

Washington County, PA-A Case Study to Improve the Obesity Epidemic and Enhance Healthcare Access at the Patient-, Community- and Health System Level

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Abstract

Across the nation it has been documented that obesity and healthcare access are growing challenges that especially impact individuals and communities of lower socioeconomic status (SES). Residents of Pennsylvania's Washington County, a lower a SES suburb on the outskirts of Pittsburgh, is not immune to these variables. These residents have decreased access to necessary healthcare resources making them increasingly vulnerable to higher disease burdens with greater co-morbidities. The economic status of these residents plays a profound determining factor in level of education, career choice, and several social aspects such as dietary needs and physical well-being. At the patient level, these same individuals are plagued by obesity and access to healthcare that arises due to poor dietary habits and limitations in healthcare literacy, respectively. At the community level, a central trait of limited access plagues patients and restricts their access to a wider variety and quality of healthier food options, healthcare providers, healthcare insurance, and access to community programs that promote healthier living. Studies have demonstrated that healthcare systems that work closely with community leaders, religious and non-profit organizations to create programs that address the needs of residents have proven to overcome these barriers and established an environment of adequate care. Furthermore, the creation of multidisciplinary healthcare teams have successfully connected patients with social workers and non-profit organizations that have helped them to attain access to health insurance and providers who have addressed their medical needs, enhanced their healthcare literacy, and promoted preventative care which ultimately reduced ER visits and healthcare costs.

Keywords: Healthcare Access; Obesity; Health System; Community Outreach; Interventions; Socioeconomic Status; Telemedicine

List of abbreviations: BMI: Body Mass Index; DASH: Dietary Approaches to Stop Hypertension; ER: Emergency Room; SEF: Socioeconomic Factors; SES: Socioeconomic Status; WHS: Washington Health System

Introduction

In 2018, Pennsylvania estimated that it had spent \$13.5 billion on obesity-related healthcare costs [1]. Obesity, characterized by a Body Mass Index (BMI) of 30+ in adults age 20 or older, is rapidly becoming a national epidemic with a prevalence of 39.8% among the population, which affects 93.3 million Americans and results in an annual cost of \$147 billion on the U.S. economy [2]. On a statewide level, 28% of Pennsylvania's (PA) adults are obese; in comparison, Washington County has an obesity prevalence of 31% [1,3]. Younger obesity onset has been associated with increased mortality risk and associated co-morbidities including heart disease, Type 2 diabetes, and cancer [4].

Lower income individuals and minorities have higher rates of obesity by as much as 31.4% when compared to Caucasians [5]. Geographically, obesity is 23% more prevalent in rural populations nationwide and in the South with a 26% higher rate of morbidity and mortality when compared to their northern U.S. and urban counterparts [6]. Studies attribute these disparities to behavioral patterns (lower levels of education and socioeconomic status), lack of primary prevention efforts, and reduced access to providers, greater comorbidities, and geographic dispersion [7].

Although the causes of obesity are multifaceted, studies have demonstrated a strong genetic and heritable influence between obesity and BMI, where genetic dysfunction of genes like leptin and ghrelin alters normal homeostatic mechanisms and increases obesity risk [8-10]. Similarly, metabolic activity, insulin sensitivity, muscle mass and physical activity decline with age irrespective of diet, resulting in body fat accumulation [11]. Medical conditions, such as hypothyroidism and Cushing's Syndrome, contribute

to obesity by decreasing metabolism and increasing fat production, respectively [12,13]. Although the exact mechanism is unclear, studies have shown shared mechanistic pathways between obesity and depression illustrating a strong bidirectional link between the two [14]. While medications for diabetes (Sulfonylureas and Metaglitinides), inflammation (Prednisone), epilepsy (Valproic acid and Lamotrigine), and depression (antipsychotics) result in unwanted weight gain as a side effect, heavy alcohol use increases appetite leading to worsening obesity [15-17].

At the community level, socioeconomic determinants are more of a cause for obesity in rural areas stemming from physical inactivity and poor diet [7]. However irrespective of location, healthier food options are more expensive than energy dense foods resulting in higher obesity rates [18]. A recent Centers for Disease Control study showed that a greater proportion of rural residents tend to be in poverty with less leisure time for physical activity due to difficulties making ends meet [19]. Additionally, gym memberships may be too expensive and/or too far away to be a viable option. Since rural areas possess fewer supermarket chains, residents are forced to rely on nontraditional outlets, such as discount stores, which stock a limited supply of healthy food options thereby limiting access to healthy nutrition [20]. Increased life stresses such as multiple jobs to make ends meet, co-morbidities, and drug use can decrease sleep quality (especially since duration and quality have been associated with good health outcomes) and increase sedentary lifestyle, which are risk factors for obesity [21].

Healthcare system-related limitations, such as provider access and healthcare delivery, can play a profound role in controlling obesity. Medicine in rural areas can be stymied by a shortage of specialists with limited clinical hours due to lower reimbursement rates in addition to a more complex patient population that is of a lower socioeconomic status (SES) with multiple comorbidities requiring greater attention and leaving insufficient time for obesity education [22]. This is further exacerbated by insurance providers not covering dietician consultations leaving patients uneducated about proper eating habits and managing their comorbidities, like diabetes [23]. Factors such as poor healthcare literacy, limited provider availability, and high healthcare costs can hinder rural residents from attaining health insurance and result in disease progression requiring increased healthcare expenses. Although healthcare systems provide free and low-cost preventative services, their effectiveness is limited by the geographic dispersion within the rural area [7].

Although worsening obesity is associated with increased mortality and risk for Type 2 diabetes, heart disease, stroke, and psychiatric disorders, these complications are further exacerbated by community-wide SES difficulties and healthcare system-related limitations that may delay care resulting in hospitalizations for progressive disease, including nephropathy, heart failure, limb amputations and even cancer, causing patients to lose income, especially if the family is barely able to make ends meet [24,25].

Lower SES patients, identified by difficulties on a patient, community or healthcare system level, are considered socially vulnerable due to their lower income status and higher disease burdens with comorbidities, requiring a greater need for healthcare services. These individuals are less likely to participate in preventative healthcare services and rarely seek medical attention until their conditions progress to levels requiring emergent intervention [26]. They are more likely to engage in excessive alcohol consumption and drug use and possess greater socioeconomic stressors. Some of these include higher educational drop-out rates resulting in jobs that require lower skills which earn lower pay, less access to resources, more unemployment resulting in greater poverty, greater social difficulties such as single parent households, and worse overall health attributed to lack of medical insurance, inadequate access, poor healthcare literacy, lower quality care, and provider ignorance or bias to their respective needs, when compared to their higher SES counterparts [27,28].

Factors Limiting Healthcare Access

Healthcare access is defined as access to quality healthcare services for promoting and maintaining health, preventing and managing disease, reducing unnecessary disability and premature death with the breadth of services including accessing insurance coverage, access to providers in a timely fashion with few geographic barriers, affordable care, and access to preventative health [29]. Barriers to adequate care, particularly affecting rural residents, include a lack of resources and providers, healthcare illiteracy and insurance coverage, geographic and transportation difficulties, and financial challenges. Recent studies show that 12% of rural nonelderly individuals nationally are uninsured with 26.5% lacking access to a provider due to finances [30]. Because there is a limited supply of providers in such areas who offer low cost or charity care, patients are less likely to seek medical attention until their comorbidities become symptomatic. Washington County, considered the 4th most socioeconomically vulnerable county in PA, ranks 22/67 counties in healthcare outcomes and 54/67 counties in preventable hospital stays with 75/1000 Medicare enrollees compared to 35/1000 nationally (Figure 1) [31,32].

Only 56% of the population seeks preventative services, such as mammograms, compared to 71% nationally. Washington County has a higher rate of healthcare costs per Medicare enrollee of \$11,193 compared to \$9,589 nationally, which could be explained by the higher adult obesity rate (28%), diabetic rate (11.8%), adult smoking rate (15%), excessive drinking rate (21%), number of air pollutants (10.7%) and drinking water violations [33,34]. The county is also plagued by socioeconomic factors (SEF) including residential segregation, income inequality, and low social mobility for minorities [33]. Healthcare access can be geographically challenging with commutes lasting 30+ minutes 40% of the time [32].

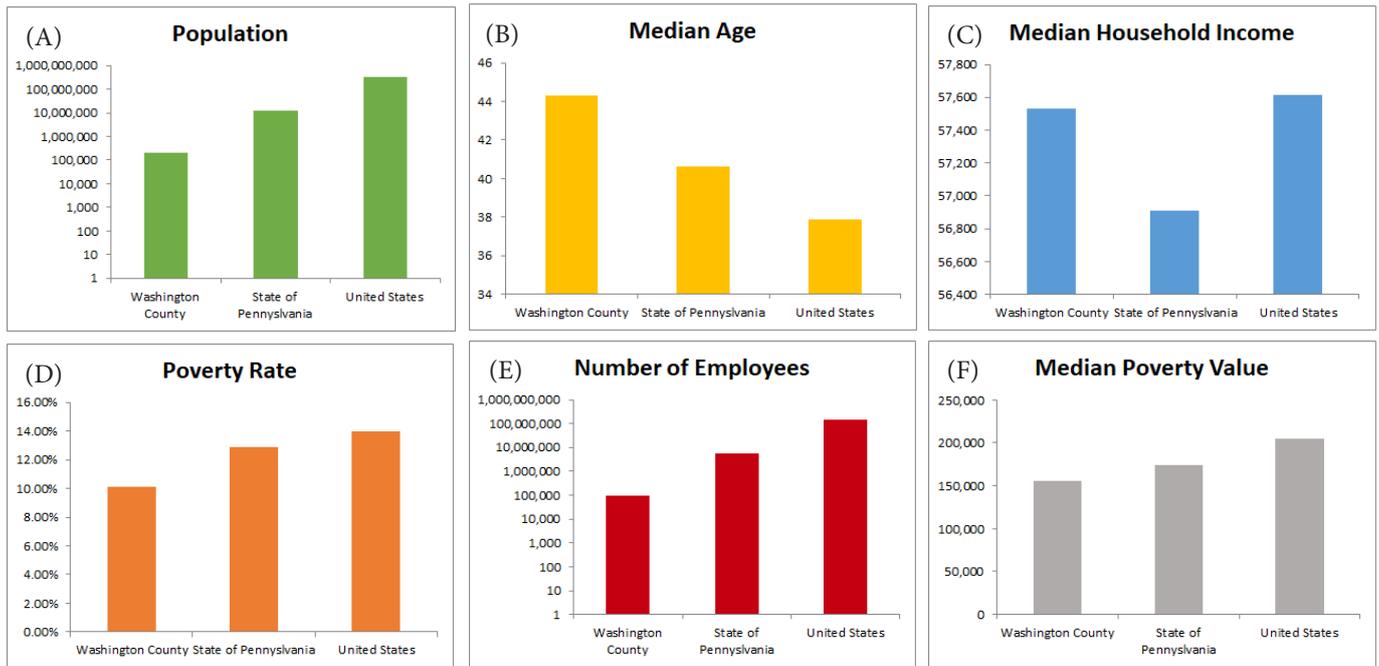


Figure 1: (A) This is a comparison of Population; (B) Median Age; (C) Median Household Income; (D) Poverty Rate; (E) Number of Employees; and (F) Median Poverty Value between Washington County, the State of Pennsylvania, and the United States [34]

At the patient level, individuals with lower SES in rural areas are more likely to have limited access to adequate healthcare. These individuals tend to have poorer healthcare literacy stemming from their limited education, higher incidents of poverty, and more likely to possess low skilled jobs without healthcare coverage (Figure 1) [34].

Due to their low income, they may not be able afford healthcare coverage but may not qualify for Medicaid either. Because they are working long hours, multiple jobs, and/or are caregivers, there may not be enough time for medical appointments, especially if clinics are only open during traditional hours [35]. Due to these social constraints coupled with cultural norms, patients are less likely to see providers for preventative services until their conditions become chronic, emergent and require medical attention.

At the community level, healthcare access can be limited by social, geographical and transportation factors. Because rural communities are small with little anonymity, patients may be hesitant to visit certain providers for substance abuse, mental and sexual health because of privacy concerns [36]. Additionally, rural communities tend to possess fewer specialists, which place an additional burden on patients who need to travel longer distances to be seen by a particular physician. Limited providers with restricted clinical hours coupled with long commutes may require patients to miss work and lose income [37]. The lack of a public transportation option in rural communities can restrict provider and pharmacy access due to injury, age, location, or other complications, especially if private transportation options are limited or very expensive [38].

On a health system-related level, residents of rural areas and those of lower socioeconomic classes possess a limited understanding of the healthcare system and ability to obtain insurance resulting in heavy reliance on public assistance programs or ignorance of their comorbidities until they become intolerable [39]. Language differences can cause patients increased psychological stress and result in miscommunication errors that lead to noncompliance, negative consequences and mistrust toward the healthcare system [40]. Cultural misunderstandings and social biases can worsen existent healthcare disparities, especially those of minorities, leading to limited clinical care, fragmented patient-physician relationships, and more widespread distrust of providers [41].

Poor healthcare literacy, SEF, geographic and transportation limitations, inadequate provider access and medical coverage, language and social biases can all hinder healthcare access. These barriers will result in less healthcare screenings and ineffective preventative care. As a result, preventable conditions like obesity, which affects 39.6% of rural residents compared to 33.4% living in urban areas, will continue to progress and contribute to the development of cardiovascular disease and diabetes, which will result in more costly treatments and place limitations on a patient's daily life [42]. Delayed provider access due to geographic, transportation, or SEF will result in increased ER visits for nonurgent matters [43]. Drug dependent disorders, like alcoholism, smoking, and illicit drugs, without intervention will be allowed to progress and contribute to the development of chronic disease costing Americans more than \$600 billion annually, despite low cost medicines and psychotherapies available [44]. Social stresses can progress to psychiatric conditions, which affect 9.8 million adults annually, and progress to depression, increased drug use, and possibly suicide, if left uncontrolled [45]. Underutilization of healthcare services for initially treatable conditions, like benign masses or skin lesions, will cause delays in diagnosis, treatment, and affect overall prognosis if allowed to progress to cancer and result in longer and more extensive treatments with variable outcomes and greater risk of complications with higher morbidity and mortality rates [46,47].

Obesity in Washington County

Washington County has the 10th highest county obesity rate at 28.3% driven partially by community and health system factors [33]. At the community level, the shortage of grocery stores with limited food options has resulted in little competition and higher prices, where the most affordable foods are the least healthy. The plethora of fast food eateries offers carbohydrate-rich meals at cheap prices catering to the lowest of SES classes and those too busy to cook. Most of the residents work low skilled jobs with some having multiple jobs just to make ends meet, in addition to their caregiver obligations, resulting in little time for wellness or to prepare healthy homecooked meals. The county, with its many hills, broken sidewalks, and lack of bike paths, is unamendable to exercise and the nearest local parks are a 10-minute drive, while the nearest gym is just as far and has expensive membership fees. Because residents have limited wellness education within their school curriculums, only half visit their physicians regularly for preventative care. Due its small size, there are a limited number of preventative educational events to raise awareness about obesity, diabetes, and the high rates of smoking, drinking and drugs within the county. Although the local health system has attempted to address this issue, its effectiveness is limited due to understaffing of providers and dieticians who have insufficient time to counsel patients about the importance of diet and exercise in controlling their comorbidities. Because dietary consultations are not covered by insurance, patients are unable to afford the \$200-600 consultation fee. Although patients are screened for depression, access is limited by the shortage of psychiatrists and therapists within the area. Language barriers and limited health literacy within lower SES populations like Washington increases the risks of miscommunication and noncompliance.

To combat obesity, Washington Health has been proactive about monitoring patients' BMIs and sponsors short term gym scholarships to promote weight loss. Working with the community, Washington Health hosts a small number of talks about wellness, overcoming addiction, nutrition and healthy cooking at the community wellness center. In addition, the community provides free or discounted services for controlling addiction and support groups for patients with chronic conditions like diabetes. Although these are positive interventions, they are limited by the patient's desire to utilize them and attend these interventions. Recognizing the amount of low SES residents within Washington, the community provides a foodbank, but the food provided is mostly nonperishable with variable nutritional content to combat obesity. Due to the limited health education of the residents, their backgrounds and societal norms within the county, patients tend to ignore wellness and their comorbidities until they become symptomatic as they possess little incentive to stay in shape. Wellness lectures are positive interventions, but they only cater to those who attend as most individuals work long hour, multiple jobs, and/or are caregivers with limited free time. Although the community provides transportation assistance to lower SES residents, it does not address the unreliable and limited bus service or lack of alternative transportation options within the area. Community aspects of healthier eateries, cheaper groceries, bicycle paths and well-maintained sidewalks for exercise coupled with the healthcare limitations of staff shortages, limited clinical hours and appointment durations for education, dearth and expense of dieticians, and cultural and language barriers are equally vital aspects of wellness and longevity that have yet to be addressed.

Socioeconomic Limitations within Washington County

Washington County ranks in the top four socioeconomically vulnerable counties in PA with an unemployment rate of 6.2% compared to 3% nationally where only half of the residents utilize preventative services due to limitations with healthcare access [32]. At the community level, there is a shortage of specialists, particularly in neurology, endocrinology, rheumatology and mental health. The rural terrain of Washington coupled with the long travel times, lack of adequate public transportation and limited private options can impair the ability of caregivers, employees with multiple jobs, the chronically sick and the elderly from seeing their providers or even obtaining medications from the limited number of pharmacies in the area. The high unemployment rate and low SES of the county make it difficult to afford routine care or to miss work for appointments when many residents are barely able to make ends meet. With little social support for the 27% single parent households in this county, residents are more prone to miss appointments due to their caregiving obligations [32]. The high income inequality rate of 4.6 within the county compared to 3.7 nationally coupled with the limited health education options within the school curriculum causes lower SES patients to be misinformed about nutrition, wellness, and preventative care resulting in only emergent visits to either their PCP or ER due to convenience of care [32]. Washington Health System has acknowledged these difficulties and has attempted to devise solutions, such as forming a partnership with Freedom Travel Services to offer transportation to low SES patients with a 48 hours reservation. Although the healthcare system is understaffed, it attempts to address patient access needs through social work, patient navigators and residents, but is unable to provide lower cost nutritional counselling or increase access to providers. Although educational talks, social and support groups, and community events are available at the community center, their utility is limited because they are not recorded and only offered at specific times. To address language barriers, the hospital offers a limited translation service.

To address difficulties in healthcare access, WHS has tailored its services to the needs of its patient population by keeping its clinic open for two extra hours on two evenings each week. However, the community and the health system are limited in their ability to help patients who do not attend their appointments despite caregiving or job obligations as few providers do in-house visits. To minimize overutilization of the ER, the hospital has devised a "Call Us First Campaign" which would allow residents and providers to assess the acuteness and severity of the problem, better advise the patient how to manage it if an ER visit would be unnecessary and make a follow-up appointment with a provider in one of Washington's outpatient clinics. WHS can also provide patients with same day appointments to their family medicine clinic and specialists if space permits. Despite the health system attempting to

close the gap on missing services with residents, nurse practitioners, physician assistants, and family medicine physicians, the community and health system are unable to recruit long term providers in neurology, endocrinology, rheumatology or mental health. Recognizing the high prevalence of smoking, alcohol and illicit drug use, the community and WHS provides tobacco, alcohol, and drug cessation resources, counselling and support groups at low or no cost. Although the community provides its residents with a resource guide of child care, counselling, drug and alcohol, dental, therapeutic, and health-related services, they are mostly provided by private organizations that may or may not provide discounts based on SES. The effectiveness of community events, educational lectures, and support groups is limited for those who can find time and a mode of transportation to attend. Washington Health is attempting to improve these outcomes through resident community engagement projects to address various community needs including nutrition and health education and preventative services. Realizing the high unemployment rate and low SES of its patient population, the health system never turns away patients and has devised reduced payment and hospital assistance programs to ensure that every patient receives proper medical care. In conjunction with the community church, Washington Health has created a free biweekly Mission Clinic to address the healthcare needs of the poor and homeless by providing preventative services, screenings, immunizations, medications, patient education and a free meal.

Global Interventions to Rectify the Obesity Epidemic

Since the U.S. spends 10% of the U.S. healthcare dollars on the negative effects of obesity where 60% of American adults are overweight, it is critical to address this epidemic at the patient level starting with education [48]. Upon the initial diagnosis of obesity, studies have shown enhanced benefit and compliance from gradual education through subsequent visits to minimize overwhelming the patient [49]. Although reading materials are typically provided by physicians, they possess limited effectiveness in lower literacy settings and thus should be augmented with pictures to reinforce comprehension and long-term retention [50]. Patients should be educated about the importance of exercise to control weight, suppress appetite, improve mood, cardiopulmonary function, and prevent diabetic complications [51]. Daily exercise, consisting of cardiorespiratory fitness and resistance training, augmented with positive daily life alternations, such as increased stair use, and daily walking have been shown to further enhance outcomes [48]. Studies emphasizing the importance of home cooking to promote better adherence to a healthier diet like the Dietary Approaches to Stop Hypertension (DASH), have shown that participants were 1/3 less likely to have elevated BMIs [52]. Despite caloric, genetic and environmental factors, studies have shown that obesity risk was lowest among patients who consumed 290-310 g/day of carbohydrates derived mostly from fruits and vegetables due to greater weight sustainability [53].

Community interventions to address obesity that have increased the number of residential supermarkets has resulted in lower prices, wider selections, healthier diets and a clinically significant reduction in obesity prevalence [54,55]. Because convenience stores in lower SES areas possess limited healthy food options, studies have suggested that community farmers could rectify this by providing residents with access to fresh fruits, vegetables, and low fat dairy products contributing to improved BMIs [56,57]. Early schoolwide education about healthy eating habits and exercise in children resulted in a 50% reduction in the incidence of being overweight after two years illustrating the impact of early intervention to promote sustained wellness [58]. Because rural residents have felt isolated with little social support or motivation to engage in healthy dietary and exercise habits, church-based community collaboration programs in rural lower SES populations have produced 1.96 kg weight losses and 1.6 BMI decreases over 10 weeks, while leaving participants motivated and spiritually enriched; this showcases the importance of social support to promote positive health habits and weight loss [59].

Healthcare systems should address the obesity epidemic through patient education, proactive support, and approaches to better reach the residents. Although studies from rural low SES communities have shown misconceptions about the difficulty and expense of healthy dietary lifestyles, proactivity by physicians to educate and direct patients to community programs aimed at improving cooking skills have been shown to enhance food literacy, dietary habits, and overall weight loss within several months [60,61]. To circumvent the expense of food and enhance fresh produce access, farmer's market prescription programs have provided low SES residents with free access to fresh produce contributing to healthier lifestyles, weight loss and decreased diabetes risks [62,63].

A systematic review showed that a primary care delivered tailored weight loss program tailored to each patient employing nutrition education, physical activity, interpersonal support and food stamp intervention was most effective in decreasing body weight and BMI over the span of at least 6 months in lower SES populations [64]. A telemedicine weight loss study incorporating interventions from dietitians, exercise physiologists and clinical psychologists performed in a rural low SES obese population showed a clinically significant weight loss of 3.8 kg within a month [65].

Global Interventions to Enhance Healthcare Access

Patient level interventions to improve healthcare that provide written materials to enhance healthcare literacy have resulted in improved comprehension, compliance, and clinical outcomes by 1.5 times with a 30% reduction in ER visits [66,67]. Additional engagement in community health-centered education or healthcare coaching program have helped to remove accessibility, timing or literacy barriers and demonstrated markedly better understanding, compliance, and outcomes [68,69]. Although finances can limit access to healthcare, government sponsored business loans and private investments by corporations in rural areas have stimulated economic growth, decreased unemployment, and increased the ability to afford healthcare insurance especially for lower SES communities [70].

Interventions at the community level that have employed outreach enrollment specialists have contributed to a 35% increase in the number of Medicaid applicants in low SES regions of which $\frac{3}{4}$ successfully enrolled resulting in increased access to care [71]. To improve healthcare access to the large number of single parent homes found in lower SES areas, studies have demonstrated the effectiveness of community organized biweekly nurse visits to single parent homes resulting in improved compliance and preventative care for both the child and first-time mother, while providing society with financial savings and improved healthcare outcomes [72,73]. To circumvent the negative stigma about the use of certain medical services, such as mental health, in smaller communities where most individuals know one another, studies have shown that community-wide policies and programs advocating awareness in conjunction with outreach have promoted greater acceptance of evidence-based treatment in rural America and resulted in improved patient compliance [74]. Provider recruitment challenges to underserved areas are being addressed government financed incentive programs [75]. Studies from third world rural communities showed that community-based road rehabilitation projects utilizing unemployed community workers produced economically efficient employment, quality labor, and improved infrastructure that enhanced access to both local and surrounding healthcare and social services [76,77]. To address the dearth of transportation options in rural areas, rideshare-based medical transportation for Medicaid patients have been shown to increase patient show rates by 14% at primary care offices appointments in patients whose attendance could be hindered for transportation reasons [78].

Interventions by healthcare system that have instituted simplified patient education programs delivered by nurses focusing on a single disease component of symptom recognition have demonstrated significantly improved patient self-care behavior and less frequent ER visits in rural low SES areas [79]. Although language and cultural disparities can greatly impact quality of care, studies have demonstrated that the use of interpreters resulted in reduced ER and increased preventative office visits, greater patient compliance and satisfaction with the culturally competent care [80]. Studies have shown that the creation of multidisciplinary teams to provide cost-effective and comprehensive care can address rural community needs where there exists a limited number of specialists, like mental health, decreased barriers of care and enhanced collaboration between all members leading to better outcomes and increased patient satisfaction [81,82]. To address specialist shortages, a study showing the application of telemedicine to diabetic management in rural low SES settings has significantly improved healthcare literacy, dieting, exercise, and glucose monitoring compliance, while reducing patient anxiety and confusion [83].

Interventions as Applicable to Washington County

In many cases, overutilization of the ER for non-emergent complaints indicates an insufficient understanding of health conditions. An ideal patient-oriented intervention would incorporate textual information supplemented with visual cues to reinforce understanding of disease causes, pathogenesis, symptoms, medication compliance and recognition of emergent exacerbations. This approach could empower patients with lower healthcare literacy to better manage their conditions and ultimately resulted in fewer ER visits. Potential challenges that could arise include mental health comorbidities that prevent patients from having an adequate comprehension of their clinical state or a lack of motivation to alter their way of life to better control symptoms. Studies have recommended that medical staff educate their patients about the importance of home cooking to promote better diet adherence and BMI control [60,61].

Because residents living in lower SES communities may lack adequate understanding of calories, metabolism, portion sizes, and the clinical significance of BMIs, patient education would need to be included to reinforce the rationale of home cooking. Engaging in healthier dieting habits, such as portion control, decreased intake of carbohydrate-rich meals, and increased consumption of fruits and vegetables would promote better BMI control and lessen the risk of additional or progressively worsening comorbidities. Lifestyle changes, however, are only effective if patients are inherently motivated to adhere to them. An inability or lack of desire to cook would limit the maximum benefits from this suggestion.

Community interventions can provide lower SES residents with healthier food options, such as fruits and vegetables that are typically scarce within their communities and would especially be helpful in patients who lack reliable access to the supermarket. Although this intervention would increase access, it would need to be supplemented with education to ensure that residents can fully understand and appreciate the important role that these foods possess in their daily diets to promote long term compliance. The initial creation of a farmer's market is not without its challenges and would require forming sustainable collaborations with local farms, finding space to hold the event, and adequate promotion to ensure a sufficient turnout. Even if a farmer's market is created, the positive effects of this intervention would be limited if residents are unable to reach it due to limited physical mobility, travel distance, work, caregiver obligations and/or affordable produce (which could be rectified through healthcare system prescribed produce). Communities who embrace religion and possess a strong faith etiology, church-based community weight loss programs can be utilized to help residents to attain better control over their BMIs, while empowering them with spiritual enrichment to promote compliance.⁵⁹ Although the effects of such programs may be limiting in those with ambulatory difficulties, this activity can provide social and spiritual support, while tailoring exercises to the abilities of its clientele. However, success will further be determined by compliance, finances, and the ability of residents to attend classes.

Healthcare system interventions are most effective when there is coordination within the community and implementation of resource events like live cooking classes taught by hospital staff that could educate residents about healthy food preparation, while

dispelling falsehoods about its difficulty. To enhance accessibility, each session would be taped with easy community access for at-home viewership. The effectiveness of such a program is limited by community participation, residential computer literacy and internet access to ensure long term compliance. Although volunteer participation may become a concern over time due to job and extracurricular obligations, quality could still be maintained if how-to videos could be created from the volunteers' homes and saved for future use. Since low SES residents experience financial difficulties that may pre-determine their dietary habits, studies have shown the benefits of hospital systems partnering with local farms to prescribe fresh produce at low to no cost to promote healthier diets. Starting such a program would initially be challenging because WHS would need to convince local farmers to participate and insurance companies to fund this effort by demonstrating patient need, compliance, and overall better disease control. However, program approval does not guarantee patient engagement and thus additional education efforts would need to be employed to reinforce positive dietary habits. Program success may be limited if produce is not delivered to an easily accessible pick-up location or demonstrates modest outcomes because of limited insurance participation.

Healthcare illiteracy in lower SES populations increases ER overutilization and impairs healthcare access. Although providing patients with literary materials has been shown to enhance understanding and serves to empower them to better manage their comorbidities, this strategy is limited in patients who possess a mental health disorder, do not speak or understand English, and are noncompliant or illiterate. Thus, it would be best to supplement learning with community health-centered education programs or through healthcare coaches, who can overcome language and cultural barriers, illiteracy, and promote greater personalized understanding of one's condition. Although starting such a patient-oriented intervention may be difficult initially due to the high start-up costs of finding counsellors, securing meeting spaces, and requiring large charitable contributions and outside grants, studies have shown that such interventions serve to increase patient engagement long-term due to the higher potential for seeing quicker self-improvement results after just a few sessions [84].

To address travel concerns in the county, community organized nursing visits could be used to improve compliance and increase access to preventative services for patients with restricted access to their provider and contribute to reduced overall ER visits. Starting such a program would initially be difficult due to challenges in nurse recruitment and obtaining the necessary capital to fund such an initiative as it is unknown whether insurance companies would support such an endeavor. However long-term dependence on grants and philanthropy to keep such programs running long-term is unsustainable as well. Additionally, poor patient-nurse relationships as well as limited staffing will limit its effectiveness. WHS can help to improve preventative care compliance by forming collaborations with ride-share services, like Uber and Lyft, which are gradually increasing their presence within this area. Although Washington County has the infrastructure to support this endeavor initially, it would need to invest in road rehabilitation projects to decrease congestion long-term. Investing in its residents would have increased positive benefits for the community including decreased unemployment; improve SES and access to healthcare. Although such a program would provide patients with limited access to reliable transportation to reach their medical appointments, its success depends on the sustained program investment by insurance providers, service reliability, and patient liability concerns if they experience acute distress during a ride. Ultimately, ride-share services would enhance access to clinical providers, reduce access anxiety, and hopefully result in overall fewer ER visits.

Healthcare systems with few specialty providers in rural communities can improve access by forming multidisciplinary healthcare teams that can address a patient's multiple comorbidities in fewer visits. Because many lower SES residents possess little time to attend office visits due to transportation limitations, work or caregiver obligations, such an intervention would improve compliance, streamline care coordination by providing comprehensive care, and be financially beneficial to the patient, insurance, and healthcare system. However, such an intervention would be limited by the patient's access to health insurance and a poor patient-specialist relationship, especially if only one provider is available in that specialty. Low quality of care within the practice of the several specialists can affect patient compliance and limit the success of this intervention. To circumvent this, healthcare systems can employ telemedicine to provide missing services to its patient population resulting in improved access to care, reduced anxiety and waiting periods. Telemedicine could improve quality outcomes, but may be limited by its reliability, physician quality, and patients' faith in the technology. Nonetheless it can improve access and provide quality care to patients plagued by transportation access, work or household responsibilities, who may otherwise be unable to receive it. Implementation of this technology will initially be limited by insurance reimbursement and patient skepticism but should subside with continued use and positive results.

Conclusion

Healthcare equity is defined as equal opportunity for good health and healthcare access, independent of social vulnerability or social determinants within a healthcare system. However, the quality of and ability to manage social vulnerabilities, which are preconceived notions of social determinants set by society beyond the patient's control based on their location, religion, occupation, gender, race, education, SES, sexuality and stigma, vary affecting equal access to healthcare and ultimately resulting in healthcare inequity. Although healthcare systems recognize these factors and devise solutions, inherent deficiencies can also contribute to and even exacerbate the problem due to factors that they are unable to control. For instance, low SES rural communities are plagued by shortages of specialists for which healthcare systems have limited ability to intervene resulting in reduced patient equity to care irrespective of their social or insurance status. Healthcare systems have attempted to rectify this through government loan repayment programs, creation of healthcare teams, and investments in telemedicine. Healthcare systems, especially those in lower

SES settings, have recognized social determinants of health and established partnerships with the local community, government, non-profits and local organizations to rectify them. Leaning heavily on social workers, healthcare systems have attempted to facilitate methods of signing up for healthcare coverage and creating viable payment plans to minimize disparities and ensure good access. In addition, they have invested in community education to enhance literacy, wellness, and access to healthy food options through programs to prescribe produce. Community-healthcare partners have attempted to tackle problems of infrastructure, transportation, and access to healthier food options with the goal of minimizing inequity based on the impact of social factors and societal determinants.

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