The Role of Vape Shop Density and Health Consciousness in Cardiovascular Health Disparities

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INTRODUCTION

Take a walk through any low-income, minority neighborhood in America, and you may pass a corner store or two. Amidst the rows of chips, sugary drinks, and instant meals, you will likely spot something else entirely—vapes. Vape shops are sometimes even more common in these communities than grocery stores. For minority groups like African Americans, already dealing with more than a 10% increase (NHLBI) in the occurrence of cardiovascular disease (CVD) when compared with other racial groups, the toxic landscape of unhealthy foods, easy-access e-cigs (ECs), and other cardiotoxins isn't just a coincidence; it's a public health crisis in plain view.

For minority groups, socioeconomic and racial risk factors remain strong propagators of CVD, especially as they pertain to the gaps in mortality and cumulative incidence between groups in underserved spaces and well-off communities, with the latter's rates being much lower. Data from the NHLBI showed that the combined prevalence of coronary heart disease, heart failure, stroke, hypertension, peripheral artery disease, aortic aneurysm, and deep vein thrombosis was 59% among African Americans, while Non-Hispanic Whites, Hispanics, and Asians had prevalence rates of 47.9, 44.7, and 44.6, respectively. (NHLBI, 2020). Statistics like these are scary for a reason: they are in part due to the accumulation of risk factors present in minority communities, with socioeconomic class being a selecting factor.

In our current healthcare system, it is all too common for higher CVD rates among specific racial groups to be understood as patient-specific problems (Mazimba and Peterson). A Nurse who worked in Detroit for over five years, Vivian Addrow, noted one particular physician in her community tended to "write patients' conditions off as being caused by their habits" (V. Addrow, personal communication, September 28, 2024). To move forward, society must disregard such assumptions, as it is now a well-researched fact that increased rates for conditions such as myocardial infarction, deep vein Thrombosis (DVT), and pulmonary embolism (PE) are greatly increased among the low socioeconomic class and minorities.

"Clinicians rarely experience the frustrations and challenges of getting care until they or a family member needs care. Patients bring the lived experience, as well as knowledge about how well the healthcare system functions to meet their needs." (Edgman-Levitan & Schoenbaum, 2021). These disparities are in part attributable to systemic racism, social determinants of health, and poor access to care. A study published in the Journal of the American Heart Association (JAHA) highlighted disparities in CVD treatment and the need for targeted interventions; "approximately 30% of the mortality difference between Black and White men and 40% of the difference between Black and White women is driven by disparities in CVD outcomes." (Mazimba and Peterson). This study also showed that hypertension and smoking were strong predictors of CVD. Factors leading to these higher rates are directly related to access to healthy food options and the density of cardiotoxin promoters like ECs, and a vehicle of this class/race-driven selection is "ad-targeting". This is a strategy employed by corporations seeking "easier" clients of specific classes and ethnic groups that I will address in this paper.

AD-TARGETING IN MARGINALIZED COMMUNITIES

The true extent to which ECs can impact cardiovascular disease chronically is currently under research and can be complex. Still, it is in part a cause of higher cases of myocardial infarctions that we observe in low socioeconomic class communities. This is an important facet of our understanding, as approximately 1.62 million (95% CI, 1.27 to 2.04) cardiovascular deaths in the 2000s were attributable to smoking alone (Ezzati M., et al., 2005). While the chemicals that smokers are exposed to generally cause more life-threatening health complications than vaping, both practices propagate cardiovascular disease and are worth mentioning synonymously; our focus, however, will be on ECs mainly due to their recent buzz.

Although ECs have been circulating in the market for decades, they have recently been adopted by storm. A recent study by Espinoza-Derout showed a general correlation between atherosclerosis, or clogging of the arteries, and EC usage among the many other conditions that these products cause, such as diabetic cardiomyopathy (Espinoza-Derout, J. et al., 2019). A possible explanation for the higher rates of cardiovascular disease (CVD) among African Americans compared to their white counterparts may be attributed to a greater density of cardiotoxins available in their local stores. Minority groups, particularly African Americans, may be experiencing cardiovascular issues at significantly higher rates due to the increased proximity to these cardiotoxins, which can exacerbate their conditions. This will be further explored concerning the intersection of vape shop density within minority populations.

The disparity in health-related advertisements across different neighborhoods highlights the broader issue of how chronic vaping and socioeconomic factors intertwine to increase cardiovascular disease risk. When exploring neighborhoods in Michigan, one can observe how the billboards change between communities. In an affluent area like Bloomfield Hills, electronic billboards cycle information about local college opportunities, health insurance offerings, and new plant-based food options. On Detroit's west side, however, this narrative changes completely. The billboards become promotions for unhealthy fast foods, vape shop locations, and similar legal psychostimulants. The connection between these advertisements and the CVD disparity experienced in these communities requires a closer look. It is important to note the connection that vaping has to increased CVD risk. According to the NHLBI, chronic vaping can impact the function of blood vessels to the extent that it directly increases the risk for various cardiovascular diseases (National Institutes of Health, 2022). In many cases, the socioeconomic class that many of these minority communities occupy propagates a cycle of buying cheaper, riskier options that increase the prevalence of CVD in these communities.

To evaluate the magnitude of this disparity, a survey was conducted in a low-income, diverse school in New Jersey among students from 7th to 11th grade that identified their smoking habits and, more importantly, their interest in ECs, which may correlate with their susceptibility to trying them (Tercyak). Of the 1350+ students surveyed, “45% were curious about e-cigarettes, 34% thought they would try e-cigarettes, and 40% were open to using e-cigarettes if a friend offered it; 55% of adolescents were deemed 'susceptible' to trying e-cigarettes or continuing their use.” (Tercyak, K. P., 2021). In regards to the acquisition methods of these ECs, almost a fifth of

the exposure to these products was due to their presence in gas stations (Tercyak, K. P., 2021). While this doesn't explicitly prove that smoking in this community is due to EC advertising, we cannot deny the influence that the advertising of these products can have on CVD levels in these communities. Youth are consistently exposed to e-cigarette ads in the stores they frequent daily. This fact is underscored by a recent $439 million settlement against an e-cigarette company for deliberately targeting adolescents in their EC marketing (Janowitz & McDaniel, 2022). This especially raises concern as youths can be more susceptible to addiction associated with ECs due to their inherently smaller body mass.

An important overlooked piece in characterizing corporations' ad-targeting effect is the correlation between vape shop density (VSD) and minority populations. A study by Venugopal, an environmental health scientist at the FDA who has published numerous papers on toxicology and environmental health, identifies the relationship between socioeconomic disparities and the presence of vape shops around public schools in the nation. Their team assessed the median distance of vape shops from 10,687 school districts to see if there was a correlation between minority populations and vape shop proximity. A significant positive correlation between VSD and African American and Asian populations was determined, with the opposite for White populations, and no statistically significant correlation for Hispanic populations. (Venugopal, P. D. et al., 2020). This demonstrates a trend between the communities these shops choose to reside in; being with minority groups at large, a trend further emphasized by the vast sums of money spent on advertising aimed at individuals within these areas.

ECONOMIC AND ENVIRONMENTAL FACTORS INFLUENCING CARDIOVASCULAR DISEASE RISK

Just as important as the focus on ECs, as they affect cardiovascular health in minority communities, a more prevalent historical CVD risk has been present for decades due to the scarcity of healthy food, termed "food deserts," along with lackluster health education in community environments.

From 1932 to 1972, a Tuskegee study was conducted on black males in which a curative treatment was withheld from hundreds of men to examine the effects of untreated Syphilis (Muvuka B. et. al., 2020). Following this development, there was much distrust among minority communities in the healthcare industry, and that distrust has been passed down. This is due to a history of exploitation among these communities as it relates to the healthcare system. Despite these betrayals, "Education is positively correlated with health literacy" (Muvuka B. et al., 2020), which is a glimpse of hope for how this issue can be remediated. Low health literacy correlates with a weakened ability to identify medications and follow routines, rendering it a severe propagator of persistent CVD, amongst other diseases (Berkman et al., 2011). So, the question remains: how can we combat health disparities and increase health literacy in these communities to promote healthier habits and reduce the risk of CVD?

To get a deeper understanding of the issue, we interviewed a nurse in the Detroit, Michigan, community named Vivian Addrow. Mrs. Addrow is an African American woman who

has lived in Detroit for 15+ years with many years of experience as a nurse in her city. According to Mrs. Addrow, there is a lack of CVD health resources in urban areas, noting the limited availability of fresh food markets and the absence of heart health initiatives in her community. While there are a few health services, such as accessible COVID testing, there is a glaring absence of cardiovascular awareness programs. She also noted an often-seen mechanism that leads to CVD in her community: Stress from low-income jobs contributing to unhealthy coping mechanisms.

"When people feel stress, they try to compensate for it, and they may either drink or smoke." "One of the best things is prevention, forget treatment, if you make people aware, we can prevent the disease," she said. A unique remedy she came up with was exercise facilities that gave you advice on dieting and healthy eating. This would be a good addition to these communities, considering there were sparse fitness zones and much less of something of this caliber present. She also noted that grocery stores in Detroit often fail to offer fresh, nutritious foods, especially in comparison to more suburban outlets like Trader Joe's. Addressing the issues listed requires targeted policies that promote prevention, equitable care, and better access to healthy foods and resources.

We can start where the corporations finish—in community ads. An esteemed nurse from Detroit with a history working with hospitals in her community noted, "The billboards in my community have ads about special events, marijuana, and stuff like the Henry Ford" (a museum in the area), but noted that the ads were "not educational". She also said that patients, especially those with complications related to heart disease, would receive a fact sheet or resource sheet after their stay, "but the majority of the individuals here get confused; the information is there but there is a lack of carry over." This suggests that patients, in at least the hospital setting, often have the necessary information to manage their condition but struggle to make good on these actions. Thus, there is a problem inside hospitals with a lack of information retention. Outside of the hospitals, there's still a lack of funding and care for health initiatives.

Food insecurity and food deserts are synonymous with non-nutritious foods being widely available in communities. Food insecurity is defined as having limited or uncertain access to nutritionally safe and adequate foods that can be acquired in socially acceptable ways (Core indicators of nutritional state for difficult-to-sample populations, 1990). In many cases, it can be the lack of knowledge in health literacy for those living in food deserts that increases CVD Risk. A very restricted program called SNAP-Ed works with this goal in mind. It is an education program for those who are already eligible for SNAP and likely do not have much know-how for managing themselves in food deserts. SNAP-Ed provides information about balanced diets, essential nutrients, portion sizes, and how to read food labels. It aims to help participants understand the importance of eating a variety of fruits, vegetables, whole grains, and lean proteins, all while keeping in mind the budget of participants.

SNAP-Ed provides information about balanced diets, essential nutrients, portion sizes, and how to read food labels. It aims to help participants understand the importance of eating a variety of fruits, vegetables, whole grains, and lean proteins. According to a study that monitored an Indiana SNAP-Ed population over a year, SNAP-Ed improved food security by 25% over a 1-year timeframe in an intervention compared with a control group that was independent of participation in SNAP or other food assistance (Liu Y. & Eicher-Miller, 2020).

A study published in the NLM evaluates the effect that food insecurity and inadequate stores (in terms of the healthy foods they offered) had on the health risks of the members. Both coronary heart disease (CHD) and Heart Failure With Reduced Ejection Fraction (HFWRF) were significantly correlated with economic food insecurity (Chang and Javed, 2021). It is a well-known fact at present that socioeconomic risk factors drive forms of CVD, and economic barriers have never been left out of this argument. When individuals have more than 2.5 inadequate stores within 1 mile of their residence, their risk for hypertension and diabetes is higher (Chang et al., 2021). While this data doesn't directly correlate this inequity with CVD risks, conditions like diabetes and hypertension can still contribute to greater rates of heart disease in general due to the symptoms and additive weight of effects on overall quality of life and movement. An interesting statistical association also presented by Chang & his team was the identity of the individuals within communities, with the > 2.5 zones being, not surprisingly, minorities, older, and women (Chang et al., 2021).

Furthermore, it would be incorrect to attribute solely the adoption of unhealthy habits in low socioeconomic zones to problems within the education system. A short excerpt by a research team done on this topic used the term "diminished returns" to describe the phenomenon of Black Americans not experiencing the same health benefits from socioeconomic factors (including education) that Non-Latino Whites may experience in the US. As postulated by Assari, the increase in education does not reduce the gap but continues to increase it (Assari, 2018; Whiting & Bartle-Haring, 2022). This is a difficult statement to understand at face value, but she then proceeds to convey that "Black people may sacrifice their health to gain education or earn higher incomes" (Whiting & Bartle Haring, 2022).

There are a plethora of factors that contribute to habits that bolster CVD rates, directly connected to the environment and systemic stressors present in these communities. A study was done by Pamepel et al., 2010 on the inverse relationship between socioeconomic status (SES) and unhealthy behaviors, such as tobacco use, physical inactivity, and poor nutrition contributing to stressors that lead to derogatory habits like overeating, drinking, and smoking, "all understood causes of heart issues" (Pampel, Krueger, & Denney, 2010). One trend of note in a paper by Sun et al. highlighted the tendency of regions with higher outpatient costs to overlap with areas with a significant number of individuals from low socioeconomic status backgrounds. This suggests a pressing need for more advertising resources allocated toward promoting the management of cardiovascular risk factors in these communities.

Recommendations

In the review of the information gone over as it relates to Ad-targeting, health knowledge inequity, and distribution of cardiotoxins present in minority communities, it is paramount that we consider solutions to mitigate the looming disparity we see present.

The first suggestion would be to promote the use of city funds to drive advertisements that are conscious of health education in the community. A useful facet of this would be rerouting inefficient taxpayer dollars into purchasing billboard adverts for the sake of health education. Another would be the funding of widely accessible innovative approaches, which may very well accomplish the task of lowering the risk of CVD for all parties involved. An approach of this caliber can be seen at the University of Michigan's Michigan Healthcare Business Club, called Ancestral Plate. This application seeks to use an individual's genome to identify possible risk factors in food for their ethnic groups and pair ethnically inspired dishes that escape the implications of adverse health conditions. A final recommendation would be the adoption of a policy that discourages any very dense placement of gas stations selling ECs in communities with low socioeconomic status. Because this can be a difficult issue to mitigate, it would be wise to try to curb the extent to which individuals are exposed to cardiotoxins.

Conclusion

The disparities in cardiovascular health faced by minority groups in the US at large are due to an interplay of systemic factors: access to healthy food, socioeconomic status, and targeted marketing of cardiotoxin-containing items such as ECs. The statistics in the current literature highlight the disproportionate rate of CVD among Blacks and other minorities; the environment in which these individuals live plays a crucial role in their health outcomes.

Furthermore, the presence of a market filled with unhealthy options for the people of these communities and the higher density of places like "vape shops" correlated with the presence of minority groups like African Americans contributes to a toxic landscape that drives cardiovascular risk. Coupled with historical mistrust in the healthcare system, inadequate health education, and socioeconomic stressors, these factors create a cycle of health inequity that is difficult to break.

To effectively address these disparities, we must implement targeted interventions that promote health equity; part of this struggle will be putting in place community health education possible in the form of targeted gym centers funded with tax money, enhancing access to nutritious food, and regulating the proliferation of unhealthy product advertisements in marginalized communities. By employing some of these changes, we can contribute to healthier environments that support the well-being of all.

Overall, recognizing CVD as a public health crisis necessitates acknowledgment by policymakers, healthcare providers, and community leaders. We must move beyond viewing the minority-associated disproportionate statistics associated with problems associated with individuals and instead acknowledge the systemic injustices that contribute to health inequities. By employing comprehensive and equitable approaches in these communities, we can hope to reduce the burden of CVD and ensure a healthier future for minority groups across the US.

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