U.S. Mobile Clinics, Chronic Diseases, And Healthcare Access Barriers In Low Income Populations

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By Sherry Leonard
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Abstract

Background Health disparities derived from healthcare barriers affect low income populations in the United States. Barriers that lead to decreased access, increased costs, and inadequate quality of care are attributed to an inefficient and ineffective healthcare system that unfairly and disproportionately affects low income populations. Social, economic, and environmental factors, to name a few, greatly influence healthcare barriers and the degree to which the resultant disparities are posited throughout communities and populations in the United States. There are a number of measures set forth to combat these healthcare barriers such as the formation of the Patient Protection and Affordable Care Act of 2010. However, beneficial, these mandates are merely scratching the surface of a much larger obstacle—the gap between healthcare delivery and actual healthcare receipt—seen even after their enactment. Mobile clinics have the potential to offset this gap by offering and literally delivering a diverse array of healthcare services to underserved and disparate populations in the United States. This paper outlines a literature review performed to determine how primary medical healthcare mobile clinics affect healthcare access and health outcomes in the U.S.

Methods Articles for this literature review were chosen systematically using the PubMed database. Included studies pertained to U.S. mobile clinics in a primary medical healthcare setting only that targeted low income populations from January 2000 to October 2014.
Results Inclusion criteria warranted 11 articles that described eight primary care mobile clinics across the U.S. Seven of the eight mobile clinics conducted retrospective and/or cross-sectional analyses from the convenience of patient records showing that gender, race or ethnicity, language, health insurance status, and age are all contributing factors to decreased access for low income populations.

Conclusions Mobile clinic services in the U.S. increased healthcare access for low income and underserved populations. Results for an impact of mobile clinics on health outcomes, on the other hand, looked promising but could not be accurately determined due to the small number of primary care mobile clinics that surfaced from the literature review and the insufficient data of measurable health outcomes in which only three of eight mobile clinics provided. Overall, the inadequacy of data capture on primary care mobile clinics within the last 15 years poses a challenge for a proper assessment of their total and complete impact.
Introduction

Mobile clinics take healthcare to people in need. They offer services ranging from examinations, diagnoses, and treatments to education and preventive maintenance in various health professions to include medical, dental, and optometry. Mobile clinics are located in various sites throughout the United States where health disparities are prevalent due to barriers that lead to decreased healthcare access, increased costs, and lower quality of care. A network of over 650 mobile clinics in the U.S. provides services that include: Dental, prevention and screening, primary medical care, specialty medical care, mammography, mental health, maternal and infant health, disaster relief, and homelessness (Mobile Health Clinics, 2014). This mobile health network is supported by the U.S. Department of Health and Human Services Office of Minority Health in collaboration with Harvard Medical School and Mobile Health Clinics Association since 2011, and able to reach and provide services to rural and urban, uninsured and low-income, male and female, and minority populations of all ages throughout the U.S. (Mobile Health Map, 2013).

In an attempt to combat healthcare barriers in the U.S., the Patient Protection and Affordable Care Act of 2010, a health reform law effective in 2014, was established under President Obama with the intentions of increasing healthcare access, reducing costs, and improving quality by:

- Requiring all individuals to purchase insurance,
- Expanding Medicaid coverage,
- Developing affordable insurance exchanges,
- Mandating employers to offer insurance to employees, and
- Prohibiting insurance companies from denying coverage for pre-existing conditions (Public Law, 2010).
These are a few of many provisions that were formed to help compensate for the predominantly private and expensive healthcare system in the U.S. by creating competitive premiums among insurance companies allowing Americans to have more affordable options in the private sector and extending benefits to more low-income Americans through federal programs such as Medicaid in the public sector.

Despite the recent reform there are still shortcomings within the healthcare system. For instance, even with the increased benefits and lower premiums created in an effort to insure all Americans, not all Americans have purchased health insurance, still, due to the debilitating factors inhibiting access, costs and quality (Caraway et al., 2011). In 2013, 271.4 million (86.6%) of Americans had health insurance coverage, with 201.1 million Americans covered by private health insurance and 107.6 million Americans covered by government health insurance (Medalia and Smith, 2014). The number of uninsured Americans, nevertheless, totaled a sizeable 42 million (13.4%) with Texas having the highest uninsured rate at 22.1% and Massachusetts the lowest at 3.7% (Medalia and Smith, 2014). Additionally, the first three months (January - March) of 2014 estimated that 41 million (13.1%) Americans were yet still uninsured (Cohen and Martinez, 2014). Consequently, a gap remains in the U.S. healthcare system. Mobile clinics in this instance could potentially and continually close these gaps of disparity. This paper presents a systematic literature review examining how U.S. primary care mobile clinics affect healthcare access and outcomes for low income populations.
Background

Low Income Populations

According to the U.S. Census Bureau, the median household income in 2012 was $51,017 (2013). However, with a poverty rate of 15.0%, 46.5 million people lived below their national poverty threshold (DeNavas-Walt et al., 2013). The poverty rate consisted of a population that was 12.7% White, 27.2% Black, 11.7% Asian, 25.6% Hispanic, 13.6% male, 16.3% female, 9.1% age 65 and older, 28.4% disabled, 14.5% living in metropolitan areas, and 17.7% living outside metropolitan areas (DeNavas-Walt et al., 2013). The national poverty threshold, used for statistical purposes by the U.S. Census Bureau, is broken down by family size and income and is used to determine poverty status in the U.S. For instance, the 100% poverty threshold for a family of four is $23,492 annually (Poverty, 2014). If the family of four makes less than half of this dollar amount they are considered to live below the 50% poverty threshold based on a ratio of income-to-poverty (DeNavas-Walt et al., 2013). Similarly, if the family makes 1.25 times the amount, then they are living at the 125% poverty threshold. In 2012, 6.6% of Americans were below 50% of the federal poverty threshold, 19.7% were below 125% federal poverty threshold, 24.6% were below 150% of the federal poverty threshold, and 34.2% under 200% of the federal poverty threshold (DeNavas-Walt et al., 2013).

Chronic Diseases and Their Associated Costs

The United States spent $2.7 trillion on healthcare in 2011 averaging $8,680 per person (Health Expenditures, 2014). A major portion of this healthcare cost stems from a large increase in preventable chronic diseases—the leading cause of death and disability in the U.S. (Chronic Diseases, 2014). In 2011, diseases of the heart followed closely by malignant neoplasm were the top diseases that led to death in the U.S (Deaths, 2011). Risk factors attributed to the
development of chronic diseases include: little to no exercise, high sodium intake leading to high blood pressure, tobacco and alcohol use, and poor nutrition (Chronic Diseases, 2014).

Additionally, in 2010 heart disease and stroke costs were approximately $315.4 billion, cancer care was $157 billion, and diabetes was estimated (in 2012) to cost $245 billion (Chronic Diseases, 2014).

These chronic diseases and their associated healthcare costs disproportionately affect low income populations (Levine, 2011). Generally, low income populations contribute considerably to healthcare increases due to modifiable (controllable) risk factors or habits (high blood pressure and cholesterol, smoking, diabetes, poor diet and physical inactivity, and overweight and obesity) formed as a direct cause of numerous disparities to include health, education, social, and economic (Levine, 2011) and (Heart Disease and Stroke, 2014). Low income populations, therefore, have increased cases of chronic diseases but decreased means to manage, care, or pay for the services necessary to deal with these chronic health pangs (Levine, 2011). A review of poverty and obesity rates across 3,139 counties in the U.S. showed that Americans who lived in poverty-stricken areas were more apt to be obese leading to chronic diseases such as diabetes (Levine, 2011). Additionally, areas with poverty rates greater than 35% had rates of obesity that were 145% higher than wealthier areas (Levine, 2011). In these areas, fresh and healthy food choices were lacking, and physical activity virtually obsolete, possibly due to environmental factors such as community violence that prevents outdoor physical activities or the inability to afford a gym membership which prevents indoor physical activities (Levine, 2011). These data showed that the number of chronic diseases and the financial burden of healthcare costs increased as poverty increased. These populations were less likely to seek healthcare or purchase health insurance, maintain poor health habits, and have less access to basic healthcare. Levine
further suggests that to deal with healthcare costs will necessitate tackling poverty in its entirety (2011).

Common Barriers to Healthcare Access in Low Income Populations

Uninsured and underinsured

Low income populations are less likely to purchase the appropriate amount of health insurance coverage or forgo health insurance altogether due to lack of affordability (Medalia and Smith, 2014). Insurance coverage in 2013 included employer based (53.9%), Medicare (15.6%), Medicaid (17.3%), direct purchase (11.0%), military (4.5%), and uninsured (13.4%) (Medalia and Smith, 2014). Those with incomes of less than $25,000 made up 17.8% of the total population, but 21.6% of the uninsured population (Medalia and Smith, 2014). Similarly, those that made $25,000 - $49,999 comprised 22.4% of the population and 18.7 % of the uninsured population (Medalia and Smith, 2014). Uninsured populations have poorer health outcomes, worse access to healthcare, and higher, and likely unaffordable, medical bills than insured populations.

The underinsured populations face similar financial hardships as the uninsured populations. Not having adequate health coverage leaves the underinsured at risk for higher out-of-pocket costs including premiums, deductibles, copays, and coinsurance, poor access to healthcare providers, declining recommended care due to cost, or having limited or part-time yearly coverage (Bolduc et. al., 2011). In one study conducted by the States Network of Colorado Ambulatory Practices and Partners (SNOCAP), 948 patients from 37 different primary care facilities were surveyed (Bolduc et. al., 2011). It reported that 36.3% of the patients were underinsured (Bolduc et. al., 2011). Additionally, 50% of those underinsured patients had a
significant decline in health due to omitted and delayed care as a result of cost (Bolduc et. al., 2011).

Transportation

Low income populations—especially those with chronic diseases—face great challenges to healthcare access due to transportation barriers (Gerber et al., 2013). Populations of a lower socio-economic status were found to show higher rates of transportation barriers than populations of higher socio-economic status leading to worse health outcomes overall (Gerber et al., 2013). Without sufficient transportation, healthcare management is likely to decline as appointments are missed or rescheduled, care and treatments are postponed, and medication use is delayed or missed altogether (Gerber et al., 2013).

Physician Shortages

Limited access to physician services due to an increasing shortage in primary care physicians presents yet another healthcare barrier. With an aging population and an increase in chronic diseases, primary care physician services are vital and necessary now more than ever. Primary care physicians are a “first line of defense” for patients, especially those with chronic diseases that benefit the most from care coordination and continuity (Zerehi, 2008). It is estimated that 150 million Americans will have at least one chronic disease by 2015, and with a shortage of 35,000 – 44,000 primary care physicians expected by 2025, demand will sharply outweigh supply leading to a severely fragmented and unstable healthcare system (Zerehi, 2008).

Mobile Clinics—A Healthcare Delivery Option

Mobile clinics present a delivery option for the U.S. healthcare system. They are essentially “clinics on wheels” that provide various discounted or free healthcare services to low income and other underserved populations that face access barriers. They come in a range of
sizes and forms to include vans, buses, mobile homes, and recreational vehicles or campers. These vehicles have an extremely small footprint especially when compared to fixed structures such as hospitals, clinics, and other medical facilities. Although there is a diverse array of mobile clinics, 44% provide primary care, 42% provide prevention services, and 31% provide dental care. They are operated by various organizations to include independent entities (45%), hospitals (25%), community health centers (16%), and academic medical centers (15%). In addition, many of the mobile clinics provide free or discounted services with the financial support of federal programs (17%), philanthropy (38%), and independent companies and private insurance providers (10%) (Hill et al., 2014).

**Methods**

This literature review aims to address how U.S. primary care mobile clinics impact healthcare access of underserved populations, namely low income, and seeks to explore the effects that mobile clinics have on the health outcomes of low income populations. Inclusion criteria used in this literature review were as follows: (1) Mobile clinics in the U.S., (2) that targeted low income or underserved populations, (3) performed primary medical care or prevention services, (4) and published from January 2000 to October 2014. Articles related to disaster relief, gender specific such as mammography mobile clinics, children specific (less than 18 years of age), and stationary only clinics were excluded in the search criteria. The PubMed database was searched on October 7, 2014 with keywords: Mobile, health, clinic, and unit.

All articles that emerged from the search criteria were analyzed in several screening phases. The primary screening phase consisted of title reviews. The title had to contain or allude to mobile clinics, excluding mobile clinics from foreign countries, in order to pass to the
secondary phase. In the secondary phase, abstracts were reviewed to confirm the use of mobile clinics in the U.S. and to further classify the type of mobile clinic in operation. Mobile clinics that conducted primary medical or prevention care services were further analyzed in the tertiary screening phase where full article reviews occurred. The full article reviews were used to examine the target populations, listed health outcomes, and the effects of mobile clinics on access for the target populations. Access in this literature review was defined as either the hindrance or the facilitation of healthcare services based on social, economic, environmental, or other associated factors. Additionally, health outcomes were defined as evidence-based data that showed current health status or involved a change in health status. The articles that made it through all phases of the screening process were chosen for this literature review, entered into a data table (Appendix A), and analyzed according to their population demographics, healthcare services provided, healthcare access improvement or deterioration, and recorded health outcomes. All excluded articles were further categorized according to their respective topics, counted, and used for statistical purposes only, as shown in the Results section of this paper.

Results

The PubMed database yielded 574 results using the keywords described in the Methods section. Approximately, 18% (101 articles) of the reviewed articles pertained to U.S. technologies (mobile phones, mobile apps, messaging, internet, and mobile equipment), 56% (322 articles) were foreign in nature (mobile clinics, mobile technologies, or other), 13% (73 articles) were U.S. and not related to mobile clinics but generally health related, 1% (8 articles) were either literature reviews or making a case for the use of mobile clinics, and finally, 12% (70 articles) were related to mobile clinics in the U.S.
The 70 eligible articles were further reviewed and many were found not appropriate to the review for the following reasons: the focus was on mobile clinics that pertained to cancer (2), children (8), dental (8), eye (5), depression (1), disaster relief (2), drug use or sexually transmitted diseases (16), women’s health (2), hemoglobin screening (1), homelessness (1), Parkinson’s Disease (1), pharmacy (1), telehealth (1), tuberculosis (5), and primary care (16).

The 16 remaining articles were further analyzed and 5 of those articles were eliminated since they did not actually describe mobile clinics (1 mobile clinic literature review article, 1 privacy and disclosure of information on mobile clinics, 1 recruitment of subjects from a mobile clinic, 1 quality management practices of mobile clinics, and 1 development of an outreach program using mobile clinics). The 11 remaining articles (2% of all articles (574) and 16% of all U.S. mobile clinic articles (70)) were selected for this literature review.

**Primary Care Mobile Clinics**

Of the 11 reviewed articles, 3 covered the Family Van, 2 pertained to the Health Wagon, and the final 6 involved separate mobile clinics: The MediVan, the Mobile Health Van, Migrant Clinic Experience project (MCE) mobile clinic, Institute for Rural Health mobile clinic, the Walhalla mobile clinic, and the Wellmobile. Each mobile clinic is summarized and described in more detail below (Table 1)
<table>
<thead>
<tr>
<th>Mobile Health Clinic</th>
<th>Operating Organization</th>
<th>Target Population</th>
<th>Objective</th>
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</tr>
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<tbody>
<tr>
<td>Family Van</td>
<td>Harvard Medical School</td>
<td>Minority, low income men and women in underserved communities in Boston, MA</td>
<td>Provide primary care to under-privileged communities</td>
<td>(Hill et.al., 2012)</td>
</tr>
<tr>
<td>Health Wagon</td>
<td>Non-Profit Organization</td>
<td>Poor and Rural populations in Southwest Virginia in Central Appalachia</td>
<td>Deliver free healthcare to rural areas</td>
<td>(Gardner et.al., 2012)</td>
</tr>
<tr>
<td>MediVan</td>
<td>Non-Profit Organization</td>
<td>Low income, immigrant (Haitian), minorities in Broward County, South Florida</td>
<td>Determine effect of multidisciplinary team on MediVan on CVD</td>
<td>(Singh-Franco et.al., 2012)</td>
</tr>
<tr>
<td>Mobile Health Van</td>
<td>Religious Organization</td>
<td>Four Low income and underserved neighborhoods (especially low income women) in Pittsburgh, PA</td>
<td>Mobile Health project to bring screening/preventive services to low income neighborhoods</td>
<td>(Mayernik et.al., 2012)</td>
</tr>
<tr>
<td>Migrant Clinic Experience</td>
<td>Georgia Southern University</td>
<td>Latino Migrant Farmworkers in South Georgia</td>
<td>Occupational Health Needs Assessment</td>
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</tr>
<tr>
<td>Institute for Rural Health</td>
<td>Western Kentucky University</td>
<td>Rural, low income, and health professional shortage areas in South Central Kentucky</td>
<td>Use of mobile clinics in rural and remote areas to gather data</td>
<td>(Michimi et.al., 2013)</td>
</tr>
<tr>
<td>Walhalla Mobile Clinic</td>
<td>Clemson University</td>
<td>Latino immigrant populations in rural areas in Oconee County, SC</td>
<td>Increasing access to rural Latino Immigrants</td>
<td>(Sherrill et.al., 2005)</td>
</tr>
<tr>
<td>Wellmobile</td>
<td>University of Maryland</td>
<td>Underserved urban and rural neighborhoods in Baltimore, MD</td>
<td>Informative Article; not research related</td>
<td>(Heller and Goldwater, 2004)</td>
</tr>
</tbody>
</table>

Table 1: Eight primary care mobile clinics provided by the PubMed database from Jan 2000 – Oct 2014.

**The Family Van**

The Family Van, founded by Beth Israel Hospital in 1992 and a Harvard Medical School program since 2001, is an urban-based mobile clinic in Boston, Massachusetts (Song et. al., 2013). It targets populations struggling with decreased healthcare access, increased cost, substandard quality of care, lack of trust in the healthcare system, poor health, and high emergency department use in six underserved Boston neighborhoods (Song et. al., 2013). It also aims to reduce the many disparities resulting from these barriers as it delivers cost-effective services to include health screening, monitoring, coaching, and referrals to populations in need (Song et.al., 2013).
Populations Reached and Health Outcomes

From 2006 to 2009, 13,272 patients (5,898 first-time patients and 7,374 returning patients) visited the Family Van (Hill et. al., 2012) and 5,900 patients (totaling 10,509 visits) used the mobile clinic’s services from January 2010 through June 2012 (Song et. al., 2013). Some patients used the mobile clinic for both acute and chronic care while others used it as a primary healthcare source (Song et. al., 2013). The mobile clinic challenged several access barriers—distance and transportation, low income, and language—by pinpointing target populations and literally taking healthcare to them. As a result, the program was successful in creating access for minorities (85%-90%), non-English speaking (28%-39%), uninsured (10%-18%), homeless (4%-5%), and low-income (approximately 73%) populations—the populations at high risk for chronic diseases, most likely to face health disparities, and least likely to get the appropriate form of healthcare (Hill et. al., 2012) and (Song et. al., 2013). The data collected and retrospectively analyzed from the 2006 to 2009 patient visits, showed that 60% of previously undiagnosed patients had either high blood pressure or borderline high blood pressure, 14% had diabetes or pre-diabetes, and 39% had border line or actual high total serum cholesterol, while patients with a history of chronic disease management had high blood pressure (33%), diabetes (18%), and/or hypercholesterolemia (17%) (Hill et. al., 2012). A cross-sectional analysis of returning patient visits from the subsequent years (2010 to 2012) showed an average reduction in both systolic blood pressure (by10 mmHg) and diastolic blood pressure (by 6.2 mmHg) signifying a reduced relative risk of myocardial infarction by 32.2% and stroke by 44.6% (Song et al., 2013).

The Family Van is one of few mobile clinics to have quantified the value of its services. A cost assessment, or return on investment (ROI), was conducted using data collected from
3,878 patients that utilized services from the Family Van in 2008. These patients were presumed to have otherwise used emergency department (ED) services ($923) if the mobile van services ($117) were inaccessible due to a previous high correlation with ED visits (Oriol et. al., 2009). The mobile clinic prevented unnecessary emergency department visits providing a total cost savings of $3,125,668 and increased quality adjusted life years saved (QALYS) by 254, or $17,780,000, with screening interventions to include hypertension, vision, cholesterol, obesity, depression, diabetes, and diet (Oriol et. al., 2009). These dollar amounts resulted in a combined ROI of $20,339,968 and a ROI ratio of 36:1 when compared to the $565,700 in mobile clinic expenses (Oriol et. al., 2009). For every $1 invested in the mobile clinic expenses, $36 was returned from ED visits avoided and the value of life years saved (Oriol et. al., 2009). Overall, the patients received alternative access to healthcare and over an 85% discount in costs by using the mobile clinic services instead of the emergency department services, and the mobile clinic received a return on investment 36 times its expenses. Additionally, the ED potentially saved millions of dollars as well by possibly avoiding a lack of or non-payments from patients that were not able to afford their services.

**The Health Wagon**

The Health Wagon, founded in 1980 and whose services began in the trunk of a Volkswagen Beetle, is a mobile clinic operated by a non-profit organization that offers free healthcare to the underserved populations in the remote mountains of southwest Virginia in Central Appalachia (Snyder and Thatcher, 2014) and (Gardner et. al., 2012). The mobile services provide comprehensive primary care, diabetic supplies, and prescription medications to low income patients with little to no healthcare access in three underserved rural counties (Gardner
et. al., 2012). The Health Wagon aims to reduce financial barriers that suppress healthcare access and to remedy the deteriorating health of the population.

*Populations Reached and Health Outcomes*

Over many decades the Health Wagon’s services have evolved. Infant mortality was a major public health concern in Central Appalachia in the early 1980s (Snyder and Thatcher, 2014). The Health Wagon helped to reduce infant mortality from 6.69 per 1000 live births in 1982 to 1.86 per 1000 live births in 1989 (Snyder and Thatcher, 2014). Today, the Health Wagon visits eight sites across three counties on a weekly, biweekly, or monthly basis depending on the area serviced (Gardner et. al., 2012). In 2009, 3,165 patients used the Health Wagon’s services and consisted of a population that was 97% White, 71% female, 48% married, 72% with no insurance, 73% with no prescription drug coverage, and low income (86% made $29,999 or less) (Gardner et. al., 2012). A majority (71%) of the patients used the Health Wagon because they lacked health insurance or simply could not afford their co-payments (Gardner et. al., 2012). The Health Wagon delivered services free-of-charge to a population that otherwise would have been deprived of basic healthcare needs due to cost and access. There were no measureable health outcomes to report from the Health Wagon during this time period.

*The MediVan*

The MediVan, operated by a non-profit organization, provided monthly medical services to underserved, low income, and minority populations in Broward County, Florida (Singh-Franco et. al., 2013). The mobile services included physical exams, laboratory analysis, health education, nutrition counseling, follow-up visits and referrals within two examination rooms upon the 36-foot recreational vehicle (Singh-Franco et. al., 2013). The MediVan allowed
healthcare access to the underserved populations, but has since ended its mission in August 2008 due to its own financial barriers (Singh-Franco et. al., 2013).

**Populations Reached and Health Outcomes**

Patient data from January 2003 to May 2008 was collected and retrospectively analyzed in increments of three, six, nine, and twelve months to determine how a multidisciplinary health team affected the outcome of surrogate markers for cardiovascular disease in a target population that consisted of low income, minority immigrants (Singh-Franco et. al., 2013). Services were free for those that were 55 years of age or older and lived at 150% or less of the federal poverty level ((Singh-Franco et. al., 2013). One-hundred and fourteen patients visited the mobile health clinic and met the inclusion criteria during this time frame consisting of 75% women, 76% Haitian, averaged 63 years of age, and were low income (averaged $747/month). This study group began with 80% hypertension, 74% hyperlipidemia, and 79% diabetes mellitus. After 12 months of screenings, education, and medication made available by the mobile clinic, systolic blood pressure was reduced by 7.4% (or an average of 10 mmHg) with a 5 mmHg reduction corresponding to 14% reduced mortality due to stroke and 9% reduced mortality due to coronary heart disease (Singh-Franco et. al., 2013). Additionally, heart rate, diastolic blood pressure, BMI remained unchanged, while hemoglobin A1c was reduced by 1%, total and LDL-cholesterol were significantly reduced, and the average number of medications per person increased from 3.4 to 4.4.

**The Mobile Health Van**

The mobile health delivery project, operated across four sites by parish nurses in Pittsburgh, Pennsylvania and the surrounding communities of Allegheny County in conjunction with a food pantry, offers free disease screenings, counseling, health education, referrals,
advocacy, and follow-up to vulnerable populations (low income, inner-city neighborhoods, and declining towns), especially targeting low income women who are usually health initiators within families (Mayernik et. al., 2010). These populations face healthcare disparities due to various access barriers including unemployment, low income, and those that are uninsured or underinsured.

*Populations Reached and Health Outcomes*

From September 2005 to December 2008, 1,617 patients utilized the mobile health van services (Mayernik et. al., 2010). The patients’ demographics consisted of 69% women that were 86.5% White, 13% Black, and an average age of 64 years. A retrospective analysis of patient data showed 39.1% had high blood pressure, 59.8% had hyperlipidemia, 8% had diabetes or pre-diabetes, more than 50% were at risk for bone fractures, and 61.9% were overweight or obese (Mayernik et. al., 2010). These patients used the mobile health van as a source of primary healthcare.

*Migrant Clinic Experience*

Occupational hazards expose populations to chronic diseases. The migrant clinic experience project, operated by Southern Georgia University, was created to reach Latino migrant farmworkers—a population that develops injuries from physical exertion, receives no medical benefits, lives in substandard housing conditions, low income, and has language and cultural barriers (Luque et. al., 2012). The mobile clinic provides 12 evening primary care services annually from April to June in four South Georgia counties (Luque et. al., 2012). Primary care services include diabetes and blood pressure screening and sometimes physical therapy, dental and other screenings (Luque et. al., 2012).
Populations Reached and Health Outcomes

From 2009 to 2011 a study was conducted in two phases (Luque et. al., 2012). In phase one, 100 farmworkers were identified and participated in a cross-sectional survey, and in phase two, demographic and medical diagnoses data over a three year period was collected from 1,161 patient records (six different farms) and retrospectively analyzed using a farm clinic database (Luque et. al., 2012). The self-reported data in the survey was compared to actual demographics and medical diagnoses made by health professionals from the mobile clinic as presented in the farm clinic database. Phase one demographics comprised of 87% male, 56% married, 70% Spanish speaking only, 93% Mexican, and 40% permanent U.S. resident and phase two demographics consisted of 89.9% male, age 18 and over, 98.5% Spanish speaking only, 97.1% migrant, and 87.8% Mexican (Luque et. al., 2012). Additionally, in phase one 25% of the patients reported hypertension and 10% reported diabetes, and in phase two hypertension was found in 9.3% (2009), 13.9% (2010), and 13.0% (2011) of the patients (Luque et. al., 2012). Other data was also reported to include musculoskeletal pain, eye issues, and skin infections and rashes. These mobile clinics succeeded in reaching their target populations in which much of the population only had the mobile clinics as their primary healthcare source due to access barriers.

Institute for Rural Health

The mobile health unit, operated by the Institute for Rural Health at Western Kentucky University, provides health screenings for diabetes in populations that are low income, rural, and least likely to adhere to diabetes self-care guidelines (Michimi et. al., 2013). These populations face many healthcare access barriers to include transportation, physician shortages, and lack of health insurance giving way to the increased prevalence of diabetes (Michimi et. al., 2013). The
mobile health unit provides the opportunity for these populations (free-of-charge) to measure and monitor their conditions (Michimi et. al., 2013).

*Populations Reached and Health Outcomes*

In a cross-sectional analysis of 1,212 patients from October 2006 to November 2011, self-reported diabetes was linked to clinically measured blood glucose levels and socio-demographic characteristics (Michimi et. al., 2013). The population was 63.6% age 45 and older, 68.8% female, 90.4% White, 10.7% lacking health insurance, 15.1% smokers, and 52.8% rural (Michimi et. al., 2013). Self-reported medical conditions included diabetes (9.6%), hypertension (32.7%), and hypercholesterolemia (31.3%) (Michimi et. al., 2013). Clinical data showed 33.3% of patients were obese, 7.4% had a non-fasting glucose level 140 mg/dl or higher and 3.2% 180 mg/dl or higher (Michimi et. al., 2013). The study showed individuals with elevated glucose levels were least likely to have health insurance, a reflection of poor healthcare access, and most likely to report diabetes from previous diagnoses, signifying poor self-care of diabetes possibly due to location (rural) and lack of transportation to healthcare facilities in order to maintain their conditions.

*The Walhalla Mobile Clinic*

The Walhalla mobile clinic, operated by Clemson University, travels to Walhalla, South Carolina, once a week delivering health screenings and immunizations, and other healthcare services to the rural Latino immigrant population (Sherrill et. al., 2005). This particular population faces healthcare access barriers to include lack of insurance, and language and cultural differences (Sherrill et. al., 2005). The Accessible and Culturally Competent Health Care Project (ACCHP) was created and designed to address these barriers by offering healthcare services and education in a mobile clinic setting (Sherrill et. al., 2005).
Populations Reached and Health Outcomes

From January 31, 2003 to June 30, 2004, the program reported 1,076 patients from 63 mobile clinic sessions with demographics consisting of 65% Hispanic, 67% female, and 51% ages 19 – 39 (Sherrill et. al., 2005). Additionally, 68% of the patients reported that they used the mobile clinic as a primary healthcare source and would, otherwise, have used the emergency department for care (Sherrill et. al., 2005). A majority (87%) of the patients received laboratory work-ups and immunizations, but actual health outcome measures were not reported.

Wellmobile

The Governor’s Wellmobile program, a fleet of four mobile clinics operated by the University of Maryland’s School of Nursing, was established in 1994 to serve uninsured and underserved urban and rural communities in an effort to improve health outcomes (Heller and Goldwater, 2004). The Wellmobile provides services to include physical examinations, laboratory tests, cancer screening, smoking cessation, health education, manage chronic diseases such as hypertension, diabetes, and asthma, and make referrals and follow-up care. The article on Wellmobile provided no demographics or measured health outcomes.
<table>
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<tr>
<th>Mobile Health Clinic</th>
<th>Services Provided Mobile Clinics</th>
<th>Resulting Health Outcomes From Patient Studies</th>
</tr>
</thead>
</table>
| Family Van          | Hypertension, diabetes, hypercholesterolemia screening, health education, health coaching, referrals, healthcare navigational support, no treatments | 1. Previously undiagnosed populations: 23% high blood pressure and 37% borderline, 3% diabetes and 11% pre-diabetes, and 13% high total serum cholesterol and 26% borderline.  
2. Monitored history of conditions: 33% high blood pressure, 18% diabetes, 17% hypercholesterolemia |
| Health Wagon        | Comprehensive healthcare: acute and chronic disease management (hypertension, high cholesterol), laboratory and diagnostic services, medication assistance, dental and eye care, immunization, diabetes and cancer screenings, women’s health, education and outreach | 1. Improved infant mortality from an average of 6.69/year in 1982 to 1.86/year in 1989                                                                                                                                                                   |
| MediVan             | Primary care services: physical exams, Screening: hypertension, cholesterol, diabetes, obesity, arthritis, gastro-esophageal reflux disease, lab analysis, health education, nutrition counseling, follow-up visits, referrals | In 12 months:  
1. Hypertension and Systolic blood pressure reduced by 7.4% (10mmHg) in which 5mmHg corresponds to a 14% reduced mortality due to stroke and 9% due to coronary heart disease, 7% in all-cause mortality.  
2. Heart rate, diastolic blood pressure, and BMI remained unchanged,  
3. 1% reduction in hemoglobin A1c,  
4. Total and LDL-cholesterol significantly reduced,  
5. Average number of medications per person increased from 3.4 to 4.4 |
| Mobile Health Van   | Disease screening (total and HDL cholesterol, blood glucose, blood pressure, bone density, body mass index (BMI), body fat analysis), counseling, health education, referrals, advocacy, and follow-up | 1. 39.1% had high blood pressure,  
2. 59.8% had hyperlipidemia,  
3. 8% had diabetes or pre-diabetes,  
4. More than 50% at high risk for fracture,  
5. 61.9% overweight or obese |
| Migrant Clinic Experience | Primary care services (diabetes, blood pressure, eye, skin, musculoskeletal, depression screening); Health education | Phase 1: 25% reported hypertension, 10% reported diabetes.  
Phase 2: Hypertension 9.3% (2009), 13.9% (2010), and 13.0% (2011) |
| Institute for Rural Health | Screening: Blood glucose, hypertension, hypercholesterolemia, obesity | 33.3% obese, Self-Reported: 9.6% diabetes, 32.7% hypertension, 31.3% hypercholesterolemia, non-fasting glucose: 7.4% ≥ 140mg/dl and 3.2% ≥ 180mg/dl |
| Walhalla Mobile Clinic | Weekly Comprehensive healthcare services: screenings, immunizations, health education | No measurable health outcomes |
| Wellmobile          | Physical assessments, lab tests, cancer screenings, smoking cessation, health education, immunizations and vaccinations, diagnose/treat common illnesses, manage chronic health conditions (hypertension, diabetes, asthma) and referrals for follow-up | No measurable health outcomes |

Table 2: Summary of mobile clinic services and health outcomes.
Synthesis of Evidence Regarding Access

Healthcare access for many populations was affected in several ways to include costs, lack of insurance, language and cultural differences, transportation, and geography. The mobile health clinics targeted these underserved populations and curtailed many healthcare barriers simply by being “mobile”. All eight mobile clinics (11 articles) reported increased access among their populations usually by offering free or discounted services. Table 3 reports the demographics of the low income populations reached by the mobile clinics with the exception of the Wellmobile which reported no demographic data.

<table>
<thead>
<tr>
<th>Mobile Health Clinic</th>
<th>Demographics of Populations Reached By Mobile Clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>Family Van</td>
<td>55%</td>
</tr>
<tr>
<td>Health Wagon</td>
<td>71%</td>
</tr>
<tr>
<td>MediVan</td>
<td>75%</td>
</tr>
<tr>
<td>Mobile Health Van</td>
<td>69%</td>
</tr>
<tr>
<td>Migrant Clinic Experience</td>
<td>10%−13%</td>
</tr>
<tr>
<td>Institute for Rural Health</td>
<td>69%</td>
</tr>
<tr>
<td>Walhalla Mobile Clinic</td>
<td>67%</td>
</tr>
<tr>
<td>Wellmobile</td>
<td>---</td>
</tr>
</tbody>
</table>

Table 3: Populations reached by primary care mobile clinics.
*To qualify for study patients had to have no insurance.
**Statistics from female population only.
**Gender**

The Parish nurses from the mobile van realized that women were usually the initiators in families when it came to health (Mayernik et. al., 2010). Six of seven mobile clinics had a population that was majority female as shown in figure 2. Males, however, represented 25% - 45% of the population in six mobile clinics studies and 87% - 90% in one mobile clinic study. These data show that both sexes had difficulty accessing primary healthcare services and women (on average) utilized the mobile health services almost twice as much as men.

**Race and Location**

Whites were the majority race in 3 mobile clinic studies with approximately two-thirds located in rural areas. Blacks and Hispanics were the dominant race in 4 mobile clinic studies. Blacks utilized the Family Van, located in an urban setting, more than Whites and Hispanics. The MediVan, also located in an urban setting, was utilized almost equally by Blacks and Hispanics with higher utilization than Whites. These data illustrate that Whites, particularly in rural areas, Blacks, especially in urban settings, and Hispanics, in both urban and rural settings, face barriers to healthcare access at various rates depending on geographic location.

**Language**

A language barrier was presented in 3 mobile clinic studies. English was reported as the second language for a majority of the patients in the MediVan and the Migrant Clinic Experience mobile clinics, and in approximately one-third of the Family Van visitors. Navigating the U.S. healthcare system presented a daunting task for immigrant and migrant populations as language and cultural differences increased communication barriers and decreased health literacy.
Health Insurance Status

Patients with no health insurance were reported by 4 mobile clinic studies including the MediVan which required 100% of its patients to have no insurance for participation. The Health Wagon (rural setting) reported 72% of its patients lacked health insurance, the Family Van (urban setting) reported 10%-18% as having no health insurance, and the Institute for Rural Health (rural setting) reported providing services to 11% of patients with no health insurance. Overall, a lack of health insurance presented a huge access barrier for both rural and urban low income populations at various rates.

Age

Although the mobile clinics reported various age ranges, a vast majority of patients that visited the mobile clinics were age 18 and over. The reported age ranges also show that older Americans utilized mobile clinics at a higher rate than younger Americans, suggesting that aging Americans have limited access to healthcare as transportation becomes a barrier for those populations no longer driving or costs becomes an issue due to a fixed income for those populations that are not able to work.

Synthesis of Evidence Regarding Health Services and Outcomes

Although other services were provided by many of the mobile clinics, addressing chronic diseases through various screening methods was a major focus, followed by health education. The mobile clinics commonly screened for hypertension (7 mobile clinics), diabetes (7 mobile clinics), hypercholesterolemia (3 mobile clinics), hyperlipidemia (2 mobile clinics), and obesity (4 mobile clinics) as shown in table 4. The Walhalla mobile clinic article indicated that it offered screenings, but failed to specify which screenings it provided. Health education (7 mobile clinics) and referral services (6 mobile clinics) were also offered by a majority of the clinics.
Health screenings and health education were intervention methods employed by the mobile clinics in an effort to thwart the poor health outcomes that came with the access barriers. These interventions gave the populations the opportunity to improve their health outcomes by allowing them to monitor and manage their health. The Walhalla mobile clinic and the Wellmobile articles reported no health outcomes along with only one of the Health Wagon articles. Three of eight (38%) mobile clinics showed measureable health outcomes overtime with a decrease in hypertension for both the MediVan and the Family Van, reduced Hemoglobin A1c, and total and LDL-cholesterol for the MediVan alone, and a decrease in infant mortality (a health parameter measured before its current evolvement) for the Health Wagon (Hill et.al., 2012), (Singh-Franco et.al., 2012), and (Snyder and Thatcher, 2014). These measureable health outcomes gave the patients the opportunity to monitor and manage their health over a period of time through a combination of medication and education.

Half (4) of the mobile clinics (the Family Van, the Mobile Health Van, the Migrant Clinic Experience mobile clinic, and Institute for Rural Health mobile clinic) reported immediate health outcomes that showed the patients’ current health status only (a single point in time).

Table 4: Types of services offered by primary care mobile clinics.
However favorable the outcomes these data failed to show the progression (or regression) of the patients’ health over a period of time to accurately assess the total effectiveness of the mobile clinic services categorizing them as non-measureable.

**Discussion**

Primary care and prevention mobile clinics aim to improve the healthcare management of chronic diseases, and treat and educate patients that utilize their services. Though they represent the largest portion (44%) of all U.S. mobile clinics, only 16% (8) U.S. primary care mobile clinics published health data in the last 15 years, with a majority lacking measureable health outcomes. Additionally, the data pre-date (1980 – 2012) the Patient Protection and Affordable Care Act recently enforced in 2014. Consequently, the full effect of mobile clinics on healthcare accessibility and outcomes after the healthcare reform was implemented cannot be accurately determined until current data is available. The data presented in this literature review depict the population demographics, provided services, and health outcomes of the mobile clinics leading up to the healthcare reform. The post health care reform era does leave room, however, for mobile clinics to expand their healthcare roles, such as collaborating with other medical facilities for better patient care coordination, follow-up, and referrals, as the outcomes of the healthcare reform laws are presumed to increase healthcare demand with the addition of millions of Americans gaining health insurance coverage, but leaving millions, still, without access.

Achieving better access by reaching target populations facing healthcare barriers was an accomplishment for all the mobile clinics. The mobile clinics reached, largely, low income older populations in multiple geographic locations and with differing health insurance statuses. They also reached men and women of various races and ethnicities, and cultural and language
differences. The mobile clinics facilitated patient access to healthcare through the use of discounted or free services, along with their transport, allowing underserved populations the opportunity to have their medical needs addressed. Mobile clinics identified in this literature review favorably affected healthcare access.

Healthcare access, however vital, covers only a mere fraction of a patient’s overall health status. This limits the impact of healthcare access as larger factors affecting a patient’s health surface. These factors include social, economic, and physical environments, and individual characteristics and behaviors (Health Impact Assessment, 2014). A patient’s health status is largely determined by individual circumstances signifying that even individuals living within the same population, community, or household can have immensely different health conditions and varying chances of good health (Health Impact Assessment, 2014). Mobile clinics in this instance have the potential to address these factors by shifting focus to continuity and quality of care in concurrence with the existing provider and hospital organizations. Mobile clinics could, thus, earn a respected and trusted position within the healthcare system, especially during the time of healthcare reform and expansion when the healthcare system will likely face excess strain.

Attaining measureable health outcomes is where the majority of mobile clinics fell short. A number of reasons may account for this shortcoming to include the nature in which mobile clinic data are collected, and the available resources to finance them. First, data collection by mobile clinics is often anonymous and sometimes not tracked systematically, or at all. Follow-up is then virtually obsolete. These limitations negatively affect data capture of repeat patient visits and therefore, measureable health outcomes that are needed to determine the progress and impact that the mobile clinics have on the health status of the populations. Only three (37.5%) mobile
clinics successfully recorded measureable health outcomes leaving a huge gap that represents a potential measureable data loss just shy of two-thirds. This data loss limits the ability to make an accurate and confident assessment of the effect that mobile clinics have on health outcomes. Second, uniform data collection practices and standards are lacking possibly stemming from poor communication within the mobile clinic network consisting of hundreds, and even thousands, of participants. Uniform standards and practices would allow for consistent, reliable, and repeatable data collection, and promote efficiency in data sharing both inside and outside of the network. All in all, despite a lack of measureable evidence, the 37.5% of mobile clinics that reported measureable data showed a promising outlook for the effectiveness of mobile clinics on healthcare outcomes.

A lack of appropriate financial resources and support could also contribute to the shortcoming of measureable health outcomes. Most of the mobile clinics in this literature review failed to specify the costs and expenditures of operating and maintaining mobile clinic facilities and neglected to indicate the amount of monies received for the continuity of operation. Expenses ranging from marketing services and availability to purchasing fuel to maintain mobility incur costs that could be detrimental to the operation of mobile clinics. In such cases, mobile clinics may get underutilized, forgo or limit data collection, or forfeit services altogether.

Limitations

A majority of the mobile clinics faced the same limitations and biases when it came to their data samples and analyses. Non-randomization, sampling bias, self-selection bias, and recall bias were evident in many of the articles due to the fact that, first, the mobile clinics targeted underserved populations giving way to a sampling pool that overrepresented patients with poor health conditions, second, patients enrolled themselves (usually anonymously) into the
mobile clinics creating convenient, but biased and nonrandom samples, and third, many of the studies that relied on the patients to report accurate data from previous diagnoses and medical care allowed for error due to a lack of recollection. Additionally, control groups were also lacking in a majority of the studies. Another limitation that arose was not taking into account the chance that patients received care from outside sources that potentially affected the health outcomes of mobile clinic data between patient visits. Finally, all the mobile clinics reported favorable outcomes potentially giving a one-sided and biased depiction of mobile clinics altogether.

**Conclusion**

Mobile clinics, overall, have the potential to positively and favorably affect healthcare access and health outcomes of many underserved populations. The “mobility” of their services alone curtails many of the barriers that present health disparities and gaps in low income residents. As shown with this literature review, extensive research on primary healthcare clinics is destitute along with insufficient data of measureable health outcomes to definitively and quantitatively conclude any improvement status, or lack thereof. The data available, however, do show that they are beneficial to low income populations. The mobile clinics allowed for the access of services by both men and women, lessening any gender disparities, helped eliminate geographic location and transportation barriers, gave non U.S. citizens a fair chance to receive quality care—or even care at all, helped patients avoid health insurance barriers by offering free and discounted services to all populations whether insured or not (with the exception of the MediVan), and alleviated many troubles that older adults face by bringing more cost effective
services to them. It is the nature of their services that makes them a unique, but promising option for the U.S. healthcare delivery system.

**Leadership Reflection**

Owning and operating a global mobile health clinic is a goal that I aim to achieve in the long term. I proceeded to do research on U.S. mobile clinics as a foundation to tap into the mobile clinic sector as a result of an uncertainty what country I will reside. A country-specific healthcare and mobile clinic assessment, or perhaps literature review, is in order prior to a final decision.

Given both the lack of research on U.S. mobile health clinics and the shortage of measureable health outcomes, the full value of their use is hidden. In order to fully assess the benefits and effectiveness of mobile clinics, resources (funding, workers, supplies) are needed to calculate earned value (return-on-investment, costs, time) and performance measurements and deliverables (healthcare accessibility, lower patient costs, improved health outcomes) objectively and quantitatively over a period of time (Lientz and Rea, 2002). With a large number of U.S. mobile clinics in various locations performing diverse services, such a project encroaches upon becoming a level four super project (a large project divided into subprojects) due to the complexity and scope of such a tremendous task of identifying, certifying, qualifying, tracking, supporting, and developing protocols for consistency and uniformity in data collection across the mobile clinic board (Lientz and Rea, 2002). This would be a multi-faceted, multi-organizational project much like the mobile health network previously mentioned in the introduction section of this paper, but with additional stipulations. Such a project would require great organizational, networking, and assertive leadership skills.
Over the last two and a half years I have had the opportunity to attend leadership workshops, engage in group discussions and assignments for class projects, and build relationships with other current and future public health workers. It is with pleasure that I undertook such a meaningful and rewarding program such as the Public Health Leadership Program. I have reached milestones that have broadened my sense of self awareness and knowledge of the world around me. This experience has prepared me for a profession, and even livelihood, of leadership and management, and coaching and educating.
# Appendix A.

<table>
<thead>
<tr>
<th>Title</th>
<th>Lead Author</th>
<th>Description</th>
<th>Main Findings</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledgeable Neighbors: A mobile clinic model for disease prevention and screening in underserved communities</td>
<td>Hill, Caterina</td>
<td>Mobile clinics in underserved neighborhoods that show the value of mobile clinics by reaching and giving access to populations that, because of disparities, would not otherwise have it.</td>
<td>1. Reached minority, low income, 2. Diagnosed previous undetected high blood pressure (60%), elevated blood glucose (14%), and hypercholesteremia (38%), 3. Most patients had insurance (other barriers were addressed)</td>
<td><a href="http://ajph.aphapublications.org.libproxy.lib.unc.edu/doi/pdf/10.2105/AJPH.2011.300472">http://ajph.aphapublications.org.libproxy.lib.unc.edu/doi/pdf/10.2105/AJPH.2011.300472</a></td>
</tr>
<tr>
<td>Calculating the Return on Investment of Mobile Healthcare</td>
<td>Oriol, Nancy E.</td>
<td>A prototype ROI tool invented to measure savings due to prevented ED visits and increased quality adjusted life years saved.</td>
<td>Savings of $3,125,668 from avoided ED visits and $17,780,000 saved in life years for a total of $20,339,968. Total ROI: $36 dollars saved for every $1 spent in expenses</td>
<td><a href="http://www.biomedcentral.com.libproxy.lib.unc.edu/content/pdf/1741-7015-7-27.pdf">http://www.biomedcentral.com.libproxy.lib.unc.edu/content/pdf/1741-7015-7-27.pdf</a></td>
</tr>
<tr>
<td>Improvement in Surrogate Endpoints by a Multidisciplinary Team in a Mobile Clinic Serving a Low-Income, Immigrant Minority Population in South Florida</td>
<td>Singh-Franco, Devada</td>
<td>Find effects of multidisciplinary team on CVD of Immigrant Haitians and how that compare to non-Haitians.</td>
<td>Increase access to population; Hypertension, systolic blood pressure, total and LDL cholesterol significantly reduced due to a combination of education, treatments (medications), and lifestyle changes</td>
<td><a href="http://muse.jhu.edu/journals/journal_of_health_care_for_the_poor_and_underserved/v024/24.1.singh-franco.html">http://muse.jhu.edu/journals/journal_of_health_care_for_the_poor_and_underserved/v024/24.1.singh-franco.html</a></td>
</tr>
<tr>
<td>Mobile clinic in Massachusetts associated with cost savings from lowering blood pressure and emergency department use.</td>
<td>Song, Zirui</td>
<td>Assessing BP changes in underserved populations in Boston, MA, using the Family Van</td>
<td>Mobile Medical Clinics are usually the only healthcare accessible to this population</td>
<td><a href="http://www.ncbi.nlm.nih.gov/pubmed/23297269">http://www.ncbi.nlm.nih.gov/pubmed/23297269</a></td>
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<td>Mobile Farm Clinic Outreach to Address Health Conditions Among Latino Migrant Farmworkers in Georgia</td>
<td>Luque, John S.</td>
<td>Occupation Health Needs Assessment and to see whether the self-reported data correlated to actual diagnosis</td>
<td>Mobile Medical Clinics are usually the only healthcare accessible to this population</td>
<td><a href="http://www.ncbi.nlm.nih.gov/pubmed/24149055">http://www.ncbi.nlm.nih.gov/pubmed/24149055</a></td>
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<tr>
<td>Variability between self-reported diabetes and measured glucose among health screening participants in South Central Kentucky.</td>
<td>Michimi, Akihiko</td>
<td>Correlating self-reported data with their associated factors</td>
<td>1. Self-reported diabetes higher in older and obese adults who reported hypertension and hypercholesterolemia and family history of diabetes. 2. Elevated non-fasting glucose levels in those with no insurance and reported diabetes.</td>
<td><a href="http://www.ncbi.nlm.nih.gov/pubmed/16283825">http://www.ncbi.nlm.nih.gov/pubmed/16283825</a></td>
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<td>Educational and health services innovation to improve care for rural Hispanic communities in the USA</td>
<td>Sherrill, W.</td>
<td>Breaking access barriers for rural Latino Populations: Language, health insurance</td>
<td>87% Patient visits were for lab work and immunizations, 4% for physicals, 13% on Medicare/Medicaid, 68% used mobile clinic as primary source of care</td>
<td><a href="http://www.ncbi.nlm.nih.gov/pubmed/14974519">http://www.ncbi.nlm.nih.gov/pubmed/14974519</a></td>
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<td>The Governor's Wellmobile: Maryland's mobile primary care clinic</td>
<td>Heller, Barbara R.</td>
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<td>Increased access to low income and rural areas in Maryland</td>
<td><a href="http://www.ncbi.nlm.nih.gov/pubmed/14974519">http://www.ncbi.nlm.nih.gov/pubmed/14974519</a></td>
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References


