2021-06-18

Social Determinants of Health Screening and Preventive Care: A Survey to Assist in Linking Patients to Community Resources in Payson, Utah

Gabriel Ghanadan

Honors Thesis

Social Determinants of Health Screening and Preventive Care: A Survey to Assist in Linking Patients to Community Resources in Payson, Utah

Gabriel Ghanadan

Submitted to Brigham Young University in partial fulfillment of graduation requirements for University Honors

Department of Public Health

June 2021

Abstract

A survey was conducted to screen for social factors that may negatively affect the health of patients being seen by physicians at the Revere Health Family Medicine Clinic in Payson, Utah. Patients who expressed the need for local community services and resources were referred to these services by researchers via phone after physicians were consulted. Out of 690 individuals who visited the clinic between November 11 to December 2, 2019, the survey was administered to and filled out completely by 169 patients. Demographic information on participants was not collected to reduce response time and encourage participation. One hundred and twelve patients were found to have at least one social factor that could negatively affect their health. The social factors with the greatest prevalence were related to financial problems such as difficulty paying bills (41.4%) or purchasing food (17.2%), and having an unstable source of income (14.2%). Patients who identified as having these needs, especially those with issues buying food, were at a significantly higher risk of experiencing at least one other social issue (OR=19.2). The largest barrier in this study was the lack of full facility participation in survey administration due to the limited time of the clinic staff. This can be addressed in future research by integrating the paper screening tool into existing electronic systems.

Acknowledgments

I am grateful for the mentoring and support of Dr. Robert Clark, MD, MPH and for the participation of the staff, physicians, and medical assistants at the Revere Health Family Practice Clinic in Payson, UT. I also acknowledge the community organizations for graciously accepting and helping the patients we referred to them.

I would also like to express my appreciation for the members of this thesis defense committee, namely, Dr. Len Novilla, MD, MPH (mentor), Dr. Jeff Glenn, DrPH, MPA, and Dr. Lori Spruance, PhD, M.Ed. My heartfelt thanks to them, the BYU Public Health Department, the BYU Honors Department, and my student peers who helped make my accomplishments possible.

Table of Contents

Introduction……. 11
Methods……... 15
Results……. 20
Discussion……... 22
Conclusion……...25
References……... 26
Appendix……. 34

List of Tables and Figures

Table 1: Abbreviated List of Survey Domains……16
Table 2: List and Descriptions of Community Resources……...17
Table 3: Frequency of Each Social Need…… 21

Figure 1: Patients With At Least One Social Issue……. 20
Figure 2: Frequency of Each Social Needs Score Among Sample…. 20

Introduction

The social determinants of health (SDH) are economic, environmental, and social conditions that influence individual and community health. They are defined by the Centers for Disease Control and Prevention (CDC) as the "conditions in the places where people live, learn, work, and play that affect a wide range of health and quality-of-life-risks and outcomes" (CDC, 2021). These conditions put individuals at higher risk for developing health issues. For example, people living below the poverty line may have limited access to healthy foods, and their eating habits could increase their risk for developing obesity-related illnesses (Ferreira & Magalhães, 2019; Levine, 2011; Sheehan, Cantu, Powers, Margerison-Zilko, & Cubbin, 2017). Individuals who are unemployed are less likely to have insurance or attend regular medical check-ups, increasing the chances that they miss important health screenings and develop serious health conditions such as cancer (Ampofo, Adumatta, Owusu, & Awuviry-Newton, 2020; Charkhchi, Kolenic, & Carlos, 2017; Hollederer, 2019; Woolhandler & Himmelstein, 2020). People with limited levels of education, such as those who do not finish high school, may not have had proper amounts of sexual education, putting them at a higher risk for contracting human immunodeficiency virus (HIV) and other sexually transmitted infections (Borawski et al., 2015; Kirby, Laris, & Rolleri, 2007; Lloyd et al., 2012). Individuals living in poor housing conditions, such as having dampness or poor ventilation, are at a higher risk for contracting diseases such as streptococcal infection, acute rheumatic fever, and rheumatic heart disease (Coffey, Ralph, & Krause, 2018; Falck, Kjellander, & Schwan, 1998; Perry, Siegel, Rammelkamp, Wannamaker, & Marple, 1957).

SDH-related disease pathways can be facilitated by a number of factors, the most common of which being increased toxin exposure, behavior changes, and chronic stress (Braveman & Gottlieb, 2014; Miller et al., 2009). Many of these mechanisms rely on living conditions and choices which are correlated with the SDH, as found by existing studies. For instance, homes located in low-income communities are more likely to use lead pipes, and families living in these homes have been found to have increased levels of lead ingestion (Lanphear et al., 2001; Lidsky & Schneider, 2003). Low-income communities are also located within closer proximities to power plants and hazardous construction zones, increasing exposure to allergens and pollutants which exasperate asthma (Brown, 1995; Lanphear et al., 2001). Lower levels of education can be a barrier to healthy behaviors; poor health choices such as smoking, heavy alcohol consumption, physical inactivity, and obesity have been negatively correlated with number of years of education (Cutler & Lleras-Muney, 2010; Margolis, 2013). These poor health choices have been identified as risk factors for more serious conditions, increasing the prevalence of chronic diseases among individuals who do not graduate from high school (Assari, Chalian, & Bazargan, 2020; Rogers, Hummer, & Nam, 1999).

Stress exposure is a crucial facilitator to disease and is largely present in individuals with social needs (Garner & Shonkoff, 2012; Spruce, 2019). One meta-analysis found that children from low-socioeconomic backgrounds with parents who have low levels of education have higher-than-average hair cortisol concentration, which is an indicator for

chronic stress (Gray et al., 2018). High levels of cortisol may negatively impact the hypothalamic-pituitary-adrenal (HPA) axis, which helps to regulate many bodily processes such as digestion, immune response, emotion, sexuality, and energy expenditure (Clark & Mach, 2016; Juruena, Eror, Cleare, & Young, 2020; Speer, Semple, Naumovski, D'Cunha, & McKune, 2019). Cortisol has a negative feedback effect on the hypothalamus and anterior pituitary glands, meaning excess cortisol limits the secretion of hormones which are necessary to maintain bodily function. For this reason, chronic stress exposure can facilitate the development of more serious health conditions such as cardiovascular disease, liver disease, kidney disease, lung disease, chronic obstructive pulmonary disease, hypertension, neurodegeneration, and many different cancers (Boyer-Diaz et al., 2020; Iob & Steptoe, 2019; Liguori et al., 2018; Udeh-Momoh et al., 2019; van der Vliet, Janssen-Heininger, & Anathy, 2018). Individuals with high concentrations of cortisol are also at a higher risk for contracting infectious diseases as immune system function becomes impaired (Cohen et al., 2012; Lopez-Acevo et al., 2021; Pinto, Arredondo, Bono, Gaggero, & Díaz, 2006). The knowledge of correlation between SDH, stress, and disease is reason for health clinics to prioritize the adoption of preventive care strategies. To simultaneously survey patients for chronic stress, poor health behaviors, and toxin exposure, SDH screening tools can be used (Chung et al 2016; Braveman & Gottlieb, 2014; Francis, DePriest, Wilson, & Gross, 2018).

Individuals from similar populations or living within a specific area often experience the same SDH (Braveman & Gottlieb, 2014; Martinson, 2012; Moore et al., 2019). This study sought to identify the SDH that are prevalent in Payson, UT, a small town at the southern end of the Provo-Orem Metropolitan Area in Utah County. According to U.S. Census data, there are many similarities between Payson and the greater United States population, making it an ideal case study for understanding the community-wide prevalence of SDH. As SDH consider the conditions in which individuals live, learn, work, and play, it is important to compare these areas against different locations. With a population of 18,294, Payson is defined by the U.S. Census Bureau as an “urban cluster.” Approximately 70% of the United States population lives in urban clusters (US Census Bureau, 2021). The median household income ($67,272) and median house value ($231,000) in Payson are also similar to those of the United States ($62,843 and $217,500, respectively) (U.S. Census Bureau, 2019). In reference to education, Payson has a similar population per capita of high school graduates (90%) and college graduates (23%) as compared with the United States (88% and 32%, respectively) (U.S. Census Bureau, 2019). Payson is less ethnically diverse, however, with 86.8% of its population identifying as non-Hispanic white compared to 76.2% of the national population (Payson City, 2020).

A community health needs assessment (CHNA) conducted by Intermountain Healthcare (IHC) in 2019 identified mental health disorders, diabetes, and hypertension as three of the priority health concerns within Utah County (Moore et al., 2019). This is largely unchanged from the 2016 CHNA conducted by the same organization which highlighted prediabetes, high blood pressure, depression, and prescription opioid drug abuse as the priority health concerns (Miner, Moore, & Boshard, 2016). Although the priorities remain similar, comparison of both CHNAs revealed improvement in each area of

concern. Between the two assessments, IHC worked to create partnerships with community resources such as senior centers, safety net clinics, mental health and substance abuse authorities, and case management programs (Moore & Foust, 2020). IHC referred patients to these resources after screening for SDH. Because IHC and Revere Health serve the same communities in Utah, similar health improvements could be observed among the Revere Health patient population if patients were screened for SDH and referred to community resources (R. Clark, personal communication, October 1, 2019).

Multiple studies have found that the conditions identified by the 2019 CHNA (mental health disorders, diabetes, and hypertension) are tied to social needs concerning income and education (Crews et al., 2015; Gaskin et al., 2014; Utah Department of Health, 2020; Vitolo, da Costa Louzada, Maria Laura, Rauber, & Campagnolo, 2013). Statewide research from Utah in 2019 found that incidence of depression is higher in adults who have an annual income around $25,000 compared to those who have an annual income around $75,000. (Utah Department of Health, 2020). The same research found that individuals without a college education were also more likely to experience symptoms of depression and anxiety. A meta-analysis conducted by Johns Hopkins University found incidence of diabetes to be significantly associated to income level as well. Researchers concluded that poorer households had less access to healthy food and quality education, increasing their risk for developing health conditions such as diabetes (Gaskin et al., 2014). Similarly, individuals in low-income communities appear to be at a higher risk for hypertension because of limited access to high-quality foods. One study conducted in an urban center outside Baltimore, Maryland found low-income families to have higher levels of sodium in their diets, which has been known to increase blood pressure and risk for developing chronic kidney disease (Crews et al., 2015).

After identifying which health concerns are most prevalent on a community-level, SDH screening tools can be used to determine which individual patients would benefit from a referral to outside resources, as done in an intervention by IHC (Moore & Foust, 2020). SDH screening tools that have proven to be most effective cover five essential domains: housing stability, food insecurities, transportation difficulties, utility assistance needs, and interpersonal safety (Billioux, Verlander, Anthony, & Alley, 2017; Page-Reeves et al., 2016; Ridgeway et al., 2013). These tools must first be tested for validity to ensure they capture correct information about the population they are targeting. When provided by primary care clinics, validated screening tools can identify which social needs patients face and inform physicians of which health conditions can be prevented or are at risk of becoming severe. For this reason, health clinics across the United States are beginning to implement SDH screening tools into their medical practice (Chung et al., 2016; Herrera, Brochier, Pellicer, Garg, & Drainoni, 2019; O'Brien, 2019).

In the context of preventive care, it is theorized that screening tools can save physicians time by reducing the number of questions that must be asked in medical appointments and providing information on the social needs and health risks which patients face (O'Gurek & Henke, 2018). Multiple organizations recommend implementing screening tools to assist in preventive care techniques and health risk diagnosis (Alley, Asomugha,

Conway, & Sanghavi, 2016; Committee on the Recommended Social and Behavioral Domains and Measures for Electronic Health Records, Board on Population Health and Public Health Practice, & Institute of Medicine, 2014; Council on Community Pediatrics & American Academy of Pediatrics, 2016). However, screening tools that are not implemented correctly can contribute to physician burnout as medical professionals can view it as another task which requires time and effort (Bryan et al., 2014; Garg, Boynton-Jarrett, & Dworkin, 2016). For this reason, the American Academy of Family Practitioners (AAFP) recommends that physicians not take upon the responsibility of screening patients themselves, but instead implement it within an electronic health records (EHR) system (O'Gurek & Henke, 2018). Doing so, as the AAFP points out, can actually ease physician burnout and save them time in medical appointments.

With risk of burnout, it is no surprise that physicians also seem to be apprehensive to screening patients for SDH. A 2011 survey conducted by the Robert Wood Johnson Foundation reported that, while about 85% of surveyed physicians believe that social needs must be addressed in primary care settings, 80% are not confident in their ability to do so (Fenton, 2011). More recent surveys seem to suggest that this confidence is improving with a 2019 study finding that 60% of physicians were comfortable addressing patient social needs social needs (Schickedanz, Hamity, Rogers, Sharp, & Jackson, 2019). Organizations aforementioned, such as the AAFP and IHC, suggest physicians help to bridge the gap between primary care and public health by referring patients to community resources rather than addressing the social needs themselves (Moore & Foust, 2020; O'Gurek & Henke, 2018). In other words, it may be easier for physicians to place confidence in the efficacy of community resources rather than their own ability to help patients with social needs. Historically, there are multiple successful collaborations between primary care and public health organizations. Some of these collaborations have included immunizations and emergency preparedness, the legislative passage for the Health Center Program in 1964, and the Alma Alta primary mission of primary care physicians and organizations (DeVoe et al., 2016, Pratt et al., 2018).

Despite the lack of physician confidence, numerous studies show that efforts to screen patients for SDH can be feasible. Since 2011, at least 80% of office-based physicians have integrated a certified EHR system into their clinics (Jamoom & Yang, 2016). Because of the widespread use of EHR systems, the feasibility of integrating SDH screening has increased. In a 2016 study, researchers pointed out that clinics more effectively gather, track, and use SDH data when it is recorded through EHR systems than via other methods (Hughes, Phillips, DeVoe, & Bazemore, 2016). Across multiple studies, clinics that screened for SDH in their patients consistently found that at least 50% of their patients had at least one social concern in need of addressing (Page-Reeves et al., 2016; Tong et al., 2018; Hughes, Phillips, DeVoe, & Bazemore, 2016).

Properly addressing SDH before patients develop health problems has been found to save patients and providers more money in downstream medical services every year as serious conditions are increasingly prevented (Beaton, 2017; Costello, 2021; Enard & Ganelin, 2013; Peeler, 2019). Patients save money in medical costs when adverse health conditions are recognized earlier. For instance, if a patient is identified early on as high-

risk for developing diabetes, he will save money by changing his eating and exercise habits as opposed to paying for treatment costs and hospital expenses. With the passing of the Affordable Care Act, financial incentives have become available for medical providers which provide preventive care and apply more holistic measures of care for their patients (Chait & Glied, 2018). These incentives are in place to allow healthcare providers and insurance agencies to save billions of dollars every year and are a major reason why SDH screening tools are beginning to see widespread use (Cohen, Neumann, & Weinstein, 2008).

According to Dr. Rob Clark M.D., head physician for the Revere Health Family Medicine Clinic in Payson, Utah, the provider network does not currently screen patients for SDH in its primary care clinics (R. Clark, personal communication, October 1, 2019). In a later interview, Dr. Clark also said that his respective clinic has no system in place to identify patient social needs and that they are discussed in very few patient visits (R. Clark, personal communication, February 23, 2021). The lack of screening for and subsequent failure to address underlying SDH severely limits prospective methods of prevention of the root causes related to individual health problems. This SDH screening study attempted to bridge the gap between primary care and public health by identifying the social needs of family practice patients and referring them to community health services more equipped to address social needs. It is anticipated that with these referrals, health clinics such as Revere Health would better utilize limited resources and community health services would help patients decrease problematic health exposures, improve behaviors, and better manage stress levels. This would lead to an increased ability for Revere Health to see and treat medical conditions as well as more opportunities for community health services to address the SDH that may lead to poor health outcomes. As a preventive healthcare intervention, the Revere Health clinic in Payson can better prioritize the health of their patients by addressing the impacts of SDH through social needs screenings and referrals to community resources.

Methods

The existing SDH screening tool published by the AAFP was used to identify social needs. This survey covers the five essential domains of housing stability, food insecurities, transportation difficulties, utility assistance needs, and interpersonal safety. Although other surveys exist to screen patients for social needs, the AAFP survey is one of only three open-access SDH screening tools that have been validated for use within the general public (O'Gurek & Henke, 2018). The other two were created by the National Association of Community Health Centers, which asks for more detailed personal information, and the Centers for Medicare and Medicaid Services, which was designed to be home-administered (AAFP, 2018). Out of these three options, the AAFP screening tool was chosen because it was designed to be administered in a primary care setting and did not ask any detailed personal information. The survey was limited to 15 short questions which would be easier for patients to answer. The staff at Revere Health Payson was also already familiar with the AAFP screening tool, so implementation was more feasible. The wording of one question (#7) was slightly adjusted to avoid using a double-negative statement. The domains covered by the survey are shown in Table 1.

Table 1: Abbreviated List of Survey Domains		
#	**Variable**	**Question**
1	Housing Worries	In the past twelve months, have you worried about not having stable housing?
2	Housing Issues	Do you have any health issues in your home (bugs, mold, etc.)?
3	Food Insecurity	In the past twelve months, have you been unable to afford food when needed?
4	Transportation Issues	Do you neglect going to the doctor because of transportation?
5	Utility Shutoff	In the past twelve months, have utilities been shut off to your home?
6	Child Care Issues	Do problems getting child care make it difficult for you to work?
7	Lack of Employment	Does your household struggle to provide a stable income?
8	High School Education	Does nobody in your household have a high school education?
9	Financial Difficulty	In the past twelve months, have you struggled to pay bills?
10	Physical Abuse	How often does anybody physically hurt you?
11	Verbal Abuse	How often does anybody insult or talk down to you?
12	Threatened	How often does anybody threaten you with harm?
13	Screamed At	How often does anybody scream or curse at you?

Screening tools were administered during a 14-day period from November 11 to December 2, 2019 (excluding holidays and weekends). Medical assistants at the Payson clinic printed paper copies of the screening tool and handed them to patients after they checked in to their appointments. Only patients over the age of 18 were invited to participate, as the AAFP screening tool has only been validated for this population. Patients who agreed to participate acknowledged that their survey responses would be reviewed by BYU researchers and forwarded to their physician if they were considered at risk for developing SDH-related health concerns. Upon agreement, participants were asked to fill out the screening tool and leave their phone number if they wished to be contacted with information on public health resources. Completed screening tools were then collected by medical assistants and reviewed by the research team. Patients who indicated social needs and expressed interest in learning more about community resources were contacted by researchers via phone.

All responses were entered into a spreadsheet and each patient was given a unique identifier. Data was analyzed using SAS software. The possible responses to each question were given a value of either 0 = not a need, 1 = a possible need, or 2 = an identified need. Patients were scored for severity of social conditions using three methods. The first was by totaling their number of possible and identified social needs, with the maximum possible being 13, called the “Social Needs Score”. Second, each patient was given a score which ranged from 0-10, with the severity of social condition increasing with number. This was termed the “SDH Severity Score”. Third, patients’

"Safety Scores" were calculated using the AAFP formula which considers the final four survey questions about abuse in the home. Safety scores range from 4-20 with the severity of safety concern increasing with number. As a general rule, patients who identified as having more social needs received higher scores. Odds ratios between the prevalence of having an individual social need and the prevalence of having more than one social need were calculated to see which SDH were predictive of a patient experiencing others as well.

Additionally, a list of community public health resources was prepared to address the needs assessed in the screening tool. Resources were identified using the United Way of Utah County 2-1-1 website, a service that connects those in need in the community with a wide range of social resources. A list of these resources can be found in Table 2. Resources were selected to cover the thirteen domains asked by the screening tool. Selection was narrowed down based on the scale, funding, and location of the resource. Larger, better funded resources were prioritized over smaller ones as they were more likely to handle a diverse range of referrals. Researchers contacted the offices of each resource to confirm they were well-equipped to do so. Only resources within a 25-mile radius from Payson (about a 25-minute drive away) were selected to ensure patients would be able to visit in-person if desired. Patients were contacted by research assistants via phone with a referral to one or more of these resources if they identified as having a social need and indicated that they wanted help addressing it. Phone calls were made within a week of survey completion. Another week after, a follow-up phone call was made to ask if patients utilized the information provided.

Table 2: List and Descriptions of Community Resources

Social Determinant	Community Resource
Finances, Housing, Utilities	*Community Action Services and Food Bank- Provo* A non-profit organization that provides emergency assistance and long-term support to help families in become self-reliant. Services include motel vouchers, financial counseling, rental deposit assistance, and utility service payment assistance. 815 South Freedom Boulevard (200 W) Provo, UT
	Agape Community Center Provides food, clothing, and utility service payment assistance 765 East 100 N Payson, UT 84651
	Mountainlands HEAT Program Provides winter home heating assistance (Nov 1 – Apr 30) and year-round energy crisis intervention for eligible low-income households throughout Utah until funds are exhausted. Also provides utility payment Assistance 586 E 800 N Orem, UT 84097
Food	*Agape Community Center*

	Food pantries and thrift shops 765 East 100 N Payson, UT 84651 (801) 658-5158
	Pioneer Community - Diaper and Formula Pantry Provides free diapers and formula to families in need (385) 258-3140
	Tabitha's Way A non-profit organization that provides food, diapers, school supplies, and personal hygiene items to those in need in the community 45 E 100 N Spanish Fork, UT 84660 (801) 709-8573
	Utah County Health Department - Payson Provides a nutrition program for low-income women who are pregnant or postpartum and for children up to age five. Also provides Women, Infants, and Children (WIC) services which assist in paying for healthy food 285 N 1250 E 3rd Floor Payson, UT 84651 (801) 851-7351
Childcare	*Boys and Girls Club of America* Offers after-school programs at Mount Nebo Junior High School for children from low-income families or with working parents 851 W 450 S Payson, UT 84651 (801) 465-6040
Employment	*Department of Workforce Services - Spanish Fork Center* Provides employment and support services to help individuals improve their economic opportunities, including comprehensive job assistance programs, veteran employment programs, Workforce Innovation and Opportunity Act (WIOA) programs, work clothing, work-related fee payment assistance, and work tools/equipment 1185 N Canyon Creek Parkway Spanish Fork, UT 84660 (866) 435-7414
	LDS Employment Resource Services- Springville Provides career development assistance, comprehensive job assistance, education related fee payment assistance, job finding assistance, and return to education support 1672 W 700 S Springville, UT 84663 (801) 491-7379
Safety	*Center for Women and Children in Crisis - Provo*

	Provides services to victims and survivors of domestic violence and sexual assault. Services include child counseling, sexual assault spouse / intimate partner abuse counseling, crime victim support, domestic violence hotlines, domestic violence shelters, and in-person crisis intervention (801) 374-9351
	Family Support and Treatment Center Provides therapeutic treatment and prevention programs for children, adults, and families whose lives have been affected by abuse or neglect. Services include child abuse counseling, children's out-of-home respite care, crisis nurseries / child care, general counseling, parenting skills classes, play therapy, sexual assault prevention, and social skills training Joy A O'Banion Building; 1255 N 1200 W, Orem, UT 84057 (801) 229-1181
	Payson City Attorney Serves families and individuals by prosecuting criminal cases and providing a crime victim support program 439 W Utah Ave Payson, UT 84651
Transportation	*Community Action Services and Food Bank - Provo* Provides gasoline ($20/12-month period) or UTA tokens (max of 4 at each visit), both for verifiable employment purposes or emergency medical appointments (801) 373-8200

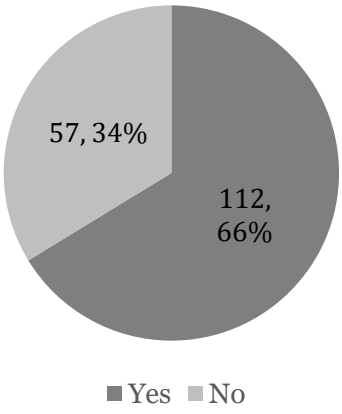
Qualitative analysis was conducted to understand the barriers and feasibility to implementation of an SDH screening tool. Patients' general understanding of the SDH was assessed in phone conversations. Notes from these conversations were written down and then reviewed together for analysis. Researchers also interviewed physicians before and after implementation to assess their understanding of the SDH and what they have done in patient visits to address them. During survey implementation, feasibility and barriers were discussed with physicians and staff on a twice-weekly basis. A follow-up survey was sent to physicians one year after implementation concluded to assess behavior change and change in understanding.

IRB approval was not obtained prior to the implementation of this survey due to time limitations.

Results

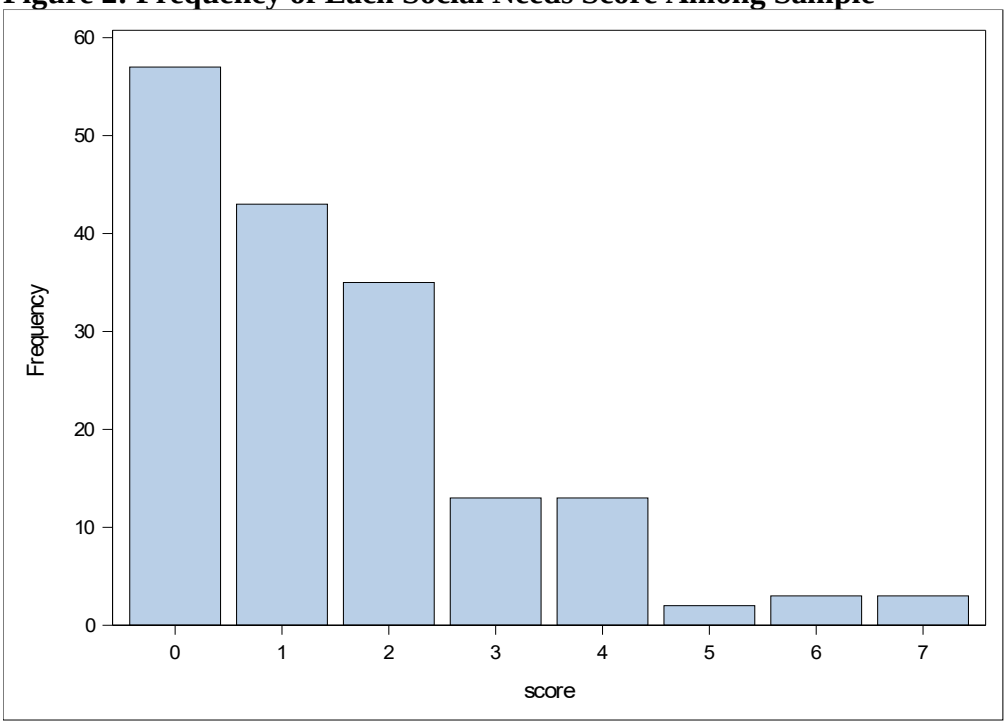
As reported by the clinic, 690 patients were seen over the 14-day administration period; 169 of which received and completed the screening tool. Of those 169 patients that filled out the SDH screening tool, 112 (66.3%) indicated that they had at least one social issue (Figure 1).

Figure 1: Patients With At Least One Social Issue (n = 169)



The number of social needs patients faced varied greatly and no patient identified as having more than 7. The breakdown of this statistic (the social needs score) can be found in Figure 2. The mean SDH severity score for patients was 0.84, indicating that patients did not suffer serious SDH needs on average. However, 6.5% of the patients scored above 3.0 for this score, suggesting that moderate social issues were present among the population. The mean safety score was 4.5, with 1.4% of patients scoring over the AAFP action limit of 10, suggesting that there may be concerning levels of abuse occurring within the Payson population.

Figure 2: Frequency of Each Social Needs Score Among Sample



In addition to revealing how many patients had social needs, results also showed what specific needs were most common among patients. The screening tool included categories regarding housing, food, transportation, utilities, child care, employment, education, finances, and safety. The most prevalent social determinants that people

expressed were housing issues (mold, insects, lead paint, inadequate heat, problems with utilities, not working smoke detectors, or leaks), lack of healthy food, employment concerns, financial issues, and safety concerns (Table 3).

Table 3: Frequency of Each Social Need (n = 169)

#	Variable	Question	Frequency	Prevalence (%)
1	Housing Worries	In the past twelve months, have you worried about not having stable housing?	7	4.14
2	Housing Issues	Do you have any health issues in your home (bugs, mold, etc.)?	25	14.79
3	Food Insecurity	In the past twelve months, have you been unable to afford food when needed?	29	17.16
4	Transportation Issues	Do you neglect going to the doctor because of transportation?	4	2.37
5	Utility Shutoff	In the past twelve months, have utilities been shut off to your home?	11	6.51
6	Child Care Issues	Do problems getting child care make it difficult for you to work?	8	4.73
7	Lack of Employment	Does your household struggle to provide a stable income?	24	14.20
8	High School Education	Does nobody in your household have a high school education?	13	7.69
9	Financial Difficulty	In the past twelve months, have you struggled to pay bills?	70	41.42
10	Physical Abuse	How often does anybody physically hurt you?	8	4.73
11	Verbal Abuse	How often does anybody insult or talk down to you?	13	7.69
12	Threatened	How often does anybody threaten you with harm?	4	2.37
13	Screamed At	How often does anybody scream or curse at you?	37	21.89

Some social needs were predictive of having additional SDH-related concerns. The most significant was food-related, as patients who expressed difficulty affording healthy food were 19.2 times more likely to have at least one other social need than those who expressed no difficulty affording healthy food ($p=0.0001$). Another significant predictor was general financial need, with patients who expressed difficulty paying bills being five times more likely to have other social needs than those who showed no difficulty paying bills ($p<0.0001$).

Post-intervention interviews found that physicians did not discuss the SDH with patients in appointments very often. This was not asked of them; however, it did seem to make a difference to patients. Phone conversations revealed that patients generally did not understand the impact social factors can have on health outcomes, but they expressed appreciation for physicians who explained this connection in appointments. The most common concern identified by physicians and staff was the cost of time to screen patients and address SDH in appointments. Screening tools were not administered to every patient during busy hours because it required additional attention of MAs. Even so, providers and staff agreed that SDH were important in a clinical setting and should be discussed with patients with social needs.

Discussion

These findings concurred with existing studies about SDH prevalence and found that a large percentage (66.3%) of patients identify as having at least one social need (Page-Reeves et al., 2016; Tong et al., 2018; Hughes, Phillips, DeVoe, & Bazemore, 2016). Other urban clusters around the state and country may show similar results. More than half of Revere Health clinics are located in cities of similar populations, making this data highly valuable for the provider network. Another important finding was the odds ratio between social needs. Analysis revealed that difficulty paying bills and difficulty affording healthy food are predictive of patients experiencing other social needs as well. This suggests that interventions which target these specific needs could be highly valuable in preventing disease, saving patients money in downstream medical costs, and allowing providers to benefit from existing financial incentives.

As physicians discussed the SDH with their patients following completion of the screening tool, they found that patients were generally unaware that existing social needs could be barriers to health and that patients were apprehensive to talking about social needs in a clinical setting. Additionally, patients often responded in the negative when asked if they wanted help with addressing social issues. Because these patients did not previously understand the connection between social factors and health, Prochaska and DiClemente's Transtheoretical Model can be used to discuss the next steps in addressing SDH. Unlike other behavior of change models, the Transtheoretical progresses from a point where which individuals are unaware that their behavior is problematic and may be producing negative health consequences. (LaMorte, 2019). According this model, these patients would be placed in the "precontemplation stage" of change because of their limited understanding of the SDH. It could therefore be advantageous for primary care providers to assist in health education and help patients move between the precontemplation and contemplation stages. In the contemplation stage, individuals recognize that their social conditions may be problematic for their health and consider the steps necessary to improve, although they may be ambivalent towards making real changes. Providers can help patients reach this stage by explaining what the SDH are and how their individual social needs could lead to worsening health conditions. The urgency with which providers should address this must depend on how severe their patients' health conditions are and how serious the social needs are. The following stage, the preparation stage, is where individuals are actually ready to take action and begin making

plans to do so. Providers can assist in the transition between the contemplation and preparation stages by referring patients to outside resources and explaining how easy the process of addressing SDH may be.

As these social determinants are correlated with poor health outcomes, patients should be referred to more outside resources as a preventive healthcare technique (Borawski et al., 2015; Coffey, Ralph, & Krause, 2018; Hollederer, 2019; Kirby, Laris, & Rolleri, 2007; Levine, 2011; Lloyd et al., 2012; Margerison-Zilko, & Cubbin, 2017; Sheehan, Cantu, Powers, Woolhandler & Himmelstein, 2020). These resources should focus on improving health and well-being by targeting the social needs which may contribute to or be the cause of disease. This focus on preventive medicine is advantageous for both patients and providers. The patients themselves will save money by utilizing subsidized community resources and pay less for downstream healthcare services. Referrals to outside resources will also save the healthcare provider money and time; the clinic will no longer need to provide costly services for frequently returning patients (Beaton, 2017; Chait & Glied, 2018; Costello, 2021; Enard & Ganelin, 2013; Peeler, 2019).

Key Takeaways

The Revere Health Payson clinic received a report detailing these findings after the termination of the study. This was followed by a discussion about the future of implementation. **As found by qualitative analysis, providers and staff agreed that SDH were important in their discussions with patients.** The screening tool helped to quickly identify patient needs and, when paired with other patient-given information, was helpful in making preventive care treatment recommendations. Although the benefits of implementing an SDH screening tool into the existing EHR system were discussed with providers and staff, that option was not feasible at the time due to the clinic's lack of control over what is saved into the database. To do this, partnership must be achieved with the corporate office of Revere Health which is the developer of the EHR system.

Revere Health Payson can utilize a preventive medicine strategy by creating a focus on SDH in two different ways. Firstly, medical assistants can screen all patients for social needs during check-in. To shorten the survey and save time for the provider and patient, only social needs which put patients at a higher risk for developing health concerns that are prevalent in the community need be asked. Prevalent health concerns can be reevaluated every three years by referencing the Utah County CHNA conducted by IHC. Results would immediately be reviewed by medical assistants who can be trained to quickly determine whether social issues are unimportant or worth bringing up during the appointment (O'Gurek & Henke, 2018). Serious issues can then be addressed by the physician in appointments if he or she deems it necessary, and patients can be referred to outside resources during the payment and check-out process.

A second way Revere Health can implement preventive medicine techniques is by promoting local resources online. By the use of signage, Revere Health can grab the attention of people who experience social issues and inform them that they can save money and improve their health for free by going to their resource website. The website

would educate individuals on the SDH and refer them to local resources when needed. This not only serves as a partnership between Revere Health and local resources, but as an advertisement for Revere Health itself. Individuals should be recommended via the website and/or by email to visit their primary care physician once a year and when needed for check-up appointments. Using signage and a referral website, Revere Health will see an increase of clients for yearly physicals and non-SDH related issues.

Limitations

This SDH screening tool did not collect patient demographics which could have proved useful when referring patients to outside resources. Researchers were unable to know whether patients were financially or residentially eligible to obtain the resources because the data remained confidential. For example, patients who are unemployed and struggle to buy food may qualify for Supplemental Nutrition Assistance Program (SNAP) Food Benefits, but the survey did not ask such specific questions. This choice was made to keep the length of the survey brief enough for all patients to fill out, which was a major tradeoff for this SDH screening study. In future implementation, patient SDH responses should be stored in EHR systems alongside demographic data.

Another limitation to study results is the relatively low patient response rate. As reported, only about 25% of patients actually received a survey, indicating the Payson clinic was too busy to recruit and invite participants. As a result, this study saw a smaller sample size than anticipated. Staff members cited time restrictions as the major reason for why surveys were not administered to all patients, and physicians expressed their concern over burnout. Adding an additional responsibility concerned physicians and was seen as a low priority. However, with fewer patients screened, physicians saw a smaller number of patients with social needs, and therefore did not grasp the full prevalence of SDH in their community. The AAFP argues that correct utilization of SDH screening tools can actually reduce instances of physician burnout as it can provide them with more useful information and prevent downstream complications from arising. Regardless, physicians seemed to view SDH screening as a burden rather than a tool, and surveys were not administered as frequently as anticipated. This issue could have been mitigated by greater cooperation with the Payson clinic. If more preparation time were given, researchers could have been present at more staff meetings to ensure all clinic workers knew the importance of and plan for survey administration. More presentations could have addressed misinformation concerning burnout and SDH screening. Providing academic articles and supplemental information could have been helpful for physicians as well.

Conclusion

Addressing the social needs of the public is directly correlated to the prevention of chronic disease. The social determinants of health are a strong predictor of one's health outcomes and often influence the ability of those who have social needs to receive healthcare services. The data show that there are social needs in the Payson community that must be addressed. With social needs affecting 66.3% of the sample population, it would be irresponsible to ignore this information and keep hundreds of individuals at risk for developing more serious health conditions which could be prevented. It is especially informative given the three most prevalent social needs (difficulty paying bills, difficulty affording food, and screaming-related abuse) are correlated with prevalence of Utah County's three priority health concerns (hypertension, diabetes, and mental health disorders) (Crews et al., 2015; Gaskin et al., 2014; Malik, Munir, Ghani, & Ahmad, 2021; Vitolo, da Costa Louzada, Maria Laura, Rauber, & Campagnolo, 2013).

As indicated earlier, the Payson patients did not seem particularly aware of the connection between SDH and health outcomes. It is therefore critical that physicians move toward the practice of informing their patients of the SDH and the health risks they are associated with. With steadfast commitment from physicians, patients will understand how health conditions develop, why they are at an elevated risk, and the importance and benefits of preventive care. Over time, consistent physician participation in this effort could lead to long-term behavior changes throughout the Payson area. As patients see a greater link between social needs and health outcomes, they could make choices to prevent many of these issues from arising in the first place. For example, more individuals may adopt a personal budget system to prioritize buying healthy food and minimize eating out if they understand that their financial well-being is connected to their physical health. This would be extremely effective in addressing prevalent SDHs and reducing incidence of the priority health concerns identified by CHNAs.

It is also important to consider these implications for the health clinic in general. While implementing screening tools correctly will require effort on the administrative side of Revere Health, it will ultimately improve their relationship with patients and the greater community. While it may require time and effort to adjust the EHR system to account for patient SDH, it will save the organization money by allowing for incentives and partnerships within the community. Revere Health should refer patients who struggle with social needs to local services to build rapport with public health and primary care stakeholders in the area. This sends a message to the community that shows how Revere Health prioritizes the health and needs of their patients. Larger resources will build partnerships with Revere Health as they learn that patients are being referred more often. In the long term, as Revere Health refers more patients, these resources will increase in size and funding and grow in their ability to help those in need. This will give the Payson community an even greater opportunity to get involved in benefitting the health of others by participating in and donating to the efforts of their local resources. Through the coordination of public health workers and primary care providers, more people will obtain the benefit of a healthier lifestyle and can achieve a higher level of self-efficacy to invest in their personal health as a lifelong endeavor.

References

AAFP. (2018). Three tools for screening for social determinants of health. *Family Practice Management, 25*(3). https://www.aafp.org/journals/fpm/blogs/inpractice/entry/social_determinants.html

Alley, D. E., Asomugha, C. N., Conway, P. H., & Sanghavi, D. M. (2016). Accountable health communities - Addressing social needs through Medicare and Medicaid. *The New England Journal of Medicine, 374*(1), 8-11. https://doi.org/10.1056/NEJMp1512532

Ampofo, A. G., Adumatta, A. D., Owusu, E., & Awuviry-Newton, K. (2020). A cross-sectional study of barriers to cervical cancer screening uptake in Ghana: An application of the health belief model. *PLoS One, 15*(4). https://doi.org/10.1371/journal.pone.0231459

Assari, S., Chalian, H., & Bazargan, M. (2020). Race, ethnicity, socioeconomic status, and chronic lung disease in the U.S. *Research in Health Science, 5*(1), 48-63. https://doi.org/10.22158/rhs.v5n1p48

Beaton, T. (2017, August 2). Payer collaboration can address social determinants of health. *HealthPayerIntelligence*. https://healthpayerintelligence.com/news/payer-collaboration-can-address-social-determinants-of-health

Billioux, A., Verlander, K., Anthony, S., & Alley, D. (2017). Standardized screening for health-related social needs in clinical settings: The accountable health communities screening tool. *NAM Perspectives*. https://doi.org/10.31478/201705b

Borawski, E. A., Tufts, K. A., Trapl, E. S., Hayman, L. L., Yoder, L. D., & Lovegreen, L. D. (2015). Effectiveness of health education teachers and school nurses teaching sexually transmitted infections/human immunodeficiency virus prevention knowledge and skills in high school. *The Journal of School Health, 85*(3), 189-196. https://doi.org/10.1111/josh.12234

Boyer-Diaz, Z., Morata, P., Aristu-Zabalza, P., Gibert-Ramos, A., Bosch, J., & Gracia-Sancho, J. (2020). Oxidative stress in chronic liver disease and portal hypertension: Potential of DHA as nutraceutical. *Nutrients, 12*(9) https://doi.org/10.3390/nu12092627

Braveman, P., & Gottlieb, L. (2014). The social determinants of health: It's time to consider the causes of the causes. *Public Health Reports, 129*(2), 19-31. https://doi.org/ 10.1177/00333549141291S206

Brown, P. (1995). Race, class, and environmental health: A review and systematization of the literature. *Environmental Research, 69*(1), 15-30. https://doi/10.1006/enrs.1995.1021

Bryan, S., Davis, J., Broesch, J., Doyle-Waters, M. M., Lewis, S., McGrail, K., . . . Sawatzky, R. (2014). Choosing your partner for the PROM: A review of evidence on patient-reported outcome measures for use in primary and community care. *Healthcare Policy, 10*(2), 38-51.

CDC. (2021, May 6). *Social determinants of health: Know what affects health*. Centers for Disease Control and Prevention. https://www.cdc.gov/socialdeterminants/index.htm

Chait, N., & Glied, S. (2018). Promoting prevention under the affordable care act. *Annual Review of Public Health, 39*, 507-524. https://doi.org/10.1146/annurev-publhealth-040617-013534

Charkhchi, P., Kolenic, G. E., & Carlos, R. C. (2017). Access to lung cancer screening services: Preliminary analysis of geographic service distribution using the ACR lung cancer screening registry. *Journal of the American College of Radiology, 14*(11), 1388-1395. https://doi.org/10.1016/j.jacr.2017.06.024

Chung, E. K., Siegel, B. S., Garg, A., Conroy, K., Gross, R. S., Long, D. A., . . . Fierman, A. H. (2016). Screening for social determinants of health among children and families living in poverty: A guide for clinicians. *Current Problems in Pediatric and Adolescent Health Care, 46*(5), 135-153. https://doi.org/10.1016/j.cppeds.2016.02.004

Clark, A., & Mach, N. (2016). Exercise-induced stress behavior, gut-microbiota-brain axis and diet: A systematic review for athletes. *Journal of the International Society of Sports Nutrition, 13*, 43. https://doi.org/10.1186/s12970-016-0155-6

Coffey, P. M., Ralph, A. P., & Krause, V. L. (2018). The role of social determinants of health in the risk and prevention of group A streptococcal infection, acute rheumatic fever and rheumatic heart disease: A systematic review. *PLoS Neglected Tropical Diseases, 12*(6). https://doi.org/10.1371/journal.pntd.0006577

Cohen, J. T., Neumann, P. J., & Weinstein, M. C. (2008). Does preventive care save money? Health economics and the presidential candidates. *New England Journal of Medicine, 358*(7), 661-663. https://doi.org/10.1056/NEJMp0708558

Cohen, S., Janicki-Deverts, D., Doyle, W. J., Miller, G. E., Frank, E., Rabin, B. S., & Turner, R. B. (2012). Chronic stress, glucocorticoid receptor resistance, inflammation, and disease risk. *Proceedings of the National Academy of Sciences of the United States of America, 109*(16), 5995-5999. https://doi.org/10.1073/pnas.1118355109

Committee on the Recommended Social and Behavioral Domains and Measures for Electronic Health Records; Board on Population Health and Public Health Practice; Institute of Medicine. (2014). *Capturing social and behavioral domains and measures in electronic health records: Phase 1*. National Academies Press. https://doi.org/10.17226/18709

Costello, A. M. (2021). *Opportunities in Medicaid and CHIP to address social determinants of health (SDOH).* Centers for Medicare & Medicaid Services. https://www.medicaid.gov/federal-policy-guidance/downloads/sho21001.pdf

Council on Community Pediatrics. (2016). Poverty and child health in the united states. *Pediatrics, 137*(4). https://doi.org/10.1542/peds.2016-0339

Crews, D. C., Kuczmarski, M. F., Miller, E. R., Zonderman, A. B., Evans, M. K., & Powe, N. R. (2015). Dietary habits, poverty, and chronic kidney disease in an urban population. *Journal of Renal Nutrition: The Official Journal of the Council on Renal Nutrition of the National Kidney Foundation, 25*(2), 103-110. https://doi.org/10.1053/j.jrn.2014.07.008

Cutler, D. M., & Lleras-Muney, A. (2010). Understanding differences in health behaviors by education. *Journal of Health Economics, 29*(1), 1-28. https://doi.org/10.1016/j.jhealeco.2009.10.003

DeVoe, J. E., Bazemore, A. W., Cottrell, E. K., Likumahuwa-Ackman, S., Grandmont, J., Spach, N., & Gold, R. (2016). Perspectives in Primary Care: A Conceptual Framework and Path for Integrating Social Determinants of Health into Primary Care Practice. *Annals of Family Medicine, 14*(2), 104-108. https://doi.org/ 10.1370/afm.1903

Enard, K. R., & Ganelin, D. M. (2013). Reducing preventable emergency department utilization and costs by using community health workers as patient navigators. *Journal of Healthcare Management, 58*(6), 412-427.

Falck, G., Kjellander, J., & Schwan, A. (1998). Recurrence rate of streptococcal pharyngitis related to hygienic measures. *Scandinavian Journal of Primary Health Care, 16*(1), 8-12. https://doi.org/10.1080/028134398750003331

Ferreira, V. A., & Magalhães, R. (2019). Social inequalities, poverty and obesity. *Psychology of Health - Biopsychosocial Approach.* IntechOpen. https://doi.org/ 10.5772/intechopen.80987

Francis, L., DePriest, K., Wilson, M., & Gross, D. (2018). Child poverty, toxic stress, and social determinants of health: Screening and care coordination. *Online Journal of Issues in Nursing, 23*(3) https://doi.org/10.3912/OJIN.Vol23No03Man02

Garg, A., Boynton-Jarrett, R., & Dworkin, P. H. (2016). Avoiding the unintended consequences of screening for social determinants of health. *Journal of the American Medicine Association, 316*(8), 813-814. https://doi.org/10.1001/jama.2016.9282

Garner, A. S., & Shonkoff, J. P. (2012). Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. *Pediatrics, 129*(1), 224. https://doi.org/10.1542/peds.2011-2662

Gaskin, D. J., Thorpe Jr, R. J., McGinty, E. E., Bower, K., Rohde, C., Young, J. H., . . . Dubay, L. (2014). Disparities in diabetes: The nexus of race, poverty, and place. *American Journal of Public Health, 104*(11), 2147-2155. https://doi.org/ 10.2105/AJPH.2013.301420

Giuse, N. B., Koonce, T. Y., Kusnoor, S. V., Prather, A. A., Gottlieb, L. M., Huang, L., . . . Stead, W. W. (2017). Institute of medicine measures of social and behavioral

determinants of health. *American Journal of Preventive Medicine, 52*(2), 199-206. https://doi.org/10.1016/j.amepre.2016.07.033

Golding, J. M. (1999). Intimate partner violence as a risk factor for mental disorders: A meta-analysis. *Journal of Family Violence, 14*(2), 99-132. https://doi.org/10.1023/A:1022079418229

Gray, N. A., Dhana, A., Van Der Vyver, L., Van Wyk, J., Khumalo, N. P., & Stein, D. J. (2018). Determinants of hair cortisol concentration in children: A systematic review. *Psychoneuroendocrinology, 87*, 204-214. https://doi.org/10.1016/j.psyneuen.2017.10.022

Herrera, C., Brochier, A., Pellicer, M., Garg, A., & Drainoni, M. (2019). Implementing social determinants of health screening at community health centers: Clinician and staff perspectives. *Journal of Primary Care & Community Health, 10* https://doi.org10.1177/2150132719887260

Hollederer, A. (2019). Health promotion and prevention among the unemployed: A systematic review. *Health Promotion International, 34*(6), 1078-1096. https://doi.org/ 10.1093/heapro/day069

Hughes, L. S., Phillips, R. L., DeVoe, J. E., & Bazemore, A. W. (2016). Community vital signs: Taking the pulse of the community while caring for patients. *The Journal of the American Board of Family Medicine, 29*(3), 419-422. https://doi.org/10.3122/jabfm.2016.03.150172

Iob, E., & Steptoe, A. (2019). Cardiovascular disease and hair cortisol: A novel biomarker of chronic stress. *Current Cardiology Reports, 21*(10), 116. https://doi.org/10.1007/s11886-019-1208-7

Jamoom, E., & Yang, N. (2016). Table of electronic health record adoption and use among office-based physicians in the US, by state: 2015 national electronic health records survey. *Hyattsville, MD: National Center for Health Statistics.* https://www.cdc.gov/nchs/data/ahcd/nehrs/2015_nehrs_web_table.pdf

Juruena, M. F., Eror, F., Cleare, A. J., & Young, A. H. (2020). The role of early life stress in HPA axis and anxiety. *Advances in Experimental Medicine and Biology, 1191*, 141-153. https://doi.org/10.1007/978-981-32-9705-0_9

Kirby, D. B., Laris, B. A., & Rolleri, L. A. (2007). Sex and HIV education programs: Their impact on sexual behaviors of young people throughout the world. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 40*(3), 206-217. https://doi.org/10.1016/j.jadohealth.2006.11.143

LaMorte, W. W. (2019). *Behavioral change models*. Boston University Medical Campus. https://sphweb.bumc.bu.edu/otlt/mph-modules/sb/behavioralchangetheories

Lanphear, B. P., Kahn, R. S., Berger, O., Auinger, P., Bortnick, S. M., & Nahhas, R. W. (2001). Contribution of residential exposures to asthma in us children and adolescents. *Pediatrics, 107*(6). https://doi.org/10.1542/peds.107.6.e98

Lebrun, L. A., Shi, L., Chowdhury, J., Sripipatana, A., Zhu, J., Sharma, R., . . . Nair, S. (2012). Primary care and public health activities in select US health centers: Documenting successes, barriers, and lessons learned. *American Journal of Preventive Medicine, 42*(6), 191-202. https://doi.org/10.2105/AJPH.2012.300679

Levine, J. A. (2011). Poverty and obesity in the U.S. *American Diabetes Association, 60*(11), 2667-2668. https://doi.org/10.2337/db11-1118

Lidsky, T. I., & Schneider, J. S. (2003). Lead neurotoxicity in children: Basic mechanisms and clinical correlates. *Brain: A Journal of Neurology, 126*(1), 5-19. https://doi.org/10.1093/brain/awg014

Liguori, I., Russo, G., Curcio, F., Bulli, G., Aran, L., Della-Morte, D., . . . Abete, P. (2018). Oxidative stress, aging, and diseases. *Clinical Interventions in Aging, 13*, 757-772. https://doi.org/10.2147/CIA.S158513

Lloyd, S. W., Ferguson, Y. O., Corbie-Smith, G., Ellison, A., Blumenthal, C., Council, B. J., . . . Akers, A. (2012). The role of public schools in HIV prevention: Perspectives from African Americans in the rural south. *AIDS Education and Prevention, 24*(1), 41-53. https://doi.org/10.1521/aeap.2012.24.1.41

Lopez-Acevo, C. A., Arrendondo-Loza, E., Salinas-Carmona, M. C., Rendon, A., Martinez-Castilla, A. M., Vázquez-Marmolejo, A. V., . . . Rosas-Taraco, A. G. (2021). Cortisol and perceived stress are associated with cytokines levels in patients infected with influenza B virus. *Cytokine, 138*. https://doi.org/10.1016/j.cyto.2020.155400

Malik, M., Munir, N., Ghani, M. U., & Ahmad, N. (2021). Domestic violence and its relationship with depression, anxiety and quality of life: A hidden dilemma of Pakistani women. *Pakistan Journal of Medical Sciences, 37*(1), 191. https://doi.org/10.12669/pjms.37.1.2893

Margolis, R. (2013). Educational differences in healthy behavior changes and adherence among middle-aged americans. *Journal of Health and Social Behavior, 54*(3), 353-368. https://doi.org/10.1177/0022146513489312

Martinson, M. L. (2012). Income inequality in health at all ages: A comparison of the United States and England. *American Journal of Public Health, 102*(11), 2049-2056. https://doi.org/10.2105/AJPH.2012.300929

Miller, G. E., Chen, E., Fok, A. K., Walker, H., Lim, A., Nicholls, E. F., . . . Kobor, M. S. (2009). Low early-life social class leaves a biological residue manifested by decreased glucocorticoid and increased proinflammatory signaling. *Proceedings of the National Academy of Sciences of the United States of America, 106*(34), 14716-14721. https://doi.org/10.1073/pnas.0902971106

Miner, K., Moore, M., & Boshard, C. (2016). *Utah Valley Hospital 2016 community health needs assessment report*. https://intermountainhealthcare.org/locations/utah-valley-hospital/hospital-information/utah-valley-chna-report/-/media/0374c7fb1dd3466f8139b78b06bd6c1e.ashx

Moore, M., & Foust, T. (2020). *Utah Valley Hospital 2019 implementation plan.* https://intermountainhealthcare.org/locations/utah-valley-hospital/hospital-information/utah-valley-chna-report/-/media/15c50ce0973d439bb0075064a3c9b2b0.ashx

Moore, M., Stokes, S. C., Dillingham, A., Forsythe, N., Macleod, L., Neerings, K., & Zheng, T. (2019). *Utah Valley Hospital 2019 community health needs assessment report.* https://intermountainhealthcare.org/locations/utah-valley-hospital/hospital-information/utah-valley-chna-report/-/media/64b27351d1594cdfb27a124843e6f79f.ashx

Nathanson, A. M., Shorey, R. C., Tirone, V., & Rhatigan, D. L. (2012). The prevalence of mental health disorders in a community sample of female victims of intimate partner violence. *Partner Abuse, 3*(1), 59-75. https://doi.org/10.1891/1946-6560.3.1.59

O'Gurek, D. T., & Henke, C. (2018). A practical approach to screening for social determinants of health . *Family Practice Management, 25*(3), 7-12. https://www.aafp.org/fpm/2018/0500/p7.html

Page-Reeves, J., Kaufman, W., Bleecker, M., Norris, J., McCalmont, K., Ianakieva, V., . . . Kaufman, A. (2016). Addressing social determinants of health in a clinic setting: The WellRx pilot in Albuquerque, New Mexico. *Journal of the American Board of Family Medicine, 29*(3), 414-418. https://doi.org/10.3122/jabfm.2016.03.150272

Payson City. (2020). *Payson city demographics*. Payson Utah. https://paysonutah.org/city-info/demographics

Peeler, A. W. (2019a). Strategies for cost saving through social determinants of health. *Journal of Healthcare Management, 64*(4), 222-230. https://doi.org/10.1097/JHM-D-19-00113

Peeler, A. W. (2019b). Strategies for cost saving through social determinants of health. *Journal of Healthcare Management, 64*(4), 222-230. https://doi.org/10.1097/JHM-D-19-00113

Perry, W. D., Siegel, A. C., Rammelkamp, C. H., Wannamaker, L. W., & Marple, E. C. (1957). Transmission of group A streptococci. I. the role of contaminated bedding. *American Journal of Hygiene, 66*(1), 85-95. https://doi.org/10.1093/oxfordjournals.aje.a119888

Pinto, A. D., Glattstein-Young, G., Mohamed, A., Bloch, G., Leung, F., & Glazier, R. H. (2016). Building a foundation to reduce health inequities: Routine collection of sociodemographic data in primary care. *Journal of the American Board of Family Medicine, 29*(3), 348-355. https://doi.org/10.3122/jabfm.2016.03.150280

Pinto, R. A., Arredondo, S. M., Bono, M. R., Gaggero, A. A., & Díaz, P. V. (2006). T helper 1/T helper 2 cytokine imbalance in respiratory syncytial virus infection is associated with increased endogenous plasma cortisol. *Pediatrics, 117*(5), 878. https://doi.org/10.1542/peds.2005-2119

Pratt, R., Gyllstrom, B., Gearin, K., Lange, C., Hahn, D., Baldwin, L., . . . Zahner, S. (2018). Identifying barriers to collaboration between primary care and public health: Experiences at the local level. *Public Health Reports, 133*(3), 311-317. https://doi.org/10.1177/0033354918764391

Ridgeway, J. L., Beebe, T. J., Chute, C. G., Eton, D. T., Hart, L. A., Frost, M. H., . . . Sloan, J. A. (2013). A brief patient-reported outcomes quality of life (PROQOL) instrument to improve patient care. *PLoS Medicine, 10*(11). https://doi.org/10.1371/journal.pmed.1001548

Rogers, R. G., Hummer, R. A., & Nam, C. B. (1999). *Living and dying in the USA: Behavioral, health, and social differentials of adult mortality*. Elsevier.

Fenton. (2011). *Health care's blind side*. Robert Wood Johnson Foundation. https://www.rwjf.org/en/library/research/2011/12/health-care-s-blind-side.html

Schickedanz, A., Hamity, C., Rogers, A., Sharp, A. L., & Jackson, A. (2019). Clinician experiences and attitudes regarding screening for social determinants of health in a large integrated health system. *Medical Care, 57*(6), 197-201. https://doi.org/10.1097/MLR.0000000000001051

Sheehan, C. M., Cantu, P. A., Powers, D. A., Margerison-Zilko, C. E., & Cubbin, C. (2017). Long-term neighborhood poverty trajectories and obesity in a sample of California mothers. *Health and Place, 46*, 49-57. https://doi.org/10.1016/j.healthplace.2017.04.010

Speer, K. E., Semple, S., Naumovski, N., D'Cunha, N. M., & McKune, A. J. (2019). HPA axis function and diurnal cortisol in post-traumatic stress disorder: A systematic review. *Neurobiology of Stress, 11*. https://doi.org/10.1016/j.ynstr.2019.100180

Spruce, L. (2019). Back to basics: Social determinants of health. *AORN Journal, 110*(1), 60-69. https://doi.org/10.1002/aorn.12722

Tong, S. T., Liaw, W. R., Kashiri, P. L., Pecsok, J., Rozman, J., Bazemore, A. W., & Krist, A. H. (2018). Clinician experiences with screening for social needs in primary care. *The Journal of the American Board of Family Medicine, 31*(3), 351-363. https://doi.org/10.3122/jabfm.2018.03.170419

U.S. Census Bureau. (2019). *Quick facts: Payson City, UT; United States*. Census.gov. https://www.census.gov/quickfacts/fact/table/US,paysoncityutah/PST045219

Udeh-Momoh, C. T., Su, B., Evans, S., Zheng, B., Sindi, S., Tzoulaki, I., . . . Middleton, L. T. (2019). Cortisol, amyloid-β, and reserve predicts alzheimer's disease progression for cognitively normal older adults. *Journal of Alzheimer's Disease, 70*(2), 553-562. https://doi.org/10.3233/JAD-181030

US Census Bureau. (2021). *Rural America*. Census.gov. https://www.census.gov/programs-surveys/geography/data/interactive-maps/rural-america-map.html

Utah Department of Health. (2020). *Complete health indicator report of depression: Adult prevalence*. Public Health Indicator Based Information System (IBIS). https://ibis.health.utah.gov/ibisph-view/indicator/complete_profile/Dep.html

Van der Vliet, A., Janssen-Heininger, Y. M. W., & Anathy, V. (2018). Oxidative stress in chronic lung disease: From mitochondrial dysfunction to dysregulated redox signaling. *Molecular Aspects of Medicine, 63*, 59-69. https://doi.org/10.1016/j.mam.2018.08.001

Vest, J. R., Grannis, S. J., Haut, D. P., Halverson, P. K., & Menachemi, N. (2017). Using structured and unstructured data to identify patients' need for services that address the social determinants of health. *International Journal of Medical Informatics, 107,* 101-106. https://doi.org/10.1016/j.ijmedinf.2017.09.008

Vitolo, M. R., da Costa Louzada, Maria Laura, Rauber, F., & Campagnolo, P. D. B. (2013). Risk factors for high blood pressure in low income children aged 3–4 years. *European Journal of Pediatrics, 172*(8), 1097-1103. https://doi.org/10.1007/s00431-013-2012-9

Woolhandler, S., & Himmelstein, D. U. (2020). Intersecting U.S. epidemics: COVID-19 and lack of health insurance. *Annals of Internal Medicine, 173*(1), 63-64. https://doi.org/10.7326/M20-1491

Appendix

Appendix A: Social Needs Screening Tool

Revere Health

BYU Public Health

Social Needs Screening Tool

Students at Brigham Young University are developing an intervention to improve primary care efforts in responding to social needs. As part of this program, we are asking all patients at the Revere Health Payson Family Medicine Clinic to fill out this 15-question survey which discusses social factors which may affect health.

This form is to be filled out only by patients 18 or older.

HOUSING

1. Are you worried or concerned that in the next two months you may not have a stable housing that you own, rent, or stay in as a part of a household?
   - Yes
   - No
2. Think about the place you live. Do you have problems with any of the following? (check all that apply)
   - Bug infestation
   - Mold
   - Lead paint or pipes
   - Inadequate heat
   - Oven or stove not working
   - No / not working smoke detectors
   - Water leaks
   - None of the above

FOOD

3. Within the past 12 months, you worried that your food would run out before you got money to buy more.
   - Often true
   - Sometimes true
   - Never true
4. Within the past 12 months, the food you bought just didn't last and you didn't have money to get more.
   - Often true
   - Sometimes true
   - Never true

TRANSPORTATION

5. Do you put off or neglect going to the doctor because of distance or transportation?
   - Yes
   - No

UTILITIES

6. In the past 12 months has the electric, gas, oil, or water company threatened to shut off water services in your home?
   - Yes
   - No
   - Already shut off

CHILD CARE

7. Do problems getting child care make it difficult for you to work or study?
   - Yes
   - No

EMPLOYMENT

8. Do you or does someone you live with have a job?
   - Yes
   - No

EDUCATION

9. Do you have a high school degree?
   - Yes
   - No

FINANCES

10. How much of the time do you have enough money to pay your bills?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

This screening tool was developed by the American Academy of Family Physicians and will be reviewed by BYU Public Health Department students

PERSONAL SAFETY

11. How often does anyone, including family, physically hurt you?
    - Never
    - Rarely
    - Sometimes
    - Fairly often
    - Frequently
12. How often does anyone, including family, insult or talk down to you?
    - Never
    - Rarely
    - Sometimes
    - Fairly often
    - Frequently
13. How often does anyone, including family, threaten you with harm?
    - Never
    - Rarely
    - Sometimes
    - Fairly often
    - Frequently
14. How often does anyone, including family, scream or curse at you?
    - Never
    - Rarely
    - Sometimes
    - Fairly often
    - Frequently

ASSISTANCE

15. Would you like help with any of these needs?
    - Yes
    - No

Thank you for taking the time to fill out this survey.

By signing this form, you consent to having this information reviewed. You may receive a phone call with a referral to free services.

Printed Name: _____

Signature: _____

This screening tool was developed by the American Academy of Family Physicians and will be reviewed by BYU Public Health Department students