrepresentative sample of each Asian subgroup.

In addition to a lack of research done on different Asian subpopulations, there has yet to be a project that examines health trends among different Asian subpopulations in Riverside. Although such research has been done on a national scale, such as an earlier study that examined cancer statistics by race and ethnicity on a national scale, a similar research study has not been done in the Inland Empire.[5]

The Inland Empire presents a very unique opportunity for exploring the health of various Asian subgroups as Asians compose 7.24% of the Riverside population, and there are multiple predominantly Asian sites of worship throughout Riverside.[6] Hence, this project's focus on two large but understudied Asian subgroups—i.e., South Asians (Indian) and Southeast Asians (Thai)—will allow us to gain greater insight on the health of relatively unresearched Asian racial subgroups in Riverside.

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[3] "Census Data & API Identities," *Asian Pacific Institute on Gender Based Violence Website*, 12 Mar. 2018.
[4] Ibid.
[5] Parker, Sheryl L., Davis, Kourtney J., Wingo, Phyllis, G., Lynn A., Heath Jr., Clark W. "Cancer statistics by race and ethnicity," CA: a cancer journal for clinicians 48.1 (1998): 31-48.
[6] "Riverside, California Population 2019," *Riverside, California Population 2019 (Demographics, Maps, Graphs)*, 2019.

By doing so, this project may contribute useful information for targeting healthcare to the unique health needs of these Asian subgroups, such as diabetes. For example, the data gained from this project may assist doctors in the Inland Empire in providing more effectively catered diabetes care for Asians living in Riverside as in 2007 alone, $218 billion were spent towards diabetes.[7] Through this project, physicians in the Riverside community may become more conscious about levels of body mass index (BMI, blood pressure, and blood glucose) that various Asian communities deal with, thus addressing their health needs through improved targeting of treatment.

PROJECT OBJECTIVES

There are four main hypotheses for this research project examining health among South Asian and Southeast Asian individuals living in Riverside. The first hypothesis states that BMI, blood pressure, and blood glucose levels will be positively correlated in our total sample (i.e., South Asian and Southeast Asian participants combined). The second hypothesis states that South Asian participants will have significantly higher levels of BMI, blood pressure, and blood glucose in comparison to White Americans. Similarly, the third hypothesis states that Southeast Asians will have significantly higher levels of BMI, blood pressure, and blood glucose in comparison to White Americans. The fourth hypothesis states that age, sex, and family history of diabetes, heart disease, high cholesterol, and hypertension will significantly predict BMI, blood pressure, and blood glucose levels in our sample. This final hypothesis will allow us to determine which demographic factors may lead to increased risk for elevated BMI, blood pressure, and blood glucose among South Asian and Southeast Asian individuals living in Riverside; and therefore, which of these factors may be screened to alert future healthcare providers to South

[7] Chow, Edward A., Foster, Henry, Gonzalez, Victor, McIver, LaShawn "The disparate impact of diabetes on racial/ethnic minority populations." *Clinical Diabetes* 30.3 (2012): 130-133.

Asian and Southeast Asian participants' increased risk for chronic diseases such as diabetes and heart disease.

METHODS

The study sample consisted of adults from two large Asian subgroups in Riverside: South Asian (Indian) and Southeast Asian (Thai). For my capstone, I analyzed data from 270 total participants from these subgroups: 225 South Asian and 50 Southeast Asian participants. I then compared the levels of BMI, blood pressure, and blood glucose (our study outcome variables) for participants against data collected on White American participants. The independent variables of this study were age, sex, and family history of diabetes, heart disease, high cholesterol, and hypertension for the two minority groups.

DATA COLLECTION

Data was collected during community health screenings held at South Asian and Southeast Asian churches by BPSHI, an established free UCR-led clinic organization. Specifically, this study used screening data collected during the established clinic flow of registration, BMI, blood pressure, and blood glucose readings, and doctor consultation. All data for this study was collected on the standard BPSHI registration forms. Specifically, the de-identified data drawn from the registration forms were clinic location, in order to determine the racial group; BMI; blood pressure level; blood glucose level; age; sex; and family history of diabetes, heart disease, high cholesterol, and hypertension. Figure 1.1 below shows the data collection page of the registration form.

Project data was collected from two community sites served by BPSHI: Southeast Asian (Thai) community at the Suddhavasa Buddist Meditation Center, South Asian (Indian) community at the Riverside Gurdwara. These two sites were used as BPSHI sets up clinics at these locations every quarter.

DATA ANALYSIS

In order to test out four hypotheses, three types of data analysis were performed using SPSS v. 24.[8] For the first hypothesis, which determines whether or not there are positive correlations between BMI, blood pressure, and blood glucose in our total sample, Pearson's correlations were conducted.[9] For the second and third hypotheses, which compare the South Asians and Southeast Asians to the White Americans, descriptive statistics was conducted to establish the mean scores of our participant subgroups for direct comparison to the mean scores in the national data for White Americans. Independent t-tests were also conducted to compare the mean scores of South Asian and Southeast Asian participants.[10] For the fourth hypothesis, linear regression was conducted with separate regression models for our three dependent variables of BMI, blood pressure, and blood glucose levels, predicted by our independent variables of age, sex, and family history of diabetes, heart disease, high cholesterol, and hypertension.

[8] Chesley, Ross, "How to Setup and Use Microsoft SQL Server Management Studio," *Liquid Web*, 10 July 2019.
[9] "Pearson Correlations – Quick Introduction," *SPSS Tutorials*, Sept. 2019.
[10] Kenton, Will, "Descriptive Statistics," *Investopedia*, Investopedia, 27 June 2019.

RESULTS

The full data set, following analysis and editing for missing data and human error, resulted in 286 entries. Of those entries, 225 (78.7%) represented the South Asian community at the Riverside Gurdwara and Walnut Hindu Temple, 50 (17.5%) represented the Thai community from the Suddhavasa Buddist Meditation Center, and 11 (3.8%) represent the White American community, as seen in ***Table 1*** below.

Table 1 Health Demographics for Three Populations Studied

	Total N	%	Arthritis	%	Cancer	%	Diabetes	%	Heart Disease	%	High Chol.	%	HTN	%
South Asian	225	78.7	11	4.9	3	1.3	48	21.3	9	4.0	36	16.0	43	19.1
Southeast Asian	50	17.5	2	4.0	1	2.0	8	16.0	4	8.0	10	20.0	13	26.0
White American	11	3.8	11	100.0	11	100.0	3	27.3	0	0.0	11	100.0	4	36.4
Total	286	100.0	24	8.4	15	5.2	59	20.6	13	4.5	57	19.9	60	21.0

Prevalence of arthritis was 21.3% (n=48) in South Asian participants, 16.0% (n=8) in Southeast Asian participants, and 27.3% (n=3) in White American. Prevalence of cancer was 1.3% (n=3) in South Asian participants, 2.0% (n=1) in Southeast Asian participants, and 100.0% (n=11) in White American. Prevalence of diabetes was 21.3% (n=48) in South Asian participants, 16.0% (n=8) in Southeast Asian participants, and 27.3% (n=3) in White American. Prevalence of heart disease was 4.0% (n=9) in South Asian participants, 8.0% (n=4) in Southeast Asian participants, and 0.0% (n=0) in White American. Prevalence of high cholesterol was 16.0% (n=36) in South Asian participants, 20.0% (n=10) in Southeast Asian participants, and 100% (n=11) in White American. Prevalence of hypertension was 19.1% (n=43) in South Asian participants, 26.0% (n=13) in Southeast Asian participants, and 36.4% (n=4) in White American.

The first hypothesis, which states that BMI, blood pressure, and blood glucose levels will be positively correlated in our total sample, was tested via Pearson's correlation. The Pearson's correlations as seen in ***Table 2*** shows no statistical correlation between the three variables at the 0.05 level.

Table 2 Pearson's Correlation of BMI, Blood Pressure, and Blood Glucose Level

	BMI	BP Systolic	Blood Glucose
BMI	--	0.024	- 0.018
BP Systolic	--	--	0.076
Blood Glucose	--	--	--

To test the study's second and third hypotheses, which states that South Asian and Southeast Asian participants will have significantly higher levels of BMI, blood pressure, and blood glucose in comparison to White Americans, respectively, one-way ANOVAs with Tukey post hoc analyses were conducted as seen in **Tables 4, 5, and 6**.

For South Asian participants, mean scores of BMI, systolic blood pressure, and blood glucose were 27.2084, 136.9511, and 130.3467, respectively. For Southeast Asian participants, mean scores of BMI, systolic blood pressure, and blood glucose were 27.7322, 131.2000, and 133.4800, respectively. For White American participants, mean scores of BMI, systolic blood pressure, and blood glucose were 33.2400, 134.4545, and 150.3636, respectively.

Table 3 Mean BMI, blood pressure systolic, and blood glucose of three populations

	BMI	Blood Pressure Systolic	Blood glucose
South Asian	27.2084	136.9511	130.3467
Southeast Asian	27.7322	131.2000	133.4800
White American	33.2400	134.4545	150.3636

As seen in **Table 4**, BMI one-way ANOVA with Tukey post hoc comparisons between the South Asian and Southeast Asian populations there is a mean difference of -0.52376, between the South Asian and White American populations there is a mean difference of -6.03156, and between the Southeast Asian and White American populations there is a mean difference of -5.507. None of these values meet the level of significance for the populations to be statistically different in the BMI model.

Table 4 BMI One-Way ANOVA with Tukey Post Hoc Comparisons

Population (I)	Population (J)	Mean Difference (I-J)	Significance
South Asian	Southeast Asian	-0.52376	0.935
	White American	-6.03156	0.106
Southeast Asian	South Asian	0.52376	0.935
	White American	-5.50708	0.198
White American	South Asian	6.03156	0.106
	Southeast Asian	5.507	0.198

As seen in **Table 5**, for blood pressure systolic one-way ANOVA with Tukey post hoc comparisons between the South Asian and Southeast Asian populations there is a mean difference of 5.75111, between the South Asian and White American populations there is a mean difference of 2.49657, and between the Southeast Asian and White American populations there is a mean difference of -3.25455. None of these values meet the level of significance for the populations to be statistically different in the blood pressure systolic model.

Table 5 Blood Pressure Systolic One-Way ANOVA with Tukey Post Hoc Comparisons

Population (I)	Population (J)	Mean Difference (I-J)	Significance
South Asian	Southeast Asian	5.75111	0.174
	White American	2.49657	0.918
Southeast Asian	South Asian	-5.75111	0.174
	White American	-3.25455	0.882
White American	South Asian	-2.49657	0.928
	Southeast Asian	3.25455	0.882

As seen in **Table 6**, for blood glucose one-way ANOVA with Tukey post hoc comparisons between the South Asian and Southeast Asian populations there is a mean difference of 9.46754, between the South Asian and White American populations there is a mean difference of -20.0167, and between the Southeast Asian and White American populations there is a mean difference of -16.88364. None of these values meet the level of significance for the populations to be statistically different in the blood glucose model.

Table 6 Blood Glucose One-Way ANOVA with Tukey post hoc comparisons

Population (I)	Population (J)	Mean Difference (I-J)	Significance
South Asian	Southeast Asian	-3.13333	9.46754
	White American	-20.0167	18.69887
Southeast Asian	South Asian	3.13333	9.46754
	White American	-16.88364	20.1665
White American	South Asian	20.016697	18.69887
	Southeast Asian	16.88364	20.1665

To test the fourth hypothesis, linear regressions were conducted with BMI, blood pressure, and glucose as the dependent variables, and age, sex, diagnosis of heart disease,

diabetes, hypertension, and high cholesterol as the independent variables. For the BMI model, none of the independent variables significantly predicted BMI. For the blood pressure model, significant predictors were age with $B = 0.428$ ($p < 0.05$), sex with $B = -6.876$ ($p < 0.05$), heart disease with $B = -1.507$ ($p < 0.05$), and HTN with $B = 9.383$ ($p < 0.05$). For the glucose model, significant predictors were diabetes with $B = 0.441$ ($p < 0.05$) and high cholesterol with $B = -0.165$ ($p < 0.05$).

CONCLUSION

This research project tested four hypotheses. The first hypothesis was that BMI, blood pressure, and blood glucose levels would be positively correlated in our total sample (i.e., South Asian and Southeast Asian participants combined). The second hypothesis was that South Asian participants would have significantly higher levels of BMI, blood pressure, and blood glucose in comparison to White Americans. The third hypothesis was that Southeast Asians would have significantly higher levels of BMI, blood pressure, and blood glucose in comparison to White Americans. The fourth hypothesis was that age, sex, and family history of diabetes, heart disease, high cholesterol, and hypertension would significantly predict BMI, blood pressure, and blood glucose levels in our sample.

Based on analysis of ***Table 2***, there was no statistical significance among BMI, blood pressure, and blood glucose levels in our sample. Based on analysis of ***Tables 4, 5, and 6***, neither South Asian nor Southeast Asian participants had significantly higher levels of BMI, blood pressure, and blood glucose than White American participants. Based on analysis of the regression coefficients of our three linear regression models, none of the independent variables were significant predictors for BMI in our BMI model. In contrast, age, sex, heart disease, and HTN were significant predictors for blood pressure in our blood pressure model while diabetes and high cholesterol were significant predictors of glucose levels for our glucose model.

This paper is a step in the direction of extracting more background and data on underrepresented groups within healthcare research. Through the discovery of significant predictors of BMI, blood pressure, and blood glucose in the fourth hypothesis, healthcare professionals within the Inland Empire can gain further insight on their patient population, as well as indicators for risky health conditions. Beyond these key takeaways, further research

should be done on racial demographics and health indicators beyond the Inland Empire and the South Asian and Southeast Asian communities.

PROJECT LIMITATIONS

Limitations will include the use of a convenience vs. random sample, which may have introduced bias into our results. Another limitation is the small sample of White American participants, which may have caused the comparisons between our Asian American samples vs. White American samples to not reach significance. As seen in the participant descriptive statistics in ***Table 1***, a potential limitation is the skewed population group size with the South Asian population including 225 participants and the Southeast Asian population including 50 participants in comparison to the White American population of 11 participants.

IMPLICATIONS

Based on the research findings of this paper, healthcare providers can better understand the health demographics of two populations within the Inland Empire not predominantly discussed within the research community. By doing so, measurements of BMI, blood pressure, and blood glucose can be contextually analysed so false negatives and false negatives for health conditions do not arise when consulting with a patient. Specifically, this section will further analyse the conclusions in relation to their connections to society.

The second hypothesis's finding that neither South Asian nor Southeast Asian participants had significantly higher levels of BMI, blood pressure, and blood glucose than White American participants was surprising as it differed from the prediction in the hypothesis. As mentioned in the project limitations section one possible reasoning behind this result is the difference in population size between the Asian subgroups and the White population. Along with this, another possible reasoning for a lack of differences between the two groups is geographic similarities. Since all three sites studied fell within a 15 mile radius within one another, with a notably small difference of 5 miles between the South and Southeast Asian populations, a potential reasoning for no difference is the similar community. Based on the close proximity of the sites, it is possible that the health-related facilities of the community, such as grocery stores, doctor offices, and exercise facilities, overshadow any differences that can be seen in the health of the population groups.

The fourth hypothesis's finding based on analysis of the regression coefficients of our three linear regression models, none of the independent variables were significant predictors for BMI in our BMI models. Based on the participant data used, a potential reasoning for the independent variable of age not being a significant predictor of BMI, is the lack of a large age

range. The South Asian and Southeast Asian populations had data collected from sites of worship, in which a majority of the population skewed older. When analyzing the data, it was found that the average age of 286 participants in the study was 54.3322 years old, with it being 54.92 00for the South Asian population, 52.4800 for the South Asian population, and 50.7273 for the White American population, as seen in ***Table 7***.

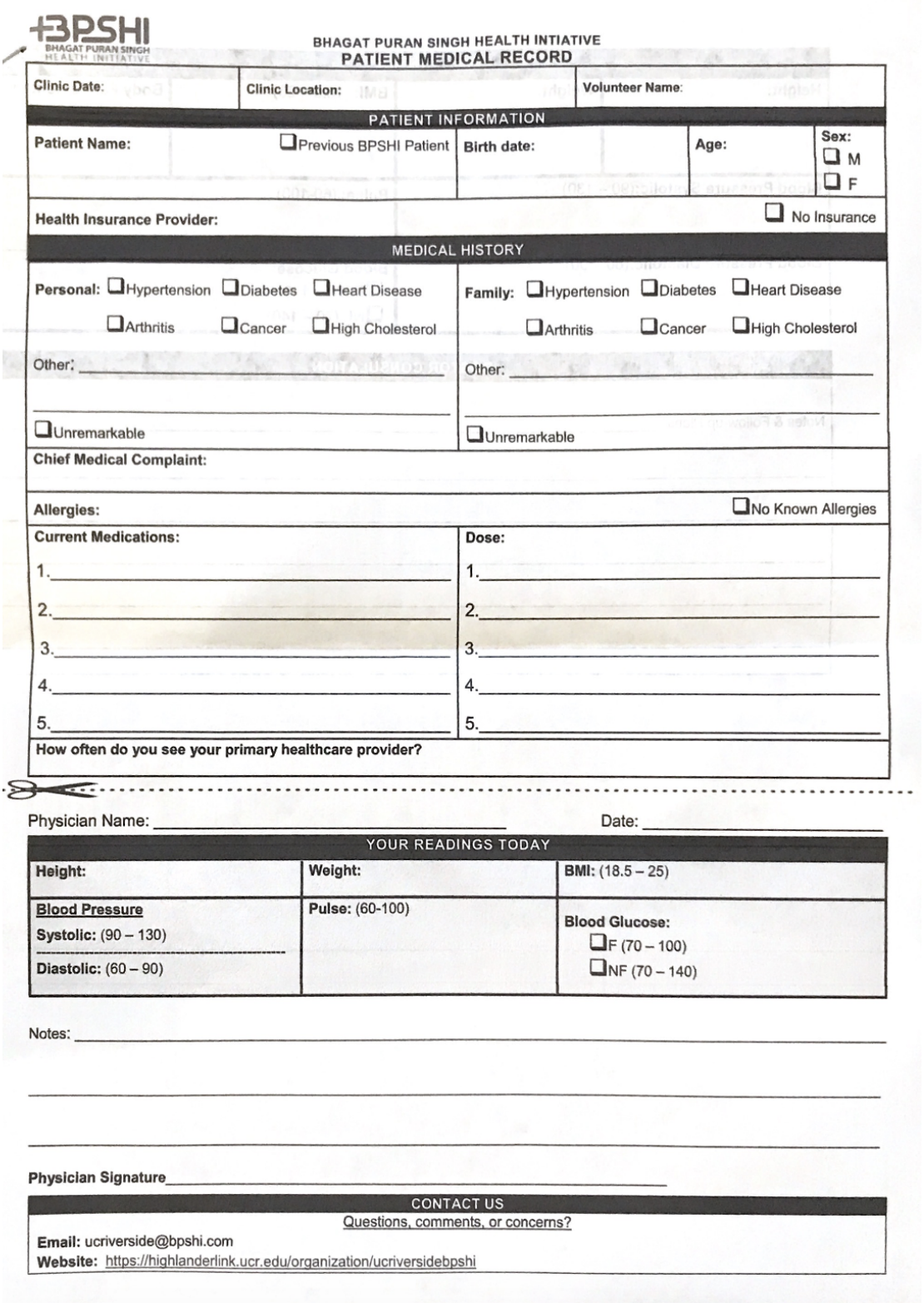
Table 7 Average Age for Three Populations Studied

Population	South Asian	Southeast Asian	White American	Total
Average Age	54.9200	52.4800	50.7273	54.3322

The fourth hypothesis's significant finding for the blood pressure model, which states that age, sex, heart diesease, and HTN are significant predictors for blood pressure in our blood pressure model, aligns with the study's hypothesis. Along with this the fourth hypothesis's additional significant finding for the blood glucose model, which states that diabetes and high cholesterol are significant predictors for blood pressure in our blood pressure model, aligns with the study's hypothesis. While this has not been repeatedly studied specifically in the South Asian and Southeast populations, it provides valuable insight for healthcare professionals when working with either population groups. For instance, if a healthcare provider has a South or Southeast Asian patient with a medical history of heart disease or a South or Southeast Asian patient with a medical history of diabetes and high cholesterol, the provider can provide preventative suggestions to their patient for blood pressure and blood glucose health, respectively. Knowledge derived from research studies which analyze significant health predictors for specific populations can transform healthcare to take more preventative measures rather than reactive.

FIGURES OF IMPORTANCE

FIGURE 1.1- *REGISTRATION FORM*



BHAGAT PURAN SINGH HEALTH INTIATIVE

PATIENT MEDICAL RECORD

Clinic Date:	Clinic Location:	Volunteer Name:

PATIENT INFORMATION

Patient Name: ☐ Previous BPSHI Patient	Birth date:	Age:	Sex: ☐ M ☐ F

Health Insurance Provider: ☐ No Insurance

MEDICAL HISTORY

Personal: ☐ Hypertension ☐ Diabetes ☐ Heart Disease ☐ Arthritis ☐ Cancer ☐ High Cholesterol	Family: ☐ Hypertension ☐ Diabetes ☐ Heart Disease ☐ Arthritis ☐ Cancer ☐ High Cholesterol
Other: _____	Other: _____
☐ Unremarkable	☐ Unremarkable

Chief Medical Complaint:

Allergies: ☐ No Known Allergies

Current Medications:	Dose:
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

How often do you see your primary healthcare provider?

Physician Name: _____ Date: _____

YOUR READINGS TODAY

Height:	Weight:	BMI: (18.5 – 25)
Blood Pressure **Systolic:** (90 – 130) **Diastolic:** (60 – 90)	**Pulse:** (60-100)	**Blood Glucose:** ☐ F (70 – 100) ☐ NF (70 – 140)

Notes: _____

Physician Signature _____

CONTACT US

Questions, comments, or concerns?

Email: ucriverside@bpshi.com

Website: https://highlanderlink.ucr.edu/organization/ucriversidebpshi

FIGURE 1.2- ***HIPAA RELEASE FORM***

Health Awareness Clinic

HIPPAA Notice of Patient Information Privacy Practices This notice describes how medical information about you may be used and how you can access this information. Please review carefully.

BPSHI and United Sikhs is required by law to protect the privacy of your personal health information, provide this notices about our information policies, and follow the information practices described therein.

Uses and disclosures of Health Information
BPSHI and United Sikhs uses your personal health information primarily for:

Treatment Which includes providing, coordinating, or managing health care by one or more health providers or doctors, e.g., we may share your health information with physicians who are treating you.

Health care operations which includes conducting internal administrative activities and evaluating the quality of care that we provide. We may also call you by name in the waiting room when your physician is ready to see you. We may use your information as necessary to contact you to remind you of your appointments.

We may also use or disclose information without prior authorization for public health purposes for auditing purposes, for research studies, for emergencies and when required by law.

Patient's Individual Rights
You have the right to review or obtain a copy of your personal health information at any time. All request must be made in writing to BPHSI and United Sikhs. You have the right to request we correct any inaccuracies or incomplete information in your records. You also have the right to request a list of insurances where we have disclosed your personal health information for reasons other than treatment, payment or health care operations purposes.

You may also request in writing that we do not sue or disclose your personal health information for treatment, payment, and health care operations purposes except when specifically authorized by you, when required by law, or in emergency circumstances. BPSHI and United Sikhs, will consider all such request on a case-by-case basis, but it is not legally required to accept them.

LEGAL DISCLAIMER FOR PROVIDED SERVICES

I, _____ hereby, with my free will agree to take advice, consultation, and/or examination by physicians, health care providers and volunteer staff working for/with BPSHI and United Sikhs health camps/clinics. I will not, in any way, hold any of the aforementioned health care providers, volunteers, BPSHI and United Sikhs staff members or any associated individual or business entity responsible for the advice or consultation given at these medical camps and clinics.

PATIENT NAME _____ **DOB** _____

PATIENT SIGNATURE _____ **DATE** _____

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