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Photo by Tyler Kalanquin

UJPH Editorial Board

Table of Contents

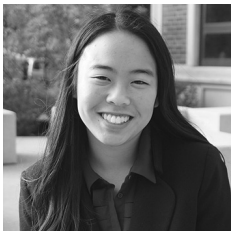
Letter from the Editors

Dear Readers,

Thank you for taking the time to read the annual print publication of the *Undergraduate Journal of Public Health* at the University of Michigan. Our third year as an undergraduate platform for public health ideas carried great expectations, prompted from growing interest in public health within our campus community and a new editorial team to manage the publication. We challenged writers to highlight public health research on specific communities through our "Snapshots" theme. They successfully answered the call to action, with insightful submissions on public health issues affecting communities locally, across the nation, and around the world. We are excited to present to you research and commentary on topics ranging from cultural competency for mental health to the intersection of unconscious biases and health disparities. We encourage you to consider how this knowledge will transform the public health field and how you will continue to add to this growing body of knowledge as a member of the public health community.

To respond to the blogging age and need to quickly address relevant public health issues, we piloted the blog component of the journal, bringing new editors and writers to the team. After you peruse this year's journal, we encourage you to follow our blog featured on our website. In addition to giving more opportunities for students to write in short form, we are excited to present writing pieces written by our own editors, on issues affecting local communities and groups in the state of Michigan. While our editors often work diligently on guiding our writers, our "From the Voices" blog section showcases their own writing talents. This publication could not succeed without our editors' meticulous reviewing, so we cannot thank our editors enough for their hard work, energy, and passion for public health.

We express gratitude toward our past editors in chief and founders, Sonia Ahluwalia and Krittika Pant, for offering keen advice and providing us the privilege to grow their treasured work over this past year. We owe our PhD reviewers for the accuracy of our journal and mentorship to our writers, for their expertise greatly improves the academic rigor of our publication. We thank Professor Eduardo Villamor for continuing to mentor the journal's progress as our faculty advisor, new partnerships within the School of Public Health and campus community, MPublishing for bringing our writers' words to life, and financial support and encouragement from the School of Public Health. Finally, we thank our writers for caring about these public health issues and communicating effectively the urgency in addressing them. We wish them the best of luck in their endeavors to improve public health and hope you enjoy reading their analyses and perspectives.



Caitlin Heenan and Tiffany Loh

Co-Editors-in-Chief

FIELD NOTES

Nutrition and HIV in Masiphumelele, South Africa

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Abstract:

South Africa is known for having the largest population of HIV-positive individuals in the world. The country faces especially large barriers to controlling this epidemic due to the organization of its health care system into a public sector and a private sector, generating a massive gap between the quality of care accessible to the lower and upper classes. Health inequities in South Africa become more apparent when the nutritional status of those living in impoverished townships like Masiphumelele is considered, especially when the high nutritional demands of HIV are taken into account. Current governmental interventions are ineffective at addressing this issue, and the absence of supermarket chains from these townships leaves the residents without fresh food. This article will examine the implications of contracting HIV while relying on the public health sector, the nutritional barriers to health in townships, and what must be accomplished to combat this crisis in South Africa.

Keywords: South Africa, Nutrition, HIV, Masiphumelele

Background

When I studied abroad in Cape Town, South Africa, in the summer of 2018, I was both shocked and disturbed at the extent of disparity in the public health issues that ravage the country, especially for HIV-positive individuals. Arguably, the largest public health issue facing South Africa is the inequality between the public and private health care systems. The system is organized in a way that directly allows affluent, privileged people to access an entirely different sector of care than the general impoverished population, with the World Health Organization (2011) noting that more than 80% of South Africa's population uses the public health care sector. Those who can afford their own health care have access to better doctors and nurses, cleaner and higher quality facilities, more immediate care, and more education about their health through the private sector of the health care system. The majority of the population only has access to the public sector, in which the government struggles to provide basic resources, the staff are overworked and underpaid, and treatment waiting periods can be days in cities (Cleary, Boulle, Castillo-Riquelme, & Mcintyre, 2008). In rural

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areas, the situation becomes much worse. Clinics are scarce, and doctors and specialists are few and far between. Because of the under-resourced nature of the public health care system, HIV-positive individuals in South Africa disproportionately use the public health care system because they typically have low socioeconomic status (Cleary et al., 2008). This is due to less education about how HIV is spread and less access to preventive care. The nutrition and HIV class I took on my study abroad examined this disparity by looking specifically at the HIV epidemic in South Africa and how malnutrition affects this issue. As part of the class, I took a trip to Masiphumelele, a township in Cape Town, to observe this issue firsthand. It became evident to me that the people of Masiphumelele and other South African townships are subjected to inadequate health care, education, and nutrition, all of which strongly contribute to South Africa's HIV epidemic.

My class took a trip to the primarily Black township of Masiphumelele, which is Xhosa for "let us succeed" (Hendricks, 2017). The name is ironic because despite its hopeful tone, the community is far from success, because the population was forced to relocate to this area by the apartheid government, then deprived of the resources and jobs that would allow them enough social mobility to transform their community or to move to a safer place. Visiting the Masiphumelele Community Clinic, a spaza shop (which is a small street shop that acts as a grocery store for those who do not have access to grocery stores in impoverished South Africa), and the community primary school, it was clear why the residents struggle to meet their nutritional needs and why they have such high rates of HIV infection. By my observations, Masiphumelele is an overrun community abandoned by its government. The staff at the clinic are overworked and the clinic lacks governmental resources that should be a given, such as more than one cup to collect urine for standard tests, or essential drugs like chemotherapy. The spaza shops are unable to offer a wide variety of foods and primarily sell unhealthy items such as chips. The school can only provide one meal a day to its students, which they do not receive during school breaks or vacations, and the students overwhelmingly choose unhealthy foods at school (Temple, Steyn, Myburgh, & Nel, 2006). These obstacles require the residents of Masiphumelele to work hard not only to advance socially but simply to survive their daily living conditions.

HIV-Positive Children and Mothers

South Africa contains the highest population of HIV-positive individuals in the world (De Klerk, 2018b). Although the epidemic is widespread, HIV disproportionately affects those in poor communities ravished by the apartheid regime, like Masiphumelele, who must now access the public health care system (De Klerk, 2018b). In Masiphumelele, I was informed by a physician that many children are infected with HIV primarily due to their HIV-positive mothers not taking their medication either while pregnant or while breastfeeding. Some parents choose never to divulge their HIV status to their children, resulting in teen pregnancies where expectant mothers do not understand why they are taking antiretrovirals (ARVs), drugs used to treat HIV. Doctors are also not permitted to inform these patients that they are HIV-positive until they are 18, even if they are pregnant or breastfeeding prior to this age. Thus, more children are born with HIV and the cycle repeats.

HIV-positive children are difficult for the clinic to treat. The medicine tastes vile and retains this taste even when mixed with other things. Because of the poor taste and lack of understanding of the importance of the medication, mothers struggle to get their children to

comply with the ARV regimen. At my visit to the clinic, I had the chance to try a syrup form of an ARV often given to children, and it became clear to me why the kids refuse their medicine. Forcing kids to take this medicine is a necessity but negatively affects the nutrition of these children. In addition to the taste, side effects of many ARVs include loss of appetite, nausea, vomiting, and diarrhea (Castleman, Seumo-Fosso, & Cogill, 2013). If I had to take that medicine twice a day every day, I would frequently lose my appetite too. This has many implications for HIV-positive kids, who already require at least 10% more energy than those their age who are HIV-negative (Rajabiun, 2001). This means that even if the child is able or forced to take in enough food with enough nutritional content, which is unlikely in such an impoverished community, the nutrients may be lost without ever being absorbed due to diarrhea or vomiting.

Luckily, the government has set up programs for both adults and children to achieve the nutritional requirements for those on antiretroviral treatment (ART). The Nutrition Therapeutic Programme (NTP) supplies those with a body mass index (BMI) of less than 18.5, which is considered underweight (Onis et al., 2007), with nutritional supplements and fortified food (De Klerk, 2018c). This is especially important for those who are HIV-positive and even more important for those additionally affected by opportunistic infections because they experience additional weight loss. I had the opportunity to try a modified peanut butter and a milk-like drink supplied by this program. The modified food has similar sensory characteristics to the original products and nutritionally could dramatically affect the life of someone suffering from malnutrition. The NTP is a great start to combating weight loss in HIV/AIDS patients and the general malnourished population in South Africa.

The NTP is also critically important for breastfeeding or pregnant mothers, who have even greater nutritional demands (De Klerk, 2018a). The supplements support a healthy pregnancy and ensure that mothers will not become malnourished due to the fetus taking all nutrients from the mother it needs, even at the expense of her health, or from breast milk production. At the Masiphumelele clinic, the halls were filled with young children and breastfeeding mothers, many of whom were there to pick up nutritional supplements. However, outreach and implementation must be improved for this program. A study of pregnant women in the city of Cape Town found that only one woman in six who qualified for food supplementation received it, and only 61% of the women in the study used the supplements properly and received all of them, although all studied women qualified (Grundlingh, Herselman, & Iversen, 2013). It is the responsibility of health care practitioners to ensure that their patients are receiving the best care possible and achieving the best health they can, given their circumstances. Clearly, these women have not been educated fully about the options and support available to them. Some women may need assistance applying to the program, which seems to not be available given the number of participants. If there were a sufficient number of practitioners in the public health care system, perhaps the number of people reached would be greater. Without this assistance, there are extreme financial and educational barriers to meeting the nutritional requirements of pregnancy, especially for HIV-positive mothers.

This pattern also appeared in children in need of supplements. A study by Brits et al. (2017) found that more than 80% of the children attending a clinic for nutritional supplementation stopped attending before any change could be recorded. Only 14.1% of the participants exited the study successfully with a normal weight for their age, and even more surprisingly 3.0% deteriorated while on the supplements (Brits et al., 2017). This demonstrates that governmental

efforts are currently extremely inadequate at addressing this issue because the vast majority of children are not improving even with governmental assistance. It is essential for the health of HIV-positive individuals in South Africa that the NTP improve its outreach programs.

Barriers to Nutrition in South African Townships

The spaza shop truly exemplified the nutritional implications of living in a place like Masiphumelele. The spaza shop that I visited was one of the largest in the area, yet it still offered very few options. Although fruits were available, vegetables were not sold at all and chips abounded. Fresh vegetables are offered in impoverished townships at small independent stands, but they are just not accessible because of the cost. These foods are marked up from grocery store prices so that the vendors can make a profit, resulting in a community deprived of access to the nutrient-dense foods that they desperately need. One public health solution frequently used in other food deserts is the implementation of personal gardens. However, the infrastructure of Masiphumelele does not allow for personal gardens because the residents are already living in tiny corrugated steel shacks sometimes so close to one another that they share walls. These living conditions force residents to buy produce elsewhere. The food grown in a personal garden may be enough to feed one person, but the amount that can be grown in this space is not sustainable for an entire family and certainly not enough to have excess to sell. Therefore, all of the vegetables sold on the street are less fresh (and thus less nutritionally valuable) due to transport from the grocery stores and unsanitary storage conditions, and more expensive, creating an issue of accessibility to nutritious foods and taking a huge toll on the nutritional status of residents of impoverished communities like Masiphumelele.

In the shops, the chips are all positioned at the front so as to be the first thing that you see when you enter. To access the fruits, one must squeeze through narrow passages. Whole foods crucial for nutritional support in the treatment of diseases like HIV, such as legumes or avocados, are not sold in the communities that need them most. In addition, the prices at spaza shops are all marked up from grocery store prices. This makes food unaffordable for most residents, especially expensive healthy food. For a person with HIV or AIDS, access to these healthful foods is essential. Unfortunately, achieving nutritional health through the foods sold in these communities is simply not a possibility. These people must somehow come up with the money to afford the fully balanced, nutritious diet that their disease demands or else rely entirely on governmental supplements, which do not seem to be sufficient.

Sanitation is another issue that arises from living in these conditions and can further affect nutritional status. People living with HIV are already highly vulnerable to infections (De Klerk, 2018b), and living in unsanitary conditions puts them at an even higher risk. Although HIV is nutritionally demanding, acquiring an additional infection increases the required nutrient intake even further (Mangili, Murman, Zampini, Wanke, & Mayer, 2006). I observed that many have only a communal Porta Potty as their toilet, which does not contain a sink or even hand sanitizer. This means that these people are exposed to an abundance of germs without the appropriate hygienic measures in place. Becoming infected would mean that the person would have even higher nutritional needs, which they would not be able to meet in these communities. They could also pick up a parasite or worm, which would deprive them of even more of the nutrition that they desperately need (Stewart, 2014). Promoting the

health of people living in such townships is possible only when these conditions are improved. After all, prevention of infectious disease transmission is not possible without access to hygiene.

Another major factor in the health care received by residents of Masiphumelele is the way their poverty reprioritizes day-to-day activities. For example, in poor weather, people must prioritize fixing their homes, which are made of corrugated steel and miscellaneous construction materials, to prevent leaking rather than spending their time waiting in obscenely long lines at the clinic. This has huge implications for people with HIV/AIDS. If the day a person is supposed to pick up their medication has bad weather, they would have to go without their ARVs for at least a day. The same applies to those participating in the NTP who must go to the clinic to pick up their food or supplements. This means that if they are unable to make it to the clinic that day, they may have to go at least a day without food. This can be devastating for the health of those suffering from HIV/AIDS. Besides the energy required for the immune system to stay strong enough to battle the disease, for those who must take their ARVs with food this means at least a day of less effective treatment. Although these factors cannot be controlled, they dramatically affect the health of individuals in these types of communities, especially those suffering from HIV/AIDS, and add even more barriers to getting adequate care and nutrition in impoverished communities.

Conclusion

In many ways, living in a township like Masiphumelele is a death sentence for HIV-positive individuals. They face inadequate access to health care, inaccessible support programs, a lack of essential nutritious foods, and unsanitary living conditions. Innocent children are born into a life with HIV/AIDS due to the insufficient education of their mothers. Malnutrition is widespread, and people are not provided with enough room or resources to grow their own vegetables. Food prices are unaffordable, and the contents are not nutritious enough to meet the demands of HIV or the opportunistic infections that come with it. People do not have enough opportunity or social mobility to remove themselves from these situations, and thus remain trapped in impoverished townships like Masiphumelele, their children living the same lives deprived of health and comprehensive education.

Changes must be made at a governmental level to improve quality of life. Primarily, education must be expanded to teach people the importance of knowing HIV status for adults and children, the importance of ART, the nutritional demands of HIV/AIDS, and the promotion of nutrient-dense foods. In addition, governmental supplement programs should be expanded through greater outreach and more effective distribution of products. Health care workers should be educated about the eligibility requirements of these programs and instructed to offer assistance with the applications if necessary. Delivery programs could be implemented so that patients are able to receive their medication and supplementations daily regardless of factors like work and weather. Finally, the availability of large, inexpensive grocery stores should also be expanded to include communities like Masiphumelele, where these goods are sold on the street at higher prices. With these improvements, the prevalence of HIV/AIDS would be reduced through education; the entire community would live healthier, more nutritious lives; and the people living in these townships would finally be a step closer to the equal opportunity that they deserve.

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FIELD NOTES

Rape Culture as a Worldwide Epidemic: India as a Case Study

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Abstract:

Rape exists worldwide; however, cultural differences between regions of the world can have heavy impacts on the way health care systems view rape and treat survivors. On a recent study-abroad trip to New Delhi, India, I had the opportunity to see firsthand how handling rape has become a prevention effort in India. Women and their families are taught to protect themselves, as opposed to teaching people to not rape in the first place. Although this practice is not uncommon to many parts of the world, historically conservative and often misogynistic views of women as subordinate have made the prevention efforts of rape pervasive in everyday practices. This toxic mind-set on women's rights has invaded social institutions. Governments and organizations would rather regulate the women who are survivors of violence, expanding the fear associated with rape culture, rather than place an emphasis on preventing and punishing the rapists themselves. This form of rape culture can be seen in the way the health care system treats survivors, the way the women interact with society, and the way women are treated in the family unit. Viewing this prominent public health issue with an appreciation for India's cultural history illuminates the need to consider multiple facets when analyzing any region's policy for preventing rape, treating survivors, and ensuring all citizens are safe from sexual violence. It is with this unique cultural lens that globally minded citizens are able to take a critical look at their own country's efforts and the efforts of worldwide entities to prevent rape culture.

Keywords: India, Rape Culture, Intimate Partner Violence

Jyoti Singh

In the United States, we are not strangers to rape culture, as it can take many forms. The sad reality of this pervasive mind-set in many cultures is well described in a book by Buchwald, Fletcher, and Roth (1993), "in a rape culture, [people] assume that sexual violence is a fact of life, inevitable as death or taxes" (p. vii). Simply put, when people must defend their right to dress the way they want, defend the right to refuse unwanted cat calling and sexual encounters, and defend the basic right to one's own body, they are fighting against the idea

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that being raped or sexually violated is inevitable based on circumstances. However, this fight is fought all over the world, and in some places, it is a more difficult fight than in others. Just try to make it through the devastating 1 hr 2 min 15 s of the BBC documentary *India's Daughter*, and you can see how rape is combated in India. The documentary tells the story of the brutal rape and murder of Jyoti Singh in 2012 in the capital city of India, which sparked numerous uprisings and protests for increased visibility of rape culture (Udwin, 2015). Aside from telling Singh's story, the documentary depicts the fight for a woman's right to her body amid changing, culturally ingrained traditional values for women. The Indian government has since banned this documentary (*The Indian Express*, 2015).

Through the film, viewers understand that although many people in India recognize the need to uplift women and to respect them as human beings, there are still others who choose to dehumanize them and to see women through a traditional or conservative lens. For example, A. P. Singh, one of the defense attorneys for Jyoti Singh's rapists, said,

> If my daughter or sister engaged in pre-marital activities and disgraced herself and allowed herself to lose face and character by doing such things, I would most certainly take this sort of sister or daughter to my farmhouse, and in front of my entire family, I would put petrol on her and set her alight. (Udwin, 2015)

It is this widespread misogyny that seems to be a major barrier to promoting female autonomy and the right a woman has to her own body, thus making it a contributor to the proliferation of rape culture.

A Snapshot of New Delhi From Personal Experiences

While visiting New Delhi, the capital of India, in August 2018 for a public health study-abroad, I did not find the society depicted in this documentary. I found a culture centered on community and family well-being that is deeply dedicated to the overall health of their neighbors and friends. However, the more I asked our hosts about the reasons behind certain health care and social practices centered on women's health, the more I saw a society trying to prevent rape, as opposed to trying to prevent rapists or the actions that proliferate rape culture. While visiting hospitals and rural health centers in India, my group was guided by women from the Salokaya College of Nursing. They were not shy, even when asked tough questions about the prevalence of rape and domestic violence in India. They were very willing to paint the picture of passive and quiet prevention of rape that has become the norm for approaching sexual violence in India, especially when asked about their personal experiences as health care professionals and women.

The nursing students at Salokaya work a 12-hr night shift so that they do not have to walk to the hospital while it is dark and risk encountering a sexual predator. However, sexual violence can occur in the workplace also. According to a report on the extent of sexual violence in hospitals of Kolkata, India,

> The women who had experienced harassment [while working in hospitals] were reluctant to complain, fearing for their jobs or being stigmatized, and most were not aware of formal channels for redress. Experiences of sexual harassment reflected the obstacles posed by power imbalances and gender norms. (Chaudhuri, 2007, p. 221)

The nursing students in Delhi further explained that in many places around India, girls have a curfew at dusk and are often accompanied by men in their family when they have to travel far. Even during the day, on public streets, I rarely saw women walking alone; they always traveled in small groups. This feeling of needing to stay in packs is evidence of how rape culture has turned preventive efforts into daily habits and routines. In addition, advertisements throughout hospitals and community centers depict images of young women, warning parents to protect their daughters and brothers to watch over their sisters. Again, the inevitability of rape is proliferated, even in a health care setting, suggesting that women need to be protected, rather than suggesting that other people need to be taught to ask for consent or respect other's right to safety from unwanted sexual encounters. These prevention efforts, although noble in the purist of safety, are part of the rape culture they are trying to combat. Prevention methods cannot stop all rape and those who are raped do not often feel comfortable reporting their experiences.

These preventive habits are accompanied by a lack of health care services provided to survivors. At the public health center in Najafgarh, a rural area just outside New Delhi, there are no services provided specifically for the survivors of rape and there is no scheme or program to help survivors. Some health care providers seemed confused as to why I would even ask if such services were available, as if rapes were not prevalent in their area or a genuine concern. However, there is a center in the hospitals for survivors of rape, which can be up to 30 kilometers away in some rural areas and nearly impossible to travel to without a car or by bus. Those who are able to make it to a hospital to seek treatment after an assault often arrive in the emergency department.

While in India, I had the opportunity to visit hospitals and ask questions about the policies in place for when a survivor of sexual assault arrives to receive medical attention. At the Dr. Baba Saheb Ambedkar Hospital in Delhi, a patient who wishes to be treated after a rape would first enter a large open room with a doctor's table and a nurse's table, swarming with patients and other patients in beds waiting to be treated or transported to another unit. After navigating through this chaotic emergency department, they would be taken to a private area and a doctor would investigate the patient to ensure a rape has actually occurred, asking the patient where they were inappropriately touched using a picture of the human body. No other tests or procedures for confirming a rape were discussed at this particular hospital. This method of treatment can often re-victimize the survivor. According to a study on the impact of re-victimization, "rape victims who do not seem to be 'real' victims to police, doctors, and nurses often face blame and stigmatizing responses" (Maier, 2008, p. 787). Treating survivors of sexual assault as if they need to prove that their experiences are real also reduces the rate at which important health care concerns are discussed with these patients, such as mental health concerns, pregnancy, and the spread of sexually transmitted diseases (Maier, 2008, p. 789). This can greatly limit the ability for survivors to receive and accept treatment, cope with their experiences, and seek help in the case of future sexual violence encounters. However, these practices are still common in India and throughout the world.

After it is confirmed in a hospital that the patient has been raped, court proceedings could begin and then counseling is offered to the survivor. When a rape is reported in India, it seems that health care practices are centered on ensuring that the survivor is actually telling the truth about what happened to them, as opposed to offering support during a difficult time in someone's life and commending them for their bravery in reporting in the first place. However,

most rapes go unreported. According to the nurses we worked with at the Salokaya College of Nursing, the range of punishments for rapists is 5 years in prison to life in prison; the death penalty is used only in the most extreme cases. According to an amendment to the Protection of Children From Sexual Offenses Act of 2012, raping a child 12 or younger could result in the death penalty (Thiagarajan, 2018). In addition, rape of a minor below the age of 16, with this amendment is now a 20-year sentence or life imprisonment, compared with the previous punishment of a 10-year maximum sentence (Thiagarajan, 2018). Although these efforts to reform court involvement in rape cases of children is positive, mixed public perception of the changes shows that some members of society are not embracing these changes, perhaps because of deep-rooted cultural norms that have traditionally ignored rape as an issue.

The nursing students with whom I worked while in India said that rape is not taboo to talk about but also is not readily exposed. Often, rapists are male breadwinners in the family; the entire family suffers if he is caught and sent to jail. Thus, many people do not report rape or sexual assault, as it can negatively affect an entire family. This also removes the family unit as a place to confide in when predators are people who are close with or a member of the family. A majority of research on how best to work with survivors of rape and assault to cope with their experiences and prevent future risk involves an ability to be open with an emotional support network and health care team. According to Ellsberg et al. (2015), these interventions "use a combination of strategies, including psychosocial support, advocacy and counseling and home visitation to provide women with resources and support to reduce their future risk of violence, and to improve their physical and psychological health and well-being" (p. 1557). However, when many people do not feel comfortable seeking help from health care professionals or family members, this opportunity is missing. As a result, not only are many rapes not reported, but many women fall victim to the same predators. Some of the most underreported rapes and instances of sexual violence are those that occur between a woman and someone she knows, such as her partner. As such, marital rape is rarely questioned in India.

Intimate Partner Violence

Historically, marriage in India has been a highly regulated process, involving input from various family and community members. However, one player in marital unions who is often neglected is the bride. Women, especially in northern Indian culture, are seen as bargaining chips in the social aspect a marriage brings to the community. This mentality around a woman's role in a union can have problematic effects on female autonomy. For example, "[a] very important indicator of female autonomy is the extent of their control over refusing sexual intercourse with their husbands" (Banerjee & Roy, 2015, p. 1039). Some women in India do not have this autonomy and suffer from intimate partner violence, which can include rape, physical, verbal, or mental abuse, nonconsensual sexual contact, and so on. According to Kalokhe et al. (2017), some causes of high rates of domestic violence in India are "deep-rooted male patriarchal roles and long-standing cultural norms that propagate the view of women as subordinates throughout their lifespan" (p. 499). The misogynistic undertones in this aspect of the culture are a major contributing factor in propagating rape culture and produce dangerous consequences for many people.

Furthermore, the importance of family and the presence of many opinions in the traditionally multigenerational households throughout India can pose another obstacle for women

seeking care, not just for issues of violence, but even for other more general issues of women's health and family planning. While shadowing Salokaya students in Delhi during home visits, I saw how the fear of disapproval from a person's family can affect the ways in which patients approach health care. At one such home visit, a pair of women felt comfortable asking about contraceptive methods only because their husbands and mothers-in-law were not present at the time; otherwise, they would have been ashamed to seek those services.

The cultural neglect of female autonomy in social situations such as marriage translates to this decreased feeling of autonomy in health care as well. A lack of autonomy in marital relationships and in health care can lead to high rates of unreported intimate partner violence, unwanted pregnancies, the spread of sexually transmitted infections, and various mental health problems such as depression and anxiety, and the lack of reporting of violence often prevents treatment for these issues as well.

Rape Culture Worldwide

Women in India have been at the forefront of challenging the rape culture that has been expanded by misogyny in their country. Especially after Jyoti's death, many women have protested and have taken an active approach to changing cultural aspects that breed rape culture. Although the issues that arise from a lack of female autonomy are compounding, the views that proliferate intolerant actions are changing in India and more positive ideas on the role of women in families and communities are taking hold. These changing attitudes and more widespread support for survivors have enabled increased reporting of sexual violence in India, despite a lack of health care policy reform. After the enhanced visibility of rape as a result of the protests following Singh's death, reporting of rape increased by 35%. At the time that *India's Daughter* was produced, current statistics stated that a woman in India was raped every 20 min (Udwin, 2015). Cultural views that diminish female empowerment may be a predominant factor perpetuating rape culture in India, but sexual violence is prevalent throughout the world and in cultures that view women in various ways.

The following statistics, shown before the production credits of *India's Daughter*, show that stories of sexual assault and rape are not a devastating reality for people in any particular area, but the devastating reality for people worldwide (Udwin, 2015): In Australia, 35% of women have been sexually assaulted, while only 15% report to the police. In Canada, one in three women have been sexually assaulted, while only 6% report to the police. In the Democratic Republic of Congo, 400,000 women are raped each year. In Denmark, only 20% of reported rape cases result in a conviction. In Egypt, 95% of women have suffered genital mutilation. In Ethiopia, 60% of women have been subjected to sexual violence. In France, one in 10 women are victims of domestic violence. In Nigeria, 10 out of 36 states have laws that allow husbands to use physical force against their wives. In South Africa, a woman is raped every 26 s. In Sri Lanka, an average rape case takes 6 to 12 years to resolve. In the United Kingdom, one third of girls between ages 13 and 17 have experienced sexual violence. In the United States, 17.7 million women have been raped. These statistics are scary. They show that no matter the culture of a country or region, rape culture is rampant worldwide. Analyzing such widespread issues in the way that rape is prevented and treated from a multi-faceted lens shows the need for increased visibility of prevalent health issues and the need for collaboration among citizens of the world. We all have the opportunity to learn about other cultures and counties, to investigate public health issues that are prevalent in a given area,

and to think critically about how rape culture can be combated on a global level by sharing stories and ideas.

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INDEPENDENT RESEARCH

Analyzing Cultural and Linguistic Competency in 12 Mental Health Agencies in Wayne County

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Abstract:

This study examined the comments of the parents/caregivers who completed the Cultural and Linguistic Competency Assessment survey distributed at 12 mental health agencies in Wayne County, Michigan. The study participants (*N* = 348) completed a paper-based survey, answering the two comment sections. The two comment sections asked them about the quality of care that they received at their child's mental health agency. The research team hypothesized that the cultural competency of services could be improved, consistent with recent research studies on cultural and linguistic competency at mental health agencies. Through analyzing qualitative survey data, the research team found both strengths that agencies have and challenges that agencies face in providing culturally and linguistically competent care. This study seeks to examine self-identified needs of parents/caregivers, such as the need for more translators, and pathways that improve the quality of mental health care clients receive.

Keywords: Wayne County, Cultural and Linguistic Competency

Introduction

Wayne County residents are in great need of quality and culturally sensitive mental health services. Wayne County is the most populated county in Michigan and includes cities like Detroit and Dearborn. The poverty rate in Wayne County is 22.7%, compared with the national average of 14% and the Michigan average of 15% as reported in the annual American Community Survey. According to their annual report, Detroit Wayne Mental Health Authority (DWMHA; 2017) agencies' client base is more than 48% African American, 30%

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non-Hispanic White, and less than 1% identifies as Asian, American Indian, Pacific Islander, or Alaskan Native. In Wayne County, an individual's economic circumstances and social environment are predictors of poorer mental health outcomes. This study seeks to examine how well DWMHA responds to residents' circumstances, by examining the extent to which they provide culturally and linguistically competent mental health care.

This study's Implementation Team—composed of DWMHA agencies and the University of Michigan School of Social Work—was awarded a Substance Abuse and Mental Health Services Administration (SAMHSA) grant that included an imperative to evaluate the youth-serving mental health agencies in the Detroit area. The Detroit Wayne System of Care (SOC) CONNECTIONS serves a diverse population including Latino, American Indian, African American, and Arab American populations. This diversity underscores the importance of having mental health care providers who understand the cultural and linguistic needs of the populations they serve.

According to the research team's Preliminary Wayne County Cultural & Linguistic Competency Assessment Report of parent/caregivers, 65% identified as Black/African American, 7% identified as American Indian/Alaskan Native/First Nations, 18% identified as White, and 10% identified as Other. There was a separate category in the survey for parents/caregivers to identify as Hispanic or non-Hispanic. Of the parents/caregivers surveyed, 86% identified as non-Hispanic, 12% identified as Hispanic, and 2% stated, "prefer not to say."

This research addresses the areas in need of improvement, according to the parents/caregivers who responded to the two comment sections of the surveys. Through this report, we hope to inform board members, executive leadership, and direct service providers from each of the 12 mental health agencies on how to better meet the needs of the parents/caregivers of youth receiving care. An aggregate report of all participating agencies was created and individual reports to each agency were disseminated. We provided observations and suggestions for improvement to each agency to improve their cultural and linguistic competency (CLC) to better serve their clients and families.

Review of Literature

The conceptual model of Brach and Fraserirector (2000) frames the ability of cultural competency in mental health agencies to reduce racial and ethnic health disparities in the United States. Cultural competency, as defined by Brach and Fraserirector, is "a set of values, behaviors, attitudes, and practices within a system that enables people to work effectively across cultures" (p. 182). Brach and Fraserirector's study found nine major cultural competency techniques that improve the relationship between clients and service providers. These include interpreter services, training, culturally competent health promotion, and inclusion of family/community members. The research team aims to monitor the use of similar techniques for mental health providers, aligning with findings to the Brach and Fraserirector study, to deliver appropriate services to diverse populations (Brach & Fraserirector, 2000). A review published by Kohn-Wood and Hooper (2014) also substantiates the need for reducing racial and ethnic disparities in health care through prioritizing culturally competent practices. Kohn-Wood and Hooper focus on the ability to culturally tailor the assessment of cultural competency, diagnosis, and treatment of mental health issues, and how this will reduce disparities in equal access to culturally appropriate mental health care (Kohn-Wood & Hooper,

2014). In our assessment of Wayne County, for example, the research team considers evaluating agencies based on criteria such as the availability of Arabic translators.

Other studies and projects have underscored the need for hiring diverse health care providers at mental health agencies to reduce ethnic and racial disparities. Lu (2006) outlined his findings by corresponding with the Liaison Committee on Medical Education as they correlated disparities, cultural competency, and diversity. A project designed and implemented by Siegel, Haugland, and Chambers (2003) measured the performance of cultural competency in behavioral health care. The research team in this study investigated the capacity of mental health agencies to serve their diverse client population. The expert panel provided feedback by considering the needs the clients believe are most important. The panel highlighted evaluating the importance of hiring mental health care providers who come from similar cultural backgrounds as their clients.

As the basis for the evaluation, the research team referenced National CLAS (Culturally and Linguistically Appropriate Services) Standards to guide our assessment. A study by Barksdale, Kenyon, Graves, and Jacobs (2014) highlighted the historic inability of the mental health care system to effectively address the cultural needs of diverse populations. To address these shortcomings, the study posits ways in which national CLAS standards should be incorporated into the training of mental health care professionals to reduce disparities and ensure equal access to culturally and linguistically competent mental health care (Barksdale et al., 2014). Our research team incorporated these standards as well as the mission statements of our partner organizations, such as the DWMHA, to ensure equitable access to quality mental health care.

Methodology

The research team sought to understand the specific needs of youth and parents/caregivers at youth-serving mental health care agencies in Wayne County using CLAS standards.

The research team at the University of Michigan School of Social Work developed surveys to collect data on the cultural and linguistic competency of mental health care agencies in the DWMHA system. The research team, including Professor Momper, Debbie Tauiliili, Jennifer Hopson, Caroline Kelly, Amelia Mueller-Williams, and Sarah Calgie-Carr, adapted the survey from pre-existing CLC surveys. The parent/caregiver survey was for all parents/caregivers with youth 12 to 21 years old receiving services at the mental health agencies. The survey collected demographic characteristics including race, gender, ethnicity, and education. It included 10 Likert-type-scaled questions, each with room for comment, and two additional open-ended questions. The survey was available both online (Qualtrics) and on paper, but only the paper-and-pencil survey was used. The surveys were available in English, Spanish, and Arabic to meet the linguistic needs of the clients receiving services.

Once the surveys were finalized, a designated person at each agency was contacted to organize data collection (data and time), and the data collection process ensued. The research team visited 13 youth-serving mental health care agencies and surveyed parents/caregivers at 12 agencies. Parents and caregivers were asked if they wanted to participate in a survey and if they agreed, completed a consent form. The parents/caregivers of youth receiving services were asked to assess the cultural and linguistic competency of care provided to their families. All data were de-identified and, therefore, anonymous.

There were two comment sections on each of the surveys. One open-ended question asked, "What services do you need that you and/or your family are not getting?" The second asked for "Other comments or suggestions about your child/youth's or your experiences around culture and language at this agency/organization?"

Comments from the parent/caregiver surveys were analyzed via Microsoft Excel. The data were coded, using different variables in Excel. Each of the variables was coded to a number between 1 and 10. These numbers represented services that the parents/caregivers stated they needed and were not receiving at their mental health agency.

Variables of Interest

Variable 1	Greater need for the use of community health workers
Variable 2	Greater need for cultural and linguistic training
Variable 3	Encouragement on behalf of the agency of culturally competent health
Variable 4	Desire to further incorporate family into the health care decision-making process
Variable 5	Better administration practices
Variable 6	Translators and translation services
Variable 7	Staff to have a better understanding of their culture
Variable 8	Incorporation of traditional healers
Variable 9	Recruit more minority staff
Variable 10	More positive environment of the mental health agency

These variables, once coded from the survey data, were formatted in Excel tables and converted into graphs to model the distribution of responses. The Excel graphs aggregated the number of responses that correspond to each of the coded variables. The graphs highlight the variables cited most in the comments and therefore, which services are most salient to the parents/caregivers completing the survey about their mental health agency.

The overall purpose of the report is to provide the mental health providers with areas in which the agencies can improve to appropriately address the needs and concerns of their clients. This includes the analysis of the comments made on the surveys and suggestions for possible solutions to meet the cultural or linguistic needs of their clients. The findings of the report have been analyzed and disseminated to the participating agencies.

Due to privacy concerns, our research team de-identified the 12 mental health agencies. The agencies are identified A to L.

Results

Parents/Caregivers

There are two graphs for each of the partner agencies: one graph for each of the two open-ended questions addressed. The x-axis represents all the variables 1 to 10 as described in the previous section, and the y-axis represents the total number of parents/caregivers who filled

out a survey at that agency. Each point on the graph represents a parent/caregiver response (coded to variables 1–10) to the comment section of the corresponding graph. However, none of the 12 agencies had a response rate equal to the number of participants for either comment section. Parents/caregivers who did not respond to the comment sections were marked as 999 (missing) in the data and are not represented by data points in the graph; data points in the graphs represent only parents/caregivers who responded to the corresponding comment section (Figure 1).

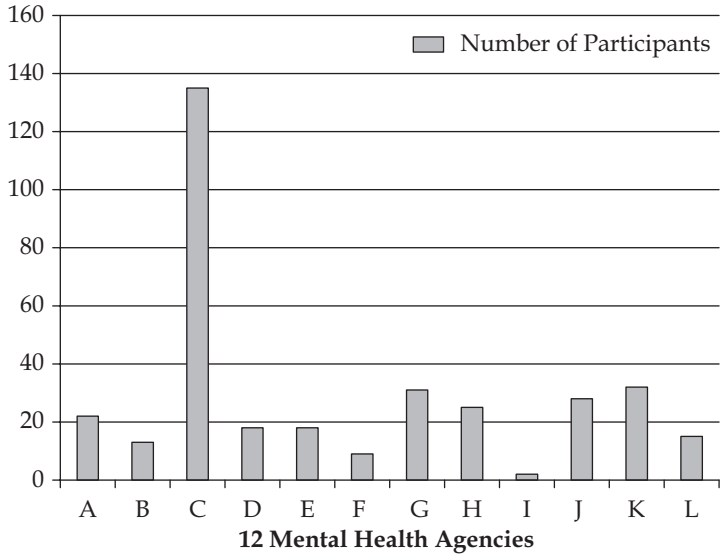

Figure 1. Number of parents/caregivers who completed surveys at each agency (Agencies A–L).

Mental Health Agency Data

Each blue dot () in the graphs (Figures 2–23) indicates one parent/caregiver coded variable response.

Agency A.

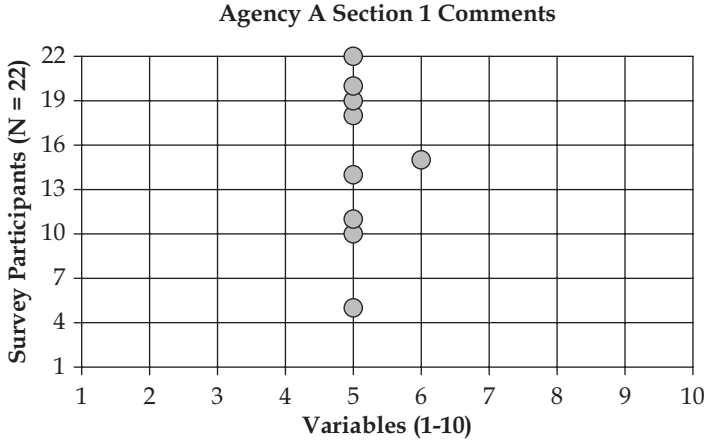

Figure 2. Which variable the respondents cited most in the surveys at Agency A. (Better admin practices, more translation services.)

Note. There were nine respondents and 13 non-respondents.

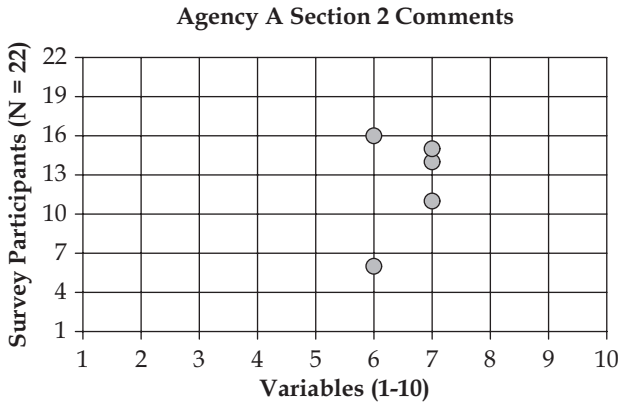

Figure 3. Which variable the respondents cited most in the surveys at Agency A. (More translation services, understand culture.)

Note. There were five respondents and 17 non-respondents.

Agency B.

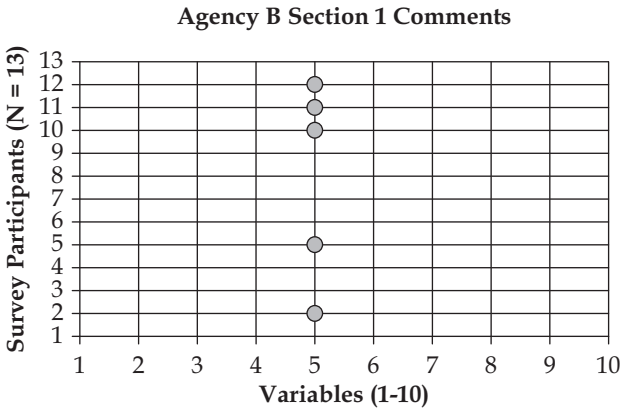

Figure 4. Which variable the respondents cited most in the surveys at Agency B. (Better admin practices).

Note. There were five respondents and eight non-respondents.

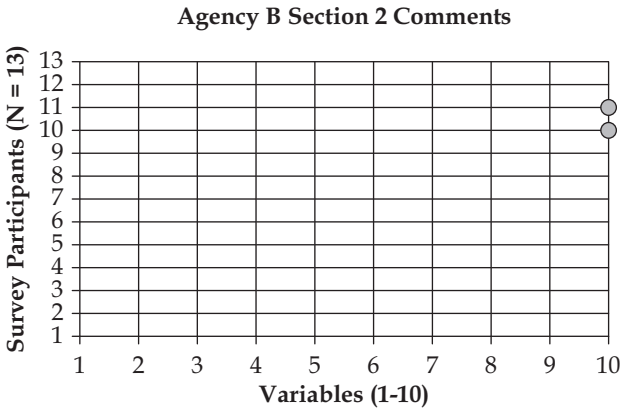

Figure 5. Which variable the respondents cited most in the surveys at Agency B. (More positive environment).

Note. There were two respondents and 11 non-respondents.

Agency C.

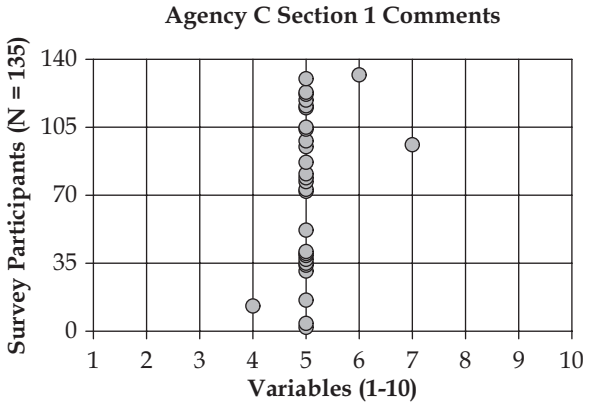

Figure 6. Which variable the respondents cited most in the surveys at Agency C. (Incorporate family, better admin practices, understand culture).

Note. There were 30 respondents and 105 non-respondents.

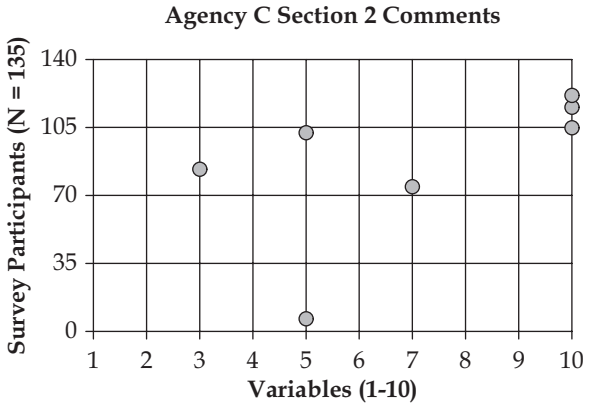

Figure 7. Which variable the respondents cited most in the surveys at Agency C. (More positive environment, better admin practices, encourage culturally competent health, understand culture).

Note. There were seven respondents and 128 non-respondents.

Agency D.

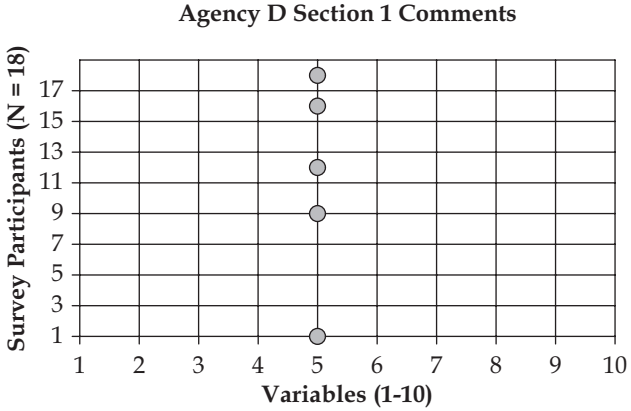

Figure 8. Which variable the respondents cited most in the surveys at Agency D. (Better admin practices).

Note. There were five respondents and 13 non-respondents.

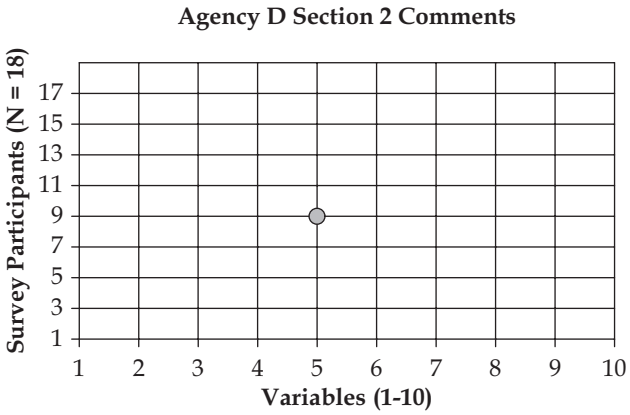

Figure 9. Which variable the respondents cited most in the surveys at Agency D. (Better admin practices).

Note. There was one respondent and 17 non-respondents.

Agency E.

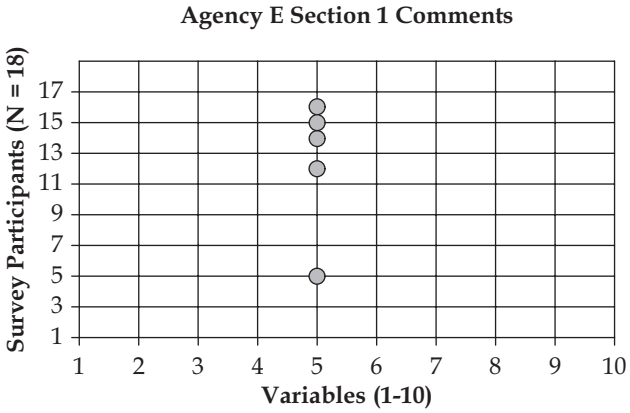

Figure 10. Which variable the respondents cited most in the surveys at Agency E. (Better admin practices).

Note. There were five respondents and 13 non-respondents.

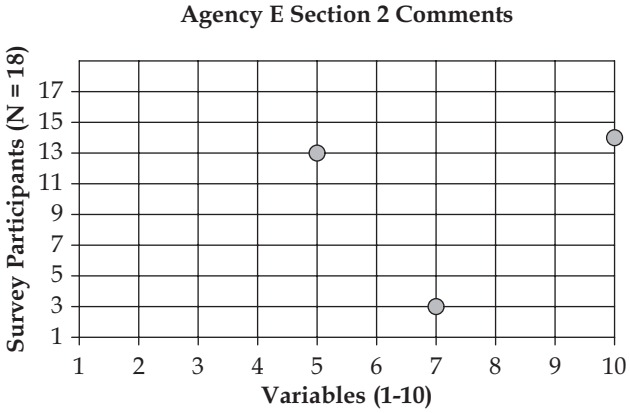

Figure 11. Which variable the respondents cited most in the surveys at Agency E. (Better admin practices, understand culture, positive environment).

Note. There were three respondents and 15 non-respondents.

Agency F.

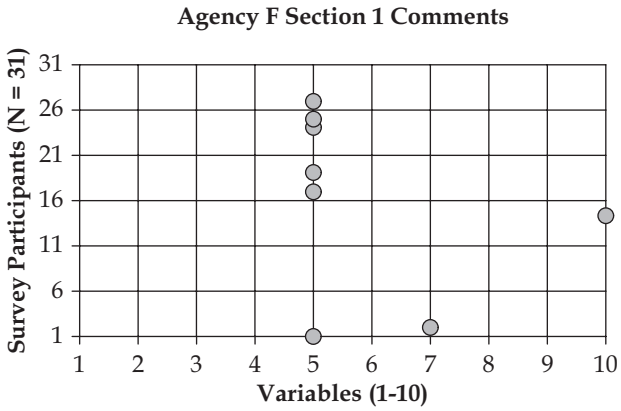

Figure 12. Which variable the respondents cited most in the surveys at Agency F. (Better admin practices, understanding culture, positive environment).

Note. There were eight respondents and 23 non-respondents.

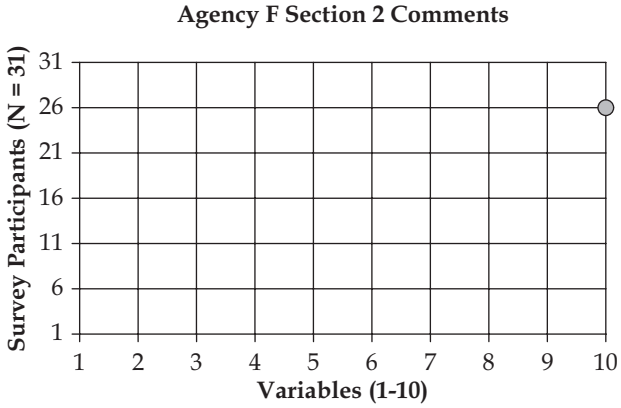

Figure 13. Which variable the respondents cited most in the surveys at Agency F. (Positive environment).

Note. There was one respondent and 30 non-respondents.

Agency G.

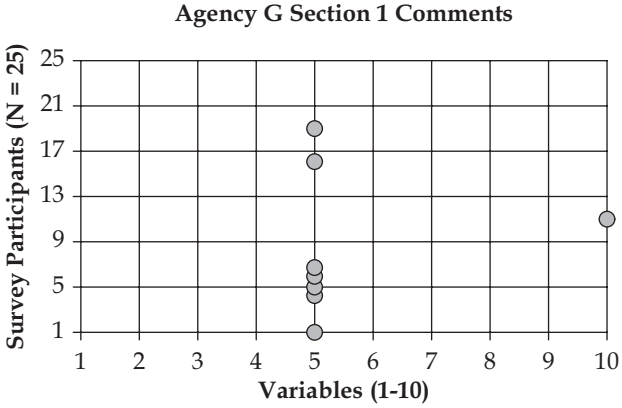

Figure 14. Which variable the respondents cited most in the surveys at Agency G. (Better admin practices, positive environment).

Note. There were eight respondents and 17 non-respondents.

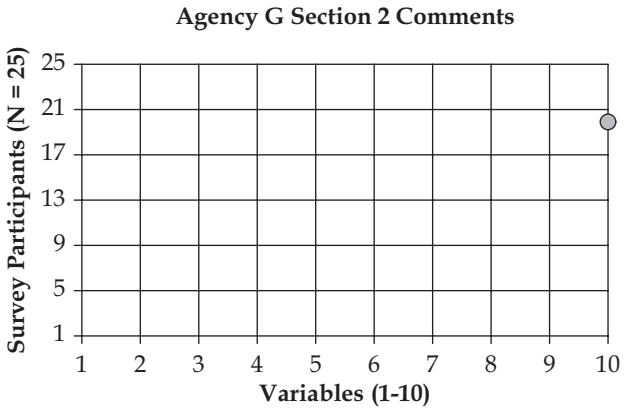

Figure 15. Which variable the respondents cited most in the surveys at Agency G. (Positive environment).

Note. There was 1 respondent and 24 non-respondents.

Agency H.

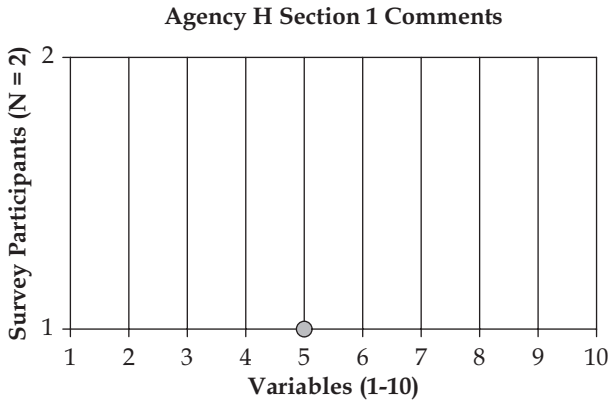

Figure 16. Which variable the respondents cited most in the surveys at Agency H. (Better admin practices).

Note. There was one respondent and one non-respondent.

Agency I.

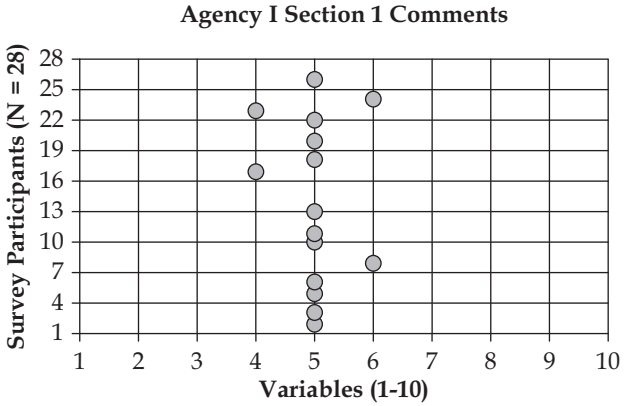

Figure 17. Which variable the respondents cited most in the surveys at Agency I. (Better admin practices, more translation services, incorporate family; there were more respondents for the first comment section).

Note. There were 15 respondents and 13 non-respondents.

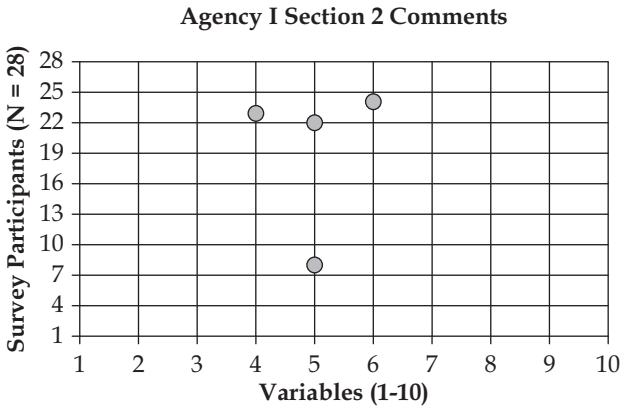

Figure 18. Which variable the respondents cited most in the surveys at Agency I. (Incorporate family, better admin practices, more translation services; there were fewer respondents for the second comment section).

Note. There were four respondents and 24 non-respondents.

Agency J.

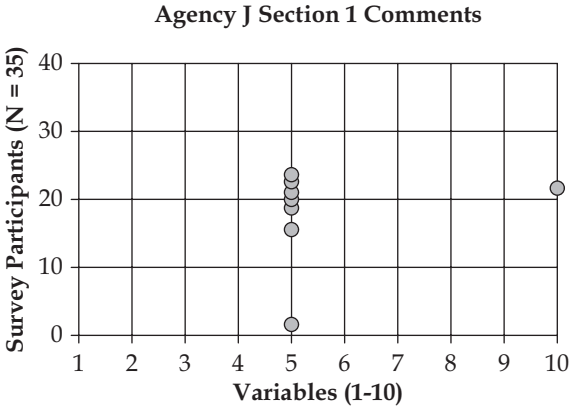

Figure 19. Which variable the respondents' cited most in the surveys at Agency J. (Positive environment, better admin practices; there were more respondents for the first comment section).

Note. There were seven respondents and 28 non-respondents.

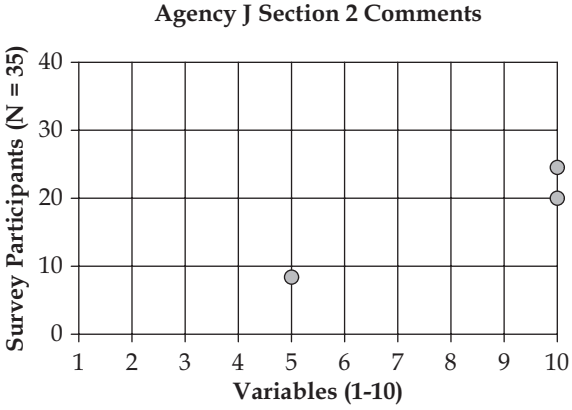

Figure 20. Which variable the respondents cited most in the surveys at Agency J. (Better admin practices, positive environment; there were fewer respondents for the second comment section).

Note. There were three respondents and 32 non-respondents.

Agency K.

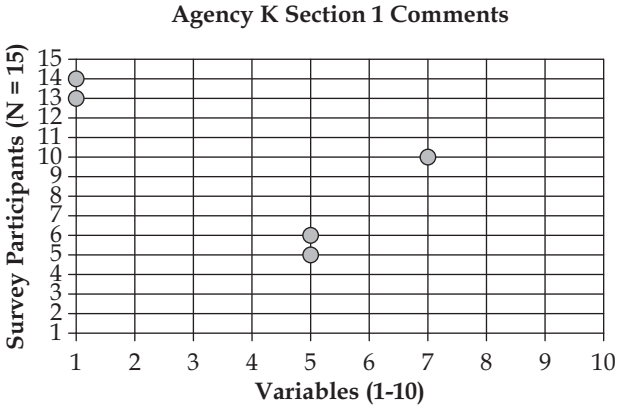

Figure 21. Which variable the respondents cited most in the surveys at Agency K. (Community health workers, better admin practices, understand culture).

Note. There were five respondents and 10 non-respondents.

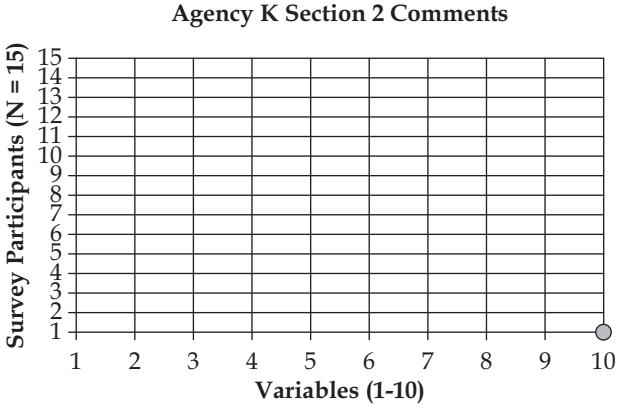

Figure 22. Which variable the respondents' cited most in the surveys at Agency K. (Positive environment).

Note. There was one respondent and 14 non-respondents.

Agency L.

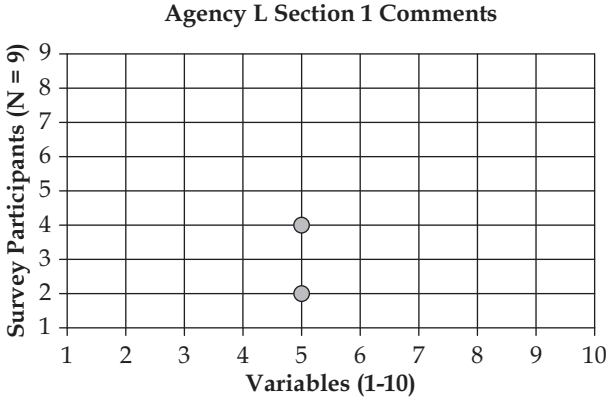

Figure 23. Which variable the respondents cited most in the surveys at Agency L. (Better admin).

Note. There were two respondents and seven non-respondents.

Overall, the need for greater translation services, improved administrative practices, improved understanding of families' cultures, and a more positive service provider environment were the most reported needs by parents/caregivers of youth receiving services at DWMHA agencies. The incorporation of families, and specifically, parents into service provider decisions was also frequently cited. On at least one of the comment sections of the survey, at least two of the parent/caregiver respondents reported the need for improved administrative practices. Only parents/caregivers from one agency reported a need for more community health workers. In addition, two mental health agencies (Agency H and Agency L) did not have comments in the second section of the survey.

Discussion

Data from the parent/caregiver surveys highlight areas of improvement for each of the 12 agencies. All agencies had parent/caregiver comments for Section 1 Comments. Agency H and Agency L were the only agencies that did not have comments for Section 2 Comments. An analysis of the data reveals the need for interpretation services, recruitment of minority staff members, use of community health workers, and administration and organizational accommodations. The parents/caregivers also communicated a need for improved availability of interpretation services. Parents/caregivers are often active advocates for their youth, underscoring the need for translation services. Without this communication, parents/caregivers will not know about the services offered and will not be able to ensure the highest quality of care for their youth.

In addition, parents/caregivers communicated a great need for more comprehensive supplemental services, such as assistance with job searches, finding housing, and paying off medical bills. The research team did not specifically ask or address this in our surveys or reports to individual agencies, because these services are not directly related to cultural competency of health care, but the need is great enough that the participants volunteered this as a need. The data also suggest that there is a need for more cultural sensitivity.

Conclusion

Cultural and linguistic competency is critical to be able to provide the best quality of care for youth and families receiving mental health care services. The DWMHA serves a diverse population, representing an array of cultures, languages, and backgrounds. It is imperative to ensure that mental health agencies are able to communicate effectively with their client base, including the families of those receiving care. The community, as a whole, must feel as though they are supported. This is demonstrated through expanding services such as greater availability of translational services on-site.

One of the limitations of the study was that the report was not able to survey all the parents/caregivers receiving services at each of the 12 agencies in this report. Another limitation is that of those who did not respond to the comment sections, the responses were marked as 999 (missing) in the data tables and the missing responses were taken out of the graph data. This is why all of the graphs have a more parent/caregiver survey participants than respondents to the comment sections of the survey. In addition, this study does not report the positive comments that were documented in each of the two comment sections. The report does not include positive feedback because the coding system of the data is based on areas in which the agencies can improve to ensure cultural and linguistic competency.

Although the research team was not able to survey every parent/caregiver receiving care at the agencies to generate a more comprehensive report, this research report highlights the critical areas in which DWMHA can improve and expand cultural and linguistic competency. This study informs future studies of cultural and linguistic competency such as studies investigating how mental health agencies in different counties, with similar client demographics, implement culturally competent practices.

Research studies investigating the training that other mental health agencies in Southeast Michigan mandate their employees to complete could further these findings. In addition, research into other agencies' mental health outcomes with similar client populations but different training practices could be helpful in explaining these findings.

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INDEPENDENT RESEARCH

Assessing the Safety of Tap Water in Public Bathrooms (Glasgow, Scotland)

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Abstract:

Waterborne diseases are one of the greatest risks to human health. An essential use for water is in public bathrooms, the installation of which is a major example of public health interventions that solved important sanitation and hygiene concerns. Currently the demand for free public bathrooms is rising and their safety has come into question. The first step in determining the safety of public facilities is to evaluate the water from public bathroom sinks in major cities for these waterborne pathogens; therefore, the water of public bathroom sinks in Glasgow, Scotland, was evaluated for pathogens. Numerous samples were collected from public bathrooms throughout Glasgow's City Centre and examined using a variety of microbiological methods to identify and analyze both pathogenic and innocuous microorganisms to ultimately assess contamination levels and water quality. No evidence of fecal contamination or pathogenic viruses was discovered; however, numerous opportunistic pathogens were identified in every public bathroom sampled. Although further assessments are necessary, these results raise numerous questions about the safety of water from public facilities.

Keywords: Scotland, Public Bathrooms, Waterborne Diseases, Gram-Negative Bacteria

Introduction

Waterborne diseases are a serious health risk globally (Nienie et al., 2017; Szewzyk, Szewzyk, Manz, & Schleifer, 2000). Waterborne diseases can be caused by bacteria, viruses, and protozoans (World Health Organization, 2004). Approximately 10% of bacteria in water can cause disease and include genuses such as *Acinetobacter, Escherichia coli, Pseudomonas aeruginosa*, and various others. Pneumonia, dermatitis, and gastroenteritis are among the diseases caused by such bacteria (Minnesota Pollution Control Agency, 2008; World Health Organization, 2004). An example of a *Pseudomonas* skin infection is shown in Figure 1 (Habif, 2015). Viruses that are spread through freshwater include enteroviruses, hepatitis A virus, and rotavirus (World Health Organization,

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Figure 1. Pseudomonas cellulitis, a skin infection caused by *Pseudomonas aeruginosa* growing in an open wound. *Source*. Habif (2015).

2004). Identification and analysis of both pathogenic and harmless microorganisms are used to assess pollution levels and quality of water (World Health Organization, 2004).

There are many methods used to identify and analyze viral and bacterial pathogens (McMinn, Ashbolt, & Korajkic, 2017). One of the most commonly used tools for simple identification is gram staining, which indicates the composition of the bacterial cell wall, shape or morphology of the bacteria, and proper antibiotic therapy for infection (McPherson & Pincus, 2017). Basic differentiation of bacteria by endospore staining reveals whether bacteria form endospores, which some bacteria produce in adverse environments to aid survival (Li et al., 2015). The structure and formation of endospores are shown in Figure 2 (Murray, Rosenthal, & Pfaller, 2015). Growing bacteria on selective and differential media also provides useful yet limited information. Common examples of media used include mannitol salt agar (MSA), MacConkey agar (MA), eosin methylene blue (EMB) agar, and sodium azide blood agar (Beecher & Wong, 1994; Leininger, Roberson, & Elvinger, 2001; Murray et al., 2015).

One of the most informative techniques for analyzing bacteria is polymerase chain reaction (PCR), which uses a segment of the bacterial gene called 16s ribosomal RNA to perform species classification of bacteria (Munang'andu, 2016; Thijs et al., 2017). Assessment of antibiotic resistance in bacteria is important because the world losses its ability to treat and prevent life-threatening infections as the number of antibiotic resistant microbes grows (Gottlieb & Nimmo, 2011; World Health Organization, 2016). Although these methods provide information about bacteria, they do not provide information about the possible presence of viruses. Bacteriophage plaque assays assess water samples for the presence of bacteriophages, which are viruses that infect bacteria and can indicate whether pathogenic viruses are present

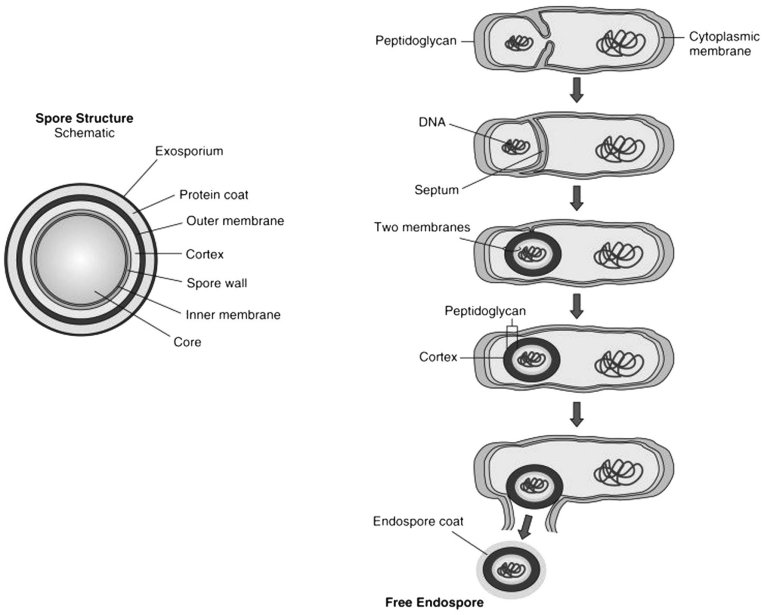

Figure 2. Structure and formation of endospores.

Source. Murray, Rosenthal, and Pfaller (2015).

(McMinn et al., 2017). Such methods can be used to assess the safety of public bathrooms, one of the most essential uses of public water that has a recorded existence dating back to Hadrian's wall in 122 AD (Stanwell-Smith, 2010).

Widespread development of public bathrooms led to crucial public health legislation that solved important community sanitation and hygiene concerns. Today's demand for public bathrooms is rising due to expanding mobile populations and declining general health of the public (Stanwell-Smith, 2010). Despite the impact of these facilities and their growing essentiality, they have been neglected in public health safety measures (Stanwell-Smith, 2010). In a study of public facilities throughout the United States, various potentially pathogenic bacteria were found in approximately 30% of soap dispensers in the public bathrooms (Chattman, Gerba, & Maxwell, 2011). In addition, the opportunistic infection known as *Pseudomonas aeruginosa* has been found commonly in bathroom tap water (Barben, Hafen, Schmid, & Swiss Paediatric Respiratory Research Group, 2005) which poses a serious and life-threatening danger to the millions of people with decreased immune function, that is, the very young, the very old, pregnant women, those afflicted with autoimmune diseases, and those taking certain medications (Otto, 2013).

Although proper hand hygiene significantly reduces various infections, hand hygiene rates are persistently low and rates of proper hand-washing after the use of public bathrooms is particularly troubling (Ford, Boyer, Menachemi, & Huerta, 2014; Lee, Hong, & Kim, 2015). The first step toward resolving the health risks of public facilities is to scientifically evaluate water quality from bathroom sinks in major cities. This study examined samples from public bathrooms in Glasgow, Scotland, to identify and analyze both pathogenic and innocuous microorganisms to assess the safety of public bathroom tap water.

Methods and Materials

Sampling

Location selection.

Public restrooms for sampling in Glasgow, Scotland, were chosen based on public popularity (Rogers, 2017) in the most often visited tourist area, called City Centre, as shown in Figure 3. Sampled public restrooms vary and include locations such as popular coffee shops, transportation facilities, shopping centers, self-cleaning toilets, and restaurants. The 11 locations chosen for sampling are shown in Figure 4 as pink dots. Restroom cleanliness and price of admission also varied.

Sample Collection

Using clean gloves for all collections, a labeled, sterile, plastic container was filled from each sink with a cool or room temperature water sample. A sterile swab was used to collect a sample from each faucet by first wetting the swab with sterile distilled water and brushing it along the inside surface of the faucet's mouth. In two locations, swab samples were also collected from electric hand dryers. Swabs were stored in labeled, sterile, plastic containers with approximately 3 ml of sterile water. Each sample was stored at room temperature immediately after collection.

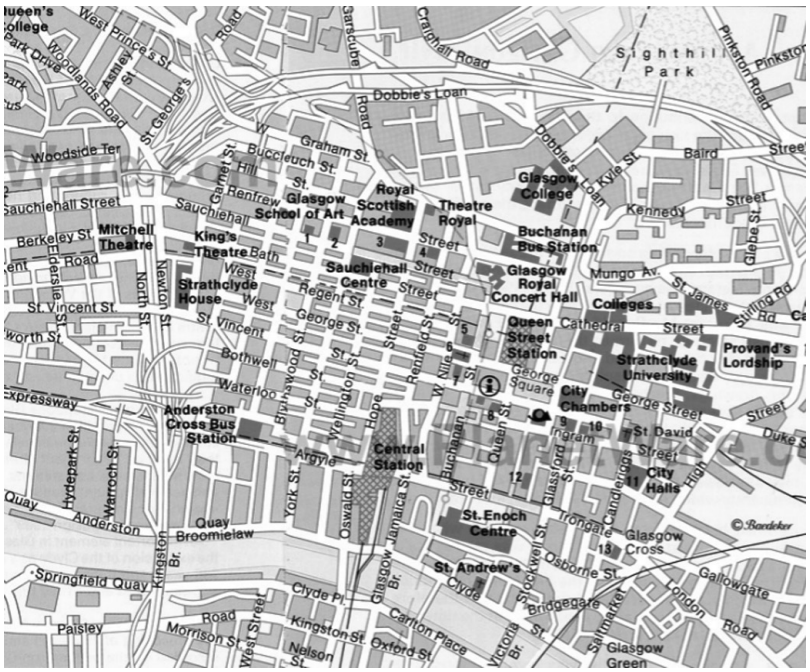

Figure 3. Most commonly visited areas in Glasgow shown in red.

Source. Rogers (2017).

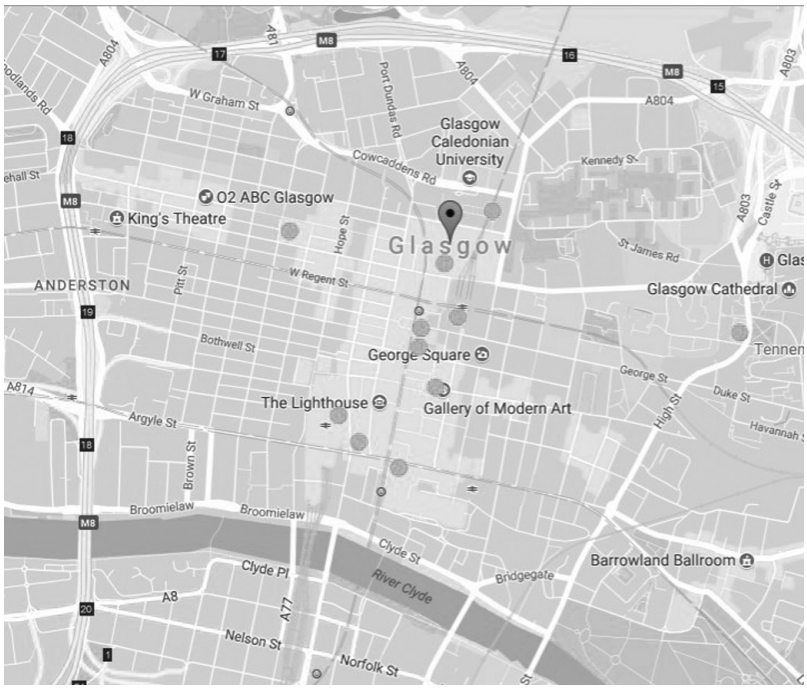

Figure 4. Map showing the 11 sampled bathroom locations (pink dots) in City Centre, Glasgow, Scotland.

Inoculation of Samples and Culturing of Bacteria

Each faucet and water sample was streaked onto two dry nutrient agar plates. One plate from every sample was placed into a 37°C incubator and the other was placed into a 25°C incubator. After initial inoculation, the original samples were placed into an incubator at 37°C for one night. The same process for inoculation was repeated for all samples after incubation. All water samples were then placed in a centrifuge and the concentrated portion of the water samples was separated. The same inoculation process was repeated using the concentrated, centrifuged water samples. These plates were incubated for 3 to 6 days (see Appendix A for details on the experimental design).

Staining

After incubation, staining and isolation of bacterial cultures began. Colonies on the agar plates were chosen based on varying colors and textures. An example of growths on nutrient agar is shown in Figure 5. Each visually unique growth was placed and fixed onto an individual microscope slide for staining. Gram staining was performed on each slide and results were noted. This process was repeated for endospore staining (see Appendix A for details on the experimental design).

Isolating Colonies

Each colony chosen for staining was also isolated from its original nutrient agar plate onto two nutrient agar plates, two MSA plates, and two MA plates by dividing each plate into equal thirds or fourths and spreading the colony sample onto the designated segment of the plate's surface. A nutrient agar plate with isolated colonies is shown in Figure 6. One plate of

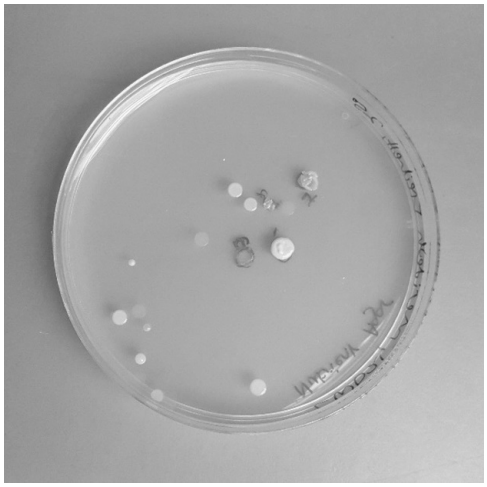

Figure 5. Culturing of a water sample on nutrient agar with examples of the selected and visually unique growths.

each media type was placed into a 37°C incubator and the other was placed into a 25°C incubator. In addition, certain isolated bacteria, chosen by gram stain result and frequency of growth throughout the samples, were inoculated onto sodium azide blood agar and EMB agar plates (see Appendix A for details on the experimental design).

PCR

After isolated colonies had grown sufficiently on nutrient agar, DNA was isolated for sequencing. For each colony sample, the 16s rRNA was amplified through PCR to have the bacterial species identified; however, gel electrophoresis was performed to ensure that each PCR sample contained no more than one type of bacterial DNA and had enough DNA to be sequenced. The PCR samples that met these specifications were then cleaned using a QIAGEN PCR purification kit to remove materials that may interfere with sequencing. After determining that every PCR sample had a high enough DNA concentration, they were sent to the DNA Sequencing Centre at Dundee University for sequencing (see Appendix A for details on the experimental design).

Figure 6. Example of four isolated bacterial colonies on nutrient agar labeled and separated.

Bacteriophage Plaque Assay

For the 11 original water samples, bacteriophage plaque assays were performed by first filtering the water samples to remove bacteria and isolate bacteriophages. Serial dilutions were then made for the filtered water samples and the control assay, which used the T4 bacteriophage. A mixture of molten soft top agar, diluted liquid, and a species of *E. coli* was made and placed onto nutrient agar plates for every water sample dilution and T4 dilution (see Appendix A for details on the experimental design).

Assaying Antibiotic Resistance

Cultures assessed for antibiotic resistance were chosen based on whether they grew in the higher temperature incubator. Sequencing showed additional colonies to be opportunistic pathogens and were also assessed for antibiotic resistance. Each colony was mixed with nutrient broth then spread onto a nutrient agar plate. An antibiotic impregnated disk, which is shown in Figure 7, was placed onto the center of the plate then placed into an incubator to allow bacteria to grow (see Appendix A for details on the experimental design).

Result

Inoculation of Samples and Culturing of Bacteria

Each of the original inoculated swab samples was able to grow bacterial cultures at both 37°C and 25°C on nutrient agar. The number of colonies isolated from each sample varied. Culturing of the original water samples was not as successful and only nine of these original samples were able to grow bacterial cultures. The remaining two original water samples were able to grow bacterial colonies after being incubated. Overall, seven water samples were able to grow a greater number of distinctive bacterial colonies after centrifugation and/or incubation. These seven water samples were examined along with the original water samples. Percentile distribution is shown in Figure 8. Incubated faucet samples were not analyzed past culturing, because the culture grown did not appear to differ from the original faucet cultures.

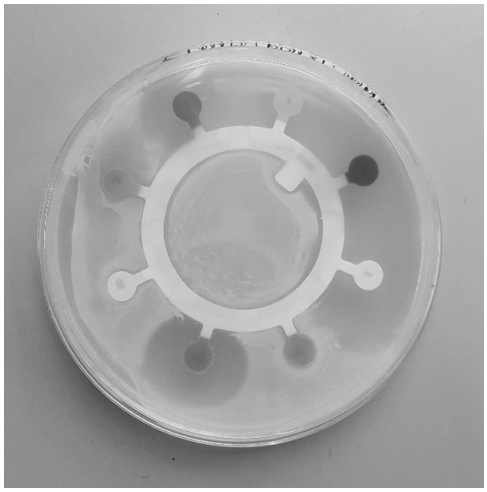

Figure 7. Antibiotic resistance assay showing a sample that is resistant to three and susceptible to five of the antibiotics on the ring, evidenced by whether the bacteria grow directly on or around the antibiotic disk.

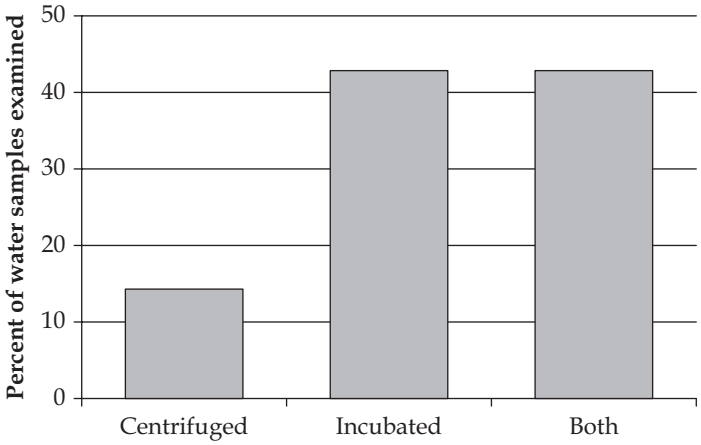

Figure 8. Bar graph of the distribution of examined centrifuged and incubated water samples, showing that of the seven water samples examined with the original samples, 14.3% grew more distinctive colonies after being centrifuged and 42.9% after being incubated; 42.9% of the water samples had both their centrifuged and incubated samples examined.

Gram Staining

The majority of distinctive cultures chosen for staining were found to be gram-negative bacteria. Figure 9 shows the percentile distribution of gram-negative and gram-positive bacteria among the 117 colonies selected for staining. Approximately 35% of the colonies stained a dark purple and were gram-positive and the remaining 65% were gram-negative and stained pink. The morphology of the selected bacterial colonies was also determined after staining. As shown in Figure 11, 32 of 117 (27.4%) of the colonies were determined to be cocci or spherically shaped. The other 85 of 117 (72.4%) of the colonies were bacillus or rod-shaped. The majority of bacteria were identified as gram-negative bacillus and the minority were gram-negative cocci. The gram stain and morphology results are shown in Figure 10.

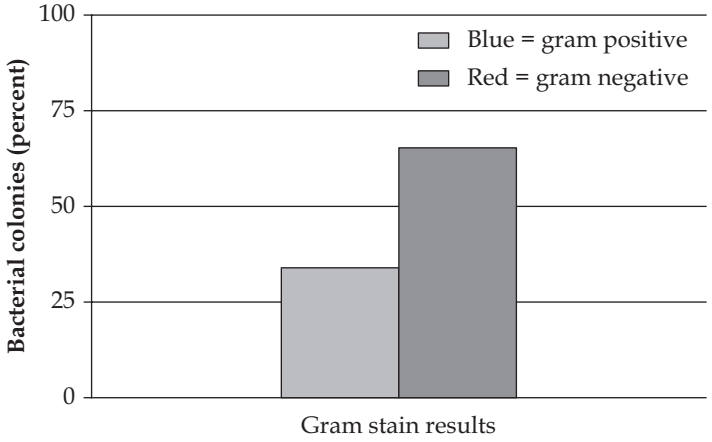

Figure 9. Bar graph of the percentile distribution of gram-negative and gram-positive bacteria among the 117 colonies selected for staining.

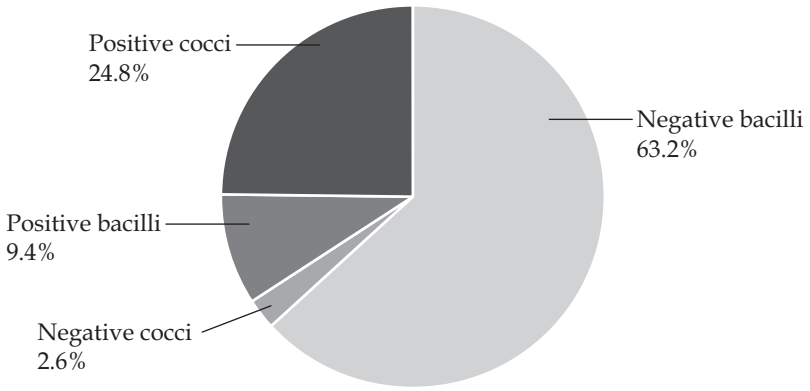

Figure 10. Pie chart of the percentages of the combined morphology and stain results for all 117 selected bacterial colonies.

Endospore Staining

Few bacteria formed endospores and the bacteria that did were found only in location F, a transportation facility. Only three (2.6%) of the colonies that were stained for endospores were positive.

Isolating Colonies

The 117 bacteria chosen for isolation were selected based on colonies' colors and textures. The number of colonies chosen for isolation from faucet samples versus water samples is shown in Figure 11. There were 115 colonies that were isolated and successfully grew on nutrient agar; however, there were two colonies that were gram stained and did not.

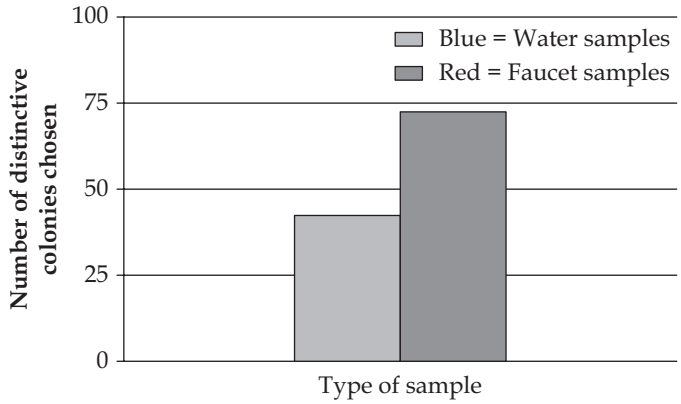

Figure 11. Bar graph of the colonies chosen from water samples versus faucet samples, showing that 43 of the selected colonies were chosen from plates of water samples including original, incubated, and centrifuged. The remaining 74 were picked from cultured faucet samples.

Selective and Differential Media

The same 117 colonies chosen for isolation were inoculated onto MSA and MA. Of those, 85 did not grow on MSA and 75 did not grow on MA. Figure 12 shows the distribution of positive and negative results of these selective and differential media. After sequencing, 10 different gram-negative species and three unidentified isolated colonies were selected to be inoculated onto EMB agar. Of those that grew on EMB, six were lactose positive and one was lactose negative. Nine different gram-positive species and the same three unidentified isolated colonies were inoculated onto sodium azide blood agar. The results of the sodium azide blood agar are shown in Figure 13.

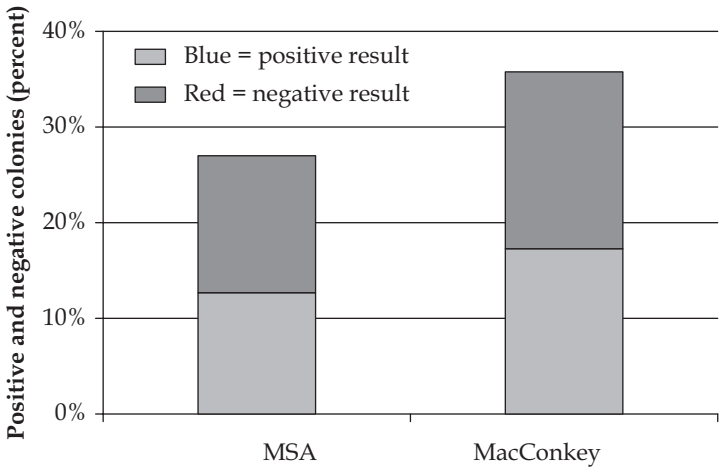

Figure 12. Bar graph of MSA and MacConkey results showing that of all isolated bacteria, 12.8% were mannitol positive and 14.5% were mannitol negative, and 17.1% were lactose positive and 18.8% were lactose negative.

Note. MSA = mannitol salt agar.

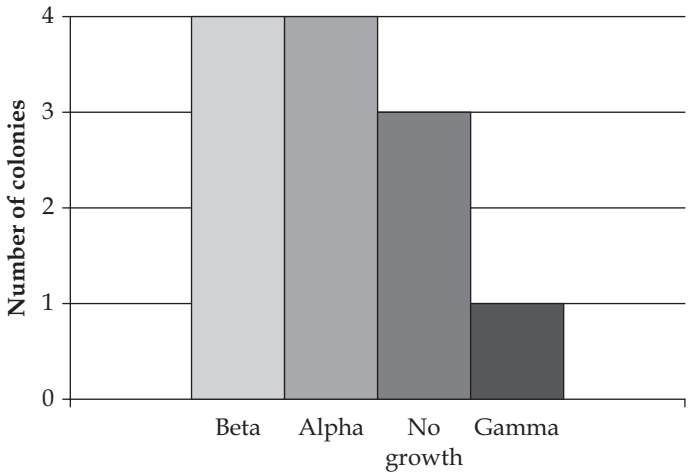

Figure 13. Bar graph of sodium azide blood agar results.

PCR

Sequencing of the PCR results allowed the identification of 30 different species among 110 successfully identified colonies. The two colonies that had not grown in isolation could not be positively identified. The remaining five colonies that had been selected for identification could not be positively identified due to logistical constraints. Figure 14 shows the number of different species found in each location. Species found in at least three locations include *Chryseobacterium, Cupriavidus, Staphylococcus, Stenotrophomonas, Flavobacterium, Microbacterium,* and *Sphingomonas*. Identification of the isolated bacteria allowed the determination of their pathogenicity. Figure 15 displays the percent distribution of pathogenicity.

Bacteriophage Plaque Assay

All 11 original water samples were assayed for bacteriophage plaques. Results showed that none of the samples produced plaques.

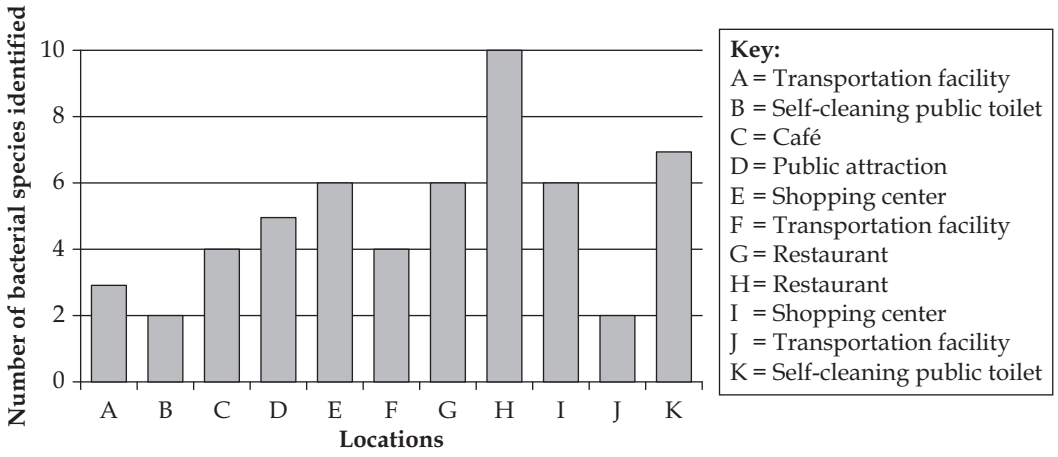

Figure 14. Locations and number of different bacterial species found.

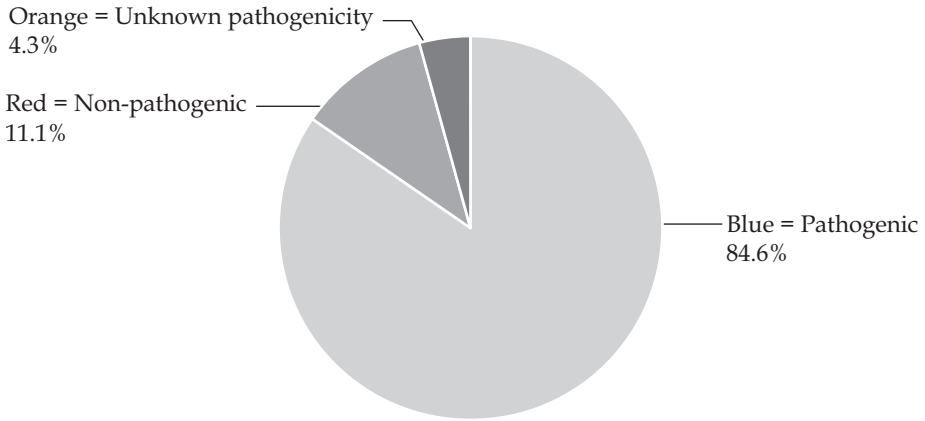

Figure 15. Pie chart showing the percent distribution of pathogenic status for the 117 colonies that had originally selected to be isolated.

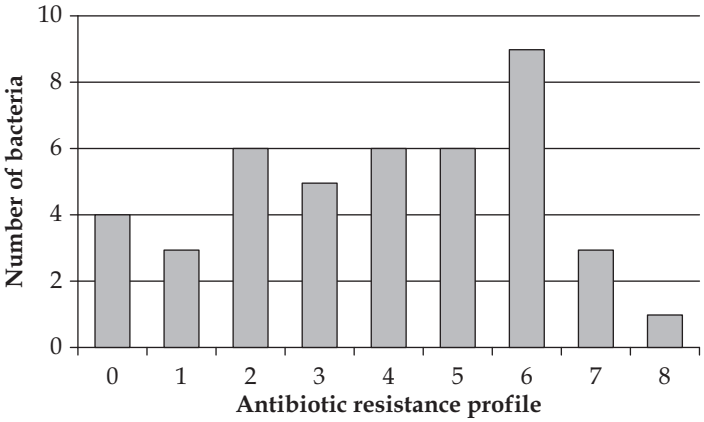

Figure 16. Bar graph showing the antibiotic resistance profile, number of antibiotics that a particular sample was resistant to, with the number of bacteria or the number of isolated colonies that had each antibiotic resistant profile.

Assaying Antibiotic Resistance

Figure 16 displays the antibiotic profile of all 43 isolated colonies chosen for antibiotic resistance assay. Of the antibiotics tested, Penicillin G had the greatest number of resistant colonies, with 36 isolated colonies resistant.

Discussion

This research is not remarkable in its finding of gram-negative bacilli species, as there have been numerous assessments of freshwater that have identified gram-negative bacilli as being common (Kämpfer & Glaeser, 2016; Makk et al., 2015). Nor is it unexpected that the majority of isolated colonies are gram-negative when the majority is also pathogenic, as a component of gram-negative bacteria is a molecule that can help pathogens initiate infection (Davis & Goldberg, 2012). What is noteworthy of this study's findings are the endospores in the samples, the antibiotic resistant types of bacteria found, and their potential risks to public health. Although not unusual to find spore-forming bacteria in freshwater sources, the occurrence of spore-forming bacteria in tap water is rare (McKenney, Driks, & Eichenberger, 2013). Finding spore-forming bacteria is also significant in that they pose a risk to public health. As spores are resistant to the majority of current disinfection practices, pathogenic spore-forming bacteria are closely monitored in a variety of settings (MacDougall et al., 2018; Mwakapeje et al., 2019). Although the cultures identified as spore-forming in this study were not found to be pathogenic, there remains a possibility of genetic rearrangements that could lead to pathogenicity (Broukhanski & Budylowski, 2019).

The selective and differential media results for MSA were most helpful for identifying samples containing *Staphylococcus aureus*, which is one of the most common reasons for using this media (De Visscher et al., 2013; Lally, Ederer, & Woolfrey, 1985). The results obtained from MSA cultures were consistent with sequencing results and confirmed the presence of *Staphylococcus aureus*. Figure 17 shows an MSA plate growing *Staphylococcus aureus*. The results for MA cultures indicate that a large amount of the isolated bacteria may reside in gastrointestinal tracts, as a large portion were lactose positive and gram-negative rods. Figure 18 displays an MA plate with lactose positive colonies. These bacteria are only harmful to those with

decreased immune function, but are commonly found in feces (Splichalova, Splichal, Sonnenborn, & Rada, 2014; Stevens, Ashbolt, & Cunliffe, 2003; World Health Organization, 2004). In addition, the MA results are consistent with the gram staining results as MA inhibits the growth of gram-positive bacteria (Ranjan, Bakthavathsalam, Raghavan, & Sindhu, 2014) and a greater percent of the isolated bacteria grew on MA. Conclusions for EMB agar and sodium azide blood agar cannot readily be made, because too few bacteria were cultured on these media due to time constraints. Ideally, all isolated bacteria should have been inoculated onto EMB agar and sodium azide blood agar to accurately interpret the results.

Figure 17. MSA plate with the characteristic gold colonies of *Staphylococcus aureus*, a mannitol positive species that also changes the surrounding media from pink to yellow. The remaining sections of the plate are mannitol negative.

Note. MSA = mannitol salt agar.

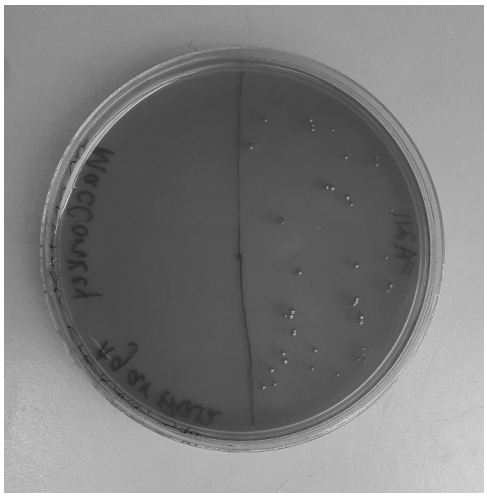

Figure 18. MA plate with purple colonies on the right half indicating a lactose positive result.

Note. MA = MacConkey agar.

Sequencing results allowed positive identification for the vast majority of isolated bacteria. Of the bacteria identified, none were found to be those that are commonly of interest when monitoring freshwater, such as *Cyanobacteria, Aerococcus, Enterococci,* and *Escherichia coli* (Alexyuk, Turmagambetova, Alexyuk, Bogoyavlenskiy, & Berezin, 2017; Westwood et al., 2002; Shoults & Ashbolt, 2018). Based on this method, fecal indicator bacteria, such as *Enterococci* and *Escherichia coli* (Shoults & Ashbolt, 2018), were not identified in any samples. However, *Staphylococcus*, an indicator of water contamination (Shoults & Ashbolt, 2018), was positively identified. *Staphylococcus aureus* is a serious opportunistic pathogen that can cause life-threatening infections in the millions of citizens with decreased immune function. Figure 19 (Wolfe, Pederson, Hotchkiss, Kozin, & Cohen, 2010) shows a *Staph* infection that can result in sepsis and difficult-to-treat open wounds or further infection of soft tissue and the lungs (Otto, 2013). Other pathogenic bacteria frequently found in freshwater that were positively identified include *Mycobacterium* and *Pseudomonas aeruginosa*, both of which can cause infections throughout the body (World Health Organization, 2004). Some pathogens that are commonly found in the environment and have recently been established as opportunistic pathogens were identified in these samples and include *Cupriavidus* (Balada-Llasat, Elkins, Swyers, Bannerman, & Pancholi, 2010), *Delftia* (Bilgin, Sarmis, Tigen, Soyletir, & Mulazimoglu, 2015), *Comamonas* (Bayhan, Tanır, Karaman, & Özkan, 2013), and *Stenotrophomonas* (Brooke, 2012). Given the rising demand for public bathrooms and the crucial impact that they have made to public health around the world, the pathogens found in this study can therefore be an example of the neglect of safety measures for public bathrooms (Stanwell-Smith, 2010).

Bacteriophages are also used to indicate the presence of pathogens, such as fecal indicator bacteria and viruses (McMinn et al., 2017). The lack of evidence of bacteriophages in the water samples indicates that there is no evidence of pathogenic viruses in the water. In addition, the presence of bacteriophages can indicate fecal contamination (McMinn et al., 2017);

Figure 19. Photo showing an infection of a strain of *Staphylococcus aureus* that is resistant to the antibiotic methicillin, known as methicillin-resistant *Staphylococcus aureus.*

Source. Wolfe, Pederson, Hotchkiss, Kozin, and Cohen (2010).

therefore, these results do not indicate the presence of fecal contamination. In general, the evidence for fecal contamination in this study is relatively low due to the negative results of the bacteriophage plaque assays and lack of positive identification for fecal indicator bacteria.

Of the types of bacteria found, most were antibiotic resistant. For example, as Penicillin G is a first-choice antibiotic for many infections, the rate of resistant bacterial strains has been increasing over the past 20 years (Bertrand, Carion, Wintjens, Mathys, & Vanhoof, 2012; Torfoss, Hoiby, Holte, & Kvaloy, 2012); therefore, discovering Penicillin G as the least effective among the tested antibiotics was concerning, but not peculiar. Given that the amount of antibiotic resistant bacteria is increasing globally (World Health Organization, 2016), it was not unexpected to find only four of 43 assayed bacteria did not have antibiotic resistance; however, the consideration that 39 of the assayed colonies can cause infections that are more difficult to treat and potentially life-threatening is a public health concern (Gottlieb & Nimmo, 2011; World Health Organization, 2016). The high rate of antibiotic resistance found in this study supports the growing trend of routine infections worldwide becoming untreatable (Gottlieb & Nimmo, 2011).

Limitations

The first limitation of this study is the small sample size of public bathrooms, which were also concentrated to one geographic location; however, the geographic location examined, City Centre, is the most frequented area of Glasgow. Culturing samples on non-selective agar, such as nutrient agar, is an affordable and common technique used for assessing water safety; however, there are numerous limitations to this culture-dependent method that was used for assessing these samples (Singer et al., 2000). One such limitation encountered was the lack of colonies grown on the original, undiluted water samples. To overcome this obstacle, it is common to facilitate growth by performing centrifugation and incubation of samples (Singer et al., 2000), which did yield more diverse cultures for some samples.

In addition, conclusions for EMB agar and sodium azide blood agar cannot readily be made because too few bacteria were cultured on these media due to time constraints. Ideally, all isolated bacteria should have been inoculated onto EMB agar and sodium azide blood agar to accurately interpret the results. Statistical models exist to assist with the challenging endeavor of identifying all bacterial species on a cultured plate (Singer et al., 2000) but were not utilized in this project; therefore, it can be deduced that some bacteria grown in this project's cultures were not isolated and subsequently identified. In addition, to sufficiently determine whether there is fecal contamination in water, indicators besides microorganisms must be examined. Some additional indicators include bile acid and fecal sterol biomarkers (Sánez et al., 2017; World Health Organization, 2004), which were not assessed in this project due to financial constraints.

To fully determine the safety of tap water of public bathrooms in Glasgow, further assessments are needed. Studies examining larger sample sizes of public bathrooms in more diverse locations would provide beneficial information. In addition, the possibility of fecal contamination and possible causes of such contamination should be investigated further. The pathogens found in this water could have effects on human health that have not yet been discovered. Investigation into these possible effects is needed (Douterelo et al., 2014).

Conclusion

Overall, the most substantial findings of this project are the pathogenic bacteria that were identified in every public bathroom examined. Some of these pathogens, such as *Staphylococcus aureus, Pseudomonas aeruginosa,* and *Stenotrophomonas*, are known to pose substantial risks to those more susceptible to infections and possibly the general public (Brooke, 2012; World Health Organization, 2004). The other opportunistic pathogens found, which may not have the same significant reputations as those just mentioned, are made more dangerous by having a high occurrence of antibiotic resistance. Antibiotic resistance leads to infections that are harder to treat and more life-threatening (World Health Organization, 2016). Due to the number of pathogens and amount of antibiotic resistance that was discovered, the safety of tap water in public bathrooms of Glasgow should be challenged and further enquiries must be made. Studies such as this one are only the first step in beginning to understand this danger; however, the pathogens found in Glasgow's public bathrooms indicate that similar dangers could be in private residences and public bathrooms across the United Kingdom (Alexyuk et al., 2017; Westwood et al., 2002). These implications arouse serious questions about the health risks of public facilities, which are already neglected in public health safety measures, in developed countries around the world (Stanwell-Smith, 2010). It warrants investigation into ways in which the safety of the public will be affected by the documented importance, rising demand, and possible dangers of public bathrooms.

Author's Note

For Appendix A, please view the online supplemental information.

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LITERATURE REVIEW

Unconscious Bias and Health Disparities A Discourse on Their Intertwining Historical and Social Contexts

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Abstract:

Unconscious biases are a functional portion of human cognition and behavior that help the individual organize, understand, and decipher stimuli. These biases can be socialized through one's family structure, culture, ethnicity, religion, and socioeconomic background. While unconscious biases are beneficial as defense mechanisms, they may also exert a deleterious influence on many aspects of a society when used to propagate negative stereotypes or attitudes. Given what is known about unconscious biases, our primary focus is on biases that exist within modes of health care. Through analysis of the McGurk effect, Stroop effect, and Implicit Association Test (IAT), we evaluate the scientific and psychological foundations upon which biases may be predicated. By examining case studies, we elucidate the historical and social contexts that surround the presence of current health disparities. To conclude our investigation, we propose a conceptual framework called the REAP Technique that provides a preliminary recognition of unhealthy biases with the hope that it prompts reflection upon ways to personally mitigate harmful judgments.

Keywords: Unconscious Bias, IAT, Health Disparities, Health Care

Introduction

Our investigation into the historical and social contexts of health disparities focuses on raising awareness about unconscious biases and their consequent effect on health disparities. We accomplish this goal by analyzing concepts in psychology and public health as well as by

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examining case studies of bias in the delivery of health care. Unfortunately, health disparities are increasingly common in American society due to changing social demographics and can be based on an individual's race, gender, or socioeconomic status (LaVeist, 2011). A prevalent example includes unequal access to quality medical treatment for marginalized populations. As no disparity is isolated in its influence or cause, it is important to examine the interplay between culture and medicine. Within the historical and social contexts of our culture, we find that unconscious biases are related to the propagation of health disparities and repeated instances of discrimination. Ultimately, raising awareness about the relationship between unconscious bias and health disparities requires both an appreciation for natural cognitive processes and a recognition of the dynamic privileges and identities one possesses within a greater social context.

Bias is established and reinforced in the human mind through socialization, which is the process by which an individual forms beliefs, makes judgments, and navigates society through interactions with their environment. It is through this continuous engagement with one's surroundings that the individual becomes a proficient member of society (Little, 2016). Biases commonly find their origin in family structure and cultural values as well as ethnic, religious, or socioeconomic influences.

Bias can manifest itself in different forms. Very often, individuals make decisions about situations based on rapid and automatic assessments. These unconscious biases exist as a fundamental aspect of human cognition and behavior. This phenomenon is due to the fact that individual preferences vary as a function of one's upbringing. Unconscious biases are a double-edged sword: beneficial in evaluating critical situations and evading threats through the body's fight-or-flight response but detrimental when used to propagate discriminatory attitudes. Because unconscious biases flourish from underlying biological and psychological identities, we will examine the McGurk effect, Stroop effect, and Implicit Association Test (IAT), three concepts that explicate the scientific underpinnings of bias.

Literature Review

McGurk Effect

The McGurk effect is a difference in auditory perception as the observer integrates disparate auditory and visual stimuli to perceive a different sound than what the speaker originally voiced (Tiippana, 2014). A study by Vidal and Barrès (2014) challenged subjects to interpret "aba" and "aga" sounds and then analyzed the difference in perception that occurred between subjects who could and could not observe the movements of the reader's mouth. The results of this study demonstrated that visuospatial perception clearly influences auditory perception. Understanding how the brain immediately perceives simple linguistic units based on auditory and visual stimuli prompts consideration of how the brain automatically produces biases by perceiving and potentially misconstruing external phenomena. The experiment opens up avenues of research that determine the possibilities that exist in decoding areas of the brain that form these biases.

The biological framework for the McGurk effect can be linked to the left superior temporal sulcus (STS), a brain region that is critical for the auditory and visual perception of speech (Nath & Beauchamp, 2012). A study was performed in which a pulsation was directed toward the STS; subjects who received the pulsation were less likely to experience the McGurk effect

as they only recognized the auditory aba/aga that was spoken (Nath & Beauchamp, 2012). The left STS is crucial for the perception of audiovisual speech, as STS activity is heightened during incongruent audiovisual speech (Nath & Beauchamp, 2012). The neurological basis for unconscious bias remains an active area of scientific inquiry, as many individual biases possess chemical and biological implications. Investigating the function of this portion of the brain, as well as the somatosensory and visual cortices, can aid in understanding the creation of biases and the possibility of preventing the formation of unfavorable attitudes.

Stroop Effect

J. Ridley Stroop sought to answer questions regarding the difference between the time it takes to read the color of a word and the word itself. He also tested how the effect of practice would affect the reaction times of these situations. Stroop (1935) found that when the interfering stimuli are presented simultaneously, the name of the color and the colored word were noted differently. For example, participants would recognize the word "green" more quickly if it was colored green as opposed to if it was colored red. Evaluating the automatic responses to visual stimuli through the recognition of text and color can reveal sensory mechanisms that may trigger individuals to instinctually characterize a person's behavior based on their skin color, gender, and socioeconomic status. Although the Stroop effect is fundamentally simplistic in element and structure, these associations between words and colors contribute to the schemas that are developed or strengthened within the brain upon perception.

IAT

The IAT is routinely used to detect implicit or unconscious biases and exemplifies an advantage over self-reported assessments by exposing possible socially undesirable or uncommon biases (Casad, Flores, & Didway, 2013). The IAT is a useful assessment to measure implicit attitudes as it calculates the difference in automatic responses between two stimuli. It is estimated that the decision a user makes regarding the association of presented stimuli is ultimately representative of their underlying judgments. Greenwald, Mcghee, and Schwartz (1998) found that when the two highly associated categories shared the same computer key, the response was faster than when less associated categories share the same key. In the IAT, two different prospects within a group are proposed. For example, using the distinction of race, the two options could be a White male and an African American male. Using two separate computer keys, which are linked with a positive or negative concept, the subject must choose to associate the presented options with a respective attribute (Greenwald et al., 1998). Consideration for these explicit connections assist in predicting implicit bias, which affects the associations that are created. A key advantage of the IAT rests in its ability to restrain the user from explicitly producing responses that may be contrary to their own judgments (Greenwald et al., 1998). Due to social norms or other external pressures, it is possible that users can manipulate their answers on similar assessments to reflect a perspective different than their own. The IAT can expose a variety of associations, especially for subjects who may not disclose attitudes involving contentious areas such as race or gender.

In addition, it is important to consider that the IAT is a noninvasive, educational tool to help people become aware of their unconscious biases, even those that are difficult to address such as those regarding race or ethnicity. Research on implicit biases and the IAT could

unlock crucial information on how people can work to overcome bias and demonstrate the potential for greater equity in fields such as health care, business, and education.

Nevertheless, these biases are natural processes of the brain that are essential for survival. Thus, to evaluate bias as a strictly negative construct would not justify the benefits that bias represents in supporting human existence and development. Not all health disparities can be straightforwardly attributed to bias. Situational context, including variables such as stress level and additional social determinants of health, can substantially affect the degree and quality of health care received by patients. An individual's environment inevitably influences their social status. Underprivileged, urban, and minority communities often experience a greater degree of poverty and compromised health care. Particularly for those living in crowded metropolitan areas, it is common for residents to experience unsanitary living conditions and pollution. All these elements exacerbate the vicious cycle of disease, discrimination, and health disparities. Presenting bias in a holistic manner ensures that healthy bias, such as the "fight-or-flight" response or a conscientious awareness of one's environment, does not become automatically dismissed as an adverse function of human behavior.

An important step in eliminating these unconscious biases is to acknowledge the fact that all individuals possess them. The result of this acknowledgment is a recognition of the subjects toward which these biases are directed. The IAT is a tool that can be employed to better understand the unconscious biases that people nurture. In corollary to the implicit biases which are exposed in a rudimentary fashion via the IAT, unconscious biases can produce stark consequences on personal actions and attitudes. Such biases are especially detrimental in the health care system and, therefore, affect the quality of care that people receive. Health disparities adversely affect groups of people who have experienced systemic obstacles to health based on their racial or ethnic group, religion, socioeconomic status, gender, age, mental health, disability, sexual orientation or gender identity, or other characteristics historically linked to discrimination or exclusion ("Disparities," n.d.). The systemic nature of disparities demonstrate that repeated discrimination and ostracism has restricted certain populations from accessing quality health care that is affordable and sufficient for their needs.

We can better understand how unconscious bias affects health disparities in people's daily lives by examining two case studies. Relating internalized, unhealthy biases to their externalized results provides evidence for establishing solutions toward compromised health care delivery. As the two studies are related to women and African American men, respectively, it is important to reinforce the direct connections between implicit biases and their manifestations in compromised care of vulnerable or marginalized populations.

Case Study: Women's Health and the Female Pain Experience

Women face a multitude of unconscious biases that greatly affect their daily lives. They are expected to embody characteristics such as being kind and docile, but they are considered socially deviant if they exhibit other traits such as being ambitious and self-reliant (Easterly & Ricard, 2011). Unconscious biases against women are salient in health care. Fassler (2015) recounts how his wife Rachel faced sexism in the emergency room when she was suffering from an ovarian torsion. Although Rachel was in obvious pain, the medical staff deemphasized the severity of her symptoms, as they were convinced that Rachel was merely suffering from kidney stones, leading to grave consequences.

In addition to inattentive nurses, Rachel's attending physician dismissed her pain as a triviality and concluded with advice for her to pursue the standard treatment for kidney stones: pain medication and a CT (computed tomography) scan. Rachel's diagnosis and treatment exposes the frequent refusal to acknowledge women's pain as being significant or even real. Fassler states that in the United States, "men wait an average of 49 minutes before receiving an analgesic for acute abdominal pain," while women who experience similar degrees of pain must wait for an average of 65 min for a similar level of care. In Rachel's case, it was only after 2 hr that she received the necessary attention when the medical staff deduced that Rachel had an ovarian torsion, a twisting of the fallopian tube that prevents adequate blood circulation and produces severe pain (Fassler, 2015). This condition is a surgical emergency that can result in ovarian loss, intra-abdominal infection, sepsis, and death (Ryan & Desai, 2012). Unfortunately, lack of adequate oversight and treatment from the attending physician resulted in the complete removal of Rachel's ovary, as this was the only means by which the torsion could be treated after such a long period of time. Although Rachel recovered from the surgery, the discrimination that she experienced is not without consequence, as she still suffers from the trauma of being ignored (Fassler, 2015).

What Rachel experienced is not uncommon in the medical field, as women are often pressured to downplay their emotions or physical pain (Jamison et al., 2014). Gender bias often plays out in clinical pain management through a phenomenon known as the "Yentl Syndrome" (Jamison et al., 2014). Women's pain is not treated equally due to the stigma that women are more sensitive and tend to overreact. Another example of this phenomenon is the gender bias against women who have fibromyalgia or chronic fatigue syndrome. The credibility of these women is called into question because these conditions often do not present visually (Åsbring & Närvänen, 2002). The process of seeking treatment as well as the societal perception of their situation are further compounded by gender-related stigma. Therefore, women are often denied treatment until they can convince the medical community that the severity of their pain is comparable with the pain experienced by their male counterparts. Ultimately, such situations contribute toward the prevalence of gender-based health disparities.

Case Study: Racial Bias in Male Health and the Tuskegee Syphilis Experiments

Persons of color are often offered decreased or compromised care due to existing stigmas surrounding their race, background, or lifestyle. Graham and Gracia (2012) investigate this perspective, particularly with regard to health disparities in populations of African American men. The authors present statistics that promote further analysis into the historical environment, illuminating the aspect of race which propagated this result. The article cites significant dissimilarities between the incidence of disease between African American males and their White counterparts. African American men are 30% more likely to die from cardiovascular disease and 60% more likely to die from stroke than White males (Graham & Gracia, 2012). AIDS/HIV is 7 times more prevalent in African American men than in White males (Graham & Gracia, 2012). African American men are twice as likely as White males to necessitate kidney treatment from diabetes (Graham & Gracia, 2012).

Such statistical data are no coincidence; males belonging to minority or underrepresented populations have faced obstacles such as inadequate health care, poor living conditions, and increased disease incidence (Graham & Gracia, 2012). Disparities in treatment do not arise

haphazardly; rather, implicit biases among health care professionals produce direct consequences on the quality of care offered to each patient. To notice these trends is imperative, yet understanding the historicity that has fostered these potentially damaging viewpoints may become exceptionally telling, especially in devising solutions to these problems.

It is important to examine the greater social structures that produce the vicious cycle of health disparities in marginalized populations. Institutions socialize people to acquire particular perspectives. This process of socialization may often ingrain discriminatory attitudes that are biased against certain groups of people. This implicit bias drives discriminatory actions, which culminate in widespread disparities. These disparities cause social division, ultimately feeding back into systemic and institutionalized oppression.

The Tuskegee syphilis experiments are an example of the interaction between social structures and race-based health disparities. This series of experiments was conducted by the United States Public Health Service in coordination with the Tuskegee Institute in Alabama from 1932 to 1972. African American men were targeted for this experimentation into the effects of syphilis; officials used coercion, manipulation, and deceit to not only attract but also trap 600 African American males as subjects. These institutions had the power and resources to take advantage of African American males without significant pushback from the public. Labeled by the government as a "study in nature," the men were denied medical treatment even after penicillin, a cure for the disease, was invented by Alexander Fleming in 1934 (Howell, 2017). Across the study's span of 40 years, the subjects were continually surveyed by health care workers, who subjugated the men to excruciatingly painful spinal taps and physical examinations as requirements of the experimental structure and process. It was not until 1972 that a whistleblower from the Associated Press intently exposed these cases of mistreatment. Fortunately, this soon led to the termination of these experiments. The Tuskegee experiments prompted a revision of studies involving human subjects as well as a re-evaluation of informed consent (Ryan et al., 2014).

The nefarious nature of the Tuskegee experiments instilled lingering fear and distrust within African Americans toward a hostile and manipulative health care system. To a degree, this perspective contributes to the wariness of the African American community toward seeking medical assistance. The unhealthy biases of government physicians throughout the course of these Tuskegee experiments have culminated in health disparities that are salient in the modern era, as African American males experience greater incidence of disease, delayed diagnoses, antagonistic health care environments, and compromised care.

Recommendations and Conclusion

REAP Technique

In summarizing this discussion regarding the realities of health disparities now and through history, it is crucial not only to understand the presence of these disparities but also to ruminate over plausible methods for improving upon a vulnerable health care system. Changing the past is impossible, yet to comprehend past detriments while refusing to reverse their deleterious implications is unacceptable. In addition to demonstrating the underlying foundation for comprehending unconscious biases and their manifest forms, this project aims to propose steps that promote reflection and evaluation in hopes of tempering the incidence

and severity of unhealthy biases. Certainly, it is crucial to remember that biases inexorably exist as natural, biological responses. In light of the social and historical contexts surrounding unconscious biases, we propose the "REAP Technique," which suggests a four-step process to help mitigate unconscious biases. The acronym "REAP" represents the words Recognize, Evaluate, Assess, and Promote. These four steps are elucidated below:

R Recognize that you have an unconscious bias

E Evaluate the source of your bias

A Assess how your bias affects yourself and others

P Promote your understanding of the bias by educating yourself

The first step of recognizing unconscious biases is essential to overcoming these biases. Solving any problem always begins by identifying and evaluating the issue with a critical lens. A simple method for recognition is writing down thoughts or potential instances where you have experienced bias or had discriminatory thoughts. In addition, the IAT, which is not flawless by any means, offers a rough approximation of areas to reflect and improve. The second step of evaluating the source of your unconscious bias encompasses considering how your background, experiences, and socialization have contributed toward your perspective and actions.

Assessing how your bias affects yourself and others allows appreciation for the complexity of the mind as well as the structure of cognitive processes. By contemplating the presence and impact of unconscious biases, you are situated to consider the implications of your attitude within social scenarios. Personal reflection is difficult, yet it allows for exploration of areas for self-improvement in hopes that equity becomes formative of one's behavior during this process. Reflection can assume many forms, including journaling and creating support groups to discuss bias. Promoting your understanding of bias through education about the connection between your unconscious bias and potential health outcomes raises greater awareness about this important issue. By understanding and utilizing REAP, you are withdrawing yourself from social structures that have continued to propagate unfair treatment of certain groups in our culture. The REAP Technique is intended to be applicable to both personal and occupational settings, as its focus on bias awareness is continually relevant.

Bias is an integral aspect of human survival, and it often functions in contrasting dimensions. Utilizing the REAP Technique is an optimistic step toward acknowledging the positive effects of bias while striving to diminish its negative influences. Although not all health disparities are solely due to bias, analyzing the context surrounding unconscious biases and health disparities is crucial to evaluating present trends and attitudes in public health.

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LITERATURE REVIEW

The Indirect Role of Breastfeeding in Fulfilling the Child's Right to Environmental Health

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Abstract:

The aim of this research is to reveal and bring attention to the indirect relationship of breastfeeding and the children's right to environmental health. There are certain aspects in this mother–child relationship that complicate breastfeeding and can even eliminate its possibility, including health issues, anatomical variation of the breast or nipple, among others. For the purpose of this research, however, it is assumed that both the mother and child are healthy and the mother is able to breastfeed. Through interviews with experts in the field and a variety of sources, this study will show the indirect benefits of breastfeeding. Focusing on breastfeeding's sustainability and beneficial environmental impacts, this research will explore how this natural feeding process can help halt the negative environmental effects of the formula industry, as well as the health issues tied to the environmental effects. With an increase in awareness and education about breastfeeding and by respecting the child's rights outlined in numerous official documents (Rights of the Child, Innocenti Declaration, International Code of Marketing of Breastmilk Substitutes), this indirect relationship can be well-known.

Keywords: Breastfeeding, Environment, Baby Formula

Introduction

In thinking of children's future health, it is important to focus on a holistic approach to health and wellness and the processes that contribute to them. The direct relationship between breastfeeding and children's health has been explored in countless research papers, discussed in numerous conventions, and promoted in a variety of declarations. However, much less explored is the indirect relationship between breastfeeding and health issues relating to environmental health. This relationship is also affected by bottle-feeding and the baby formula industry.

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Breastfeeding is a natural process that has not been proved to negatively affect the environment and provides multiple health and environmental benefits to children. Meanwhile, bottle-feeding and the baby formula industry are shown to have detrimental effects to the environment at large. Thus, when imagining a healthier future for children and other upcoming generations, breastfeeding and its benefits must be taken into account and taken to the public to spread awareness of its well-doing.

In this research paper, the question of how can breastfeeding help fulfill children's rights to a more environmentally healthy future will be answered by focusing on breastfeeding's indirect impact on a child's future environmental health. This article will first focus on the right to environmental health by exploring the Declaration on the Rights of the Child and its link to breastfeeding with the Innocenti Declaration. Next, the environmental impact of bottle-feeding will be investigated. Then, the environmental impacts of breastfeeding will be revealed and compared with those of bottle-feeding. Later, the article will shed light on the enormous health issues linked to the environmental impacts brought on by bottle-feeding. To close, the impacts of bottle-feeding and formula industry on the environment as a whole, negatively affecting the health of the child, will reaffirm the link between breastfeeding and access to a sustainable and healthy future for children.

Past Publications on the Issue

The ecological and environmental impact of breastfeeding and bottle-feeding was first explored by Andrew Radford in 1991 in *The Ecological Impact of Bottle Feeding*. In the publication, he uses a mix of both qualitative and quantitative data to achieve his goal. The qualitative data he uses are in the form of explaining scientific processes and the benefits of breastfeeding, whereas the quantitative data he used are mainly in the form of percentages to show how much of the population is bottle-fed, carbon dioxide (CO_2) emissions, water pollution, air pollution, and deforestation, among other environmental estimates from the formula industry. Radford is unique in his research and estimates, as more recent research on the areas he covers is lacking and long over-due. Some aspects found in *The Ecological Impact of Bottle Feeding* were further explored in The International Baby Food Action Network's (IBFAN) official publication, "A Formula for Disaster." This research also focuses on the ecological impacts of bottle-feeding, but goes further than Radford by exploring the environmental impacts of breastfeeding, as well. Then, there is the Convention of the Rights of the Child, which outlines that every child's human right is to have environmental health. Yet, it does not say how this right can be achieved.

With all these publications, the environmental issues caused by breastfeeding and bottle-feeding are both explored, but not how that relates to children's future health. In this research paper, this gap will be bridged and the environmental issues will be related to children's future health.

Research Methodology

Primary analysis will be done in the form of formal and informal interviews with specialists: Lida Lhotska, specialist on Breastfeeding and Food Sovereignty and part of IBFAN's Global Advisory Task Force, and Ana Carolina Terrazzan, Nutritionist and Specialist in Maternal-Infantile Nutrition with a master's in Child and Adolescent Health. Secondary analysis will

consist of evaluating a variety of research studies done in the past 30 years. These are all on the topics of environmental effects on children's health, the benefits of breastfeeding, the environmental issues caused by bottle-feeding, or official documents and declarations.

Analysis

The Right to an Environmentally Healthy Future

In the 1989 United Nations Convention, a series of articles were compiled to create the Rights of the Child (United Nations Human Rights, 1989). Today, there are a total of 54 articles that each outline a specific aspect of human rights, including the right of a healthy future for every child. In this article, the focus will be on article 24, in particular, segment 1: "States Parties recognize the right of the child to the enjoyment of the highest attainable standard of health"; 2 c: "To combat disease and malnutrition . . . through the provision of adequate nutritious foods and clean drinking-water, taking into consideration the dangers and risks of environmental pollution"; 2 e: "To ensure that all segments of society . . . are supported in the use of basic knowledge of child health and nutrition, the advantages of breastfeeding, hygiene and environmental sanitation . . ."; and 4: "States Parties undertake to promote and encourage international co-operation with a view to achieving progressively the full realization of the right recognized in the present article." Article 24 states what is necessary in order for the child to have the highest attainable standard of health, including environmental health, freedom from diseases, freedom from mortality, and the right to nutrition. Although this may seem like a wide-ranging goal, a single, simple process links these separate goals and makes them much more attainable—breastfeeding.

In 1990, the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) drew up the Innocenti Declaration to outline the uniqueness of breastfeeding. It reveals that the minimum time of exclusive breastfeeding should be between 4 to 6 months and should be continued non-exclusively for 24 months, as it is the "ideal nutrition for infants and contributes to their healthy growth and development and reduces incidence and severity of infectious diseases" (UNICEF, 1990). As seen, the benefits of breastfeeding are applicable to all aspects affecting children's health.

Environmental Impacts of Bottle-Feeding

IBFAN's official research paper "A Formula for Disaster" defines breastfeeding as the "most environmentally friendly food available." Yet, although breastfeeding is defined as both "ideal" and "most environmentally friendly food," 61% of babies born each year are not exclusively breastfed (IBFAN & BPNI, 2014). Instead they receive milk substitutes, like baby formula. Not only is formula worse for the child's future health in terms of malnutrition and disease susceptibility (a link explored in numerous research studies), it is equally as detrimental in terms of the environment's health.

Global warming, a growing threat to the planet, is worsening due to the carbon footprint of a variety of anthropological activities (Ritchie & Roser, 2017). These activities include transportation, agriculture, and industries, including the baby formula industry. The carbon footprint of this industry contains emissions at every level of its production, thus adding up to a devastating total. To begin, 10 kg of natural cow milk is needed to produce just 1 kg of

powdered milk, combining to emit 21.8 kg of CO_2 (IBFAN & BPNI, 2014). But powdered milk is not the only ingredient used to make formula; they also contain substances like soybean and palm oil to add fat, sugars, and proteins. These other substances also contain a large carbon footprint and a negative impact on the environment (Held, 2016). Still, the footprint is incomplete without factoring in the pollution brought in by the transportation of the breastmilk substitutes. Due to the fact that these factories' locations are not widespread, but still deliver formula to the most remote locations on earth, it is difficult to map a precise estimate of how much of a CO_2 footprint each route could contribute to the overall footprint. Yet, a couple of rough estimates were put together: for every 1 kg of Fat–Protein Corrected Milk (FPCM) produced and transported, 2.4 kg of CO_2 are emitted and globally 553 million tons of milk generated 1,328 million tons of CO_2 (IBFAN & BPNI, 2014). As this is just an estimate and could be vastly underestimated or overestimated, it still shows the significance of this industry, as it represents 3.69% of the 36 billion tons of total global CO_2 emission in 2015 (Ritchie & Roser, 2017).

In addition to the production of the actual formula, there is the production of its packaging, which, more times than not, ends up in landfills. For reference, for every 1 million babies fed by formula, 150 million containers of formula are consumed, and of these 150 million, a huge percentage end up non-recycled and in landfills (Graedel et al., 2011). This is particularly an issue seen in low-income, emergency status states. This phenomena is explained by Lida Lhotska (personal communication, July 2, 2018). To promote their products, baby formula companies donate huge amounts of baby formula to feed the starving baby population. But, the problem lies in the validation of these products, as it was revealed that these large donations almost always contain products on the brink of their expiration dates or products that were part of lots that were either contaminated or had insufficient nutrients. Moreover, when states are in emergency status, they are most likely suffering from lack of access to water, as well as lack of access to electricity, both of which are needed to properly prepare a feeding (Lhotska, personal communication, July 2, 2018). Thus, these products and their non-biodegradable packaging are thrown in landfills, left to pollute the land. These landfills also contain a variety of other polluting substances linked to formula feeding, like the bottles, teats, and pacifiers, all made of plastic, which take 200 to 450 years to break down (World Alliance for Breastfeeding Action [WABA], 1997). Certain "ready-to-feed" bottles, especially in years past, contain a mixture of substances that make them impossible to be recycled, even if attempted (Radford, 1991). Due to the shortage of landfills, they constantly overflow. Therefore, these products are disposed of through incinerations or ocean dumpings—which pollute bodies of water, air, and even groundwater (WABA, 1997).

Baby formula packaging provides a dual burden to the environment during its disposal, as well as during its manufacturing. The manufacturing of these packages uses valuable natural resources like aluminum, cadmium, plastics, tin, and trees (IBFAN & BPNI, 2014; Radford, 1991). With the recycling rate of tin at only around 50%, that means that thousands of tons of tin from the bottle industry end up in either landfills, oceans, or in the atmosphere (Graedel et al., 2011). Besides metals, another wasted resource is paper. The paper labels used for the labeling around the tin cans, added up to 1,230 tons of paper (Small Feet, Large Footprint). This amount of paper can be added to the amount of paper, as well as plastic, wasted with feminine hygiene products when mothers do not breastfeed. When mothers breastfeed, their periods are delayed, but when they turn to formula, their periods return. It is estimated that

Indian women alone produce 9,000 tons of menstrual waste annually, enough to fill a landfill of 24 hectares (Geertz, Iyer, Kasen, Mazzola, & Peterson, 2016). As the global infant milk formula production was calculated to have an annual growth rate of 6%, the amount of waste linked to that production will also increase (IBFAN & BPNI, 2014). As package production increases proportionally with formula production, a deeper environmental impact will occur.

Looking further into the depletion of natural resources due to the formula industry, it is necessary to explore water waste. The first example of water lost in the process of bottle-feeding is in the production phase. Formula milk is made directly from the milk of cows, a non-environmental-friendly animal, as it has a water footprint of 940 L of water per 1 kg of milk (formula) and needs at bare minimum around 25 L a day (Etienne, 2018). After the milk is gathered, the milk-processing phase begins, and the water depletion continues. Dairy farms, to clean the milk system, the milk bulk tank, and the milk parlor, take 82,620 to 74,698 L of water for every 1,000 head of cattle (IBFAN & BPNI, 2014).

The water loss continues while the milk goes through another industrial process, turning the milk from liquid to solid. The change in states of milk requires an extensive amount of water (Radford, 1991). Once this solid milk powder gets to the families, it must once again change states to go back to liquid for a proper feed. To do so, 1 L of water must be added and an extra 2 L is used for cleaning and sterilization of the packaging (Held, 2016). A total of 3 L during every feeding and 6 feedings a day generates a loss of 18 L of water per day per every bottle-fed child. This waste of water can be compared with the minimum of 3 to 5 L of water required for human survival (Etienne, 2018). Therefore, a single bottle-fed baby wastes the same amount of water that could keep three to six people alive. In its entirety, formula production hits the three biggest water depletion processes: agricultural irrigation is 70% of all water use, which is used for the dairy farms; industry use is 23% of all water use, used for producing the formula itself in factories; and domestic use is 8% of all water use, used when preparing the formula for feedings (De Sherbinin, Carr, Cassels, & Jiang, 2007).

Environmental Impacts of Breastfeeding

Among the "Six S's" of breastfeeding, as defined in "Formula for Disaster," the most important to focus on, when looking at the positive environmental impacts, are "sustainability," "spacing births," and "sustenance." By breastfeeding, especially when done exclusively, the environmental issues brought on by formula feeding can be eliminated. As defined by the WABA, breastfeeding "is a natural and renewable resource" that "protects the environment by reducing the demands made on it and eliminate waste and pollution." This is proven through the fact that breastfeeding is one of the few human activities that has zero waste and is completely sustainable. The amount of breast milk produced by mothers is directly correlated to the amount of suckling done by the baby, as the baby only suckles as much as it needs, no food is wasted (Lhotska, personal communication, July 2, 2018). Furthermore, breastmilk requires no packaging, so no valuable resources will need to be removed from the natural reserves and later wasted in landfills. The preservation of resources remains, because exclusively breastfed babies require no additional water for the first 6 months of life, therefore resulting in no water loss (IBFAN & BPNI, 2014). Finally, the sustainability continues on, as the breastfeeding process requires no industrial or transport component, keeping the pollution and contribution at (or close to) zero (WABA, 1997).

The next "S," "spacing births," or the rest period between births, is a unique characteristic of breastfeeding. As mentioned above, breastfeeding delays the return of a mother's period, making her unable to become pregnant for a longer amount of time. In countries where birth control is not used and fertility rate is high, this becomes an unexpected, yet useful form of birth control. This allows families, especially in low-income countries, to establish their lives as new parents and accommodate the new baby into their life and space out their children's birth. Women are also further empowered, as this spacing gives them time to naturally expand their options beyond those linked to reproduction (Upadhyay et al., 2014). This larger gap between births can also eventually help slow down the population growth rate. By 2050, it is estimated that there will be 9.2 billion people in the world (De Sherbinin et al., 2007). Unfortunately, population growth has been linked to an increase in global warming and air pollution, water loss, and increase in energy usage. There are 4.7 billion people in the world who consume close to 77 trillion barrels of oil a year, depleting a natural resource (De Sherbinin et al., 2007). Water loss, when linked to population growth, has made population the main driver of coastal and marine environmental issues (Etienne, 2018). Thus, with an attempt at halting the population growth by implementing breastfeeding, these environmental disasters can also be halted.

The last "S" to explore now is "sustenance." Exclusively breastfeeding is recommended for the first 6 months of life, and if possible, up to 24 months, as the natural nutrients found in breastfeeding make it "the ideal food" with all the necessary components to contribute to a healthy diet ("Breastfeeding," 2017). It even provides the ideal protection for future health issues, like lowering obesity, infectious diseases, and allergy rates, as well as helping the creation of the child's microbiome (Terrazzan, telephone conversation, July 1, 2018). Thus, breastfeeding is an all-encompassing food whose effects cannot be compared with any other, with not only immediate health benefits but also the elimination of all the environmental dangers of bottle-feeding.

Health Issues Tied to the Formula Industry's Environmental Issues

Throughout the last 20 years, baby formula industries have revealed disastrous contamination issues with their products. These include salmonella infections, unsanitary production and processing conditions, and toxic quantities of lead, radioactive particles, and broken glass (Burrell & Exley, 2010). Most recently, high levels of aluminum have been reported in formula. It is shown that aluminum is connected to both immediate and delayed toxicity in babies and is found at levels 10 to 40 times higher in formula than in breast milk due to the use of aluminum packaging (Burrell & Exley, 2010). The disposal of the formula's packaging can also lead to chemical contamination, as they are mainly thrown into landfills or dumped in oceans, which contaminate groundwater. Children's exposure to these chemical toxins can be extremely dangerous and deadly, as it causes 36% of childhood deaths worldwide (Prüss-Üstün & Corvalán, 2006). With toxic contamination, the onset of the side effects has a variety of different timeframes for different chemicals and depending on who it contaminates (Sheffield & Landrigan, 2010). This means that a child could be contaminated, but not show side effects for weeks, months, or even years later, making it too late to stop the damage that is being done or has already been done. Adding to this danger, is the fact that children have an increased susceptibility to negative toxic effects due to their rapid growth and development rate, with even occasional bottle-feeding causing detrimental effects (Sheffield &

Landrigan, 2010). Children also have higher exposures per body weight than adults do, as they drink more water than adults do, in comparison with their body weight (Sheffield & Landrigan, 2010). Therefore, the contamination found in baby formula are not only damaging to the child at the time of exposure but throughout life.

Formula industries also are related to health issues caused by air pollution and global warming, due to their million ton carbon dioxide emissions. Similar to their vulnerability to toxicity, children are also especially vulnerable to air pollutants. During childhood, organs, tissues, and cells are developing, therefore exposure to pollutants during this time severely affects the correct maturation, growth, and function of organ systems (Gavidia, Pronczuk de Garbino, & Sly, 2009). Still, the effects of pollution can even harm children before they are born. Preterm and low-weight births are both shown to increase as pollution increases and both of these can result in long-term diseases and illnesses detrimental to health, or even mortality (Katona & Katona-Apte, 2008; Sheffield & Landrigan, 2010).

Due to the increase in global population in the upcoming years and due to many anthropological processes, like the baby formula industry, air pollution is increasing (De Schutter, 2018). This air pollution is not only a result of CO_2 in the atmosphere, but by ozone, nitrogen oxides, particulate matter, and sulfur oxide, as well, as the hotter temperatures catalyze chemical reaction rates and pollution transport systems that provoke the onset of new allergies (Sheffield & Landrigan, 2010). An increase in the prevalence of malnutrition will also be provoked, as the fluctuations brought on by pollution lead to periods of drought and floods, making agricultural production slower and suffer through periods of low productivity (De Schutter, 2018). Thus, without food production, there will be a higher number of families and children suffering from malnutrition.

Conclusion

As previously mentioned, the focus of direct health benefits tied to breastfeeding have been discussed, but there are a number of health issues that are induced by environmental hazards. After analyzing the health and environmental issues brought on by the formula industry, it becomes evident that breastfeeding is a huge benefit not only for the health of the child but for the environmental health of the child as well.

The formula industry aggravates disastrous environmental matters. Among them are the increasing carbon footprint, contribution to global warming, water loss, and depletion of natural resources. Each of these is specifically linked to a detrimental disease or problem for children. The carbon footprint increases cardiovascular diseases, pulmonary diseases, asthma, and preterm and low-weight births. With relation to global warming, the hotter temperature across the world will lead to malnutrition, allergens, and outbreaks of infectious diseases. The use of chemicals in the packaging of baby formula has and can lead to high toxic chemical exposure and contamination. All the health issues mentioned particularly affect children and all have lifelasting effects. If the formula industry continues to grow, the children's right to environmental health cannot be fulfilled. With the growth of this industry, the environmental detriments will worsen, as will the health issues, eliminating the possibility of healthy future for children.

Breastfeeding provides the perfect balance of nutrients and important direct health benefits. However, equally important are breastfeeding's indirect benefits to child's health. Breastfeeding

is the most sustainable human process, with zero waste, zero carbon emissions, and zero pollution. This clean way of feeding children not only provides them with ideal nutrition but also can help them achieve ideal environmental health. To have a healthy future, it is not enough for children to receive proper nutrition, a home, and schooling, if their planet is on the brink of extinction. It is important to maintain the Earth hospitable and clean, so the upcoming generations do not need to suffer from any more environmental effects.

After interviewing specialists in the field, Lida Lhotska and Ana Carolina Terrazzan, it is clear that what needs to be done is to promote awareness. Through conversations with both specialists, it is clear that the benefits, both direct and indirect, need to be broadcasted across the world, educating women and their families correctly about the effects of breastfeeding. There must be no more violations of codes like the Rights of the Child, the Innocenti Declaration, and the International Code of Marketing of Breastmilk substitutes, and instead these must be implemented and enforced in all countries around the world. There needs to be more research directly correlating the formula industry with the environmental dangers and health issues. With the implementation of policies and increased knowledge about the dangers (both health and environmental) of formula, there will hopefully be a shift to an increase in breastfeeding, so that the child's right to a healthy environmental future can be achieved.

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PERSPECTIVES

Application of Integrative Health Care Systems in Developing Countries

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Abstract:

Traditional medicine practice (TMP) has played an important role in caring for the health of many populations in developing countries, especially in Madagascar. While modern medicine has become the most widely accepted form of health care, it has pushed TMP to the wayside in these countries, negatively affecting the legitimacy of traditional medicine. This study examines the feasibility and potential efficacy of integrative medicine in Madagascar in an effort to reduce cost and improve accessibility of health care for those who cannot afford modern medicine. Data from interviews conducted in Madagascar along with online research articles suggest that integrative medicine can improve both affordability and accessibility of health care in developing countries, while promoting local biodiversity and legitimizing the effectiveness of TMP.

Keywords: Integrative Health Care, TMP, Modern Medicine, Affordability, Accessibility

Introduction

Traditional medicine is defined by the World Health Organization (WHO; 2017) as the "knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, used in the maintenance of health and in the prevention, diagnosis, improvement or treatment of physical and mental illness." This type of practice has a deep and rich history in Madagascar; however, political crises and unstable transitions of leadership, coupled with the forceful hand of colonizing powers, have neglected or at times actively sabotaged traditional medicine practice (TMP) (Tilley, 2016).

TMP has been slowly pushed to the wayside in favor of the modern system. Western countries have seen success with pharmaceutical drugs, orthoscopic surgeries, and other methods resulting from technological advances, but much of their success is owed to the presence of compounds obtained from medicinal plants. Pharmacopeias around the world cite plant drugs, and some countries even have separate herbal pharmacopeias (Petrovska, 2012). The process of transforming these plants into their important compounds, and then the desire for profit on the part of the pharmaceutical companies, turns these affordable and accessible

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plants into an expensive and therefore unavailable product for the communities they come from (Quansah, 2001). As of 2012, 70.7% of the Malagasy population were living at or below the poverty line, reinforcing the idea that a more affordable health care system is needed (World Bank, 2017).

Nonetheless, it is important to acknowledge the benefits of the allopathic system. Technological advancements have allowed us to understand the pathophysiology of disease to an unprecedented level, and the systematic method of research provides empirical evidence of what works and what does not. Modern medicine is capable of curing more complex issues that TMP may not be equipped to deal with (e.g., invasive or reconstructive surgeries, preventive medicines such as vaccines, etc.), and the industry created by the modern health care system provides a plethora of jobs that work with health care in different capacities. However, the unaffordability of its services for many populations suggests that it is time to search for an alternative that better suits people's needs—integrative medicine.

Integrative medicine combines the strongest parts of both TMP and modern medicine to create a system that maintains the biodiversity and natural resources of an area, while providing a more systematic and effective structure for care. A clinic in Madagascar has already attempted this system, but the integration of traditional medicine into the Western world will provide a different set of challenges (Quansah, 2001). This article will explore the feasibility of and potential for integrative medicine both in Madagascar and other developing countries. In addition, we will attempt to navigate the nuances of the relationship between traditional and modern medicine. Integrating traditional and modern medicine and re-establishing the credibility of traditional healers will improve the overall quality of health care in developing countries.

Method

Data for this research were collected in large part through primary sources. Interviews were conducted with traditional healers, local families, and modern health care practitioners or administrators. Lectures were also given at the Université d'Antananarivo by qualified professionals. Other data were collected through research on online databases including PubMed and Google Scholar.

Why Traditional Medicine?

TMP is important in the grand scheme of integrative medicine because it works and is affordable. Plants such as the Rosy Periwinkle (*Catharanthus roseus*) and bark from the willow tree (*Salix* sp.) have been proven to have legitimate health benefits and have been used by traditional healers for generations (Loh, 2008; Nolan & Robbins, 1999). Appendix A demonstrates a list of different plants that have been used by traditional healers as well as adapted for use in modern medicine (Boer, 2008). Although TMP is often viewed as a hoax by the Western world and attached to an idea of primitivity, its effectiveness is proven through the persistence of its use over thousands of years. Although traditional medicine cannot always cure complex maladies, it has potential to relieve a significant cost and patient burden from the modern medical system.

Affordability and accessibility are also key components to traditional medicine. Because the resources are so readily available, there is little cost associated with preparation of traditional remedies. The spirit of traditional medicine also helps maintain low—or no—cost. Veritable

traditional healers will often not charge patients for their care (Andriamparany, 2018). Healers also tend to stay in one place, allowing them to remain accessible and to develop trust within their community, as their practice is passed down from generation to generation. According to a 2008 cross-sectional study on data obtained from the National Cancer Institute's 2008 Health Information National Trends Survey, 33.3% of study participants reported delaying or avoiding care due to "unfavorable evaluations of seeking medical care," including issues pertaining to physicians and health organizations (Taber, Levya, & Persoskie, 2014).

Integrative Medicine: Benefits and Challenges

In order for integrative medicine to be successful, it must harness the strengths of each type of medicine to support the weaknesses of the other. For example, traditional remedies tend to be significantly more affordable and accessible than modern treatment in countries such as Madagascar, saving users at worst 5 to 10 times the cost (Quansah, 2001). Traditional healers, however, typically share their knowledge generationally, and record-keeping is sparse. Modern medicine is keen on maintaining records and documentation (Mathioudakis, Rousalova, & Hardavella, 2016). Record-keeping is important to maintain a consistent standard of care, as well as to track success rates of specific remedies under specific conditions. Documentation is also incredibly important in tracking trends of diseases. Most evidence pertaining to traditional medicine is empirical and anecdotal, and although this is important, quantitative data will provide another layer of information to build on and improve care.

Furthermore, integrative medicine can make positive contributions to the sustainability efforts of developing countries. Eighty percent of the population living in developing countries rely on medicinal plants to take care of their health to some extent (Quansah, 2001). This emphasizes the importance of maintaining natural resources in these areas, an important foundation of the traditional health care system. The modern system, on the contrary, has the technological capabilities to identify and isolate the specific compounds from medicinal plants to cultivate them as efficiently as possible. Practitioners and scientists should collaborate to find the most effective way to maximize the quality of care and successfully maintain the community's store of natural resources.

Health is the foundation on which society functions. Without good health, community and productivity will suffer. Therefore, it is essential to offer patients a range of options to maximize satisfaction, minimize burden, and optimize efficacy. It is important to note there are some exceptions where modern medicine is the only option—vaccinations, specialized surgery, and so on—but there is little patient-level detriment from the collaboration between these two types of health care. However, there are many challenges in the current landscape which must be addressed before there can be successful cooperation.

The attitudes of Western countries toward traditional medicine tend to be pejorative and condescending. In 2007, traditional healing in Madagascar was formally recognized by the government after decades of being an illegal practice under French colonization (Pierlovisi & Pourchez, 2014). While this is an important step toward integration, attitudes are difficult to change. In addition, in countries where traditional medicine is practiced, those that work in the modern system are skeptical of the work of traditional healers. A study performed in South Africa in 1998 surveyed general physicians, psychiatrists, consumers, traditional healers, and psychologists to look at the perceptions of traditional and Western healing. The study found that general physicians questioned the

authenticity of traditional practices and often criticized traditional healers for being illiterate, whereas psychiatrists were more open to the idea of working with traditional healers (Hopa, Simbayi, & du Toit, 1998). The study unfortunately did not provide the reverse information on what traditional healers thought of working with modern health care providers. The negative Western perception of traditional medicine has begun to proliferate throughout countries like Madagascar, but the country's high poverty levels make modern medicine inaccessible, creating a complicated paradox.

Another issue impeding integration is the general distrust that developing countries have of Western powers. The WHO has officially supported the use of traditional medicine since 1979, but some are worried that the intentions of such organizations do not have the best interest of indigenous populations at heart (WHO, Director General, 1979). History shows that the exploitation of resources and know-how at the hand of Western countries is a legitimate fear for developing countries. For example, the *Prunus Africana*—or African Cherry—was a medicinal plant used for generations in Madagascar to treat prostate gland enlargement. Laboratory tests found that the active ingredient in the bark could be harvested to create what is now known as Tadenan®, a prescription drug on the European medicinal market (Breza et al., 1998). Due to such high rates of exportation, the plant became listed as a vulnerable species on the International Union for Conservation of Nature (IUCN; 1998) website, and remains on that list today.

There is an undeniable link between dominant culture and social, economic, and political power. Diffusionist theory suggests that the strongest entities will impose their ways of life onto other cultures, and this holds true in terms of medicinal practice as well. For example, China is an exploding economic and political power, and traditional Chinese acupuncture has recently been adopted as a legitimate form of healing, now being taught in schools around the world (Raharinjanahary, 2018). Its practice and know-how, however, was only recently accepted into the realm of complementary medicine. Simultaneously, African and Native American traditional healers have been ignored, as Western powers colonized and conquered their land. This has placed African traditional medicine at a great disadvantage, and thus manifests a distrust of any efforts made by Western countries to intervene in local communities. In order for this distrust to dissipate, community members from areas that rely on traditional medicine need to be given decision-making power in the integration of traditional and modern health care systems. The agency of indigenous people should be recognized as an important step toward successful collaboration.

Integrating traditional medicine and modern medicine is tricky due to the fundamental nature of traditional healing. Some believe that the experience and the environment play a role in the success of healing, and that providing too much structure or introducing too many variables will render it ineffective. A Malagasy healer who treats burns with his saliva says that his father's lineage all has this capability, including his children, but only when the saliva is applied directly from their mouths (Raharinjanahary, 2018). When the saliva is stored and then applied to a burn later, it does not work. When their saliva was sent to a laboratory to be analyzed, no active element could be identified. However, his children are still called on by the local modern hospital to help treat burn victims—an excellent example of integrative medicine, albeit not formalized. This is just one example of how traditional medicine is a precise and delicate practice, and its integration to the modern system will have to be handled with care.

Keys to Application of Integrative Medicine

The previous sections discussed the rationalization for integrative medicine, including specific benefits and obstacles. It is also important to consider how the application of integrative medicine would look and work in practice. For this, the model of La Clinique de Manongarivo in Madagascar will be used. La Clinique de Manongarivo is an integrated health care facility that operated from 1995 to 1998, and from 2001 to 2005, in a rural area of Madagascar. The clinic had several main characteristics that are important to consider. First, patients were evaluated by both a traditional medical practitioner and allopathic medical practitioner (AMP) at the same time. The practitioners asked the patient questions and attempted to come to a consensus on diagnosis. The clinic prioritized the treatment recommended from the TMP, but if there was no local or traditional remedy, pharmaceutical products were used. Second, the resources available to the clinic were the local biodiversity and some pharmaceutical products, with the goal of providing "health for all, and health of all" (Quansah, 2018).

Finally, although the success of the clinic can be seen in the number of diseases successfully treated—32 by traditional medicine, two by modern medicine, and four by combination—the main failure is just as important. The clinic began as a project funded by a conservation action grant from the United States, but in order for the project to be maintained, the clinic's administrative staff asked the community members to contribute a small annual fee of 5,000 Ariary per person, or about US$1.66 that would be kept in a bank. This fund would accrue interest and only be used for the functioning of the program. Unfortunately, the community members did not comply with the request, and administrators decided to abandon the project in 1998. In 2001, the project was restarted by one of the administrators who used personal funds to reopen the clinic. In 2005, however, the administrator and the community had a falling out, and the status of the clinic is currently unknown (Quansah, 2018). It is important to note that, unfortunately, the primary source of the clinic's results could not be obtained, only the synopsis along with information collected from interviews.

In order for integration to be successful, all relevant parties should help create the system from the ground up. This will prevent conflict as the program develops and allow for traditional healers and medical doctors to come to an understanding of expectations and procedures for patient care. The community is the main benefactor of the existence of an integrative medicine system, so including them in the planning process will raise awareness of its purpose and account for community fears and expectations.

Collaboration between traditional medicine and modern medicine is also crucial to maximize health benefits. Traditional knowledge combined with modern technology can discover more effective ways of using natural resources for health, such as collecting oil from leaves instead of using the entire leaf or discovering that an important compound is more abundant in the flower of a plant as opposed to the roots. This relationship will maximize the effectiveness of traditional medicine and improve overall care.

In terms of the setting where the system is located, collaboration would look similar. The most important part is that there is open dialogue among all involved parties to come to the conclusion that best suits the community and the providers. This will require extensive planning, research, and coordination, such as community needs-assessments, inventory of local resources, interviews with local people, and operational cost estimates.

Conclusion

The potential for integrative medicine can provide significant benefits for both developing and developed countries. The allopathic system is capable of offering specialized procedures and medicines that the traditional system is not equipped to care for, while traditional remedies can remove a massive burden from the allopathic system for things like childbirth, common ailments, and psychiatric issues. Integrative medicine can also help maintain biodiversity in countries that rely heavily on their local resources, while also identifying the most efficient way to prescribe traditional remedies. The path to integration does have some obstacles, many of which are sociopolitical and economic, but by incorporating community-based decision-making and working to combat the stigma of traditional medicine, these obstacles can be overcome. Many of the challenges can be dealt with, in general terms, by open dialogue and equitable collaboration between allopathic practitioners, traditional healers, and communities. Integrative health care is progressive health care, and if the primary objective of health care is "health for all," it is important to consider integrative health care as a legitimate third option.

Appendix A

This image, taken from Hugo Boer's article on African plants and their anti-pathogenic effects, illustrates the multiple uses of medicinal plants in traditional and modern settings (Boer, 2008).

Species	Traditional use	Modern uses[b]	Constituents	Distribution[1]
Aframomum melegueta	Colds, migraine, tapeworm[2]	Warming remedy for nausea[3]	Terpenes[4], paradol[5]	West tropical Africa
Agathosma betulina	Stomach problems, wounds, diuretic, kidney and urinary tract diseases, rheumatism, bruises[6]	Urinary infections[3]	Isomenthone and disphenol[7]	South Africa
Cola acuminata	Stomach problems, expectorant, bronchitis, constipation, wounds, cardiac problems[8]	Relieve headaches[3]	Xanthine-alkaloids	West-Central tropical Africa
Commiphora myrrha	Antiseptic, skin diseases, pustular complaints[9]	Astringent, antiseptic and antimicrobial[3]	Terpenes[10]	East tropical Africa
Harpagophytum procumbens	Arthritic ailments, rheumatism, coughs, diarrhoea, constipation, gonorrhea[11]	Anti-inflammatory and pain reliever for joint diseases, back pain and headache[12]	Iridoid glycosides (harpagoside), stachyose, phytosterols[3]	Southern Africa
Harungana madagascariensis	Astringent, mild laxative, diarrhoea, dysentry[3]	Indigestion, increase pancreatic function[3]	Phenolic pigments, triterpenes, anthraquinones and tannins[13]	Sub-Saharan tropical Africa
Hoodia currori	Appetite suppressant[14]	Dietary supplement[15]	P57, a oxypregnane steroidal glycoside[16]	Southern Africa

Species	Traditional use	Modern uses[b]	Constituents	Distribution[1]
Jateorhiza palmata	Dysentery, vermifuge[3]	Digestive problems, loss of appetite, chronic illness, dysentery[3]	Isoquinoline alkaloids[17]	East tropical Africa
Pelargonium sidoides (and *Pelargonium reniforme*)	Treatment of dysentery, diarrhoea, hepatic complaints, wounds, colds and infections of the respiratory tract[18]	Coughs, upper respiratory tract irritations and gastrointestinal concerns[18]	Phenolic and cinnamic acids, tannins, flavonoids and coumarins[18]	South Africa
Tabernanthe iboga	Female sterility, hallucinogen, conjunctivitis[19]	Combat fatigue, intoxicant[3], addiction treatment[20]	Ibogaine[20]	West-Central tropical Africa

[a]*Source:* [1]USDA ARS (2006); [2]Walker (1952–1953); [3]Chevallier (1996); [4]Ajaiyeoba and Ekundayo (1999); [5]Nelson (1917); [6]Van Wijk *et al.* (1997); [7]Lis-Balchin *et al.* (2001); [8]Bouquet (1969); [9]El-Kamali and Khalid (1998); [10]El Ashry *et al.* (2003); [11]Von Koenen (1996); [12]MedlinePlus (2006d); [13]Ritchie and Taylor (1964); [14]McGown (2006); [15]Wikipedia contributors (2006c); [16]MacLean and Lu-Guang (2004); [17]Duke (2006); [18]Kolodziej (2000); [19]Sandberg (1965); [20]Lotsof (1995).
[b]Modern uses are not based conclusively on clinical studies, and possible adverse reactions are not fully known.

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PERSPECTIVES

Obstetric Violence as a Potential Cause of Maternal Mortality in the United States

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Abstract:

The maternal mortality rate in the United States is one of the highest among developed nations and is on the rise. Despite this disturbing statistic, little action is being taken to mitigate this national trend. Research has pointed to maternal characteristics and systemic health care factors as causes, but has largely ignored the role of health care professionals in affecting this trend. Developing countries have coined the term "obstetric violence" to identify instances of interpersonal and structural violence perpetrated by health care professionals in childbirth settings. However, the United States has yet to acknowledge the existence of this term, as well as the problem. In this article, we outline the extant literature on maternal mortality and obstetric violence, and suggest obstetric violence as a contributing factor to the increasing maternal mortality rate in the United States. Furthermore, our review highlights the lack of research, medical oversight, and lack of legislation on these issues. We discuss public health implications and propose future directions, such as the term *obstetric justice*, as means of reducing this gendered form of health inequality.

Keywords: Obstetric Violence, Maternal Mortality, Obstetric Justice

Introduction

In the United States, maternal mortality—the death of a woman while pregnant or within 42 days of termination of pregnancy—is on the rise (World Health Organization [WHO], 2018a). Women across the nation are dying from childbirth-related causes at a rate far higher than that of other comparable developed countries (Central Intelligence Agency, 2015; MacDorman, 2016). The United States is one of the only developed nations that has seen drastic increases in its maternal mortality rates, despite advantages in technology and one of the highest amounts of health care spending (Kassebaum et al., 2016). In 1990, maternal mortality rates in the United States were roughly 12 deaths per 100,000 live births. In 2013, the rate had more than doubled to an estimated 28 deaths (Molina & Pace, 2017). Consequently, researchers have tried to understand the underlying causes of this significant increase. Research largely attributes these increasing rates to the individual characteristics of mothers (e.g., body mass

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index) or to unchanging societal-level factors, such as the high costs of insurance (Molina & Pace, 2017). On the contrary, studies on maternal mortality in other countries have identified how women's rights are often infringed upon in medical settings, which is a contributing factor toward this issue (White Ribbon Alliance, 2011). Specifically, nations such as Venezuela, Brazil, and South Africa have researched the impact of *obstetric violence* – a form of gendered violence that occurs during childbirth, in which women are physically, verbally, and/or sexually abused by maternal health providers (da-Silva-Carvalho & Santana-Brito, 2017; D'Gregorio, 2010; Pickles, 2015). While developing countries appear to be the focus of research in this field, there is almost no extant research that investigates if and how obstetric violence could be contributing toward the rise of maternal mortality in the United States.

In this article, we connect these two main bodies of literature and recommend that health care professionals begin to study the role of obstetric violence as a possible contributor toward the public health crisis of rising maternal mortality. The implications of obstetric violence are also considered in reference to maternal mortality and public health. Furthermore, we introduce the term "obstetric justice," which is framed as a standard for maternal health providers to work toward, as opposed to merely preventing further violence. Should the United States begin to acknowledge obstetric violence and strive to promote a culture of obstetric justice, then the national rate of maternal mortality should begin to reverse its current trend.

Mortality on the Rise: Unprecedented Growth

The United States is a developed country with continuous advancements in health care. Yet, these advancements are not similarly reflected in maternity care. Currently, the mortality rate is estimated to be around 28 deaths per 100,000 live births and is on the rise (Molina & Pace, 2017). Importantly, the United States is the largest contributor (among developed nations) toward the roughly 830 women who die every day across the globe from preventable causes related to pregnancy and childbirth (WHO, 2018b). Canada, whose health care and technological advancements are comparable, reported a maternal mortality rate of less than seven deaths per 100,000 live births in 2015 (Carroll, 2017). It is well known that across the world women are dying, but the United States is the only developed country witnessing a preventable rise in their maternal mortality rate and that still refuses to take action through national strategies or thorough investigations (Molina & Pace, 2017). Roughly half of the childbearing population is at risk for a maternal death. Although some maternal deaths are unavoidable, researchers have suggested that many cases are completely preventable (Gil-Gonzalez, Carrasco-Portino, & Ruiz, 2006). These able and willing childbearing women are giving birth in a country where the mortality rate is rising, yet this issue remains hidden from the public's eye. The gendered nature of this problem cannot be ignored, as it serves to further exacerbate health inequalities.

The lack of recognition given to mothers being victimized by the health care system is appalling. The United States is one of the only countries still experiencing an increasing rate of maternal mortality, despite being the developed nation spending the most on health care (Molina & Pace, 2017; Neggers, 2016). Specifically, during 2000–2014, there was a 26.6% increase in the maternal mortality rate, jumping from an estimated 18.8 to 23.8 deaths per 100,000 live births (MacDorman, 2016). However, these rates are complicated. The National Center for Health Statistics, which is supposed to measure maternal mortality in the United States, stopped the publication of national-level maternal mortality data in 2007 (Gravitz,

2017). This means that each state can determine its own rates and there is no standardized metric of assessment; therefore, the national rate is merely an estimate. The United States had implemented the National Maternal and Infant Health Survey up until 1991, but even this survey focused almost exclusively on infant outcomes despite including "maternal" in the title (National Center for Health Statistics, 2009). The lack of clear measurement and the use of estimations by researchers and medical health professionals means that maternal mortality may be higher than what most believe. Perhaps more importantly, it reveals that the United States deems maternal mortality as unimportant and unworthy of further investigation. The United States is making no effort to conduct a survey to determine a reasonable estimate of its maternal mortality rate, let alone allocate resources to fully investigate the increasing numbers of maternal mortality cases. If the United States wants to reduce maternal mortality by identifying potential causes, they have to be able to measure the true rate first.

Bias in Maternity Care: Affecting the Odds of Surviving Labor

Sexism has consistently been a problematic backdrop in maternal care settings. The United Nations emphasized fundamental rights for all in medical contexts, including "the enjoyment of the highest attainable standard of health" (United Nations Educational, Scientific and Cultural Organization, 2005). Despite this symbolic gesture, women have not seen this ideal. Research has long documented that women are significantly more likely than men to face substantial forms of bias in medicine and public health broadly (e.g., Bowleg, 2012; Krieger, Rowley, Herman, Avery, & Phillips, 1993). Furthermore, research has found that within the context of maternity care, women's basic human rights are frequently violated (Davis-Floyd, Pascal-Bonaro, Davies, & Ponce de Leon, 2010). In addition, the process of labor has become increasingly medicalized; the pathologization of childbirth places medical professionals in the role of expert, as opposed to mothers themselves. This often means that the childbirth process is standardized by hospitals, with interventions (e.g., inductions, continuous fetal monitoring, and even C-sections) becoming a requirement for the ease of practitioners at the expense of mothers' pain and disempowerment over their bodies (McMahon et al., 2014). Furthermore, the attention is often emphasized on the risks to the fetus, while understating risks to the mother (Pickles, 2015). Women's bodies and autonomy are not at the forefront during the birthing process, and research has demonstrated how human rights violations are contributing to maternal death rates (Cohen Shabot, 2016; Diaz-Tello, 2016; McMahon et al., 2014).

In response, global organizations such as the White Ribbon Alliance and the International MotherBaby Childbirth Organization were created. The White Ribbon Alliance aims to help women in developing countries fight for women's health and educate medical professionals on how to provide proper treatment during labor. Often, the rights of childbearing women are ignored or unenforced; however, there are a few times when providers were held directly responsible for maternal mortality. Beyond the protection of basic human rights, organizations such as the International MotherBaby Childbirth Organization have outlined steps to improve overall maternity care. In 2008, the International MotherBaby Childbirth Initiative stated their goal "to improve care throughout the childbearing continuum, in order to save lives, prevent illness and harm from the overuse of obstetric technologies, and promote health for mothers and babies around the world" (Davis-Floyd et al., 2010, p. 13). Many of these companies are based in the United States, but place a large focus on less developed nations rather than their own. This is not surprising, as the conversation around maternal mortality

often excludes developed nations, further underlining the need for more awareness in the United States. These foundations exist because there is a demonstrated need for the protection of women's rights in the realm of childbirth. The presence of these organizations points to the potential benefits of greater awareness of the mistreatment of women during childbirth in the United States.

Obstetric Violence

Obstetric violence as a construct was first introduced in Venezuela as a legal term (Cohen Shabot, 2016; Pickles, 2015). It describes gendered violence that takes the form of dehumanizing physical, verbal, and/or sexual abuse, along with structural inequalities within medicine that promote and maintain such behavior during childbirth. Bohren and colleagues (2015) suggest a broader definition to include stigma and discrimination, failure to meet professional standards of care, and poor rapport between women and providers.

Obstetric violence exists as a gradient and can occur at any point in the labor process. Consequently, many mothers are at potential risk. The risk begins when laboring women first enter the hospital and what is supposed to be a natural process becomes over-medicalized—not because it benefits the mother but because it is often more efficient for health care professionals. Lokugamage and Pathberiya (2017) claim that "complex health, social, political and economic elements are protocolised, guided by risk, cost and fear, at the expense of personalized care" (p. 3). Interventions such as inductions, epidurals, and continuous fetal monitoring are often mislabeled and portrayed as the safest way to give birth, despite their tendency to put women at more risk for emergency cesarean sections (C-sections). These are often implemented without complete medical justification (Diaz-Tello, 2016; Morris, 2013). Routine and emergency C-sections are problematic in their own ways, with plenty of research emphasizing their danger, especially when a vaginal delivery is possible (Sadler et al., 2016). Research has shown how women can be severely pressured or threatened into specific laboring decisions, such as undergoing C-sections, despite the woman's requests. Specifically, there have been cases of medical staff threatening to call Child Protective Services or request a court order to force a C-section (Diaz-Tello, 2016). Such maternal health providers claim that they are acting in the best interest of the unborn child, but one doctor admitted that their license is "more important" than the patient's consent (Diaz-Tello, 2016). In addition, some women experience procedures without giving full consent or are coerced into consenting (*Rinat Dray v. Staten Island University Hospital and Others*, 2014). Certainly, some women do have complicated medical pregnancies that require medical treatment, but many do not. For those women, such an approach can be harmful.

Obstetric violence also occurs within interpersonal interactions. Physical and verbal abuse are perpetrated by both doctors and nurses, or other health care professionals depending on the context (da-Silva-Carvalho & Santana-Brito, 2017; da Silva, Marcelino, Rodrigues, Toro, & Shimo, 2014). Nurses participating in a study on such experiences reported witnessing physical examinations without consent and the use of fingers to widen women's cervixes, along with verbal abuses involving the assumption that women brought labor pains on themselves by being sexually active or that they do not have a reason to be in agony (da Silva et al., 2014). For example, one story describing a nurse manually widening and holding open a woman's cervix despite her protests received media attention, along with another woman who reported having her requests to stop physical examinations, catheters, and sutures

without proper pain medications ignored entirely by her doctor (Goer, 2010). Other instances of abuse can occur "behind the scenes," where patients may be unaware of certain actions, as evidenced by a nurse's report of a doctor tearing through a patient's sphincter (without the patient's awareness due to her epidural) when attempting to push the baby out through the rectum to speed up a woman's labor and then refusing to admit fault (Goer, 2010).

Obstetric violence is a way to silence and control women's bodies when they are in the powerful position of childbirth, where their femininity is seen as strong (Cohen Shabot, 2016). The need to reassert power over and dehumanize women in the delivery room has led to both rape and domestic abuse comparisons, from researchers and women themselves (Cohen Shabot, 2016; Goer, 2010). For instance, maternal health providers may restrict women's movement and voices and demand they maintain specific birthing positions, claiming it is in their best interest despite evidence to the contrary (Goer, 2010). Research and legal cases have also revealed a tendency for "unwanted" behavior from laboring women (e.g., refusal of certain medical interventions, protests of pain, and requests to stop what a medical professional is doing) to be punished, with examples ranging from doctors withholding pain medications to threatening to call Child Protective Services or force a C-sections (Goer, 2010).

It is from these experiences that many women report experiencing trauma and the development of post-traumatic stress symptoms (Fernández, 2013). Women's reported memories are full of feeling helpless, feeling disconnected from maternal health providers, and being positioned outside of their own bodies (Thomson & Downe, 2008). Obstetric violence transforms what is supposed to be a wonderful, life-changing event into a traumatic experience that can go so far as to lead to symptoms of post-traumatic stress. Importantly, these consequences of obstetric violence are exacerbated depending on the woman's individual history. Previous research has shown that women are at greater risk of experiencing post-traumatic symptoms if they have a history of sexual trauma, lower social support, higher trait anxiety, and/or poor coping mechanisms (Creedy, Shochet, & Horsfall, 2000; Soet, Brack, & Dilorio, 2003). Together, these forms of obstetric violence violate women's individual human rights.

Lack of Recognition of Obstetric Violence in the United States: Implications for Public Health

Currently, all laboring women are at potential risk for a traumatic childbirth caused by obstetric violence. Some countries have taken note of this and increased research and legal action on this troubling issue. For instance, some Mexican Provinces have formal legislation against obstetric violence. Research in India and Colombia has been conducted to better understand the incidence and impact of obstetric violence, while researchers in Canada are reconsidering the ethical guidelines of labor (Briceño Morales, Enciso Chaves, & Yepes Delgado, 2018; Chattopadhyay, Mishra, & Jacob, 2018; Kotaska, 2017). In addition, researchers from South Africa have worked to reduce obstetric violence with the greater goal of reducing their maternal mortality rate (Pickles, 2015). Specifically, Pickles (2015) suggests that in South Africa, obstetric violence should have legal ramifications for the perpetrator. To help reduce maternal mortality rates, health care professionals should put the mother first and view unnecessary medical interventions as potentially dangerous.

Despite these global efforts, there are still a number of countries that do not yet recognize obstetric violence as a legal construct despite its presence, such as the United States. Here, the

legal system encounters occasional lawsuits or the popular media has a story of one "bad doctor" that is typically seen when videos are taken of doctors performing painful medical interventions as women scream for it to stop, but there has been no close focus on systemic obstetric violence in law (Goer, 2010). Furthermore, obstetric violence has rarely been empirically examined in research within the United States. To the best of our knowledge, there is currently only one study that examines the impact of obstetric violence in the United States (i.e., Diaz-Tello, 2016). In addition, there is no standard measure for researchers to measure the different forms of obstetric violence (Jewkes & Penn-Kekana, 2015). Thus, accurate rates of obstetric violence are not assessed, our understanding of its impact is extremely limited, and women's traumatic experiences are effectively erased.

Right now, the only people in the United States who are attempting to bring light to obstetric violence are childbirth activists, who are typically midwives or mothers who have experienced this personally (Fernández, 2013). This systemic gap in the literature is a major concern because it suggests that obstetric violence is not occurring in the United States, thereby implying that it is not a legitimate public health issue. The lack of obstetric violence in the United States' academic literature is the result of multiple social factors. First, patients in a hospital setting are expected to be "compliant" with medical directives and are expected to inherently trust medical professionals (Hodges, 2009). Furthermore, actual incidents of obstetric violence are rarely discussed in the public space, so it is unsurprising that most people are unaware of this public health concern. One recent exception includes the news story of athlete Serena Williams, whose complaints during labor were ignored, resulting in her almost dying due to negligence. Despite her past history of pulmonary embolisms, doctors gave her worries no thought and proceeded with unnecessary treatments until her concerns were finally recognized (Salam, 2018). In addition, gender norms dictate that women are selfless and willing to sacrifice for others at the expense of themselves. For instance, research has found that mothers who do refuse certain treatments are perceived as "unfit" and some even believe that these mothers should not have the freedom to make choices if the unborn child is not prioritized (Borges, 2018). The United States has a large focus on unborn children. While this is mainly seen in abortion discourses, it means that many women face societal repercussions for refusing medical treatment that is considered to be beneficial, despite evidence to the contrary, such as continuous fetal monitoring (Borges, 2018). Even if a woman survives obstetric violence, there is no formal reporting mechanism in place, and women are left with no way to take action against mistreatment. The lack of empirical examination of obstetric violence means that it is difficult to link it to the rising rates of maternal mortality.

Attributions of Maternal Mortality in the United States

Given the rise in maternal mortality rates in the United States, research has been dedicated to understanding the underlying causes. Currently, the narrative in the extant literature about maternal mortality in the United States is that it is out of physician's hands, and the causes are attributable to other sources. Specifically, a large majority of papers about this tend to focus on individual-level factors of mothers. For instance, many point to a noticeable increase in chronic conditions among mothers, such as obesity, diabetes, and heart conditions that contribute to the increase in maternal mortality (Carroll, 2017; Molina & Pace, 2017; Neggers, 2016). The WHO and existing literature focus on eclampsia and pre-eclampsia as a primary cause, even though they represent only 12% and 20% of maternal deaths, respectively.

Research has also investigated other direct causes of maternal mortality, such as hemorrhage. The prevalence of hemorrhage is 25%, but less than 20% of studies have examined its impact on maternal mortality (Gil-Gonzalez et al., 2006). Furthermore, the WHO also points to indirect causes (e.g., AIDS, anemia, malaria, and cardiac disease) as contributing factors of maternal mortality.

On the other end of the spectrum, researchers and medical professionals point a finger at societal-level causes that are beyond their control. A lack of preventive care is widely considered to be a factor that stems from a high cost of health insurance, thereby preventing many women from seeking medical check-ups and treatment outside of childbirth itself (Carroll, 2017; Molina & Pace, 2017; Neggers, 2016). In addition, some women do not have physical access to a health care center. Outside of insurance, there are general issues with disparities, both within and between states, in the quality of medical care provided, as evidenced by women in lower quality hospitals facing childbirth complication rates twice as high as higher quality hospitals (Glance et al., 2014). Together, the existing body of research completely overlooks any physician-level factors that could contribute to the rising rates of maternal mortality. Only a few studies have considered how physician-level factors, such as the absence of a standardized obstetric response to emergency childbirth situations, could be potentially problematic (Agrawal, 2015). This gap in the literature is concerning, because the rate of maternal mortality is rising while the research remains stagnant. When the United States attributes maternal mortality to changes in individual women or greater societal factors, without investigating anything else, it removes the presence of violence and absence of care in hospital settings as a potential cause. Therefore, we suggest that obstetric violence should be investigated as a potential contributing factor of maternal mortality.

Obstetric Violence as a Factor of Maternal Mortality

Obstetric violence has been shown to have direct negative effects on women during labor. We suspect that obstetric violence has indirect effects on women as well. Most mothers are likely to have higher levels of stress during childbirth, and this stress is exacerbated if they become victims of violence. In addition, if women have a greater perception of stress than they do coping mechanisms, or if they lack social support during this time (both of which are predictors of a traumatic childbirth experience), they become more likely to have negative physiological consequences (Wakeel, Wisk, Gee, Chao, & Witt, 2013). A body under stress is not a body capable of performing at maximum. Cardiac problems, high blood pressure, and infection are all potential consequences of elevated stress, and are all contributors of maternal death as well (Hobel & Culhane, 2003). A tendency to restrict food and water for laboring mothers and the forced supine position only serves to agitate the problem (Morris, 2013). While there is little research investigating this connection, it is likely that excessive stress induced by obstetric violence does play a role in maternal mortality, and further investigation is necessary.

Another form of obstetric violence, the absence of care, can also contribute to high rates of maternal deaths. Nearly half of all cases of maternal mortality in the United States are preventable, and it is likely that a portion of these are due to instances of neglectful maternal health providers (Gravitz, 2017). When women's concerns are ignored, denied, or silenced, childbirth can turn deadly. Reports of hemorrhaging have been excused as heavy periods or

normal bleeding, and malfunctioning epidurals during surgical procedures are viewed as lies. Even if nurses, for example, are concerned about unnecessary medical interventions or lack thereof, systemic forces require compliance with abusive practitioners (Goer, 2010). One such story that received media attention is that of Lauren Bloomstein, whose pre-eclampsia turned deadly. In a lawsuit currently pending, her husband claims that her death could have been prevented if her abnormally high blood pressure had been reported by the nurse to her doctor from the start and monitored throughout, rather than going hours without being checked. After Lauren's death, the hospital implemented an action plan, but the report by the Department of Health was never made public and the lawsuit against the hospital and maternal health providers for Lauren remains unmoving (Martin & Montagne, 2017a). Therefore, we argue it is necessary for researchers to consider obstetric violence as a possible contributor to maternal mortality and research the range of its potential impact.

Although all laboring women are at risk of experiencing obstetric violence, the likelihood of this risk depends on the woman's intersecting identities. Sexism is a consistent factor affecting all women, but additional discrimination such as racism or classism affect certain women. An intersectionality framework aids in this understanding, emphasizing that an individual is perceived and treated as the intersection of their identities (Cole, 2009; Crenshaw, 1989). For instance, research has demonstrated that rates of maternal mortality tend to differ based on the demographics of individual mothers, as seen by studies identifying that African American mothers are 3 times more likely to die from pregnancy-related causes. However, few have investigated why this troubling difference exists (Martin & Montagne, 2017b; Neggers, 2016). Women of color, women with disabilities, women from low socioeconomic status, or women with specific health conditions are all affected disproportionately by obstetric violence (Bohren et al., 2015). Even single mothers or those who have previously used drugs experience worse treatment at the hands of maternal health providers. Differences in identity heavily affect how women are treated in medical settings and put women of various minority identities at a greater risk for becoming victims of obstetric violence.

In addition, identifying obstetric violence as a potential factor for maternal mortality means that women of different identities may be at varying risk for maternal death. As previously discussed, intersectionality adds to the idea that obstetric violence is weighted differently for various women due to biases in treatment they receive. Thus, researchers investigating the link between obstetric violence and maternal mortality need to consider how the strength of the relationship is not the same for all women.

Implications and Call to Action

In this article, we call attention to a growing gendered public health issue in the United States. Based on the existing literature, we recommend a few immediate steps that researchers and health care professionals need to engage in to mitigate this gendered health risk. First, the most vital step the United States can take is acknowledging obstetric violence as a legitimate form of gendered violence that perpetrates sexism, and very likely racism, in health care practices. The problem of obstetric violence cannot simply be solved by childbirth activists exclusively. Furthermore, survivors of obstetric violence are often in a position where they must focus on the health of their children and themselves, and cannot alone dedicate the necessary effort and time to work against obstetric violence. Therefore, it is imperative for

academic researchers to systematically study obstetric violence to accurately understand its true prevalence and range of impact. Increasing academic literature and published reports on obstetric violence is a key method for generating greater awareness; as such information will eventually be disseminated to the public. Importantly, it is necessary for researchers to follow suit with other countries and investigate the extent to which obstetric violence is contributing toward the increasing rates of maternal mortality in the United States.

Second, health care professionals need to address their role in this problem and act as catalysts of change to reduce obstetric violence and maternal mortality. Each stage of the birthing process needs to be reevaluated to ensure that women are receiving the best care possible. For instance, laboring women should always have a medically competent advocate present to ensure they are not being coerced into consenting to aspects of labor that they are refusing (e.g., epidural). Health care providers should work to promote *obstetric justice*. We introduce this term to represent not simply the absence of harm in the context of labor but rather the presence of care and dignity. Promoting obstetric justice includes obtaining informed consent for each aspect of the laboring process, providing interventions that are evidence based and medically justified to promote women's health, treating women with respect, promoting a healthy labor environment, and valuing the physical and mental health of mothers at least equally to that of the fetus. Obstetric justice should be the cornerstone of labor and delivery.

At the structural level, women should have equal access to reliable health care resources to promote prenatal care (Molina & Pace, 2017). Research has demonstrated that preventive care is beneficial for the fetus and the mother (Kogan, Alexander, Kotelchuck, & Nagey, 1994). As for legislation, there are currently no policies in place nationwide to hold maternal health providers accountable for preventable maternal deaths (Lokugamage & Pathberiya, 2017). Policymakers should look to other nations, such as Venezuela, Brazil, and South Africa, to develop legislation that serves to prevent obstetric violence. Furthermore, health care professionals need to critically examine their own institutions to determine their unique problems. For example, California is the only state that has managed to reduce its maternal mortality rate by half in 3 years. This demonstrates that with effort, maternal mortality can be mitigated. The California Maternal Quality Care Collaborative requires confidential reports from doctors who had a patient die from pregnancy-related causes. This allows doctors to reflect on choices they made that could have contributed to maternal deaths, along with changes to make in the future, without the fear of a malpractice lawsuit. In addition, California also implemented two new toolkits for hemorrhage and pre-eclampsia with the goal of increasing standardized responses to medical emergencies (Gravitz, 2017; Montagne, 2018).

Conclusion

Given the lack of research, medical attention, and legislation addressing this problem, every laboring woman in the United States is at risk of being a victim of obstetric violence. Obstetric violence and maternal mortality in the United States can be reduced greatly, as evidenced by efforts in California. However, this change can only occur on a national scale if researchers and medical professionals start to consider the rise in maternal mortality to be a serious problem—and how obstetric violence plays a role.

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