

DISCREPANCY BETWEEN OBJECTIVE AND SUBJECTIVE DIABETES KNOWLEDGE: BASED ON ASIAN INDIAN AND KOREAN IMMIGRANTS

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Resumo: Apesar de os asiático-americanos terem taxas de diabetes mais baixas do que a população nascida nos EUA, eles têm 40% mais probabilidade de serem diagnosticados com diabetes em comparação com os brancos não-hispânicos. Este estudo explora as discrepâncias entre medidas subjetivas e objetivas do conhecimento sobre diabetes entre imigrantes indianos asiáticos e coreanos. Os dados foram coletados de membros de templos indianos asiáticos e igrejas coreanas, totalizando 111 respostas (55 indianos e 56 coreanos). A modelagem de equações estruturais (SEM) foi utilizada para comparar essas medidas. Os resultados destacam a divergência significativa entre o autorrelato do diabetes e medidas objetivas, como os níveis de glicose. Para combater pesquisas tendenciosas, é recomendado utilizar medidas subjetivas e objetivas e propor estratégias de gestão do diabetes para indianos asiáticos e coreanos.

Palavras-chave: Diabetes; Indiano asiático; Coreano; Imigrante;

Abstract: Despite Asian Americans having lower diabetes rates than the US-born population, they are 40% more likely to be diagnosed with diabetes compared to non-Hispanic Whites. This study explores the discrepancies between subjective and objective measures of diabetes knowledge among Asian Indian and Korean immigrants. Data was gathered from members of Asian Indian temples and Korean churches, totaling 111 responses (55 Indian and 56 Korean). Structural equation modeling (SEM) was employed to compare these measures. Findings highlight the significant divergence between self-reported diabetes and objective measures like glucose levels. To counter biased research, it is recommended to utilize both subjective and objective measures and propose diabetes management strategies for Asian Indians and Koreans.

Keywords: Diabetes; Asian Indian; Korean; Immigrant;

Resumen: A pesar de que los asiático-americanos tienen tasas de diabetes más bajas que la población nacida en Estados Unidos de América, tienen un 40% más de probabilidad de ser diagnosticados con diabetes en comparación con los blancos no hispanos. Este estudio explora las discrepancias entre medidas subjetivas y objetivas del conocimiento sobre la diabetes entre inmigrantes asiáticos indios y coreanos. Los datos se recopilaron de miembros de templos indios asiáticos e iglesias coreanas, con un total de 111 respuestas (55 indios y 56 coreanos). Se empleó modelado de ecuaciones estructurales (SEM) para comparar estas medidas. Los hallazgos resaltan la divergencia significativa entre la autodeclaración de diabetes y medidas objetivas como los niveles de glucosa. Para contrarrestar la investigación sesgada, se recomienda utilizar tanto medidas subjetivas como objetivas y proponer estrategias de manejo de la diabetes para los indios asiáticos y los coreanos.

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Palabras clave: Diabetes; Asiático indio; Coreano; Inmigrante;

1 INTRODUCTION

Common belief is that Asian Americans' diabetes is lower than that of US born population (Department of Health and Human Services, 2022; National Academies of Science, Engineering, and Medicine, 2015). However, Asian Americans are 40% more likely to be diagnosed with diabetes than non-Hispanic White (OMH, 2021), and 60% of the world's diabetic population is Asian (Nanditha et al., 2016). Furthermore, diabetes is a recognized health disparity among Asian immigrant groups (Kanaya et al., 2022; Galinsky et al., 2017). More specifically, compared to non-Hispanic White 7.5%, diabetes rates are 12.6% for Asian Indian, 11.9% for Korean, and 5.6% for Chinese (OMH, 2021; Kwon et al., 2022). While diabetes disparity is observed among other Asian countries (OMH, 2021), over 30 uniquely different Asian groups are aggregated into one race and proposed recommendations. The problem with the aggregation is that the finding can potentially mask the disease burden in high-risk groups, while inflating the burden in low-risk groups (Kanaya et al., 2022).

While numerous research has been done to understand Native American and African Americans due to high rates of diabetes, sparse research has been done to understand why Asian Indians and Koreans have high diabetes rates within Asian immigrant groups in the United States. Furthermore, when first-generation immigrants came to the US, diabetes was not known to a lot of people, so they don't think about diabetes until they experience diabetes complication (Nam et al., 2013). While a handful of research attempts to understand Asians immigrant groups' health (e.g., Yang et al., 2007), these studies are solely based on subjective measures. However, subjective health self-assessment and objective health measure do not necessarily correlate in other studies (Elran-Barak et al., 2019). The gaps are expected to be higher among Asian Indian and Korean immigrants' diabetes studies because when they came, diabetes was not a common disease, and diabetes was not their top priority due to their busy immigrant life (Nam et al., 2013).

Since diabetes is especially high among Asian Indian and Korean immigrants, it is critical to focus on these two groups and discover to what extent Asian Indian and Korean immigrants are aware of their diabetes, and how their knowledge is aligned with or diverged from the factual diabetes. Therefore, the purpose of this study is to investigate to what extent Asian Indian and Korean know their diabetes; and what factors are closely related to subjective self-reported response and objective diabetes measure.

2 LITERATURE REVIEW

The boundary of data selection is based on existing studies. Biological information such as age (King et al., 2012) and family history (Meigs et al., 2000) are very important for diabetes (King et al., 2012). While family history data is difficult to get, it is crucial to predict one's chance of having diabetes. As such, these two biological data should be included in research. When a study is based on ethnic group, ethnic density should be included since ethnic density is highly correlated with health and diets (Bécares et al., 2012). Along with diets, exercise is cornerstone for diabetes control (Kuwahara et al., 2022). While ethnic groups share knowledge among the group members (Subasi, 2018), with the development of technology, increasing number of people get their medical knowledge from online (Chu et al., 2017). As such, the boundary of this research is limited to those factors: age, family history of diabetes, frequency of ethnic group meeting (an ethnic density measure), online health information seeking, and exercise.

2.1 AGE

Age is highly correlated with occurrences of diabetes (Junker et al., 2021; Xia et al., 2021). As we have increased age, many biological changes occur such as decreased tissue sensitivity to insulin and insulin receptor activity, and reduced muscle tissue that decreases the consumption of glucose (Pani et al., 2008; Sacks et al., 2011). Aging increases visceral obesity that may be responsible for the reported continuous decrease in glucose tolerance that begins in middle age (Sacks et al., 2011). The aging of the overall population is a significant driver of the diabetes epidemic because elderly people are likely to have a higher prevalence of diabetes than younger people. The percentage of Americans aged 65 and older who have diagnosed or undiagnosed diabetes remains high, at 29.2%, or 15.9 million seniors (American Diabetes Association, 2022). This literature review led us to propose positive correlations between aging and diabetes.

2.2 FAMILY HISTORY

Family history is one of the most important factors for the greater risk of diabetes. If any of parents and siblings have diabetes, one is more likely to have prediabetes that leads to diabetes (Centers for Diseases Control and Prevention, 2022). Individuals with a family history of diabetes have approximately two times higher prevalence of type 2 diabetes compared with individuals without a family history of the disease (Cederberg et al., 2015). This study further

claimed that although individuals with a family history are not obese, they tend to have diabetes due to increased ectopic/visceral fat rather than subcutaneous fat (Cederberg et al., 2015). Another study reported that a family history of diabetes identified 73% of all respondents with diabetes and correctly predicted prevalence of diabetes (Hariri et al., 2006). As such, one can expect positive correlations between the history of family diabetes and diabetes.

2.3 ETHNIC GROUP MEETING

Ethnic density is the proportion of ethnic minority residents in an area (Bécares et al., 2012), and it is commonly measured with geographical density (Das-Munshi et al., 2010), but Asian Indian and Korean immigrants are the most widely geographically dispersed immigrants among any Asian American populations (“Asian Indian, Korean, and Southeast Asian Immigration,” n.d.). An alternative way to measure ethnic density is how frequently ethnic group members meet (Stafford et al., 2009).

People living in a densely populated ethnic group tend to consume their own traditional ethnic food more than their counterpart living in a less densely populated area (Reyes-Ortiz et al., 2009; Kawachi et al., 1999). An increased density of Mexican Americans is positively associated with increased consumptions of their traditional food such as legumes, tomatoes, and corn products (Reyes-Ortiz et al., 2009). People within the same cultural background share more information than heterogenous ones, especially knowledge sharing among minority group members is notably high (Subasi, 2018). It is because same ethnic group members can culturally connect with group members and easily communicate with them, which enhances knowledge sharing, but when a group composition is ethnically heterogenous, white people dominate the group conversation (Subaşı, 2018). The knowledge sharing culture can apply to a minority group such as Asian Indian and Korean. Having a shared diet culture within the closely knitted ethnic group also facilitates health information transfer about the traditional foods to the members within the community (Kawachi et al., 1999). Since the traditional food of India and Korea are healthier than fast and fatty foods, one can expect negative relationships between frequency of ethnic group meeting and diabetes.

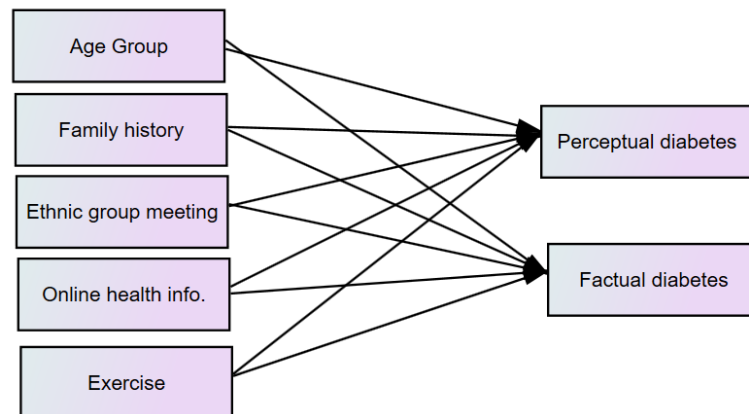
2.4 ONLINE HEALTH INFORMATION SEEKING

With the development of technology, online health information seeking has become one of the major information sources because of convenience, accessibility, and anonymity (Chu et al., 2017). Health information seekers obtain knowledge about their health issues and health problems, and the obtained knowledge is the basis for their health decision (Ghahramani & Wang, 2020). Individuals with higher health literacy enjoy health benefits from online information searching (Jia et al., 2021; Demirci et al., 2021). Older (55+ years) respondents were less likely to use the Internet to search for health information (Chu et al., 2017). It may be because some older adults may not be familiar with online information searching skills although it may change as baby boomers become seniors because they might have used computers at work. However, online health information searching can be challenging for some elderly immigrants because when they left the country, computer was not popularly used. In addition, due to busy immigrant life, elderly immigrants may not be able to keep up with changing online health information searching skills. On the other hand, immigrants who are familiar with online searching may enjoy the wealth of online health information. As such, one can propose negative relationships between online health information seeking and diabetes.

2.5 EXERCISE

Exercise is a key element to control type 2 diabetes (T2D). Exercise makes the body more susceptible to insulin, the hormone that allows cells in the body to use blood sugar for energy, thus helping manage diabetes (CDC, 2022). Regular exercise is a basis for the management of T2D because these physical activities ameliorate the effects of diabetes by improving glucose control (Kuwahara et al., 2022). However, first-generation immigrants' top priority is their business (Nam et al., 2013). Hardworking is a virtue in the Korean culture, and the first-generation immigrants tend to work "day and night" (Hahn, 2018; Nam et al., 2013). Working long hours can lead to lack of exercise, which are leading causes for weight gain and diabetes (Hahn, 2018). As such, one can expect negative correlations between exercise and diabetes.

Figure 1 – The proposed research model



Source: Created by the authors (2023)

3 RESEARCH METHOD

3.1 DATA

Data was collected from Korean and Asian Indian immigrants who are members of Korean churches and Asian Indian temples located in the Southwest Region. The questionnaire was approved by the University of Oklahoma’s IRB. The questionnaire was composed of two parts: self-report diabetes-related questions and glucose test measured by fingerstick. After many visits to the Korean churches and Indian temples, the research team collected 55 responses from Asian Indian and 56 Korean immigrants.

3.2 DESCRIPTIVE ANALYSIS

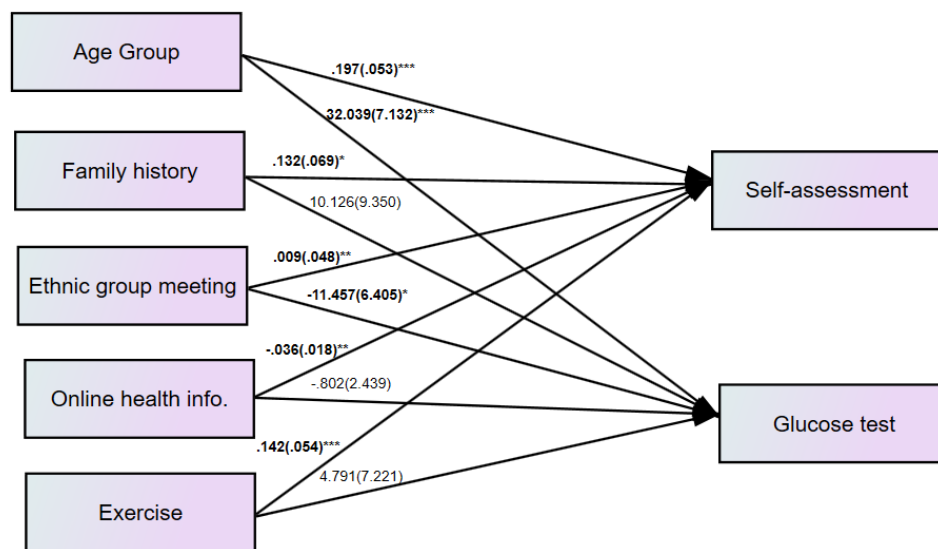
The correlation between participants’ self-assessment on their diabetes and the diabetes test is .340 ($p < 0.009$). The age group is distributed towards between ages 40 and 64 (55%), and 28% are over ages 65. This age group indicated that respondents are mid-aged to seniors and correspond to the first-generation immigration group. Gender distribution is evenly distributed: male participants (42.3%) and female respondents (57.3%).

3.3 ANALYTICAL STRATEGY AND MODEL FIT INDICES

The Asian Indians and Koreans’ diabetes levels and the knowledge on their diabetes conditions are not different ($p = .434$, $p = .972$). As such, these two groups are combined. For the analytical tool, this manuscript employed structural equation modeling (SEM). The fits are

measured by multiple indicators. Popularly used absolute fit indices are χ^2 , Goodness-of-Fit-Index (GFI), and RMSEA (Root Mean Square Error of Approximation) (Hair et al., 2010, Kim, 2009). An insignificant value of χ^2 value indicates a good fit between data in the analysis and the proposed theoretical model. The value of χ^2 is 3.095 (df=2, p=.213), which is not significant. The value of GOF is goodness of fit index (GFI) whose value is .975. The cut-out value of GFI is 0.90 (Hair et al., 2010). A third popular measurement of GOF is RMSEA, which corrects sample size and considers model complexity (Hair et al., 2010). Lower RMSEA values indicate a better fit. The value of this model is 0.071. The model fits are deemed to be very good based on these fit indices.

Figure 2 – Report of finding



Source: Prepared by the authors (2023)

4. DISCUSSION OF FINDINGS

4.1 AGE

Aging is an important risk factor for diabetes because of biological changes to decreased tissue insensitivity to insulin and increased visceral fat. It is hypothesized positive correlations between aging and diabetes, and this proposed hypothesis is supported for both self-reported assessment and the glucose test at over 99.99%. While a large portion of participants (13.5%) do not know whether they have diabetes or not, a promising finding is that most of the first-generation immigrants indicate they know whether they have or not. We also surmise that awareness of diabetes, health care access and health care insurance in the community has increased over time due to these reasons although more work is still in progress. It could be that

diabetes is a common medical problem in both India and Korea, and they may have knowledge on diabetes. So, although the dominant respondents in our study are over 40, and they are most likely first-generation immigrants, it is promising that they have knowledge about their diabetes status. As such, the proposed hypothesis is supported at over 99.99% for both perceptual and objective data.

4.2 FAMILY HISTORY

The proposed hypothesis was that a diabetes family history will impact one's chance of having diabetes. Unexpectedly, the findings are mixed. More specifically, respondents with a family history of diabetes believed that they also had diabetes, but the glucose test did not support the relationship.

One can surmise the unexpected findings. First, the dominant respondents were elderly immigrants, and when they immigrated to this country, diabetes was not a common medical problem in India and Korea, and as such the respondents might not know whether their parents or sibling have diabetes. Second, since they believe their parents or siblings have diabetes, they also perceived that they must be with diabetes. Third, a complex interplay of genetics with social demographics influenced by environmental risk factors such as diet and exercise self-care management could have led to our findings. This is small evidence that perceptual data can mislead medical research.

4.3 ETHNIC GROUP MEETING

Ethnic group meeting is a surrogate measure for ethnic density. While studies are based on geographic location of ethnic density, as noted, Indians and Koreans are geographically most dispersed, but they are closely knitted through religious gathering. As such, this study measured frequency of meeting with their own ethnic groups. Different ethnic groups are associated with distinct diets (Sutaria et al., 2019), and their choice of diets are influenced by ethnic density, in this case frequency of the meetings. Since traditional diets in Asian Indian and Korean are healthy, and since when Indians and Koreans get together, food is culturally a must. Also, frequent gatherings can be indicative of strong belonging to the culture and diets. The proposed hypothesis was negative correlations between frequent meetings with their own ethnic groups and diabetes.

Contrary to the proposed hypothesis, the finding of the self-assessment was reversed while the finding supports the relationship between the frequent meetings and the glucose test.

It could be that individuals who are participating in ethnic groups may think they have diabetes when it is not because they might share diabetes-related information and might self-diagnose based on the knowledge shared in the group. However, immigrants who participated in frequent ethnic group meetings have a lower glucose level although it is marginally significant ($p < 0.1$). As literature reported, individuals living in a densely populated area are shielded from stress, which is negatively correlated with diabetes (Scott et al., 2012), and stress is one of the critical factors impacting diabetes through diets (Ekinçi & Salier, 2023). Furthermore, when Indians and Koreans meet, it is common to have their traditional ethnic foods, and the diets are healthier than fast food or fried food. One can further investigate this unexpected finding.

4.4 ONLINE HEALTH INFORMATION

Online health information seeking was hypothesized to have negative relationships between online health information seeking and glucose. Again, the findings are mixed. Participants who frequently use YouTube for health information reported that they don't have diabetes. The negative correlation is that the higher online health information seeking, the lower diabetes self-report. As such, the proposed hypothesis is supported for the self-reported diabetes. It could be that people who can search health information online have computer and health literacy, and they may be more health conscious. However, online health information seeking behaviors are not related to the diabetes test result. This is another finding supporting how perceptual data can be biased when it is related to a medical investigation. Although people are seeking online health information, this may not translate into diabetes risk factor such as lifestyle modification of diet and exercise. We know South Asians face barriers to understanding and receiving information about type 2 diabetes from health care providers and are less likely to receive care that aligns with standards of diabetes management (Sohal et al., 2015). There is also scarce culturally appropriate and in-language resources and health information on type 2 diabetes management for this population. Poor medication adherence related to language and health literacy barriers has also been identified as a major barrier to type 2 diabetes management (Islam et al., 2012). All of these reasons could explain the no correlation between online health seeking behaviors and actual test results.

4.5 EXERCISE

Exercise is a cornerstone of diabetes control, and the hypothesis stated positive correlations between exercise and glucose. The finding shows that participants who are

frequently exercising believe they have diabetes, and it is significant at over 99.99. This finding goes against the common knowledge and the proposed hypothesis. There are multiple reasons to suspect this contradictory finding. First, it could be that since they believe that they have diabetes, they may exercise. Second, some respondents may feel that they exercise two or more times per week when they have light walks around a block. On the other hand, exercise is not statistically correlated with the diabetes test. It is again that participants' perception of their level of exercise might have contributed to this finding. Third, different types of exercise may impact glucose levels. Moderate to vigorous physical activity of 150 min or over per week has significant health impacts and decreases metabolic syndrome risk in Asian American population (Sheng et al., 2022). Since biologically the beta cell reserve, function and secretion are noted to be lower in South Asians (Hu et al., 2012), culturally adapted programs are warranted to promote exercise and increase knowledge of disease processes.

5 CONCLUSION

The purpose of this manuscript was to investigate how perceptual and factual diabetes information converged or diverged using biological and ethnic group density, health information seeking behavior, and exercise. Overall, the findings between the self-assessed and the factual measurements are very different. Among them, ethnic density measured by frequency of ethnic group meetings shows contradictory findings between self-assessed and objective measures. Participants who are frequently attending ethnic group meetings believe that they have diabetes, but they don't have diabetes. It will be very interesting to explore in future research whether it is the influence of diets or diabetes-related knowledge sharing. Since frequent ethnic group meetings are negatively correlated with the glucose result, as a way to reduce diabetes among Asian Indian and Korean immigrants, it is recommended to facilitate frequent group meetings and disseminate diabetes-related knowledge through this group.

Based on the findings of this study, one can conclude that findings from perceptual data can be misleading because respondents may not be aware of their medical conditions and/or may be biased towards their health. Combining subjective and objective medical data is especially crucial for immigrants because immigrants are often alienated from the mainstream of medical care for various reasons such as culture, language, medical systems, etc. especially the first-generation immigrants, may not have proper knowledge on how to improve their diabetes conditions.

Contributions of this study are, first, to discover how perceptual and objective data can be skewed; second, it is to focus on the most prominent diabetes immigrant groups (i.e., Asian

Indian and Korean) and to identify salient factors impacting diabetes; third, this study combined subjective and objective diabetes measurements and explored how respondents' perceptions are different from real diabetes.

A limitation of this study is the size of the data. Since the target population was Asian Indian and Korean immigrant, data collection was very challenging to access ethnic groups, get permission, and persuade members to participate in the research. As such, this study could not separate Asian Indian and Korean immigrants into two groups and compare these two groups.

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