

Accounting for Social Risk Factors in Minnesota Health Care Program Payments

Phase I Initial Findings

Phase I: Which social risk factors best identify MHCP populations with poor health outcomes?

Phase II: Is there a payment methodology that best targets these populations and the providers best able to meet their needs and reduce the health disparities?

Health Care Administration
April 2016



Minnesota Department of **Human Services**

Legislative Report

Two research projects were commissioned to fulfill the requirements of this project. Their reports are available online.

- The Improve Group interviewed community members who had experienced poverty, homelessness, or immigration, and asked them to describe barriers to accessing health care and being healthy. Their report can be found here: <https://edocs.dhs.state.mn.us/lfserver/Public/DHS-3924-ENG>
- The Oregon Health and Science University conducted a literature review of social risk factors associated with poor health outcomes. Their report can be found here: <https://edocs.dhs.state.mn.us/lfserver/Public/DHS-3923-ENG>

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Table of Contents

I.	Executive summary.....	4
II.	Legislation.....	6
III.	Introduction.....	7
	Initiatives at the State of Minnesota to address Health Disparities.....	7
	Work plan.....	8
	Conceptual framework of this report	10
IV.	Methods.....	11
	Literature review	11
	Community Engagement.....	11
	Statistical Modeling of MHCP Enrollee Data.....	12
V.	Findings.....	13
	A. Low educational attainment.....	13
	B. Poverty	15
	C. Homelessness	20
	D. Immigration.....	23
	E. Enrollee mental illness.....	25
	F. Enrollee chemical dependency	28
	G. Diminished parental functioning.....	30
	H. Caregiver capacity and need	32
	I. Other risk factors.....	35
VI.	Conclusions and Next Steps.....	37
	Next Steps	37
VII.	References.....	38

I. Executive summary

The Minnesota Department of Human Services is developing a methodology to identify and support health care providers who serve a high proportion of MHCP patients with social risk factors and experience health disparities, and who achieve better than expected outcomes for those patients, as was directed by the Minnesota Legislature. This initial report is the foundation for this work.

This initial report seeks to identify the social risk factors¹ associated with poor health, and to identify how the risk factors lead to poor health. To do so, the Improve Group conducted interviews on a small sample (37) of community members who had experienced poverty, homelessness, or immigration. The Oregon Health and Science University conducted a limited review of literature.

The literature review and other identified data sources provided evidence that six of the social risk factors being reviewed are strongly associated with poor health. These risk factors included: low educational attainment, poverty, homelessness, mental illness, chemical dependency, and diminished parental functioning. Only one indicator was found to be associated with *better* health than that experienced by those without the indicator. This indicator is immigration status.

In addition to answering questions about associations with poor health, this report also asks why there is an association with poor health, and how DHS might identify people with this risk factor. A short summary of these findings is provided below.

Low educational attainment. In literature reviews, having lower educational attainment is consistently associated with higher risk for obesity, Type 2 Diabetes, and periodontitis. Reasons for these higher rates may be related to lower access to financial and physical resources that support health (eg healthy food, exercise opportunities, health care services), and reduced capacity for understanding health information and using health services. Community members did not mention low educational attainment as a risk factor, but several confirmed that it is sometimes difficult to understand doctors' instructions and medical documents, as the language can be technical.

Poverty. People in poverty have a variety of poor health outcomes, including higher death rates for the most common causes of death. None of the community members interviewed for this project mentioned poverty explicitly, but many stated that they could not afford basic goods and services, including healthy food, child care, transportation, and health care. Poverty impacts health through poor nutrition, substandard housing, greater exposure to violence, higher levels of stress, and many other ways. Higher levels of stress are shown to hamper development of the nervous system in children, with lasting health and other impacts.

¹ Social risk factors are conceptually the same as the social determinants of health. These can be defined as the range of personal, social, economic and environmental factors that influence the health of individuals and populations (Minnesota Department of Health, 2013).

Homelessness. People experiencing homelessness are much more likely to die prematurely than are housed people. Research literature and community members both noted the prevalence of violence, malnutrition, and other physical deprivations in this population. Maintaining a healthy diet, caring for chronic conditions, and allowing injuries to heal properly are all more difficult when people do not have a stable place to live.

Enrollee mental illness. Life expectancy of people with Serious Mental Illness is 25 years shorter than that of the general population. In this report's brief review of co-morbidities with mental illness, such as depression was associated with a higher risk of cardiovascular disease, diabetes, and stroke. People with Posttraumatic Stress Disorder have higher rates of hypertension and cardiovascular disease. Similar to other populations reviewed in this report, people with mental illness were hypothesized to have poorer health behaviors (eg diet and exercise) but also to be less diligent with self-care for chronic conditions, due to lowered motivation or disorganized thinking.

Enrollee chemical dependency. This report focused on the health impacts of excessive alcohol use, as it is the most commonly used substance in the U.S. An estimated 10% of all deaths among adults age 20-64 are due to excessive drinking. People who use alcohol excessively are at higher risk of heart disease, high blood pressure, learning and memory problems, mental illness, and other chronic conditions. As this list indicates, alcohol affects multiple body systems in adverse ways.

Diminished parental functioning. Children who are exposed to physical or emotional abuse, chronic neglect, parental mental illness or chemical dependency, or other prolonged adversity are said to experience 'toxic stress.' This can disrupt healthy development and have long-term detrimental effects on their health and well-being. Experiences in this category will include parental mental illness, parental chemical dependency, and a child's involvement in child protection.

II. Legislation

Laws of Minnesota 2015, chapter 71, article 11, section 63

HEALTH DISPARITIES PAYMENT ENHANCEMENT.

(a) The commissioner of human services shall develop a methodology to pay a higher payment rate for health care providers and services that takes into consideration the higher cost, complexity, and resources needed to serve patients and populations who experience the greatest health disparities in order to achieve the same health and quality outcomes that are achieved for other patients and populations. In developing the methodology, the commissioner shall take into consideration all existing payment methods and rates, including add-on or enhanced rates paid to providers serving high concentrations of low-income patients or populations or providing access in underserved regions or populations. The new methodology must not result in a net decrease in total payment from all sources for those providers who qualify for additional add-on payments or enhanced payments, including, but not limited to, critical access dental, community clinic add-ons, federally qualified health centers payment rates, and disproportionate share payments. The commissioner shall develop the methodology in consultation with affected stakeholders, including communities impacted by health disparities, using culturally appropriate methods of community engagement. The proposed methodology must include recommendations for how the methodology could be incorporated into payment methods used in both fee-for-service and managed care plans.

(b) The commissioner shall submit a report on the analysis and provide options for new payment methodologies that incorporate health disparities to the chairs and ranking minority members of the legislative committees with jurisdiction over health care policy and finance by February 1, 2016. The scope of the report and the development work described in paragraph (a) is limited to data currently available to the Department of Human Services; analyses of the data for reliability and completeness; analyses of how these data relate to health disparities, outcomes, and expenditures; and options for incorporating these data or measures into a payment methodology.

III. Introduction

This report is submitted to the Minnesota Legislature pursuant to Laws of Minnesota 2015, chapter 71, article 11, section 63. It was prepared by the Minnesota Department of Human Services (DHS), Health Care Administration. It is the first in a series which will update the legislature as to DHS' progress in developing a payment methodology incorporating social risk factors.

Initiatives at the State of Minnesota to address Health Disparities

The social determinants of health have received extensive attention in the social sciences and health sciences in the last few decades. These can be defined as the range of personal, social, economic and environmental factors that influence the health of individuals and populations (Minnesota Department of Health, 2013). The evidence of the health effects of these risk factors is overwhelming, and interest in the topic extends well beyond health care. However, solutions to these well-established disparities are less clear and forthcoming, for a wide variety of systemic and human reasons. Further, accounting for the social determinants of health in performance measures and payments has only been in development in the past few years.

The Minnesota Department of Human Services (DHS) is only one organization in the state of Minnesota which is experimenting with innovative methods to address these problems. The following are some related projects:

- The Minnesota Department of Human Services has compiled performance measures for participants of each of the managed care organizations (MCOs) and for participants in fee for service (FFS) for many years. More recently, many of the results have been calculated by region and race/ethnicity.
- DHS has developed and implemented the Integrated Health Partnership program which rewards providers for improving health care outcomes and controlling health care costs.
- In 2015, DHS contracted with a vendor to develop a risk-adjustment methodology which could be applied to the Initial Core Set of Health Care Quality Measures for Medicaid-Eligible Adults. This work adjusted for demographic, language, and clinical indicators. This work can inform the stratification and risk-adjustment of the MCOs and FFS participant performance measures.
- The CMS State Innovation Model's grant to DHS and MDH for Accountable Communities for Health funds innovative models to reduce costs and improve care through collaborations between health care and social service organizations, which serve a common population of MHCP participants.
- MDH licenses and oversees Health Care Homes, and DHS pays for MHCP patient care at these providers. Health Care Homes coordinate patient care, and have undergone a practice transformation process focusing on patient-centeredness and other components of high quality care.

Social Risk Factors in MHCP Payments: Phase 1

- The Minnesota Department of Health (MDH) has recently been directed by state law to stratify some quality measures by race, ethnicity, preferred language, country of origin, and possibly other sociodemographic factors. DHS has been directed to follow this stratification when using MDH performance measures in its own work. MDH has also been directed to adjust quality measures for patient characteristics that are correlated with health disparities and have an impact on quality measures.

Work plan

The legislation shown in Section II directs DHS to focus attention on health disparities in a new way. It directs us to reduce health disparities in our patient populations by developing payment methodologies for providers who serve patients who experience the health disparities, and are able to implement strategies that are expected to reduce those disparities. We plan to develop such a methodology using the following work plan.

Phase I: Which social risk factors best identify MHCP populations with poor health outcomes?

Phase I lays the foundation for all work by identifying the populations that experience health care disparities. These ‘target populations’ will be identified by their social risk factors; in particular, the risk factors that tend to be most strongly associated with these disparities. The identification of these populations are achieved using three methods. First, a literature review of existing literature reviews and meta-analyses was conducted to identify social risk factors which are associated with health disparities. Second, community members were consulted about the risk factors they see as making it difficult to access health care and to attain and maintain health. Third, an analytic vendor will identify the populations which experience the greatest disparities and the health care expenditures using Minnesota Health Care Participants’ (MHCP) payments and performance measures.

The purpose of Phase I work is to identify the socially vulnerable populations that may be in need of attention. This initial report describes results of the literature review and community member interviews. The second Phase I report will use MHCP data to identify the social risk factors which are associated with worse health care performance measures and/or health care expenditures. That analytic work is likely to include multivariate logistic and linear regression analyses, which will allow us to identify the risk factors which are most predictive of health care utilization, payments and performance measures. We will control for demographic factors such as age and gender, as well as controlling for medical conditions using the Adjusted Clinical Groups or other Johns Hopkins risk adjustment tools. We may also do factor analysis, which would allow us to identify distinct populations at risk. In particular, factor analysis may draw attention to populations at especially high risk who experience a particular combination of risk factors (eg mental illness and chemical dependency).

Once we have gathered information on social risk factors using measures of patient experience, health, performance, and provider reimbursements, we will choose the populations which have relatively consistent indicators of high reimbursements and poor performance. These populations

Social Risk Factors in MHCP Payments: Phase 1

will be the target populations of interest during development of a provider payment methodology.

A secondary step in this phase will be to identify the types of services that are most likely to improve the health and the health care performance of the target populations. This is critical to the project for several reasons, the most important reason being our ability to estimate provider costs.

One of the resources we began looking for early in this project was a dataset which included the true costs to a provider of serving patients with social risk factors, in an identifiable format so we could link it with our social risk data and conduct necessary analyses. This is not available on any large scale for MHCP (or any other) enrollees. We may be able to access cost estimates from one or two clinics that serve a subset of the MHCP population. However, these would represent their *current* costs, which may underestimate the cost of providing the most effective service to these patients. The lack of a data source on provider costs limits our options for developing a payment methodology.

As an alternative, we may instead identify the effective services that are expected to improve the health of the target populations, and estimate *those* costs. This would allow us to estimate based on the services most supported by the evidence, even if those are not currently in use among our providers.

Identifying services appropriate to serve each of our target populations will also allow us to share some best practices relating to both patient outcomes and cost effectiveness. We anticipate that the literature review will be done in close collaboration with health care providers, content experts on particular risk factors, and others experienced in serving the target populations. When research evidence is lacking in a particular area, we will identify the services that show the most promise.

Identification of the best practices informs not only the expected cost, but also the mechanisms by which payment could be provided. This work supports Phase II by identifying the types of providers that currently serve or could serve these populations, identifying whether any current payment mechanisms are in place that could be leveraged, and whether payments may be best suited as general add-ons, or closely tied to particular health care services. We may also find that we can use data from clinics that have cost data on a subset of our enrollees, if they provide the types of services where we are trying to estimate cost.

We expect that this work will provide a foundation for Phase II by identifying the most cost-effective services which have been proven, or show promise, for improving health in the respective target populations.

Phase II: Which payment methodology best targets the identified populations and the providers best able to meet their needs?

Phase I will identify the target populations and the services to model payment. Phase II will identify appropriate payment methodology options. This may include adjusting by social risk factors, provider characteristics, and other factors. DHS expects that providers whose case mix

includes higher percentages of the target populations will be prioritized as they will be most impacted by higher costs, may be best positioned to implement new strategies or services, and are included in the legislation.

The first task will be to conduct an environmental scan to identify, compare, and evaluate different options for paying providers that serve the target populations, which will include looking at existing MA payment options to see if any of them align well with the target populations and services required. The second task will be to use DHS data to model different payment methods.

Given that this work is intended to reduce health disparities, we will also identify mechanisms embedded within or attached to the payment methodologies which would focus resources on the providers who may achieve better performance for the target populations.

Conceptual framework of this report

This initial report has the limited goals of identifying populations that experience health disparities, and suggesting reasons they experience these disparities. For each of the risk factors we review, we strive to answer the following questions:

- 1- Is there evidence that people with this risk factor have worse health? Instead of conducting an exhaustive review of the evidence, we chose instead to use evidence from existing literature reviews and meta-analyses. This gives us a sense for the available literature on a limited budget, within an abbreviated timeframe, and allows us to fully fund the extensive analytic work this legislation will require.
- 2- How might this risk factor impact health? We describe the ways in which risk factors might be causing poor health. To do this, we summarize the mechanisms suggested in the literature reviews. We rely even more heavily on interviews in which community members were asked which barriers make it difficult to be healthy, how they make it difficult, and how these barriers might be addressed.
- 3- How might DHS identify enrollees with this risk factor? Here we draw on previous work at DHS on populations with social risk factors. There are often multiple ways each risk factor could be operationalized, and we use the method recommended by content experts in each of the relevant areas (eg we follow the DHS Alcohol and Drug Abuse Division's recommendation for identifying chemical dependency). As new data sources and systems become available, methods for identifying the target population may need to be refined.

IV. Methods

Phase I work is well underway, with two of the three research methods being complete. DHS has set out to answer the Phase I research question using three distinct data sources, each providing a different perspective or type of information.

Literature review

The Oregon Health Sciences University identified existing literature reviews and meta-analyses which examined the relationship between social risk factors and health outcomes in adult populations. They identified and quality-assessed broad systematic reviews on the subject.

The health outcomes which were included in the analysis were the following: obesity, diabetes, psychiatric disorder, substance use disorder, oral health, and asthma. DHS identified the following social risk factors to be included in the review.

- Neighborhood poverty
- Homelessness
- Low Educational attainment
- Language other than English spoken most of the time
- Immigration
- Mental illness
- Substance abuse
- Race/ethnicity

The above literature review was limited to the adult population. In addition, DHS had access to a literature review of the relationships between social risk factors and health care outcomes (access and utilization) for the population of children. This was conducted by the Seattle Children's Research Institute in 2012, and was deemed current enough for use in this report.

Community Engagement

The Improve Group selected six social service organizations that serve people who have experienced or are currently experiencing homelessness, poverty, and/or immigration. Each organization identified one member of their staff for a key informant interview. The organizations recruited approximately six people each from among their client populations to also do an interview. In addition, Improve Group interviewed a half dozen medical providers to learn their thoughts on the role providers can play in addressing these barriers. The study is a small convenience sample, based in the metro area. It should provide insights into community members' experiences, but cannot be generalized to the larger MHCP or Minnesota population. Comments are not verbatim and instead are paraphrased by the researcher who conducted the interviews. Here were the questions that were asked of respondents:

- What factors make it difficult for people to meet their health care needs (such as being healthy, finding a provider, obtaining needed services, managing health conditions)?
- What factors help or make it easier for people to meet their health care needs?
- Would clinics providing additional services be a substantial value to target populations?

Statistical Modeling of MHCP Enrollee Data

MHCP enrollee data, and the models to be developed, will allow us to identify the enrollees with the greatest health care disparities, and whose health care is the most expensive to MHCP programs, controlling for enrollees' medical conditions. A vendor for this work is anticipated to be chosen in Spring 2016.

The analytic vendor will first conduct an environmental scan to compare and evaluate the methods that could be used to identify the populations that experience health disparities and/or are more costly for providers to serve. MA payments and performance measure data will be available, and the vendor will investigate whether other data sources are available. Next, they will use available data to identify the populations that experience the worst health and health care outcomes, and are most costly to the health care system.

Statistical modeling on MHCP data is the next piece of Phase I work, and DHS expects to contract with a vendor for this work in the next few months, with Phase I results early in 2017. Development of payment methodologies will be completed as part of Phase II, and will be described in later reports.

V. Findings

This section will describe findings from the literature review, interviews with community members, and other available information. In this first report, we did not set out to conduct an exhaustive search for all relevant data. Instead, we tried to identify the factors deemed most important by a small sample of community members, and asked them to describe how they are important. In the literature review, we chose a limited number of risk factors that we expected to be important, and looked into whether there is evidence from systematic literature reviews that these are predictive of health outcomes.

The first three social risk factors all relate to resource access. They include low educational attainment, poverty, and homelessness. These can be closely related.

A. Low educational attainment

Is there evidence that people with this risk factor have poor health?

Three articles were found which systematically review the literature on the relationship between socio-economic status (SES) such as educational attainment, and a health condition. The articles found that overall, people with low educational attainment are at higher risk for obesity, Type 2 Diabetes, and periodontitis, the three conditions studied.

One review found that lower socio-economic status is consistently associated with higher rates of adult obesity (El-Sayed et al, 2012). This study included many indicators of SES, including education, income, occupational social class, and employment history. All 16 studies reviewed found that SES at birth or during childhood predicted obesity in adulthood, though this did not hold true for some subpopulations in the studies (this relationship was sometimes stronger in women than in men). In the reviewed studies that looked specifically at the relationship between education and obesity, they generally found that low education was associated with higher risk for obesity, though there were exceptions in some subgroups.

In a meta-analysis of 18 studies, Boillot et al (2011) found that low educational attainment was associated with greater risk of periodontitis. In the seven studies that controlled for factors such as demographics, history of dental care, and smoking, people with lower education were 55% more likely to have indications of periodontitis.

In a meta-analysis of 10 multivariate studies looking at the relationship between education and Type 2 Diabetes, Agardh et. al. (2011) found that people in the lowest education group were 28% more likely to have Type 2 Diabetes than were people in the highest education group. They found education level to be more consistently predictive of this health outcome than was income or social class.

How might this risk factor impact health?

The above authors suggested various mechanisms by which low education may impact health. These relate to access to financial and physical resources that support health such as healthy food, exercise opportunities, and health care services (Agardh et al, 2011). Boillot et al similarly

Social Risk Factors in MHCP Payments: Phase 1

point to health behaviors (e.g. smoking) that are strongly associated with the chronic conditions. These authors also suggested that people without a lot of formal education may have less information and skills for using health services.

When asked to describe barriers to health and health care, community members interviewed by the Improve Group did not mention low educational attainment, but they did mention having a hard time understanding multiple aspects of the health care system. Some native English speakers reported having difficulty understanding doctors' explanations, as the language used was too technical, or the explanations too complex.

The communication piece has breakdowns, a lot of time when I talk to a nurse rather than a doctor, I understand more. Nurses break it down better, like a softer touch. Words that are used that I may not know what they mean. Almost in a sense, I want a breakdown of what they're talking about. (female, 26-35 years old)

Doctors sometimes don't talk in laymen's terms. (Case Manager, homelessness services)

Problems for non-native English speakers can be even more pronounced, and are discussed in the section on immigration. Low education can be especially problematic when there is poor access to computers and the internet, and limited computer literacy. This can make accessing information on health-related topics, where to get care, and how to enroll in health care coverage such as MHCP programs more difficult.

How might DHS identify enrollees with this risk factor? Both MA and MinnesotaCare enrollment forms ask for the enrollee's level of education. These are used to develop the risk factor of low educational attainment. Having less than a high school diploma is one way to operationalize low educational attainment.

B. Poverty

Among children enrolled in MHCP programs, DHS records indicate that 83 percent are living at or below the federal poverty guideline. This should not be surprising as most public health care program recipients' eligibility is based on an income needs test; a smaller number of recipients are eligible because of a disability.

Is there evidence that people with this risk factor have poor health?

The American Academy of Family Physicians (2016) states the following about poverty and health:

Poverty and low-income status are associated with a variety of adverse health outcomes, including shorter life expectancy, higher rates of infant mortality, and higher death rates for the 14 leading causes of death (Link & Phelan, 1995, Brooks-Gunn & Duncan, 1997). These effects are mediated through individual- and community-level mechanisms (Berkman & Kawachi, 2014). For individuals, poverty restricts the resources used to avoid risks and adopt healthy behaviors (Phelan, Link & Tehranifar, 2010). Poverty also affects the built environment (i.e., the human-made physical parts of the places where people live, work, and play, including buildings, open spaces, and infrastructure), services, culture, and reputation of communities, all of which have independent effects on health outcomes (Macintyre, Ellaway & Cummins, 2002)...

A recent study by The Commonwealth Fund assessed 30 indicators of access, prevention, quality, potentially avoidable hospital use, and health outcomes. The study found that low-income status populations suffer disparities in every state.

Community members who were interviewed for this project by the Improve Group did not mention poverty as a problem for staying healthy, but they did mention not being able to afford a variety of basic goods and services that would support their health. These included food, child care, transportation, and health care.

Healthy food

In the community member interviews, many raised concerns about their ability to buy food. While some described how difficult it is to buy food at all, others focused on the high cost of healthy food. Respondents appear to be very aware of the importance of healthy foods, but are not able to afford to buy it. Income cutoffs for the Supplemental Nutrition Assistance Program (SNAP) are lower than those for MinnesotaCare, so some people receiving Minnesota Health Care Programs (MHCP) are not eligible for SNAP. Also, SNAP is only a supplement to income and may not pay for all food needed in a month.

SNAP doesn't last all month; at the end of the month, we need to pay in additional. Sometimes there's not enough food for my family. (female, 18-25 years old)

Healthy food is expensive. You go to McDonald's and get a salad for \$5-6 when you can get a cheeseburger for \$1. In grocery stores, fruits and vegetables are more expensive than chips and cookies. I try to buy as much healthy food as I can, but for the most part,

Social Risk Factors in MHCP Payments: Phase 1

we eat more junk food than health food. With our family history, this can lead to high cholesterol, high blood pressure, diabetes, and obesity. (female, 26-35 years old)

Child care

Access to child care is another important resource tied to income. Community members reported that there are long waiting lists for child care subsidy programs, or that the cost was prohibitive. DHS records confirm this: almost 7,000 families were on the waiting list for child care assistance that helps low income working families pay for child care.

Some community members said they needed child care while at medical appointments, as having their child at the appointment makes it difficult to concentrate on what their doctor is saying. One social service provider also said that people are inhibited in sharing health information with their doctor while their child is present, and so the visit isn't as valuable. Lack of child care also limits parents' access to job opportunities.

If I had childcare, I'd have a job. I've missed out on job opportunities: last week I had an interview at [local senior assisted living center] for serving food, but didn't have anyone to keep my child. I couldn't make it to the interview. (female, 18-25 years old)

Transportation

Transportation is another resource that community members report is tied to income. Among children enrolled in MHCP programs, 59% lived in a family in which the parent reported *not* having a vehicle worth at least \$2,500 (one proxy for a reliable vehicle). The transportation options for people in the metro include medical rides, public transportation, and owning their own car, each of which has its own challenges, especially for people without the funds to call a taxi if their first choice falls through. MHCPs pay for some rides to medical appointments. Respondents were sometimes unclear about who is eligible and other rules of the program, and one service provider was concerned that the rides need to be scheduled well in advance, a problem for people without stable housing. Reliability can also be a problem.

With my insurance they said you have transportation and they send you a van to go to the doctor. I tried once but they didn't come, that time I needed a doctor but had to cancel. (female, 26-35 years old)

Car ownership is also a challenge for low-income people as their cars often need expensive repairs. Taking public transportation is another option for residents of larger cities. However, it is expensive, it is challenging to figure out the routes, and it can be problematic in other ways (eg taking one's children on the bus).

Transportation can be an issue for some people with limited income. For a first-time appointment, we'll drive them there and sit with them. But for some people the bus fare is too much (\$2.75 each way). When we have bus tokens, we'll provide them, but we don't always have them. (case manager, general social services)

Social Risk Factors in MHCP Payments: Phase 1

Health care coverage

An important income threshold for adults in Minnesota is 138% of the federal poverty guideline (\$1,367 per month for one person; \$2,318 per month for a family of three). Above that income level, people are no longer eligible for MA (the program with no premiums and very low levels of other cost sharing) but are eligible for MinnesotaCare (with premiums and higher levels of other cost sharing). Above 200% of the federal poverty guideline (\$1,980 monthly for one person; \$3,360 monthly for a family of three), most adults are no longer eligible for state public health care programs and must purchase insurance through an employer or on their own, with some being eligible for federal tax credits available through MNsure.

Nevertheless, gaining and maintaining enrollment in MA or MinnesotaCare can be complicated and time consuming. Interviewed community members described many frustrating experiences. The complexity of the enrollment process can be difficult for anyone, but may be especially so for the many MHCP-eligible people with low levels of formal education. One of the experiences community members described as frustrating is the complexity of the initial enrollment process. Some social service providers describe getting an insurance card as being a challenge. Some community members reporting not being sure whether or not their coverage was currently in effect. This can be especially problematic for people who experience frequent address changes, but is reported as problematic by others too.

Some community members mentioned that they did not have enough money to pay for medication and health care visit co-pays. Medical Assistance (MA) medication copays are \$1-\$3 each, with a monthly cap of \$12. Similarly, non-preventive health care visits have a co-pay of \$3-\$3.50 (Minnesota Department of Human Services, 2016). Certain populations such as American Indians, children, and pregnant women are exempt from cost sharing. Likewise, certain services such as preventive services and mental health services are exempt from cost sharing. While cost sharing under the MA program is significantly cheaper than costs of private plans, it can be a burden for some people.

I don't have enough money for medications or copays, even with MA coverage. (male, 56-65 years old)

How might this risk factor affect health?

The American Academy of Family Physicians (2016) summarized research related to how poverty affects health:

Prosperity provides individuals with resources that can be used to avoid or buffer exposure to health risks (e.g., knowledge, power, prestige) (Anderson, Scrimshaw & Fillilove, 2003). By contrast, poverty affects health by limiting access to proper nutrition; shelter; safe neighborhoods in which to learn, live, and work; clean air and water; utilities; and other elements that define an individual's standard of living. Individuals who live in impoverished neighborhoods are likely to experience poor health due to a combination of factors that present obstacles to health maintenance (Riste, Khan & Cruickshank, 2001). Violence is prevalent where there is poverty. From 2008 to 2013, individuals in households at or below the poverty level had more than double the rate of

violent victimization of individuals in high-income households, according to the National Crime Victimization Survey (Bureau of Justice Statistics).

Life expectancy is significantly affected by poverty due to multiple factors, some of which are more obvious (e.g., violence) than others (e.g., lack of educational opportunities)... Mental illness and substance misuse are more prevalent in low-income populations; the argument about whether poverty is a cause or effect of this higher prevalence is ongoing (Murali & Oyebode, 2004). Poor nutrition, toxic exposures (e.g., lead), and elevated levels of the stress hormone cortisol are factors associated with poverty that may have lasting effects on children beginning in utero and continuing after birth. These effects, which can influence cognitive development and the development of chronic disease, are dose dependent (i.e., the duration of exposure matters) (Evans & Kim, 2007; Lipina & Colombo, 2009; Farah, Noble & Hurt, 2005). For example, the greater the number of years a child spends living in poverty, the more elevated the child's overnight cortisol level is and the more dysregulated the child's cardiovascular response to acute stressors is (Lipina & Colombo, 2009). Impaired development of the nervous system affects cognitive and socioemotional development, and increases the risk of behavioral challenges, adverse health behaviors, and poor school performance (Lipina & Colombo, 2009; Farah, Noble & Hurt, 2005).

Consistent access to health care treatment is important to people's health. Access to food, especially healthy food, is also key to people's health and well-being. People in poverty might not be able to make decisions in line with medical recommendations. The cost of any necessity, even something non-health care related, can force people to cut back on activities that are supportive of their health.

How might DHS identify enrollees with this risk factor?

The poverty indicator we plan on using is not comparable to poverty indicators reported by the Census Bureau or other organizations using survey-based data. We will use income data collected and verified as part of the enrollment process. This includes data on all household members whose income is counted towards eligibility for the child and others in the child's eligibility unit. For SNAP applications, this can include household members who are not related to the child. In contrast, poverty measures calculated using the American Community Survey are based on the income of family members only, as reported by a family member in a telephone survey.

In the past, we have pulled income data from DHS's MAXIS eligibility system, or from MMIS if not available in MAXIS. We calculated income from all members of the same case for the previous 12 months and reported it as a percentage of the Federal Poverty Guideline (FPG).

We plan on using the raw income data on all members of the case as defined by the program's data system. In contrast, MA and MinnesotaCare eligibility determinations use only some parts of the raw income data and only the income of certain family members, as defined by that particular program's eligibility rules. The FPG used in eligibility determinations can therefore be different from what we report here.

Social Risk Factors in MHCP Payments: Phase 1

We may use the lack of a vehicle, or lack of a vehicle worth at least \$2,500 (our proxy for a reliable vehicle) as a transportation indicator. We took the family's vehicle data from MAXIS. This data field is part of the original application for Medical Assistance (MA), cash assistance and food support. However, it may not be updated regularly.

C. Homelessness

The parents of approximately eight percent of children indicated on an enrollment form that they were homeless in the past five years. This is likely an underestimate as ‘homelessness’ is not defined for parents as they’re filling out the enrollment form. Further, this does not address housing insecurity, a precursor or successor to homelessness.

Is there evidence that people with this risk factor have worse health?

The National Health Care for the Homeless Council (2011) summarizes research connecting homelessness to poor health:

Living on the street or in crowded homeless shelters is personally stressful and made worse by being exposed to communicable disease (e.g. TB, respiratory illnesses, etc.), violence, malnutrition, and harmful weather exposure (O’Connell, 2004; Singer, 2003; Wrezel, 2009). Hence, common conditions such as high blood pressure, diabetes, and asthma become worse because there is no safe place to store medications or syringes properly. Maintaining a healthy diet is difficult in soup kitchens and shelters as the meals are usually high in salt, sugars, and starch (making for cheap, filling meals but lacking nutritional content) (Burt et. al., 1999, Davis et.al., 2008). Behavioral health issues such as depression or alcoholism often develop or are made worse in such difficult situations, especially if there is no solution in sight (Johnson & Chamberlain, 2011). Injuries that result from violence or accidents do not heal properly because bathing, keeping bandages clean, and getting proper rest and recuperation isn’t possible on the street or in shelters. Minor issues such as cuts or common colds easily develop into large problems such as infections or pneumonia (O’Connell, 2004; Wrezel, 2009).

Conditions among people who are homeless are frequently co-occurring, with a complex mix of severe physical, psychiatric, substance use, and social problems. High stress, unhealthy and dangerous environments, and an inability to control food intake often result in visits to emergency rooms and hospitalization which worsens overall health. Thus, it is not surprising that those experiencing homelessness are three to four times more likely to die prematurely than their housed counterparts, and experience an average life expectancy as low as 41 years (Morrison, 2009; Song et.al., 2007).^{10,11}

Community members describe similar experiences in their interviews with the Improve Group. There were a variety of ways in which homelessness is associated with poor health and with lack of health care. This included serious physical dangers and deprivations. Violent crime was a major concern in the small sample of interviews.

The 2012 Wilder Homeless Study confirms the prevalence of violence for Minnesotans experiencing homelessness. Nineteen percent of interviewed adults reported being physically or sexually assaulted while they were homeless, and 11% reported that the injury or illness required health care. Among unaccompanied youth, 30% have stayed in an abusive situation because they had no other housing options, and 17% have traded sex for necessities such as shelter or food.

Social Risk Factors in MHCP Payments: Phase 1

Physical deprivations such as lack of sleep, food, and warm shelter were also mentioned in the interviews. These are immediate health concerns such as frostbite as well as serious long-term health issues.

I don't have housing now. Slept at Salvation housing once, another place once. Been homeless 4-5 months, it's not that short of a time, but I'm still new to it and spin around a lot: trying to find places to sleep, not having enough sleep, or to eat. It takes a lot to survive while homeless, more effort than living in a house. (female, 18-25 years old)

Social service providers reported that getting health care is simply not a priority for people experiencing homelessness. Instead, they think 'minute to minute' about their most immediate needs.

Many clients are dealing with specific issues that are more urgent than health, like getting housing. If you tell them 'you need to make an appointment for health,' they tell you 'no, first thing is I need is a place to sleep.' Much of the time health is not a priority because of other crises.

Another theme in the interviews was mental illness and cognitive impairment in people experiencing homelessness. The Wilder study finds that more than half of adults experiencing homelessness had been told by a doctor or nurse that they have a serious mental illness such as major depression, bipolar disorder, personality disorder, or schizophrenia. This was also mentioned in the community member interviews. One community member mentioned that he avoids shelters because of his PTSD, which results in frostbite.

The Wilder study finds that 31% of homeless adults and 23% of unaccompanied youth reported evidence of Traumatic Brain Injury. A health care provider describes the health implications of the resulting cognitive impairment, including memory loss, inability to manage daily activities, and difficulty following treatment plans.

Health care providers focused mostly on what they see directly in their practices: patients experiencing homelessness are missing medical appointments, and not following through on their treatment plans. They are cognizant of the many reasons for this, including general life chaos.

Without stable housing, medications can be stolen, it's hard to do special treatments because they're on the streets all day, and you can't expect patients to carry items like medications or treatment equipment with them.

The financial consequences for the provider of patients missing scheduled appointments is one of the costs to providers which are not in their control, and are not accounted for in most DHS payment mechanisms.

How might DHS identify enrollees with this risk factor?

In the past, DHS has pulled homelessness from the MAXIS application form which asks for the applicant's address, and specifies that the applicant should write 'homeless' if they do not have

Social Risk Factors in MHCP Payments: Phase 1

an address. MinnesotaCare recipients and those enrolling through MNsure have a 'Check if homeless' box which they can check. It is unknown how applicants are interpreting these instructions and in which situations they would consider themselves to be homeless or to not have an address. While one applicant may interpret this to mean that they are 'homeless' if they are living doubled-up at a friend's house, another may simply write in the friend's address. For both enrollment systems, people who gave a known homeless shelter as their address can also be included in the homeless category.

Homelessness can be defined using different time spans (eg homeless in the past year vs. homeless in past five years). For this project, people will likely be considered homeless if the applicant on the case has indicated that they were homeless during any enrollment span during the past year.

D. Immigration

Immigration is a complicated social factor. Immigrants have, on average, better health than non-immigrants, despite indications that they face health challenges not faced by non-immigrants.

Is there evidence that people with this risk factor have worse health?

The research literature disputes the idea that immigration is a risk factor for poor health. In fact, substantial evidence instead finds a ‘healthy immigrant effect’; immigrants have better health than do non-immigrants. Some of these findings are described below.

Vang et al (2015) reviewed 77 studies that compared the health of immigrants who settled in Canada with people born in Canada. They found a strong healthy immigrant effect, especially among non-senior adults. For this age group, immigrants had better indicators of mental health, disability/functional limitations, and chronic conditions. Evidence of immigrants having better mortality and life expectancy was even stronger. All 13 studies which looked at mortality found this to be lower for immigrants than for Canadian-born residents, and life expectancy was longer for immigrants than for their gender group who is Canadian-born.

Argeseanu Cunningham et al (2008) reviewed 71 articles on immigrant health in the U.S. Their findings were very similar to those in the Canadian studies: they found immigrants to be healthier than people born in the U.S. This included mortality rates, chronic conditions such as heart disease, overweight and obesity, and mental disorders. The health advantage experienced by immigrants was even stronger when immigrants were compared with U.S.-born populations of their own racial/ethnic backgrounds.

Many studies find that the ‘healthy immigrant effect’ declines with time spent in the receiving country. This decline in health experienced by immigrants after their arrival is an important health concern. However, the evidence seems to point to immigrants’ health ‘converging’ on the health of US-born populations, and not ‘overshooting it’. In other words, once immigrants have been in the US for ten years or so, their health is approximately the same as that of US-born populations.

How might this risk factor impact health?

For this project, immigrants are not a population whose health needs addressing. Nevertheless, given the dual focus on provider costs as well as patient outcomes, this is a population that might need further investigation. Providers report that this can be a time-intensive population to treat, and we will thus review experiences of community members.

The community member interviews intentionally included people who had immigrated to the U.S.; 17 of 37 interviewed were born outside the U.S. These respondents described a variety of barriers to health related to immigration. They seldom mentioned the challenges of immigration, per se, but of how this interferes with access to health insurance, and cultural challenges with getting care.

Social Risk Factors in MHCP Payments: Phase 1

It's pretty difficult to get insurance. I'm here through the DREAM Act. We don't qualify for state insurance. That's really hard because insurance is expensive. I don't have access to doctors or meds if I need them. If I get really sick, I go to a community clinic. (female, 26-35 years old)

A few immigrants, as well as service providers, suggested that the Western medical model itself is a barrier. In contrast, medical providers described the challenges of encouraging patients to adapt to the medical model. This includes time spent to explain concepts specific to the Western model, including the need for ongoing treatment of chronic conditions.

Some culture groups not socialized within the Western medical model don't understand the concept of ongoing treatment for chronic conditions, such as high blood pressure or diabetes. They will follow their treatment for a limited period of time, and then stop. (Health care provider.)

A few interviewees did mention challenges directly related to immigration. A health care provider mentioned that some undocumented immigrants are hesitant to get care as they do not want their names to be registered. A community member mentioned the stress of being an immigrant.

New immigrants feel too much stress because of their situation, some may be admitted to the hospital. I went to the Emergency Room three times because of stress. (female, 26-35 years old)

Cultural and language barriers were closely intertwined for many. The Improve Group (2016) community engagement report summarized some of the language challenges:

Participants noted numerous challenges experienced by patients who do not have English fluency. One challenge discussed was that patients struggle to learn what services are available, how to apply for them, and how to access them. Challenges with interpreters were also mentioned: patients sometimes do not have interpreters, have negative experiences with interpreters, or have fears of having negative experiences with interpreters. A third issue raised is that when patients have limited English literacy, they are dependent on others for every step, including making appointments, arranging transportation, and handling payment or insurance.

How might DHS identify enrollees with this risk factor?

Enrollee immigrated to U.S. This indicator can be taken from MAXIS enrollment forms, which asks for a person's entry date into the U.S. If there was any entry date, we can categorize that person as having immigrated. For children age 0-18, we have also created an indicator of whether or not their parent immigrated.

Applicant speaks language other than English most of the time. We might include people in this category if they met either of the following criteria: 1) Applicant indicated they need an interpreter on MAXIS enrollment application, or 2) Applicant gave a language other than English as the one they speak most of the time on MAXIS enrollment application.

E. Enrollee mental illness

Is there evidence that people with this risk factor have poor health?

The life expectancy of people with Serious Mental Illness is 25 years shorter than that of the general population (National Association of State Mental Health Program Directors, 2006). This differential is largely caused by the following conditions which are several times more prevalent in the SMI population than they are in other populations: cardiovascular disease, diabetes, respiratory disease, and infectious disease.

The specific ways in which mental illness impacts people's health varies by the type of mental illness. We focus here on anxiety disorders, the most prevalent mental illness with 19% of adults experiencing one of these conditions in the past year, and mood disorders with 10% prevalence (Substance Abuse and Mental Health Services Administration, 2013).

Depression

Depression is the most common mood disorder, with 7% of adults in the U.S. reporting they experienced Major Depressive Disorder in the past year (SAMHSA, 2013). The National Institute of Mental Health (2015) reports that people with depression are at higher risk of developing several types of physical illnesses, such as cardiovascular disease, diabetes, stroke, and Alzheimer's disease. Pan et al (2011) combined results of 28 longitudinal studies and found that people with depression (generally assessed at baseline) were 45% more likely to have a stroke, and 55% more likely to die from stroke.

Posttraumatic Stress Disorder

Approximately 4% of adults in the U.S. report having Posttraumatic Stress Disorder in the past year (SAMHSA, 2013). This is not the most common anxiety disorder, but may be especially relevant for the MHCP population given the high levels of risk factors experienced by enrollees. There are indications that people with PTSD have higher rates of stomach problems, and pelvic-area problems in women (U.S. Department of Veterans Affairs, 2015). Andreski et al (1998) noted how common it is for people experiencing PTSD to have somatic symptoms (symptoms with no discernible organic cause). In particular, they noted that people with PTSD experience a high level of medically unexplained pain. A literature review found evidence that PTSD is also associated with hypertension and cardiovascular disease (McFarlane, 2010).

How might this risk factor impact health?

There are many theories linking mental illness with poor physical health. The theorized pathways vary by the type of mental illness. One commonly proposed pathway is through health behaviors such as poor diet, lack of exercise, smoking, and lack of medication compliance. For people with existing chronic medical conditions, self-care regimens may be necessary to prevent worsening of symptoms and of the disease itself. This can be a problem for people with mental illness due to lowered motivation (Robert Wood Johnson Foundation, 2011), disorganized thinking, and paranoid ideation (National Association of State Mental Health Program Directors, 2006).

Social Risk Factors in MHCP Payments: Phase 1

The National Association of State Mental Health Program Directors (2006) also notes that mental illness symptoms may mask symptoms of physical illnesses, so they go undetected. Further, they note that people with Serious Mental Illness receive fewer preventive health care visits, an important way of identifying physical conditions early.

Depression

Pan et al. (2011) proposes three pathways whereby depression might increase the risk of stroke. The first is through health behaviors, as described above. The second is through other diseases such as diabetes and hypertension, which are more prevalent among people with depression, and are important risk factors for stroke. The third is through poor function in the neuroendocrine and immunological/inflammation systems.

Posttraumatic Stress Disorder

Jankowski (2016) notes that the physical symptoms associated with PTSD may be mediated by behavioral risk factors similar to those noted for depression. McFarlane (2010) focuses on the involvement of the sympathetic nervous system (the system which regulates the body's automatic functions during a 'fight or flight' response). He describes this process in a person with PTSD in the following way. A person experiences a traumatic event and is later unable to turn off memories of the event, especially when encountering experiences that remind them of the original event. They experience a fear response, often with hyperarousal, with increased blood pressure and heart rate, similar to what they would experience when faced with actual danger. They are unable to 'turn off' the arousal in their sympathetic nervous system. This is the pathway theorized between PTSD and diseases such as hypertension and cardiovascular disease.

Interviewed community members had a lot to say about mental illness. Stress, and the toll this takes on their mental health, was a major factor in their narratives.

Yeah, I have memory loss, but not from being hit on the head. I've gone through so much, I forget stuff. It changes your attitude. (female, 18-25 years old)

Stigma was the biggest barrier discussed related to mental health care. While it was described as a barrier for US born populations, it was a much bigger barrier in immigrant populations;

There's a lot of stigma around mental health, and we've been working hard with our families on trying to normalize that. We start from a stress management standpoint, then go on to other mental health issues. We treat it like any other health issue. A lot of new moms come in with post-partum issues, but many haven't heard of post-partum depression so we need to educate them on that. We come from wrap-around of educating all families around pregnancy and depression, then about trauma because many of our families come from trauma situations. (Program Director, transitional housing and general social service)

Respondents also talked about problems accessing mental health services, including wait times to get services. Access concerns were also raised in the much larger sample of service providers, service recipients and other stakeholders interviewed for the 2015 DHS Gaps Analysis Study (Wilder Research, 2015). Difficulty navigating health insurance systems to get mental health

services can be difficult for anyone. It can pose an even bigger barrier for people who are struggling with mental illness. Intermixed with issues of access, are lack of knowledge about what services exist. Social service providers mentioned wait times for treatment as a barrier.

How might DHS identify enrollees with this risk factor?

Enrollees who have claims/encounters with a mental illness diagnosis are counted as having mental illness. This will likely undercount the actual number of enrollees with mental illness.

Serious and Persistent Mental Illness. Enrollees are considered to have a Serious and Persistent Mental Illness (SPMI) if they meet two criteria, as operationalized by the DHS Adult Mental Health division.

First, they had to have one of the following mental illness diagnoses: Schizophrenia or Schizoaffective Disorder (295.X), Borderline Personality Disorder (301.83), Major Depression Disorder (296.2 – 296.3X) or Bipolar disorder (296.0X, and 296.4X – 296.8X).

Second, the enrollee must have received one of the following mental illness services which are both intensive and only available to people found to need a high level of care. The service categories used to represent them are the following: Inpatient MH Service (MH diagnosis was first in the list of diagnoses), MH-Targeted Case Management, MH Rehab Services CTSS, ACT, ARMHS, Day Treatment, Residential Treatment (IRTS or Rule 5), MH Crisis Services-Intervention or Stabilization, or at least 15 therapy sessions during the year.

To be flagged as having SPMI, the parent also must have *not* received a Developmental Disability Waiver and did not live in a DD/MR residential facility. The look-back period for both indicators of mental illness is 18 months. Researchers pulled all mental illness data from MMIS.

Parent has Serious Mental Illness. States receive federal block grant funding to serve people with Serious Mental Illness (SMI). The federal government defines this in a uniform way as people experiencing moderate functional impairment. However, DHS lacks data on the functional status of the majority of recipients, so the Adult Mental Health division operationalizes SMI using diagnosis codes. Other states may operationalize SMI differently. In general, these mental health conditions interfere with some area of social functioning.

F. Enrollee chemical dependency

The chemical dependency indicator in DHS data comes from diagnosis codes on medical claims and encounters, and is thus a more serious indicator than ‘excessive’ alcohol use, the indicator described elsewhere in this section. In 2013, 10% of children enrolled in an MHCP program had at least one custodial parent enrolled in an MHCP program who had a chemical dependency diagnosis within the past 18 months.

Is there evidence that people with this risk factor have poor health?

Chemical use, abuse, and dependency are associated with many negative outcomes. This section focuses on the health outcomes of alcohol, the most common drug in the U.S. The health risks for abuse and dependence on other drugs varies dramatically by drug, and will not be described here.

The Centers for Disease Control (CDC) describes a wide variety of health risks associated with excessive alcohol use (defined as binge drinking, heavy drinking, or any drinking by pregnant women or people younger than age 21) (CDC: Fact Sheets – Alcohol Use and Your Health). The CDC reports that excessive drinking is responsible for 10% of deaths among adults age 20-64 years. Its short-term health risks include alcohol poisoning, risky sexual behaviors, and negative pregnancy outcomes. The list of long-term health risks is much longer, and includes high blood pressure, heart disease, stroke, liver disease, various cancers, learning and memory problems, mental health problems, and of course alcohol dependence and alcoholism.

Excessive alcohol use also impacts people’s health through injuries and violence such as motor vehicle crashes, falls, drownings and burns. In Minnesota, 88 people died in motor vehicle crashes where alcohol was involved in 2014 (24% of all such fatalities). An additional 2,040 people were injured in alcohol-related vehicle crashes (Minnesota Dept. of Public Safety). Alcohol is also a long-term health risk involving violence such as homicide, suicide, sexual assault, and intimate partner violence (CDC: Fact Sheets – Alcohol Use and Your Health).

In community interviews, problems related to chemical dependency were only mentioned as a barrier to health by social service and medical providers – not by any of the community members themselves. One medical provider mentioned the bureaucracy related to rule 25 assessments for publicly funded chemical dependency treatment as a barrier for homeless populations. Also, once someone has completed treatment, this provider said that if they have to return to a negative environment such as a homeless shelter, they are more likely to relapse. A social service provider mentioned waiting lists as being a barrier to treatment. The 2015 Listening Sessions Summary Report (MN DHS, 2015) identified access problems especially for subpopulations (e.g. people of color, LGBTQ youth). Another medical provider mentioned how difficult it is for people who have impaired functioning due to intoxication to follow treatment. A social service provider suggested that childcare is necessary for single parents to access treatment.

How might this risk factor impact health?

Social Risk Factors in MHCP Payments: Phase 1

Drinking too much alcohol, over time or on a single occasion, affects multiple systems in the human body (National Institute on Alcohol Abuse and Alcoholism). It interferes with communication pathways in the brain, people's moods, behaviors, and makes it more difficult for people to think. It also impacts the heart, and can result in high blood pressure, stroke, and arrhythmias. It specifically harms the liver and the pancreas. It also weakens the immune system, making people more susceptible to disease. Even drinking a lot on a single occasion will reduce the body's ability to fight infections for the next 24 hours. Luckily, many health problems diminish or even reverse once a person stops using alcohol.

How might DHS identify enrollees with this risk factor? This measure only counts people as chemically dependent if they received chemical dependency treatment, paid for by MA or MinnesotaCare, in the past 18 months. We expect this significantly underestimates the total number of people who are chemically dependent. We plan to identify treatment using claims and encounter data in MMIS, using a look-back period of 18 months.

The Alcohol and Drug Abuse Division provided the diagnoses used to construct this variable. They include alcohol dependency syndrome (303.X) and drug dependence (304.X). It also includes non-dependent abuse of drugs (305.X except for tobacco use disorder 305.1). This diagnosis suggests that the parent is not dependent on the substance, but there is some problem associated with their use. A few medical diagnoses were also included. They indicated that there has at least historically been a significant abuse of chemicals. These include alcohol or drug induced mental disorders (291.X or 292.X), alcoholic gastritis (535.3) or acute alcoholic hepatitis (571.1).

G. Diminished parental functioning

Family members can be important to everyone, but are especially important to the health and development of children. The data in this and the next section are based on a report describing the risk factors of children on MHCP programs during 2013 (MN DHS, April 2015). Parental chemical dependency, parental serious mental illness and child maltreatment are serious risk factors for children's healthy development. The indicators in this section are almost certainly underestimates, as a parent has to have received a particular diagnosis or to have come to the attention of Child Protection services to be counted as having the risk factor.

Parent has chemical dependency diagnosis

Parents of one in ten MHCP children had a chemical dependency diagnosis in the past 18 months. This is a troubling number, given how substance use can impair the parent's overall ability to care for the child and, in particular, his or her emotional responsiveness (Dawe, Harnett & Frye, 2008).

Parent has mental illness

Parents of five percent of MHCP children met the criteria for Serious and Persistent Mental Illness (SPMI). Only people who are receiving intensive mental health services and have one of four serious diagnoses meet this criterion. A more common indicator is that of "Serious Mental Illness" (SMI). This indicator does not require intensive services but only particular diagnosis codes. Thirteen percent of MHCP children have parents who meet this criterion.

Mental illness in a parent can be a concerning situation, especially if untreated. These children may encounter many barriers to their own healthy emotional development (Orel, Groves & Shannon, 2003). They may experience fear, anger, guilt, shame or other feelings about their parent's illness (Blanch, Nicholson & Burcell, 1998). They may also be required to take on adult-like responsibilities at an early age, thus focusing less on their own development.

Child received child protection services

One in five MHCP children received Child Protection services within the last five years. These children may have been subjects of a Family Investigation or a Family Assessment during that time. Alternatively, they may have been subjects of a Family Investigation or Assessment in the past and sometime during those five years received post-assessment/investigation services to address risk or safety issues.

How might this risk factor impact health?

The American Academy of Pediatrics (2014) notes that "when a child experiences strong, frequent or prolonged adversity, such as physical or emotional abuse, chronic neglect, caregiver substance abuse or mental illness...in the absence of adequate adult support" (p. 2), the toxic stress disrupts healthy development and has long-term detrimental effects on the health and well-being of these individuals.

How might DHS identify enrollees with this risk factor?

DHS identifies children's parents through familial relationship fields. Chemical dependency and mental illness are identified in parents the same way as they are in the adult enrollees. The biggest difference is that this parental data will be missing if a child's parent is not enrolled in a MHCP program.

Child Safety and Permanency division staff pull child protection data from the Social Service Information System (SSIS). Children are included in the category of having received Child Protection services if they were the subject of a Family Investigation, a Family Assessment or received post-assessment services. In the past, we have used a one-year and a five-year look-back period.

H. Caregiver capacity and need

This section contains information about a family's caregiving capacity and needs, which together may give some indication of the adequacy. The picture is far from complete, as it only includes spouses; no other family members who provide care are included. This section includes information on the prevalence of these risk factors, we included information from a literature review on social risk factors associated with access to health care and health utilization indicators (but not to health outcomes). There are no comments from the community interviews as respondents were asked to talk about their own health care, not that of their children.

Parent is unmarried

Although less than one-third (29%) of all Minnesota children live with an unmarried parent, nearly two-thirds (63%) of children enrolled in MHCP programs live with an unmarried parent. Extensive research finds better outcomes for children living with married parents than for those living with single or co-habiting parents. For example, among children in the general population (Gorman & Braverman, 2008) or those with asthma (Chen & Escarce, 2008) or diabetes (Thompson, Auslander & White, 2001), those with a single parent had health care utilization that conformed less to expectations (e.g., more missed clinic visits).

Four or more children in household

One-quarter of MHCP children (23 percent) live in a family with at least four children under the age of 18 (including themselves). In comparison, only six percent of all Minnesota children live in a family with four or more children. Families with unmarried parents, and four or more children, might be considered indicators of a caregiver burden, especially if they have both characteristics. These indicators were common in populations served by all DHS safety net programs.

One researcher found that families with four or more children have more unmet mental health needs than other children (Fulda et. al., 2009), but this was only the case with low-income families (<133 percent FPG). Since almost all children served by DHS safety net programs have low family income, having four or more children in the household appears to be an important independent risk factor.

Child in household is medically complex

Among MHCP children, 17 percent live in households in which at least one child has a complex, chronic medical condition. These families require more caregiving time and effort to meet the child's medical and other needs. This could mean that other children's needs may not be addressed as quickly as needed. For families with multiple children with special health care needs, their use of specialists and prescriptions was significantly lower compared to families with a single child with special health care needs (Porterfield & McBride, 2007).

Parent is disabled or has very high health care utilization

Parents of eight percent of MHCP children used a very high level of medical resources or are eligible for MHCP programs due to a disability. These children have at least one parent who may need to put a significant amount of time and effort into his or her own medical care, leaving less time to care for children.

How might this risk factor impact health?

Getting children all recommended health care and following recommended treatment plans takes time and effort. Families with more children, or more members with high medical needs are likely to require greater time and effort from caregivers to meet all children's needs. Further, families with only one parent (or without married parents, as in this analysis) may not have as many people to care for the dependents. In these families, children may not receive the care they would otherwise receive.

How might DHS identify enrollees with this risk factor?

Parent is Unmarried: We used DHS enrollment records to identify unmarried parents. Application forms ask for marital status, but may not be updated on a regular basis. For all data sources, children are considered to have unmarried parents if the parent is co-habiting but not married.

Four or more Children in Household: If a child had three or more siblings under the age of 18 living with him/her and on the same case, we considered the family to have four or more children.

Medical Complexity in a Child: We used the Pediatric Medical Complexity Algorithm (Simon et. al., 2014) to determine whether the target child, or at least one of the children in the household (including the target child) was medically complex. The child's claims data from 01/01/2011 – 12/31/2013 was used to categorize them according to whether they have no chronic medical conditions, a single non-complex chronic condition or one or more medically complex chronic conditions. This last group, identified in this indicator, includes children with:

- a) Significant chronic condition in two or more body systems;
- b) Progressive condition associated with deteriorating health and decreased life expectancy in adulthood,
- c) Continuous dependence on technology for at least six months, or
- d) Progressive or metastatic malignancies which impact life function.

Adult Enrollee has High Health Care Use: This indicator relies on parents being enrolled in Medical Assistance (MA) or MinnesotaCare for its data. Parents who are not enrolled in an MHCP program do not have the opportunity to be identified as a high user of medical care. Therefore, this indicator may be an underestimate, as there may be parents who would qualify for the measure, but they do not receive health care through a public program.

Social Risk Factors in MHCP Payments: Phase 1

MA and MinnesotaCare claims and encounter forms provide data on parents' medical condition. This was measured using a different tool than used to identify medically complex children above. The Johns Hopkins' Adjusted Clinic Groups Resource Utilization Band (RUB) score of five out of five (very high resource utilization) was used as a proxy for parents having a medically complex condition. Only 2.7 percent of the adult U.S. population age 18 to 64 has a RUB score this high (Personal communication with Amy Salls, DST Health Solutions on October 24, 2013).

For children, an indicator was constructed which indicates whether or not they have a custodial parent with high health care use.

I. Other risk factors

Many risk factors are not addressed in this report. These include demographics such as geographic location and race/ethnicity, physical and mental conditions such as disability, frailty, and developmental disability, and highly sensitive indicators such as incarceration and sex work. These were not mentioned often in the community interviews, but some did come up in the following ways.

Rural residence

Community members were recruited for interviews from social service agencies, all of which were located in the Minneapolis/St. Paul metropolitan area, so the health challenges with living in a rural area were seldom discussed. However, one of the providers works in a rural area of northern Minnesota and described the long distances many patients need to travel in order to get to health care appointments. Without public transportation, with unreliable vehicles and lacking money for gas, this can be very difficult. Even for people with reliable cars, given the large distances involved, they have a need to bundle health care appointments together on the same day. This can be a challenge for some providers as this can result in lower MHCP reimbursement than if the services were provided over multiple visits.

Race/Ethnicity

The health disparities experienced by people of different racial and ethnic groups is substantiated by extensive research evidence. Racial/ethnic discrimination was mentioned only twice in the community interviews, both times related to the respondent's immigrant group.

I've seen it first-hand where nobody really cares what you say, and you're made to feel really stupid. Culture-wise, too, and I've had a lot of workers ... who don't like Somali women cause they've always looked down on how you wear your skirts, you know, everyone's human, and the workers have shared that with me – oh you're such a great person- but then are biased toward other people because of that reason. (female, 26-35 years old)

Concentrated poverty

This indicator has been operationalized as a person living in a census tract with at least 20 percent of residents living below the poverty guideline (100 percent FPG). We use Table S1701 "Poverty status in the past 12 months," from the 2008-2012 American Community Survey Five-Year Estimates for data on MHCP and all Minnesota children. We select poverty data for each census tract in Minnesota and download the data from the American FactFinder tool on the US Census Bureau website: <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>. We merge the percentage of people in a census tract living in poverty from the Census Bureau with data on the census tract for each child's home address.

Disability, frailty, and developmental disability

Disability, frailty, and developmental disability are physical and mental statuses which may make it more difficult to access health care and to stay healthy. None of the community

Social Risk Factors in MHCP Payments: Phase 1

interview questions related to these statuses and it is not known if any respondents have these risk factors. These factors were not raised in the community interviews.

Enrollee has a Disability. Enrollees were considered to have a disability if their eligibility for MHCP is based on a disability status. MA and MinnesotaCare enrollment records provide this data. For children, an indicator was constructed which indicates whether or not they have a custodial parent with a disability.

Enrollee is frail. We use the Johns Hopkins Frailty indicator. This is based on the enrollee having one or more diagnoses that are highly associated with functional limitations in a population of older individuals. Examples of diagnoses include profound vision impairment in both eyes, abnormal weight loss and underweight, fall from wheelchair. The indicator is available on enrollees of all ages, though it is much more common among MHCP seniors, especially those age 85 or older.

Enrollee has a Developmental Disability. We use the Johns Hopkins Developmental Disorder Expanded Diagnosis Cluster (EDC) to identify people with a developmental disability. EDC's cluster a variety of diagnoses together into a broad category.

Domestic violence

In the community interviews, domestic violence was said to be related to people's mental illness, homelessness and chemical dependency. The stigma related to domestic violence was seen as especially problematic. Sex work was also mentioned as a risk factor.

Domestic violence is an issue. We do partner with organizations, in pockets of the population stigma is high for them, safety across the board an issue. (Program Director, transitional housing and general social service)

Criminal record

Challenges associated with having a criminal record related to accessing basic resources such as housing.

Having a felony makes it harder to find housing and work. (male, 26-35)

VI. Conclusions and Next Steps

This limited review of literature and small sample of interviews with community members identified some social risk factors that are associated with poor health. Six of the social factors investigated in this report had strong evidence of being associated with poor health: low educational attainment, poverty, homelessness, mental illness, chemical dependency, and diminished parental functioning.

Only one indicator was found to be associated with *better* health than that experienced by those without the indicator. This indicator is immigration status. Nevertheless, the community interviews suggest that this population may be more costly for providers to treat than non-immigrants – such as when treating patients requires coordinating with interpreters and explaining the Western medical model. For this reason, immigration will be included for consideration in the next phase of evaluating risk factors associated with performance and cost.

Next Steps

Phase I: The final Phase I report will add MA payment and performance measure data to the data compiled in this report, and will identify the target populations that will be the focus of payment methodologies. Once the target populations have been identified, work will begin to identify the interventions which are most effective at improving the health and health care performance of these populations. This will include reviewing health care and non-health care interventions.

Phase II: We will begin development of payment methodology options once we know which interventions show the most promise in improving the health of people in our target populations. Once the methodology is complete, we will submit this to the legislature for their consideration.

VII. References

- American Academy of Pediatrics. (2014). *Adverse childhood experiences and the lifelong consequences of trauma*. Retrieved from http://www.aap.org/en-us/Documents/ttb_aces_consequences.pdf
- Anderson LM, Scrimshaw SC, Fullilove MT, Fielding JE; Task Force on Community Preventive Services. The Community Guide's model for linking the social environment to health. *Am J Prev Med*. 2003;24(3 Suppl):12-20.
- Addington, J., Case, N., Saleem, M. M., Auther, A. M., Cornblatt, B. A., & Cadenhead, K. S. (2014). Substance use in clinical high risk for psychosis: A review of the literature. *Early Intervention in Psychiatry*, 8(2), 104-112. DOI: 10.1111/eip.12100
- Agardh, E., Allebeck, P., Hallqvist, J., Moradi, T., & Sidorchuk, A. (2011). Type 2 diabetes incidence and socio-economic position: A systematic review and meta-analysis. *International Journal of Epidemiology*, 40(3), 804-818. DOI: 10.1093/ije/dyr029
- Alcantara, C., Casement, M. D., & Lewis-Fernandez, R. (2013). Conditional risk for PTSD among Latinos: A systematic review of racial/ethnic differences and sociocultural explanations. *Clinical Psychology Review*, 33(1), 107-119. DOI: 10.1016/j.cpr.2012.10.005
- Amaral Cda, S., Vettore, M. V., & Leao, A. (2009). The relationship of alcohol dependence and alcohol consumption with periodontitis: A systematic review. *Journal of Dentistry*, 37(9), 643-651. DOI: 10.1016/j.jdent.2009.04.011
- Andreski P, Chilcoat H, Breslau N. Post-traumatic stress disorder and somatization symptoms: a prospective study. *Psychiatry Res* 1998;79:131-8.
- Bartoli, F., Carra, G., Brambilla, G., Carretta, D., Crocamo, C., Neufeind, J., ... Clerici, M. (2014). Association between depression and non-fatal overdoses among drug users: A systematic review and meta-analysis. *Drug and Alcohol Dependence*, 134, 12-21. DOI: 10.1016/j.drugalcdep.2013.10.007
- Boillot, A., El Halabi, B., Batty, G. D., Range, H., Czernichow, S., & Bouchard, P. (2011). Education as a predictor of chronic periodontitis: A systematic review with meta-analysis population-based studies. *PLoS One*, 6(7), e21508. DOI: 10.1371/journal.pone.0021508
- Brooks-Gunn J, Duncan GJ. The effects of poverty on children. *Future Child*. 1997;7(2):55-71.
Berkman LF, Kawachi I. A historical framework for social epidemiology. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. New York, NY: Oxford University Press; 2014:1-16.
- Bureau of Justice Statistics. National Crime Victimization Survey API .
<http://bjs.ojp.usdoj.gov/developer/ncvs/index.cfm>(bjs.ojp.usdoj.gov). Accessed July 5, 2015.
- Burt, M.R., Aron, L.Y., Douglas, T., et al. Homelessness: Programs and the People they Serve: Findings of the National Survey of Homeless Assistance Providers and Clients. Washington, D.C.: Interagency Council on the Homeless, Dept. of Housing and Urban Development. Dec 1999.
- Centers for Disease Control and Prevention. Fact Sheets- Alcohol Use and Your Health. Downloaded from <http://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm> on March 14, 2016.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New Jersey: Lawrence Erlbaum.
- Cunningham, SA, Ruben, JD, and Narayan, KMW. (2008). Health of foreign-born people in the United States: a review. *Health & Place*, 14(4), 623-635.

Social Risk Factors in MHCP Payments: Phase 1

- Davis, L.R., Weller, N.F., Jadhav, M., et al. (2008). Dietary intake of homeless women residing at a transitional living center. *J Health Care Poor Underserved*, 19(3): p. 952-62.
- De Maio, F. G. (2010). Immigration as pathogenic: A systematic review of the health of immigrants to Canada. *International Journal for Equity in Health*, 9, 27. DOI: 10.1186/1475-9276-9-27
- Deeks, J. J., Higgins, J. P. T., & Altman, D. G. (2011). Chapter 9: Analysing data and undertaking meta-analyses. *Cochrane Handbook for Systematic Reviews of Interventions*. Version 5.1.0. Retrieved from www.cochrane-handbook.org.
- El-Sayed, A. M., Scarborough, P., & Galea, S. (2011). Ethnic inequalities in obesity among children and adults in the UK: A systematic review of the literature. *Obesity Reviews*, 12(5), e516-534. DOI: 10.1111/j.1467-789X.2010.00829.x
- El-Sayed, A. M., Scarborough, P., & Galea, S. (2012). Unevenly distributed: A systematic review of the health literature about socioeconomic inequalities in adult obesity in the United Kingdom. *BMC Public Health*, 12, 18. DOI: 10.1186/1471-2458-12-18
- Evans GW, Kim P. Childhood poverty and health: cumulative risk exposure and stress dysregulation. *Psychol Sci*. 2007;18(11):953-957.
- Farah MJ, Noble KG, Hurt H. Poverty, privilege, and brain development: empirical findings and ethical implications. In: Illes J, ed. *Neuroethics: Defining the Issues in Theory, Practice, and Policy*. New York: Oxford University Press; 2005.
- Foundation for Healthy Generations. (2014-15). Health, Safety & Resilience: Foundations for Health Equity. <http://www.healthygen.org/sites/default/files/Online%20Version%202014-2015%20Statewide%204-21-15.pdf>
- Harding, K., Galano, J., Martin, J, Huntington, L., & Schellenbach, C. J. (2007). Healthy Families America effectiveness: A comprehensive review of outcomes. *Journal of Prevention and Intervention in the Community*, 34(1/2), 149-179.
- The Improve Group. (2016). Health Disparities Project: Social risk factors that limit wellness, and potential mitigating supports. Available at: <https://edocs.dhs.state.mn.us/lfserver/Public/DHS-3924-ENG>
- Government Accountability Office. (August, 2007). Unemployment Insurance: Low Wage Workers and Part-time Workers Continue to Experience Low Rates of Receipt”, Report to the Chairman, Subcommittee on Income Security and Family Support, Committee on Ways and Means, House of Representatives.
- Heiman, H. J., & Artiga, S. (Producer). (2015). Beyond health care: The role of social determinants in promoting health and health equity. Retrieved from <http://kff.org/disparities-policy/issue-brief/beyond-health-care-the-role-of-social-determinants-in-promoting-health-and-health-equity/>
- Kirkbride, J. B., Errazuriz, A., Croudace, T. J., Morgan, C., Jackson, D., Boydell, J., ... Jones, P. B. (2012). Incidence of schizophrenia and other psychoses in England, 1950-2009: A systematic review and meta-analyses. *PLoS ONE*, 7(3). DOI: <http://dx.doi.org/10.1371/journal.pone.0031660>
- Johnson, G. & Chamberlain, C. (2011) Are the homeless mentally ill? *Australian Journal of Social Issues*, 46(1): p. 29-48.
- Lev-Ran, S., Roerecke, M., Le Foll, B., George, T. P., McKenzie, K., & Rehm, J. (2014). The association between cannabis use and depression: A systematic review and metaanalysis of longitudinal

Social Risk Factors in MHCP Payments: Phase 1

- studies. *Psychological Medicine*, 44(4), 797-810. DOI: <http://dx.doi.org/10.1017/S0033291713001438>
- Lipina SJ, Colombo JA. Poverty and Brain Development During Childhood: An Approach from Cognitive Psychology and Neuroscience. Washington, DC: American Psychological Association; 2009.
- Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B. W., & Zitman, F. G. (2010). Overweight, obesity, and depression: A systematic review and meta-analysis of longitudinal studies. *Archives of General Psychiatry*, 67(3), 220-229. DOI: <http://dx.doi.org/10.1001/archgenpsychiatry.2010.2>
- Macintyre S, Ellaway A, Cummins S. Place effects on health: how can we conceptualise, operationalise and measure them? *Soc Sci Med*. 2002;55(1):125-139.
- McCambridge, J., McAlaney, J., & Rowe, R. (2011). Adult consequences of late adolescent alcohol consumption: A systematic review of cohort studies. *PLoS Med*, 8(2), e1000413. DOI: 10.1371/journal.pmed.1000413
- McFarlane, A.C. (2010). The long-term costs of traumatic stress: intertwined physical and psychological consequences. *World Psychiatry*, 2010(9), 3-10.
- Milgrom, J., Skouteris, H., Worotniuk, T., Henwood, A., & Bruce, L. (2012). The association between ante- and postnatal depressive symptoms and obesity in both mother and child: A systematic review of the literature. *Womens Health Issues*, 22(3), e319-328. DOI: <http://dx.doi.org/10.1016/j.whi.2011.12.001>
- Labor Market Information Office (2005). Minnesota Employee Benefits Survey, Minnesota Department of Employment and Economic Development and State Society of Human Resource Managers. http://www.positivelyminnesota.com/Data_Publications/Data/LMI/PDFs/2005_Employee_Benefits_Survey/Complete_Survey.pdf
- Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav*. 1995;Spec No:80-94.
- Minnesota Department of Health. (October, 2013). Advancing Health Equity in Minnesota. Available at <http://www.health.state.mn.us/divs/chs/healthequity/definitions2013.pdf>
- Minnesota Department of Human Services, Alcohol and Drug Abuse Division. (March, 2013). Minnesota's Model of Care for Substance Use Disorder. Legislative Report. <http://www.leg.state.mn.us/docs/2013/mandated/130622.pdf>
- Minnesota Department of Human Services. (April 2015). How prevalent are family risk factors among Minnesota children who receive Medical Assistance (MA) or MinnesotaCare. Available at <https://edocs.dhs.state.mn.us/lserver/Public/DHS-7079-ENG>
- Minnesota Department of Human Services, Alcohol and Drug Abuse Division. (March 2016). 2015 Listening Sessions Summary Report.
- Minnesota Department of Human Services. (2016). Minnesota Health Care Programs: Summary of Coverage, Cost Sharing and Limits. Available at <http://edocs.dhs.state.mn.us/lserver/Public/DHS-3860-ENG>
- Minnesota Department of Public Safety. Reports and Statistics. Downloaded from <https://dps.mn.gov/divisions/ots/reports-statistics/Pages/default.aspx> on 03/14/2016.

Social Risk Factors in MHCP Payments: Phase 1

- Minozzi, S., Davoli, M., Bargagli, A. M., Amato, L., Vecchi, S., & Perucci, C. A. (2010). An overview of systematic reviews on cannabis and psychosis: Discussing apparently conflicting results. *Drug & Alcohol Review*, 29(3), 304-317. DOI: <http://dx.doi.org/10.1111/j.1465-3362.2009.00132.x>
- Morrison, D.S. (2009). Homelessness as an independent risk factor for mortality: results from a retrospective cohort study. *Int J Epidemiol*, 38(3): p. 877-83.
- Murali V, Oyebode F. Poverty, social inequality and mental health. *Advances in Psychiatric Treatment*. 2004;10(3):216-224.
- Oregon Health & Sciences University. (2016). Associations of Social Indicators and Health Outcomes: A Review of Systematic Reviews. Available at: <https://edocs.dhs.state.mn.us/lfserver/Public/DHS-3923-ENG>
- National Association of State Mental Health Program Directors. (October, 2006). Morbidity and Mortality in People with Serious Mental Illness. Available at: <http://www.nasmhpd.org/sites/default/files/Mortality%20and%20Morbidity%20Final%20Report%208.18.08.pdf>
- National Health Care for the Homeless Council. (2011). Homelessness & Health: What's the connection? Available at: http://www.nhchc.org/wp-content/uploads/2011/09/Hln_health_factsheet_Jan10.pdf
- National Institute on Alcohol Abuse and Alcoholism. Beyond Hangovers: Understanding alcohol's impact on your health. NIH Publication No 15-7604. October 2015. Downloaded March 14, 2016 from <http://pubs.niaaa.nih.gov/publications/Hangovers/beyondHangovers.pdf>
- National Institute of Mental Health. Chronic Illness & Mental Health. NIH Publication No. 15-MH-8015. <http://www.nimh.nih.gov/health/publications/chronic-illness-mental-health-2015/index.shtml>
- O'Connell, J.J. (Ed.) (2004). *The health care of homeless persons: A manual of communicable diseases and common problems in shelters and on the streets*. The Boston Health Care for the Homeless Program. Retrieved from <http://www.nhchc.org/shelterhealth.html>
- Pan, A., Sun, Q., Okereke, O.I., Rexrode, K.M., & Hu, F.B. (2011). Depression and the risk of stroke morbidity and mortality: A meta-analysis and systematic review. *JAMA*, 306(11): 1241-1249.
- Phelan JC, Link BG, Tehranifar P. Social conditions as fundamental causes of health inequalities: theory, evidence, and policy implications. *J Health Soc Behav*. 2010;51 Suppl:S28-S40.
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385-401.
- Riste L, Khan F, Cruickshank K. High prevalence of type 2 diabetes in all ethnic groups, including Europeans, in a British inner city: relative poverty, history, inactivity, or 21st century Europe? *Diabetes Care*. 2001;24(8):1377-1383.
- Robert Wood Johnson Foundation. (February 2011). Mental disorders and medical comorbidity. Policy Brief No. 21. http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2011/rwjf69438
- Singer, J. (2003). Taking it to the streets: Homelessness, health, and health care in the United States. *Journal of General Internal Medicine*, 18(11): p. 964-965.
- Song, J., Ratner, E.R., Bartels, D.M., et al. (2007). Experiences with and attitudes toward death and dying among homeless persons. *Journal of General Internal Medicine*, 22: p. 427-434.

Social Risk Factors in MHCP Payments: Phase 1

- Substance Abuse and Mental Health Services Administration. (2013). Behavioral Health, United States, 2012. HHS Publication No. (SMA) 13-4797. Rockville, MD: Substance Abuse and Mental Health Services Administration. Simpson, S. M., Krishnan, L. L., Kunik, M. E., & Ruiz, P. (2007). Racial disparities in diagnosis and treatment of depression: A literature review. *Psychiatric Quarterly*, 78(1), 3-14. DOI: <http://dx.doi.org/10.1007/s11126-006-9022-y>
- U.S. Department of Veterans Affairs. (2015). PTSD: National Center for PTSD. Sleep and PTSD. <http://www.ptsd.va.gov/public/problems/sleep-and-ptsd.asp>
- Vang, E., Sigouin, J., Flenon, A., & Gagnon, A. (2015). The healthy immigrant effect in Canada: A systematic review. *Population Change and Lifecourse Strategic Knowledge Cluster Discussion Paper Series*, 3(1), 1-41.
- Vyas, A., Greenhalgh, A., Cade, J., Sanghera, B., Riste, L., Sharma, S., & Cruickshank, K. (2003). Nutrient intakes of an adult Pakistani, European and African-Caribbean community in inner city Britain. *Journal of Human Nutrition and Diet*, 16(5), 327-337.
- Wells, J. E., Horwood, L. J., & Fergusson, D. M. (2006). Stability and instability in alcohol diagnosis from ages 18 to 21 and ages 21 to 25 years. *Drug and Alcohol Dependence*, 81(2), 157-165. DOI: 10.1016/j.drugalcdep.2005.06.006
- Wilder Research. (September 2013). Homelessness in Minnesota: Findings from the 2012 statewide homeless study. Available at: <http://www.wilder.org/Wilder-Research/Publications/Studies/Homelessness%20in%20Minnesota%202012%20Study/Homelessness%20in%20Minnesota%20-%20Findings%20from%20the%202012%20Statewide%20Homeless%20Study.pdf>
- Wilder Research (August 2015). DHS Gaps Analysis Study. Downloaded on March 16, 2016 from: <http://mn.gov/dhs/partners-and-providers/continuing-care/data-measures/gaps-analysis/current-study/index.jsp>
- World Health Organization. (2016). Social determinants of health. Retrieved from http://www.who.int/social_determinants/en/
- Wrezel, O. (2009). Respiratory infections in the homeless. *UWO Medical Journal*, 78(2): p. 61-65.
- Zunzunegui, M. V., Forster, M., Gauvin, L., Raynault, M. F., & Douglas Willms, J. (2006). Community unemployment and immigrants' health in Montreal. *Social Science & Medicine*, 63(2), 485-500. DOI: 10.1016/j.socscimed.2006.01.004