5-2015

The School Based Health Center Design Guidelines

Anna Kim
Clemson University

The School Based Health Center
Design Guidelines

A thesis presented by:
Anna Kim
May 2015

Clemson University
School of Architecture

The SCHOOL BASED HEALTH CENTER DESIGN GUIDELINES

A thesis presented to the Graduate School of Clemson University in partial fulfillment of the requirement for the professional degree, Master of Science, Architecture.

Anna Kim
May 2015

Accepted by
David Allison
Byron Edwards
Windsor Sherrill

ABSTRACT

School Based Health Centers (SBHC) have traditionally gone unacknowledged for their support in providing essential healthcare services to underserved school-aged children. The well-being of these students and their communities rely heavily on a safe, efficient and encouraging physical and responsive environment for successful health outcomes. Literature reveals that the negative health and intricate social issues that face the American youth are stunting growth in academic performance and promoting high risk health behaviors through adulthood. To help eliminate the difficulty in access to healthcare for the underserved, healthcare must be brought to them. The School Based Health Center represents a unique position to alleviate many debilitating obstacles such as poor communication, lack of transportation, strain on the healthcare system and the high cost of basic medical and mental care. Currently, the built environment of SBHCs are not held to a standard of design necessary to deliver quality health. A set of design principles and guidelines are essential to building future centers successfully that support the health and wellbeing of students and their communities.

Unfortunately, limited funding has resulted in a low design quality in School Based Health Centers, creating conditions that do not adequately support optimal healthcare and health education. Makeshift classrooms, bungalows and spare rooms represent a majority of centers

that cannot fully realize their impact on students, family and the community. The often hostile exteriors and exposed interiors can create a stressful experience that rarely provides a healing and encouraging environment. The few detached centers that exist are quickly becoming models for new construction and renovations to older sites. Advances in modular construction are paving new ways of providing an affordable setting for school based health services coupled with customizable design features.

The importance of SBHCs has been well documented, but guidelines to select appropriate sites and design facilities are scarce. In this thesis, site selection, design principles, guidelines and concepts are developed through research in literature, site visits and case studies of current centers. The County of Los Angeles and the Los Angeles Unified School District were studied to demonstrate context for selecting sites based on the health and social issues that prevail throughout the United States. Studies in Los Angeles on the juxtaposition of the prevalence of high risk behaviors, such as family income, teen pregnancy rates and obesity, in corresponding middle and high schools revealed a strong correlation between low socio-economic conditions and health. Areas in most need of a SBHC were easily identified with many overlapping high risk behaviors occurring in a several concentrated neighborhoods.

To best serve student patients and their communities, the promotion of patient and community-based care values, affordability, sustainability, staff satisfaction and efficiency should direct each architectural design decision. Through the development of these guidelines, School Based Health Centers will have important new tools to create environments that support the holistic well-being of students and their surrounding support system.

FIGURES

CONTENTS

INTRODUCTION

America's underserved youth are at a higher risk today of exposure to the a number of serious and chronic health conditions than ever before. This younger population group is not fully capable in making educated decisions nor do they hold the power to change in their socio-economic position. The physical and mental health of school aged children are in the hands parents, guardians, teachers, family members and the community. Each piece of this puzzle is crucial in the healthy development of a child. When one or more of these support systems are weak, the results can be devastating.

Figure 01. Students at library

A school's success is measured through the success of its students. To have a successful student body, the students must first be healthy. The public school system in the United States has taken on the role to educate core subjects such as Math, History and English, but has not properly educated students and families on how to take care of their physical and mental health. A collaborative connection with the school and the larger community can promote successful transition to adulthood through improving academic performance and better overall health. Studies have shown a strong correlation between the physical and emotional health of a student to absenteeism, grades and involvement in high risk behaviors such as substance abuse, violence and chronic conditions that carry through adulthood. Although the school may not be directly responsible for destructive behaviors, it can provide the tools and skills

Figure 02. Physically active students at school

for healthy decisions and clinical services to support positive growth. The powerful potential for schools to positively influence lifestyle changes in the 8 hour school day is enormous. Empowerment can be instilled in students to take charge of their own health at a young age through schools. Teaching can not only happen in the classroom, but also through shaping the everyday choices that students can make about their nutrition consumption, physical activity levels and healthy social behaviors. These choices can impact decisions made outside of school grounds that can influence a change within families and the community at large.

Health and Social Issues. The main concerns for children's health have been identified through census and health data by the C.S. Mott Children's Hospital in 2011[1]. Obesity, substance abuse and teen pregnancy are a few areas of concern on this list that are in need of dire attention. Proper education and the ability to access preventative and medical care can decrease high rates of risky behaviors and conditions. These issues are complicated further for children and families in low socio-economic areas who are presented with additional obstacles. Communication among limited English speaking households, lack of transportation and high medical costs have been road blocks in accessing healthcare. Although many public programs offer assistance, many people are still falling between the cracks, leaving children

without proper medical and mental health support in their youth. Preventable illnesses that could have been resolved early with simple remedies have been shown to escalate into chronic conditions that may be irreversible and costly to the patient and society.

Figure 03. A SBHC at the Richland Parish School System in Louisiana

The School Based Health Center. The familiarity, convenience, trust and comfort that a school can provide are unparalleled in a civic institution for delivery of health services. An on-site health facility can provide students, their families and the community basic healthcare needed to prevent minor illness and health issues from becoming larger problems in the future. The National Assembly of School Based Health Centers identifies resources that guides administrators and designers on a national and state level. A census survey conducted by this association captures a larger picture of more than 1,900 centers and their medical, mental and oral health services, financial structure, organizational features, demographics and future trends and goals.[2] Great importance is given to a collaborative process that involves the community, schools, parents and students to promote the health, education and wellness.

School Based Health Centers - The Architecture. The architecture that houses SBHCs fall in a large range of building types, from a few rooms in an administrative building, to trailers on-site, to detached facilities, to centers inside mixed use community buildings. The

primary concern that drives most design decisions is affordability. The lack of funding that comes from public sources and private donations can severely limit the ability to create a center that promotes the goals and principles of a supportive healing environment. Centers that have been fortunate to receive generous support have implemented a modular system that combines sustainablity and affordability. The prefabricated nature of modular building provides a predictable product with less waste of materials, quicker and easier construction without weather constrictions. These standardized systems are manufactured under higher quality control than many low budget conventional building methods. In addition, affordable sustainable features can be more easily designed into a modular system that can help lower lifecycle cost of the facility. For example, a higher dependence on natural ventilation and lighting are design features that may not necessarily add costs, but may only require strategic orientation and placement of the building and its openings. The multiple economical, environmental and health benefits of a sustainably modular approach can include lower operational costs overall including energy usage and the exposure to fresh air and sunlight.

Site Conditions. For a successful School Based Health Center, location is key. To properly locate SBHCs, an analysis of social and health conditions should be conducted. Census data can

reveal issues most effecting youth and the most underserved in a given area. This information can then be cross referenced to schools that represent the most underserved students and communities. After determining the schools with the greatest need, overall urban planning, analysis and design should be considered.

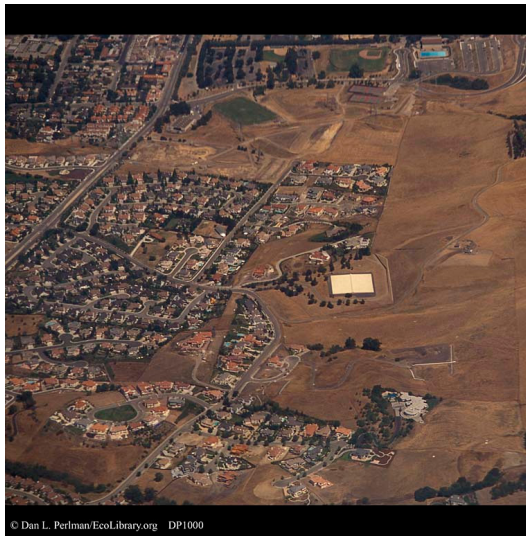


Figure 04. An example of urban sprawl in California

Urban sprawl has created many problematic issues that are slowly being addressed through more sustainable Smart Growth strategies. While many health and community clinics house themselves in new developing strip malls, SBHCs can support access and "Smart Growth" goals by the very nature of being located on-site at an existing school. The collocation of health and educational services promotes effective land use, decreased automobile use and more walkable communities. Beyond its initial siting, design decisions such as making architectural ties to the neighborhood, along with creating a welcoming, visible and physically accessible setting can ensure a strong connection to the community.

In this thesis, the Los Angeles Unified School District in southern California serves as an example that illustrates the most prevalent issues that plague students in a highly urbanized and generally low socio-economic region. Against national statistics, Los Angeles has higher rates of poverty, teen pregnancy, STI rates and obesity, among other health issues.[3] The difficulty in

accessing healthcare for not only students but their family and community members in these targeted areas clearly shows specific high schools in the Southern Los Angeles neighborhoods that are in critical need of a SBHC.

Guiding Principles and Design Guidelines. Two main guiding principles should direct overall decisions, as well as minute details to achieve a successful center: Promote Patient-centerted Care and Promote Family and Community Connections. They are meant to focus design decisions to encompass all users for both current and future needs. Patient-centered design is an inclusive model that takes into consideration a collaborative and holistic approach to design in order to promote positive health outcomes. It moves away from the disease-focused medical model of the past and moves towards meeting the needs of the patient in both physical and mental health. It includes reducing stress in the environment by providing visual and acoustic privacy, introducing physical and visual connections to natural elements and creating social gathering spaces are places for support and empowerment.

A critical facet of patient centered care is safety. Controlling the spread of illness and infection has been and continues to be a chief concern in all schools and health facilities. The high potential for contagions presents a significant risk level to staff, students and the

community. Various measures such as materials choice and natural ventilation are ways in which the physical environment can optimize protection for all in contact with the center. Waiting rooms, restrooms and all other areas that are most touched and frequented should be designed with anti-microbial materials that are low maintenance. Natural ventilation, in particular, can promote higher rates of air changes that move stale air and possibly prevent growth of mold and bacterias in particular climates.

School Based Health Centers are a critical missing link that can provide medical, mental health and support for the underserved. This thesis is meant to give school administrators, potential donors and architects a larger understanding of the health and social issues that are particular to a disadvantaged population group so they may better address the design needs and quality of these facilities. Furthermore, the guidelines developed in the thesis are the results of studies that support the ultimate goal of bringing holistic and positive health outcomes to students, their families and community.

01

HEALTH AND SOCIAL ISSUES

"It takes a village to raise a child." The physical, mental and emotional health and well being of a child depend on the interactions from parents, guardians, family, community members, teachers, coaches and peers. They influence, guide and befriend to help develop essential survival skills to maintain life and function as a member in society. These sets of acquired skills vary greatly depending on ethnicity, culture, region, social upbringing and innate personality. Therefore, to properly understand how to keep children and future populations healthy, one must first understand the attributes of a healthy child and how the social environment encourages particular health behaviors.

The Top Health Concerns of School-Aged Children

Top 10 U.S. Children's Health Concerns
1. Childhood Obesity
2. Drug Abuse
3. Smoking & Tobacco Use
4. Teen Pregnancy
5. Bullying
6. Internet Safety
7. Stress
8. Alcohol Abuse
9. Driving Accidents
10. Sexting

Figure 05. The Top 10 Health Concerns, by the C.S. Mott Children's Hospital in 2011.

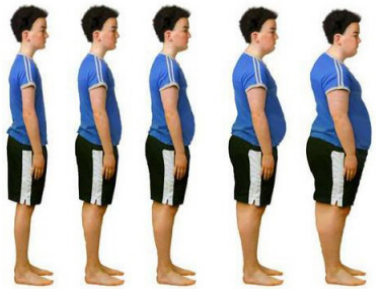


Figure 06. The gradual weight gain of an adolescent child

Developing and adolescent children nationwide are slipping through the cracks of the healthcare system in the United States. Unfortunately, issues such as those identified by the 2011 C.S. Mott Children's Hospital research[4] in Figure 05 are not adequately addressed by the school system. Childhood obesity, teen pregnancy and drug/alcohol abuse are few of the top concerns for students today. Many students that exhibit one risky behavior are more likely to engage in others and continue these behaviors into adulthood. The dangers of health risks at a young age can become chronic illnesses in the future with irreparable consequences. First, it is imperative to understand a few of the leading health threats for youth today and their possible causing factors.

Childhood Obesity. Obesity is defined as having excess body fat.[5] The Centers for Disease Control in 2014 reported children aged 2-19 have not seen improvement in childhood obesity since 2002.[6] The immediate dangers of this epidemic include the high risk of pre-diabetes, cardiovascular disease, bone and joint problems, sleep apneas, alongside the social and the psychological issues.[7] Long term effects include various cancers (breast, colon, esophagus, kidney, pancreas, thyroid, ovary, etc.), heart disease, type 2 diabetes, stroke, myeloma and osteoarthritis, among others.[8] The environmental causes of obesity comes from a variety of

sources including schools, parents, household income, the fast food industry, suburban sprawl among other causes.

Schools have been under scrutiny in recent years for exposing students to high sugar, fat and sodium content foods, drinks and candies. The largest culprit has been the widespread availability of vending machines on campus. In Figure 08, a study in Utah's school vending machines showed an alarming percentage of foods in schools filled with unhealthy junk foods. Candy bars and sodas are only now slowly being replaced with fruit snacks, cereal bars and fruit juices. Unfortunately, these items contain the comparable amount of sugars as the candy bars they are replacing. Figure 07, shows the comparison in nutrition facts in a typical Snickers bar, with 28.8 grams of sugar for a 2 oz bar to a 10 fl oz bottle of Minute Maid Orange Juice with 30 grams of sugar.[9] Although orange juice has better nutritional content, it contains more sugar than the Snickers bar. This is a step into the right direction, but the underlying causes of uneducated youth on nutritional health will not be solved by these individual acts.

Schools also have the power to choose what meals are being served to its students. With breakfast and lunch consumed on campus, school meals can directly shape dietary habits

Nutrition Facts

Serving Size: 1 (8 oz, 227 grams)

Amount Per Serving	
Calories 140	Calories from Fat
	% Daily Value*
Total Fat	
Saturated Fat	
Trans Fat	
Cholesterol	
Sodium 20mg	1%
Total Carbohydrate 33g	11%
Dietary Fiber	
Sugars 30g	

Nutrition Facts

Serving Size: 1 (2.07 oz, 59 grams)

Amount Per Serving	
Calories 280	Calories from Fat 126
	% Daily Value*
Total Fat 14g	22%
Saturated Fat 5g	25%
Trans Fat	
Cholesterol 5mg	2%
Sodium 140mg	6%
Total Carbohydrate 35g	12%
Dietary Fiber 1g	4%
Sugars 30g	
Protein 4g	8%

Figure 07. Nutrition Facts of a Snickers bar and Minute Maid Orange Juice.

Figure 08. What new snack standards set by the USDA at schools can do to reduce empty calories.

starting at a young age. A comprehensive approach begins with the ability to make healthier choices inside the home, at school and at convenience and grocery stores. The low physical activity levels among children and bad nutritional behaviors are two of the main reasons obesity rates continue to rise. Factors that influence to these behaviors include low socio-economic status, attitudes, cultural views, family and social influences. An example that illustrates many of these factors is the traditional Southern diet and lifestyle in the United States. The U.S. Census Bureau found southern states with a poverty rate of 14%. It is not shocking to find that Mississippi, the poorest state with 21% in poverty, is also the fattest state.[10] Quality

fresh foods are not cheap or abundant. The University of South Carolina conducted a study in 2004 and found that most food stores in the rural South are convenience stores that do not provide variety or healthy options.[11] In addition, many people in these rural areas are too far from grocery stores. The difficulty in accessing fresh foods and vegetables that are available and affordable puts this group at risk for obesity. Figure 10 maps the concentration within

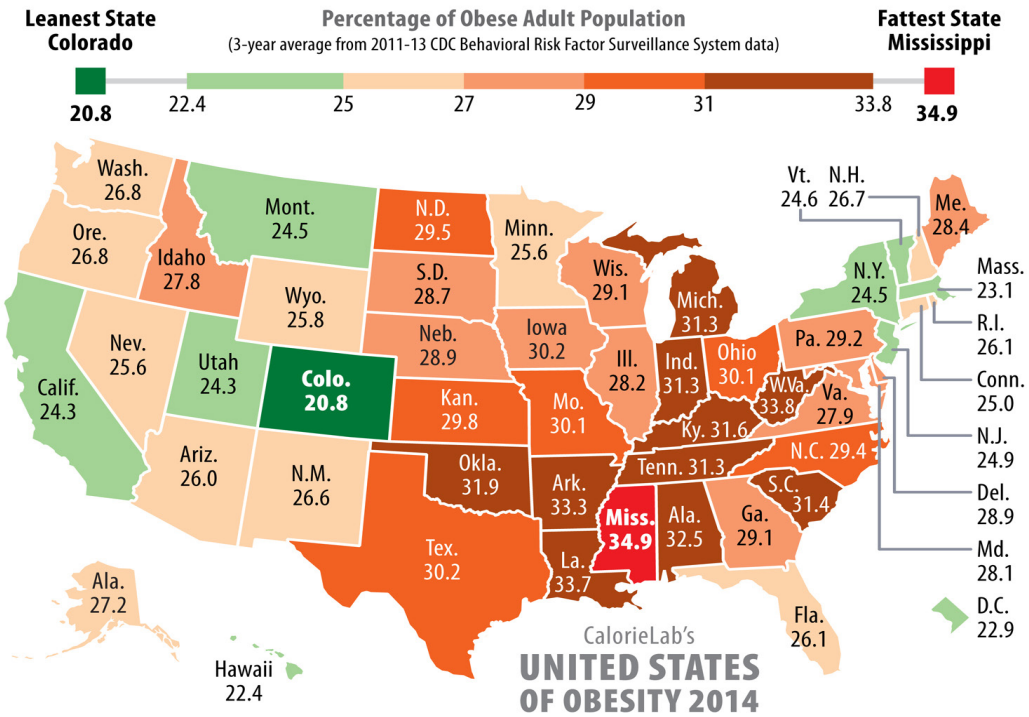


Figure 09. Obesity rates in the United States

the southern states that do not have a supermarket within a mile that also do not own a car. The darkest concentration represents over 10% of people in a particular region who are in a disadvantaged position in accessing food stores.

Another factor to consider in the South is the hot and humid weather coupled with the heavy dependence on cars for transportation. In the summer and fall months, temperatures rising over 100 degrees and extreme storms keep people inside their homes and cars. In addition,

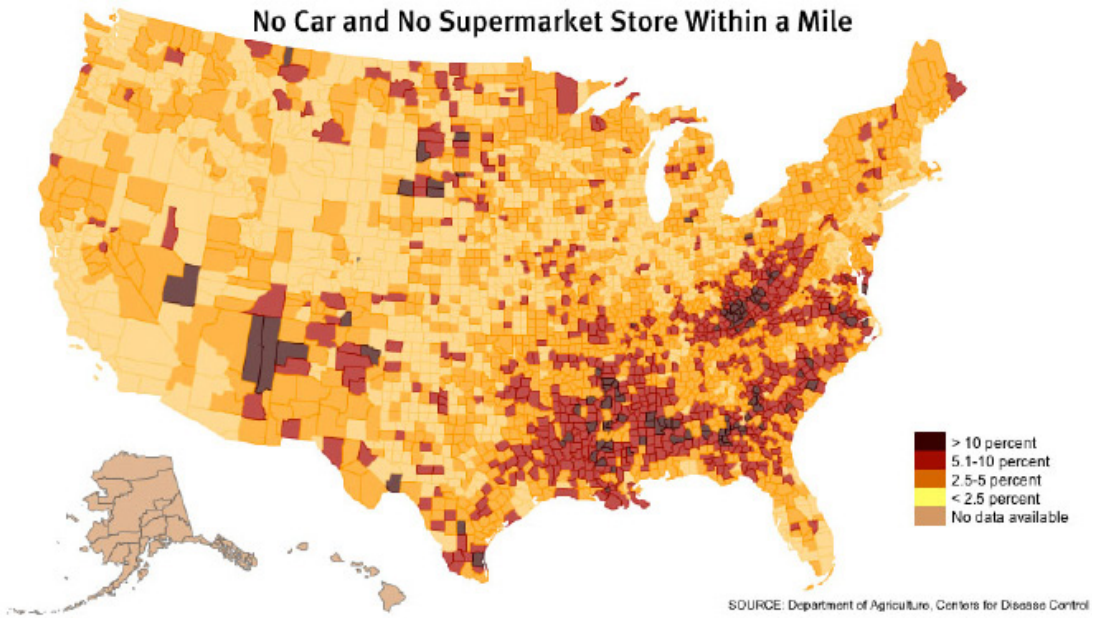


Figure 10. Compares the areas with low income rates in the United States to the concentration of areas without access to a car and supermarkets within a mile.

the lack of an efficient public transportation system in the South, forces residences to drive cars everywhere, limiting the opportunities for physical activity. These daily habits are then subconsciously learned and passed on from adults to children through their everyday routines.

Asthma. Asthma is a chronic condition is caused by inflammation of the airways that result in problems breathing. According to the American Lung Association, asthma is caused by various triggers such as colds, respiratory infections, dust, pollen, stress, sudden temperature change and cigarette smoke. Asthma affects about 7.1 million children under 18 with over 4.1 million cases of an asthma attack in 2009.[12] Figure 12 shows the average absences in schools among students as a result of asthma. It is also the third leading cause of hospitalization for children under 15 years old. In 2005, about 670,000 emergency room visits were caused by asthma attacks in children under 15 years old.[13] As a result, asthma has developed into one of the leading causes for absences in school. In 2007, approximately 14.4 million school days were lost due to asthma attacks.[14] The National Asthma Education and Prevention Program under the U.S. Department of Health and Human Services and the Department of Education created a guide for schools called, "Managing Asthma: A guide For Schools." It suggests that close monitoring of these students in taking medication, recognizing the symptoms and

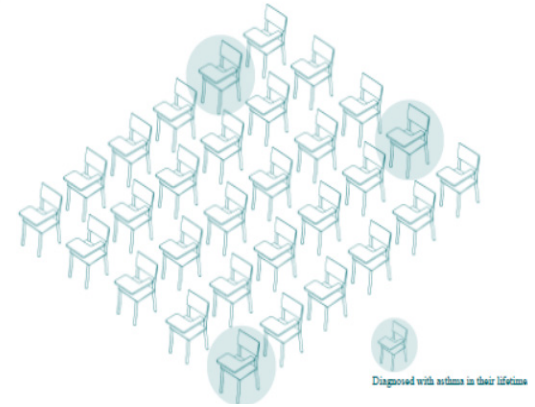


Figure 11. Represents the average absences in school among students due to asthma.

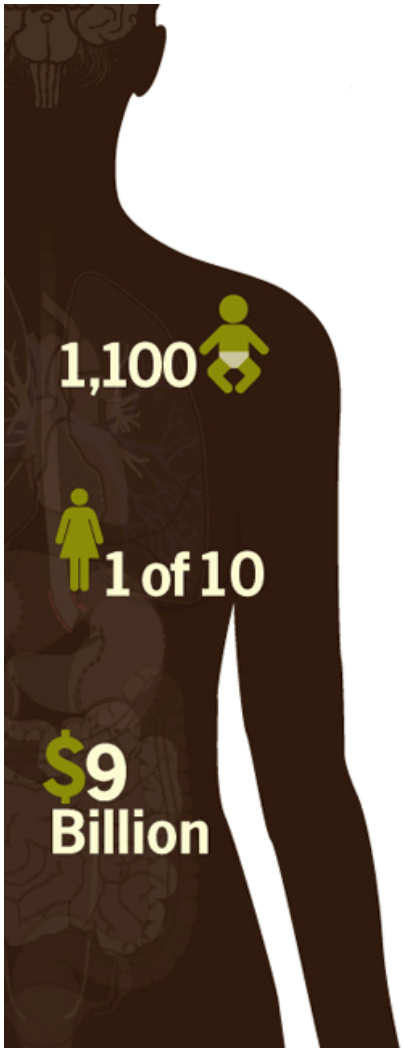


Figure 12. Teen pregnancy statistics

forming a strong partnership between the family, physician and school are the best methods of controlling asthma.

Teen Pregnancy. Nationally, teen pregnancy in all age groups and ethnicities has decreased from 2007 to 2008, according to the National Center for Health Statistics, from 42.5 births per 1,000 girls to 41.5 although, from year to year these statistics can fluctuate up to 7%.[15] Addressing this issue can dramatically change the academic success and the health outcomes for both the mother and child. Teenage mothers face a higher likelihood to drop out of school.[16] A 2001 study found teens who gave birth were only 10-12% likely to pursue a post-secondary education.[17] Completing high school and continuing onto college can provide for better opportunities in careers and higher pay. Beyond social ramifications, teen pregnancies have significantly higher complications including anemia, pre-term delivery, low birth weight and neonatal admission.[18]

The social pressures along with the general lack of information about the consequences of teen pregnancy among youth allows for the continuation of this prevailing issue. Schools are not doing their part to educate their students in prevention. Students aged 17-18 reported that they had little or no formal education about the use of condoms or contraceptive pills.

This position of ambivalence taken by schools is putting young adults at risk for unplanned pregnancies.[19] Although teen pregnancy is controversial for reasons of religion and culture, the evidence shows a need to address this issue.

Drug and Alcohol Abuse. Substance abuse holds the highest number of deaths for teens and young adults, as related to automobile accidents from alcohol.[20] Approximately 75% of high school students have tried alcohol, with 26% having had a "recent episode" of heavy drinking (5 drinks within 2 hours).[21] These statistics are a clear indicator that substance abuse is a high risk health threat for school-aged students. The consequences for the long term effects or the high risk behaviors in altered states are often ignored by young adults. Drug and alcohol abuse is particularly imperative to address as it can threaten the well-being of others with behaviors such as driving under the influence. Unfortunately, the social and/or physical addictive properties can lead to chronic illnesses such as cancers, alcoholism, liver failure, oral diseases and death. The American Journal of Public Health found in 2009 that over 60,000 of all deaths in the United States were alcohol and drug related deaths.[22]

Figure 13. Students eating a healthy school lunch at Garfield Elementary School in Kansas City, Missouri.

The Case for School Involvement. Obesity, teen pregnancy and drug/alcohol abuse are only four of the top ten health concerns. These can be addressed effectively in schools to make a substantial difference. Education and services can be provided through the school and its networks of students, parents and community members to advocate for the health and well-being of America's youth.

The goal is to identifying key risks and their factors in the context of how parents, the school system and medical community can positively affect the well being of their students. Schools today are one of the last civic institutions that bring the community together. Parents, grandparents, guardians, family and friends gather at the school for open houses, bake sales, theater productions among other events. This interaction promotes parental involvement in the child(ren)'s developing life in varying aspects, including physical, mental and emotional health that can increase academic performance and healthy behaviors. These are crucial conversations that can indirectly and directly affect imperative decisions that are made on behalf of the student. These decisions can set off a chain of reactions that affects some or all of the other students.

18,720 hours
average per student spent in schools from K-12th grades.

Schools are in a unique position- holding a captive audience. By commanding over eight hours, five days a week over 13 years, schools influence students beyond the Math and English

lessons that are taught. Students often will have breakfast, lunch and after-school snacks on campus. Schools are where children learn, grow and develop most of their habits that include social and health behaviors that will be carried throughout their life. Students learn to interact with others of different ethnicities, ages, cultures and personalities. With a good organizational framework and proper support, school systems can detect and address health problems before they become chronic issues. Prevention and health education can help students understand risk factors and high risk behaviors to make informed decisions about their health.

Figure 14. A school science fair.

Figure 15. Community fundraising bake sale on school grounds.

Socio-Economic Barriers

Socio-economic barriers are major obstructions in accessing healthcare. There are varying levels and degrees of barriers that can be specific to ethnicity, income-level, class, gender, among others. Many times there is an overlap of two or more characteristics that make access to healthcare, even when available, extremely difficult. The lack of basic prevention and treatment of physical and mental health for children inhibits the well-being and academic success of America's youth.

Communication is a chief concern for families in environments that are predominately immigrant and/or minority based. Not only is there a language barrier but also a cultural disparity that can become a struggle for schools, parents and students. Understanding English is often the first barrier in the ability to find needed care. In a family with parents or guardians that do not speak English, effective communication between schools and the family can be lost. This can lead to problems receiving critical information about academic performance, attendance, health or behavior issues. Children at a younger age themselves do not understand the content nor the weight of health decisions that are or are not being made on their behalf as a result. An open line of communication from schools to parents is an absolute necessity as a step for the well-being of growing children and adolescents.

Linguistic isolation has become increasingly problematic. In 2000, six out of every seven elementary students and two out of three secondary English Language Learner (ELL) students lived in households where no English was spoken in Los Angeles. In the last five years, this trend was paralleled in schools. One study found 70% of elementary ELL students were enrolled in 10% of all elementary schools nationwide. Nationally, Latino ELL students attend schools in which over three-fifths of the student population is Latino.[23] The majority of these students come from Latino ghettos, in which exposure to English is limited. Research has shown that parents of these students express a deep concern for the academic success of their children.[24] Unfortunately, parents of the ELL population have comparatively low levels of literacy in their native language in addition to English. Many immigrant families do not have a high school diploma or formal education. The 2000 US Census reported less than half of parents of ELL students had a high school education, with a 25% with less than a 9th grade education.[25]

One example of this disparity is seen in California, in which over 100,000 residents in 2012 will likely have restricted access to healthcare due to a language barrier. UC Berkeley and UCLA have conducted micro simulation estimates that are based on 1 million limited-English proficient adults that are eligible for coverage through the state's Health Benefit Exchange.

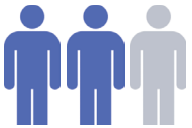


Figure 16. Represents 3 out of 4 ELL high school students in 2000 who lived in households where no English was spoken.

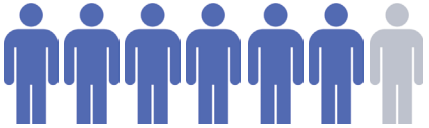


Figure 17. Represents 6 out of 7 ELL elementary students in 2000 who lived in households where no English was spoken.

Of those, only 42% are expected to enroll due to language barriers.[26] The trickle-down effect from limited ability to communicate can become exponentially catastrophic in the overall health of students and their families.

Communication goes beyond language. Providing a welcoming environment that encourages parental involvement in a student's life is critical in promoting the health of the child and all members of the family. Parents of ELL students have reported hostile environments on school grounds that discourages their involvement.[27] With innate cultural differences in ethnicity and socio-economics, many parents feel this additional obstacle may result in limited involvement with their child's growth in the school system.[28] School aged children do not have the understanding of holistic health and the importance of academic performance and must rely on their parents or guardians for support. When this chain is broken, the results have been shown to the detrimental to the physical, mental and emotional health of students and their families.

School Based Health Centers can help address communication disparities in the short and long term by employing multi-lingual staff, support and education to the families to become literate.

Transportation. Means of travel to seek healthcare is often overlooked as a determining factor in accessing healthcare. Greater access to healthcare has been linked to positive health outcomes with frequent utilization of preventative services and lower hospitalization rates.[29] Especially in low income areas, ownership of a single car can be a luxury that many families cannot afford. In these situations, public transit, bicycles and or walking are the main forms of transportation to school, work and daily affairs. Depending on the location of the clinic and or

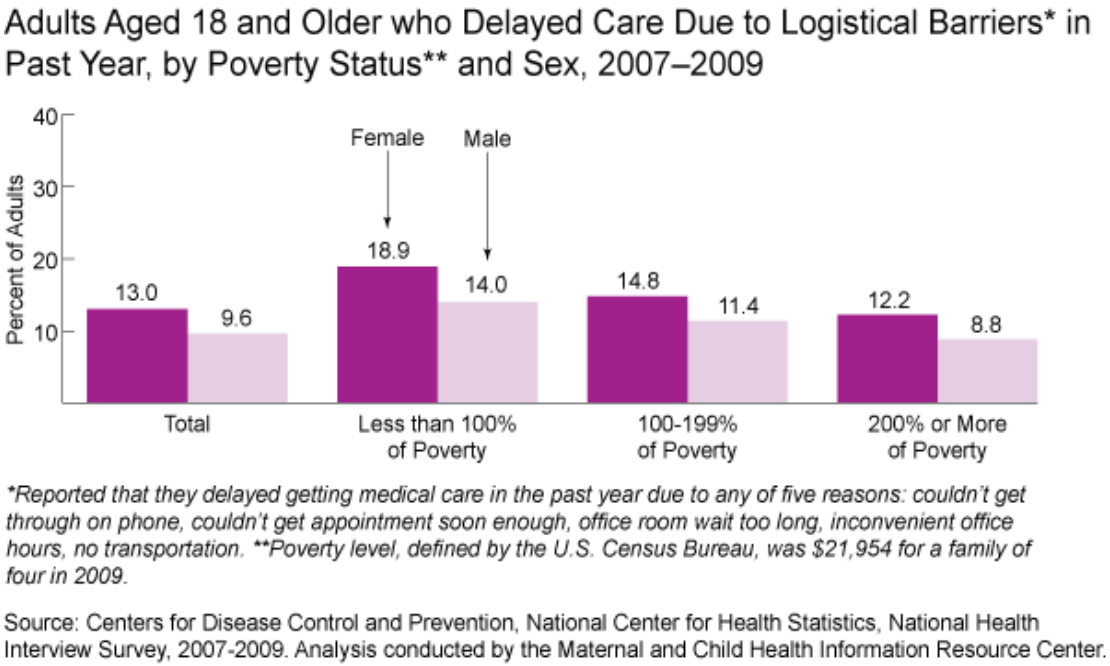


Figure 18. Delayed care due to long waits, inconvenient hours or no transportation.

hospital, this difficulty may deter and delay care that may be needed. When parents cannot physically get to appointments, it negatively effects their ability to care for their child(ren).

Studies continue to show transportation as one of the foremost difficulties in seeking care. The University of Texas conducted a study that found patients missed treatments directly from the lack of available or affordable transportation.[30] Another study in Boston identified that transportation was the primary reason among Latino parents in their inability to take their children to a pediatrician.[31] Contra Costa County (northern California) conducted a study that revealed that 24% of appointments that were missed were due to transportation.[32]

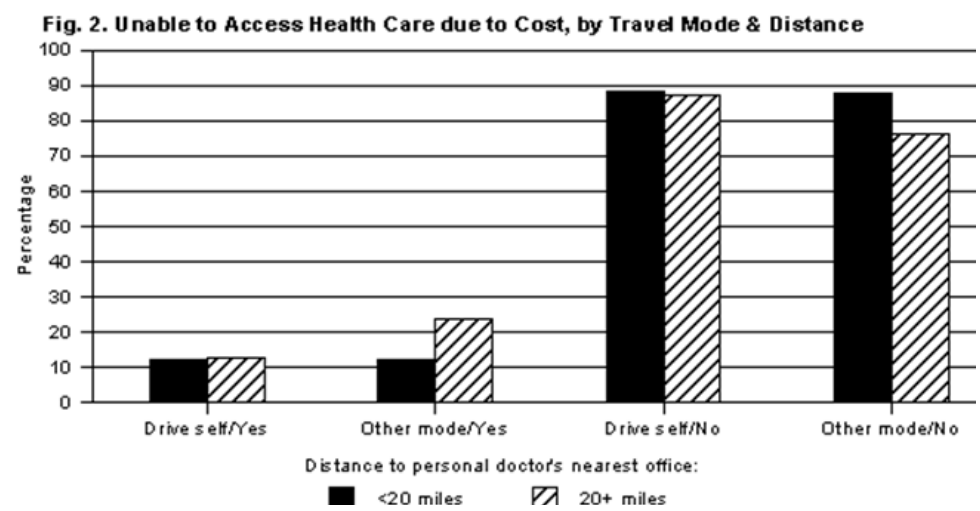


Figure 19. Table that shows the relationship between access and distance.

Locally available healthcare services. Across the country, hospitals that are financially flourishing are facilities with higher rates of private insurance holders and Medicare (age-based beneficiaries). Hospitals that are struggling and closing are those that serve predominantly Medi-caid (low-income beneficiaries) populations that significantly underpay for services. For example, since 1996, Los Angeles closed over 33 hospitals with a disproportionally high ratio in the lower income communities of south Los Angeles. Higher income areas of West Los Angeles, Beverly Hills, Culver City, West Hollywood, Santa Monica and Venice have 8 hospitals, whereas the lower income cities of Inglewood, Compton, Highland Park, Boyle Heights, etc. have half as many, but cover more city square miles.

Not only are there more hospitals in better neighborhoods, the quality of care is better. UCLA Medical Center and Cedar-Sinai are consistently ranked the best by US News Rankings in various medical departments such as neurosurgery, physician's reputation, cancer and heart disease. These two hospitals are located in the county's wealthiest areas of Westwood and West LA. The USC-LA County Hospital, known for being overcrowded and long appointment waits, serves mostly the uninsured and low-income population of Los Angeles. This disparity is discouraging, as this trend seen in most, if not all major cities across the country.

The populations that go to hospitals like the USC- LA County Hospital are the very same people who would benefit most from having a SBHC as a first and regular option for non-emergent and non-critical healthcare needs. The SBHC can offer time savings and stress relief of getting an appointment and long waits of county hospitals. This community-based option can significantly improve the likelihood of regular care.

Paid sick time and Health. In 2010, approximately 44 million private business workers did not have paid sick time. Of those who did, many were not able to take time off for a sick child.[33] Financially struggling families cannot afford to risk losing pay or their jobs. As a result, children may not make it to a doctor's appointment. An untreated and possibly contagious illness can spread to other students and staff at schools, threatening all parties from their academic goals and health. Researchers have found through interviews and surveys that families with older siblings are taken out of school to care for the younger child(ren) when sick.[34] The benefits of parents being able to care for their sick child is significant as research has shown better vital signs, faster recoveries, and shorter hospital stays.[35]

Healthcare costs increase as those parents who cannot take their children during business hours are forced to utilize urgent care clinics and emergency rooms that charge higher costs

for possible non-emergent cases. 30% of low income public school parents in New York City reported taking a child or family member to the emergency room due to their inability to take time off from work.[36]

Cost of Medical Care. The perceived cost of medical care can intimidate families who may not be able to afford the high cost of medical care to avoid contact with the healthcare system. Figure 20 shows the findings from the Kaiser Family Foundation from a study in 2011 of the percentage of individuals and families that elect not to choose medical care due to costs. A study was done through the American Journal of Public Health that sampled between 5,700-

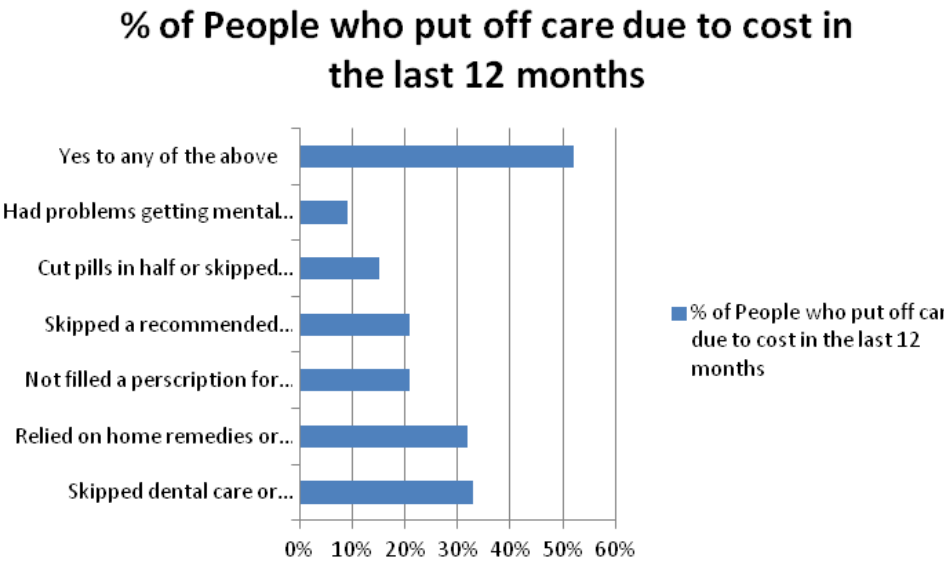


Figure 20. The percentage of people that delayed clinical and mental health services due to cost.

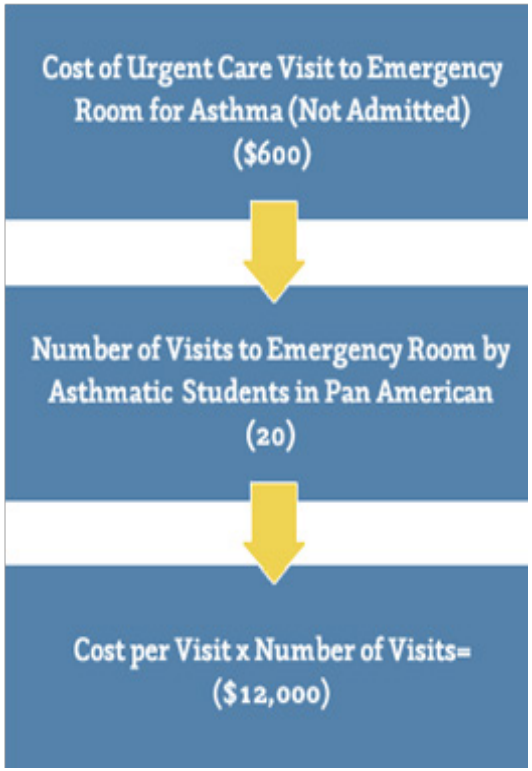


Figure 21. Shows the high costs of ER care that could be lowered with a decrease in unnecessary ER visits.

7,900 people per month in 45 states regarded their perceived cost to their personal decisions to seek care.[37] There was a consistent perception that medical costs were higher than the actual cost that led many surveyors to choose against care. An unfortunate result of these decisions is disastrous for the individual and the healthcare system.

The emergency room becomes the only provider for guaranteed medical care. This puts an extreme stress on resources while providing an acute solution to a primary care and potentially chronic health problem. Many of emergency department visits are non-emergencies. 46%

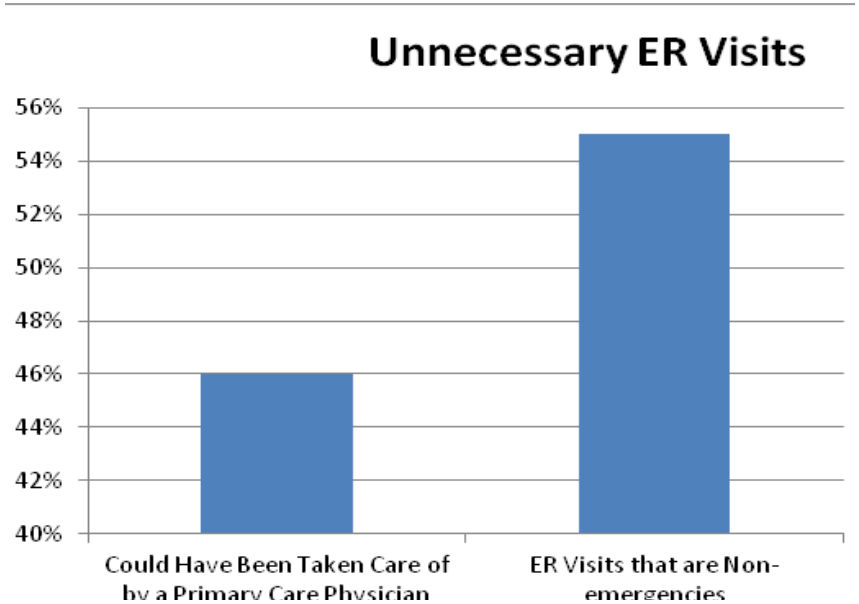


Figure 22. The percentage of ER visits that unnecessarily burdened the healthcare system in cost and human resources.

of all ER users believed that their health issue could have been taken care of in a physician's office visit, with 55% of all ER visits in 2006 non-emergency cases.[38] Of these visits, it was found that lower income families (in 2008, there were 90% more emergency room visits for Americans living in low-income areas than those in higher income neighborhoods), younger persons, women and Latin-American and African-American groups were more likely to be in this category.[39] Unfortunately, this is the most inefficient use of resources for all parties involved. For the hospital, it will have to absorb the higher cost of services provided in the emergency department requires. For the average consumer, insurance rates are often increased as a direct result of cost shifting (to cover the unpaid balances). Most importantly for the patient, the level of care is a highly episodic and acute response to the needs of that specific incident, rather than a holistic understanding of the health and social issues that may be involved. Follow up care is not given through the ER, but is the patient's responsibility for continuing treatment as needed. Those who come uninsured most likely cannot afford for follow-ups and will leave possible chronic conditions to deteriorate further.

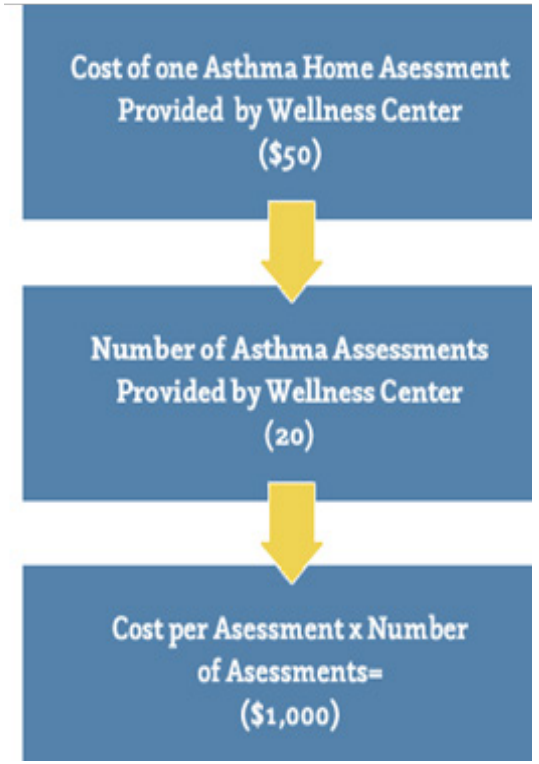


Figure 23. Cost savings from utilizing SBHC services.

The Relationship Between Health & Academic Performance

Healthier students have higher academic performance. When students are not well, the focus on learning is compromised due to missed classes for doctor's visits and recovery time. The juxtaposition of attendance rates, physical activities, high risk behaviors (such as smoking, sexual activity, drug/alcohol use), graduation rates and grades have shown that students achieve higher grades when students are in school and engage in low risk, healthy behaviors. Figure 24 charts a study done by the National Center for Children in Poverty that shows the correlation between attendance rates for kindergarteners and their performance in math,

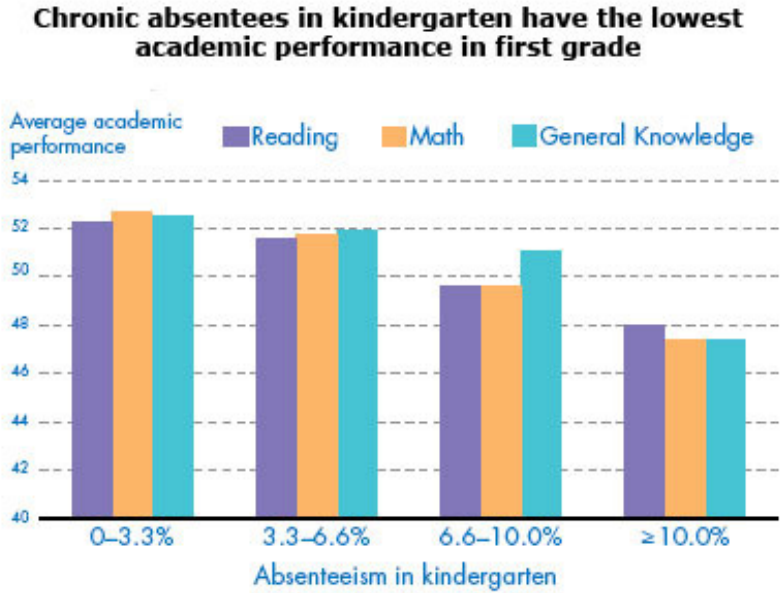


Figure 24. The NCCP relationship study in 2007 between absenteeism and academic performance.

reading and general knowledge. It shows a consistent trend of lower grades for students that have higher absentee rates. Figure 25 looks at the grades of high school students in relation to high risk behaviors. Students with higher grades show lower activity rates in behaviors such as substance abuse, weapons possession, hours spent watching TV versus hours spent in physical activity and sexual activity. The lack of adequately available healthcare for underprivileged children is straining academic performance, the healthcare system and most importantly, the personal physical and mental health of America's youth. Students with chronic illnesses have difficulties with their academics.[40] It has been reported that 45% of students with chronic

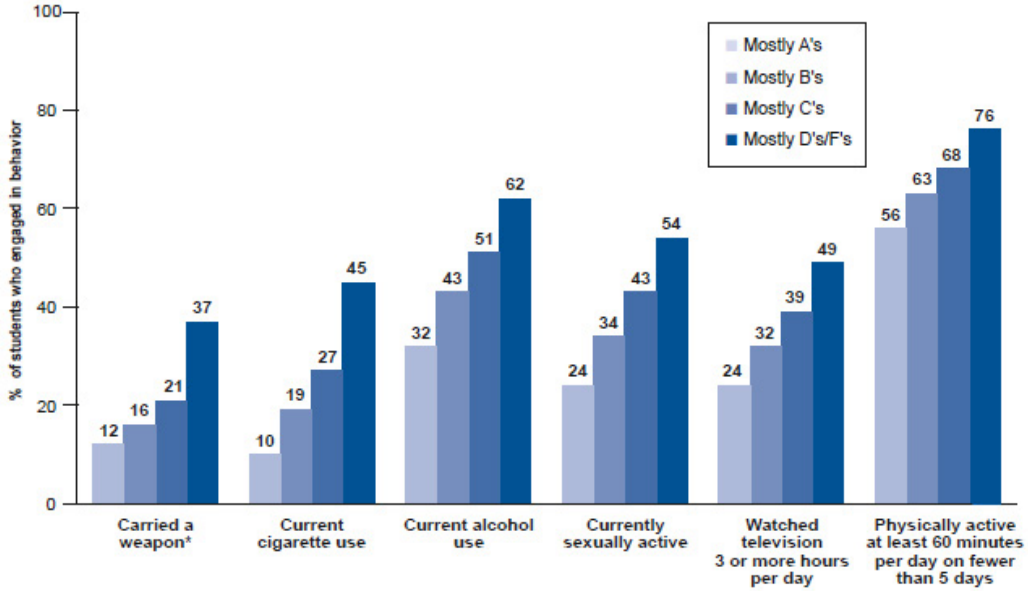


Figure 25. The Youth Risk Behavior Survey relationship between grades and high risk behaviors, 2009.

illness are behind in school work, with 35% of high school students with “health impaired” conditions had failing grades.[41] When students miss 30% of days in a grading period, they are more likely to fail.[42]

In 2001, the California Department of Education matched student results from the Stanford Achievement Test against FITNESSGRAM, a mandated physical fitness test designed to find if there is a correlation between the two. Over 800,000 students in 5th, 7th and 9th grades consistently showed approximately double on the SAT score in students that passed all 6 components on the physical fitness tests.[43] While standardized testing may not be the ideal indicator of academic performance, the association can be seen over multiple grade levels among a large survey sample. On a national level in 2009, the CDC conducted the National Youth Risk Behavior Survey (YRBS) that showed the negative connection between health risk behaviors and academic performance of high school students. Six categories of behaviors were considered: carrying a weapon, smoking cigarettes, drinking alcohol, watching 3+ hours of television a day, being sexually active and being physically active 60 minutes/5 days a week. In some categories such as smoking, non-smokers were almost four times more likely to receive A’s in class.[44] Academic achievement can be further broken down into academic behaviors, such as turning in assignments on time and school attendance, as well as cognitive

skills and attitudes, such as the ability to concentrate, memory skills and mood.

Positive health outcomes lead to higher academic performance, as higher academic performance leads to better health outcomes. When a student has higher academic performance, the likelihood of continuing onto a four-year undergraduate degree is increased. A study done by the National Poverty Center and the University of Michigan in 2007 has found

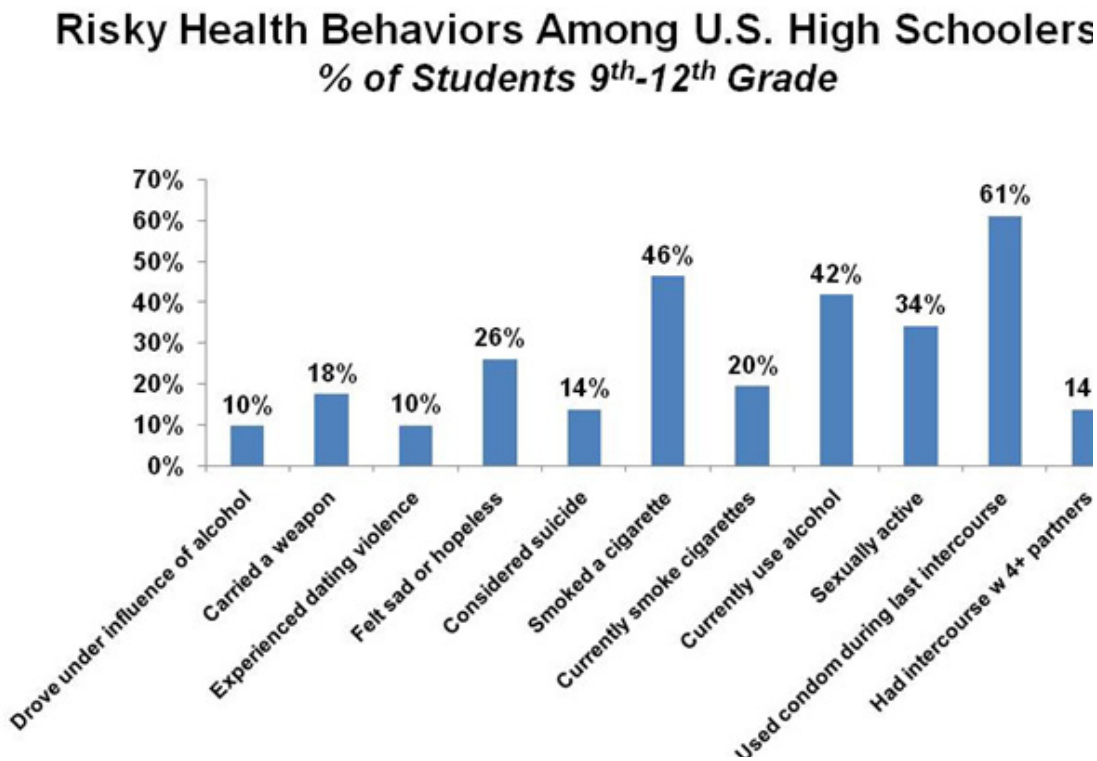


Figure 26. The percentages of high school students that engage risky health behaviors.

connections between health such as diabetes, heart disease, 5-year mortality rate and the number of sick days to be generally lower (up to 5% difference) in those that have the 4 extra years of education.[45] A healthy student has shown to obtain higher academic performance through less absenteeism and the ability to focus on schoolwork. Students with better grades in school are more likely to then continue onto higher education, which has shown to result in positive health outcomes in behavior and actual health outcomes. The hope is that as healthier adults, these behaviors are passed down to the next generation.

Summary

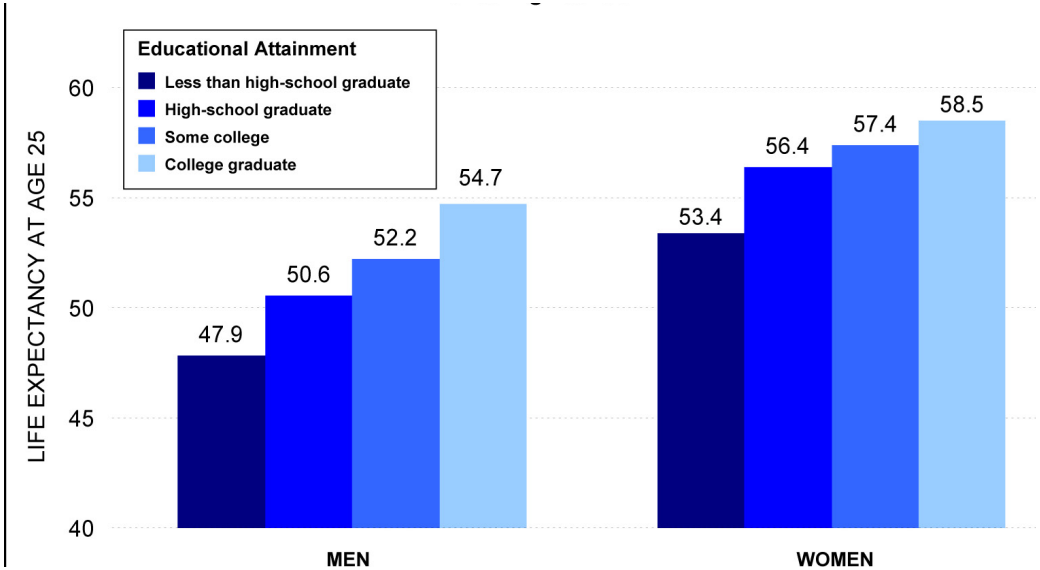


Figure 27. Study of life expectancy to education levels of men and women.

Maintaining good health in itself is a difficult task. The average person in today's society is bombarded with long work hours, environments that discourage or prohibit physical activity and fast food. These conditions are breeding grounds for a sedentary lifestyle with poor nutrition and bad habits. A few of the top concerns, identified by the Mott's Hospital, identifies obesity, teen pregnancy, lack of physical activity as the major issues facing school age children. In underserved areas, the likelihood of poor diets, fitness and risky behaviors become more prevalent on a larger scale due to the lack of proper education, transportation, finances and lack of insurance, health facilities and general healthcare access. These various social issues are negatively affecting the overall well being of school aged children. SBHCs designed with social issues in mind can not only provide essential care, but also help restore the social health of struggling communities.

02

The School Based Health Center

School Based Health Centers are by no means the panacea to the health issues of school aged children or their communities. However, they can be an integral part of the solution toward providing the basic medical and mental health services that are lacking or completely absent in medically underserved areas. The benefits of a SBHC in a community include a consistent and a convenient setting that integrates healthcare with education in their neighborhood.

Background of SBHCs

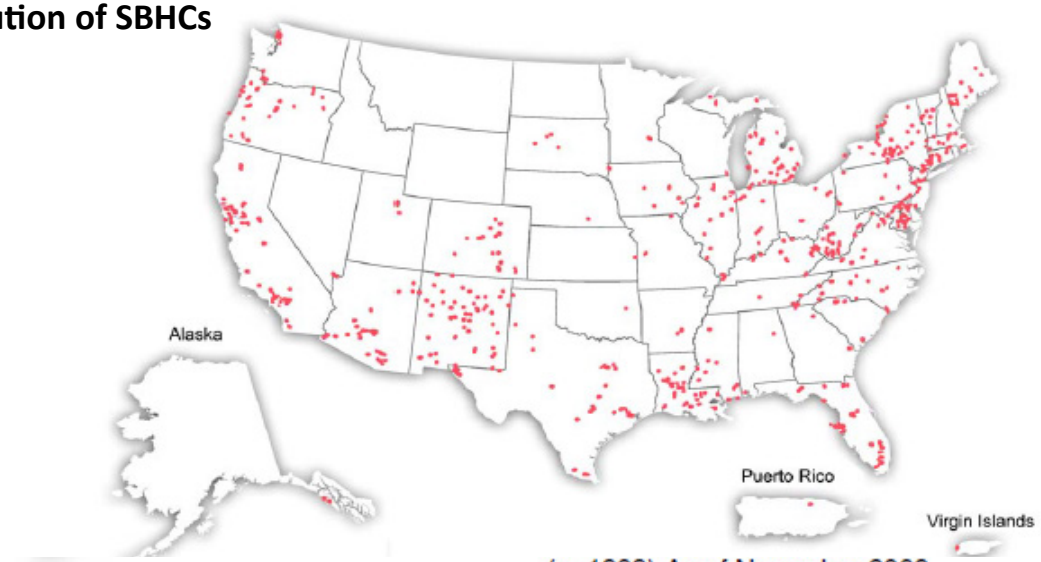
Figure 28. A medical assistant aiding a student in a SBHC at Butzel Elementary and Middle School.

School Based Health Centers are "Partnerships created by schools and community health organizations to provide on-site medical, mental health and/or oral health services that promote the health and educational success of school aged children and adolescents, " as defined by the National Assembly of School Based Health Centers (NASBHC).[46] They exist as a connection between healthcare systems and schools with a focus on underserved and uninsured students and their communities. The first school based health centers were created in Dallas, Texas and St. Paul, Minnesota in 1970. Today there are over 1,900 centers that serve patients in dense urban cities, suburban neighborhoods and rural communities. The NASBHC outlines principles that all centers should abide by and strive for.[47] They include:

Support the School by working with administration to develop goals that include effectively communicating among teachers, staff, students and parents, serving as a community resource for crises and disasters and collaborating with community resources to support student growth and learning.

Respond to the Community through a consistent evaluation of assets and healthcare needs and trends. The objective involves community input with open communication to address possible improvements and general support in operations.

Distribution of SBHCs



(n=1909) As of November 2009

Alabama	5	Indiana	87	Nebraska	1	Rhode Island	2
Alaska	3	Iowa	16	Nevada	6	South Carolina	7
Arizona	81	Kansas	2	New Hampshire	1	South Dakota	6
Arkansas	4	Kentucky	20	New Jersey	40	Tennessee	21
California	160	Louisiana	64	New Mexico	79	Texas	70
Colorado	45	Maine	26	New York	206	Utah	5
Connecticut	79	Maryland	71	North Carolina	49	Vermont	5
Delaware	28	Massachusetts	59	Ohio	17	Virgin Islands	1
District of Columbia	4	Michigan	90	Oklahoma	11	Virginia	19
Florida	245	Minnesota	16	Oregon	51	Washington	20
Georgia	3	Mississippi	31	Pennsylvania	28	West Virginia	50
Illinois	62	Missouri	3	Puerto Rico	2	Wisconsin	8

Figure 29. Map of the 1,900+ School Based Health Centers in the US and territories.

Focus on the Student by encouraging comprehensive participation from parents and family in the student's holistic development. The well being of the student should be supported through confidentiality, cultural sensitivity, and proactive prevention in the services and materials provided.

Deliver Comprehensive Care through an interdisciplinary group of people dedicated to high quality physical and mental health with focus on early intervention and prevention. These services include well-child exams, immunizations, diagnosis and treatment of acute illness and injury, management and monitoring of chronic conditions, basic laboratory, pharmacy and mental health services, substance abuse, violence education, prevention and lastly preventative and primary dental care. Efforts should be coordinated to reduce duplication of services and improvement in delivering a continuity of care as a means to maintain affordable costs to patients and their families as well as improve overall care.

Advance Health Promotion Activities by utilizing available resources from the hosting school and community. Creating programs that encourage physical activity, broadening the curricula of health education that are specific to identified risk factors and promoting

involvement from all facets are a few specific targets set in the National Association of School Based Health Center's Principles and Goals.

Implement Effective Systems to support financial stability, comply with all laws and regulations, develop and measure objectives, maintain a high quality facility that ensures patient comfort and privacy and collect health data for analysis.

Provide Leadership in Child & Adolescent Health. SBHCs are in a unique position to increase the knowledge base for school aged children and effectively influence policies and the delivery of healthcare services to this population. This can be done through active participation in local, state and national organizations, such as the NASBHC, to advocate the needs of physical, mental and dental services for all children. Leadership can also lead to increased national and worldwide attention for financial support and awareness.

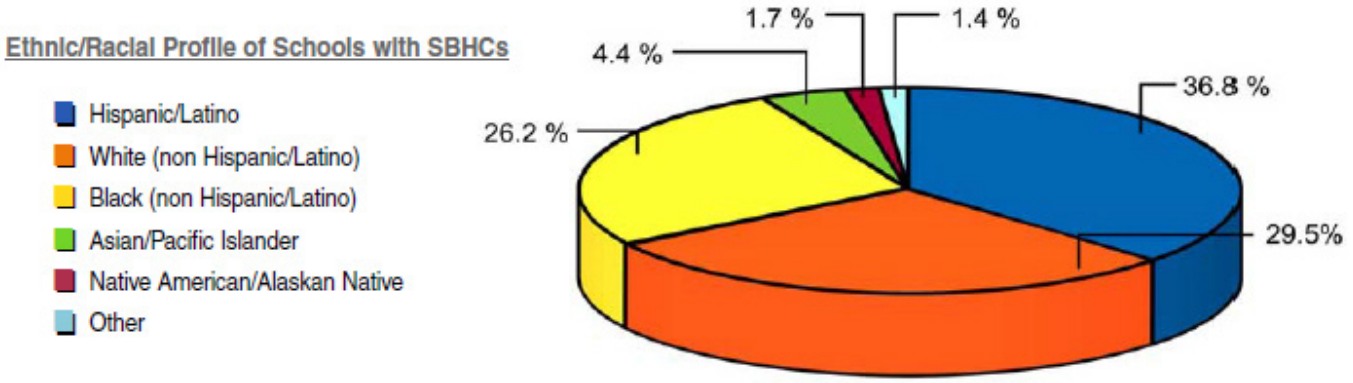
These seven main principles and goals are guidelines provided by the National Association of School Based Health Centers as a national standard for every center to encourage innovative programs, identify key characteristics and provide a structure for responsibility.

SBHCs are distinct from the school nurse's office. The National Association of School Nurses defines school nursing as, "A specialized practice of professional nursing that advances the well-being, academic success and lifelong achievement of students. To that end, school nurses facilitate positive student responses to normal development; promote health and safety; intervene with actual and potential health problems; provide case management services; and actively collaborate with others to build student and family capacity for adaptation, self-management, self advocacy and learning."[49] On a daily basis, school nurses serve most often as first responders for medical situations and administrators of medications. Although SHBCs are a separate entity than the services of a school nurse, the objectives can be united to support the holistic health and success of students in the school setting. They are not in competition, but should collaborate to extend beyond essential needs and traditional school nursing capabilities.

The majority of SBHC centers are in urban neighborhoods that serve a variety of types of schools. Ethnically, almost 70% of students in schools with SBHCs are of minority populations. With an increasing presence of centers in minority neighborhoods, services are also increasingly extending to family members of students, staff of the hosting schools and surrounding community members.[50]

STUDENT POPULATION IN SCHOOLS WITH SBHCS (n=1096)

Students in schools with SBHCs are predominantly members of minority and ethnic populations who have historically experienced under-insurance, uninsurance, or other health care access disparities.



Thirty-six percent of SBHCs report serving only children who attend the school(s) they serve, a decrease from the 2004-2005 Census, where 45 percent reported serving only the student population. This trend indicates that SBHCs are expanding their ability to provide access to care to others in the community. Factors that may have influenced this trend are increased budgetary constraints and a weak economy, coupled with greater need for affordable health care in the community. Patient populations seen by SBHCs that open their doors beyond their school's students include: students from other schools in the community (58%); out-of-school youth (34%); faculty and school personnel (42%); family members of students (42%); and other community members (24%).

Figure 30. Ethnic Profile of Schools in SBHCs, 2004-2005.

The SBHC Advantage

Schools are a familiar environment to students, parents and community members. It is a trusted institution in which the guiding principles are centered on the well-being of the student. The continuous care that is possible through a school environment will benefit the student patient as providers can monitor physical and mental chronic illnesses over a longer period of time. SBHCs can see a student patient up to 13 years from Kindergarten through 12th grade. This continuity builds a relationship between students, parents and providers, as well as provides the opportunity to predict and possibly prevent avoidable outbreaks. Studies show that continuous care with immunizations, illnesses and treatments consolidated into one file with fewer changes in providers result in better health outcomes.[51] Providers can have an extensive and holistic picture of mental and medical health to make more informed health decisions for the patient. With more SBHCs implementing Health Information Technology (HIT) for medical records (32%), electronic billing (56%), electronic medication prescriptions (22%) , telemedicine (7%) and management information (53%),[52] it will become easier for SBHCs to adopt a continuous care model.

At the Lincoln High School center in Los Angeles, most staff members and providers are younger adults that are generally from the local area and have attended LHS. This helps students to be able to relate to and feel comfortable in trusting their physical and mental health issues with

staff. In addition, some counselors have an external, private cell phone that students can text for an appointment or solicit assistance. In addition, this location is open to the community which gives graduates the opportunity to maintain their care after exiting high school.

Participants in SBHC programs are more likely to keep up with health because of the convenience in location. Some of the socio economic barriers, such as bad communication, unreliable transportation and perception of high medical costs that previously made healthcare access difficult are immediately alleviated. For example, Lincoln High School's SBHC has a predominantly Latino student and community base with a staff to reflect the needs of the Latin American culture and language needs. It staffs a full time case manager that helps parents and patients apply for federal health insurance programs and funding whenever possible. As with all SBHCs, fees are collected from patients depending on the ability to pay, with some patients seen without fees.

SBHCs improve academic performance. Healthier students are better learners. School Based Health Centers provide the means to make students healthier and therefore they can become better learners. Research from neuroscience and child development to epidemiology and public health provide evidence for the causal role that educationally relevant health disparities

play in the educational achievement gap that plagues urban minority youth.[53] In 2007, a study was done to compare the loss of seat time and early dismissal rates between students who received SBHC care and those who received traditional nursing services at school. This data was collected from 764 visits during a 3 week period in two high schools in New York with one school having a SBHC and the other did not. The results showed that students that attended the school without the SBHC lost three times as much seat time than the high school with the SBHC.[54] One reason for this statistic is that SBHC have the ability to diagnose and treat the student as needed, whereas the school nurse's office is more likely to send the student home for health issues that cannot be resolved. Another study from 2007 found that the use of mental health services through the SBHC increase grade point averages of students over time.[55]

SBHCs can save money. Studies across the United States have consistently shown cost savings seen in the larger healthcare system and savings in federal program dollars when a SBHC was present. In Atlanta, children that were enrolled in Medicaid that also had access to a SBHC cost the program an average of $898.98, versus $2,360.46 for those without access to a SBHC. Hospitals reported lower non-emergent cases in the Emergency Department paid by Medicaid in the corresponding areas with SBHCs.[56] The same trend was seen in Ohio in 2000-2003, in

which 290 Medicaid students with various physical and mental health issues were followed. Their health-related quality of life was directly measured against the use of SBHCs and its relation to Medicaid costs. Results showed an average of $30.40 less was spent compared to a non-SBHC student patient.[57]

SBHCs can integrate the community and adult population. With this collaboration, the SBHC can operate beyond school hours that will benefit student and the community members as well. Services can include adult education courses, such as GED exam prep classes for high school diplomas, hobbies, and fitness classes. The intergenerational integration of these programs promotes mutual understanding of the youth to elders and elders to youth. The EPA report[58] shows in youth:

- **Enhance Social Skills:** Interaction with elders can improve communication skills, promote self esteem and help develop problem solving skills. The exposure to elders increases a student to an adult knowledge base otherwise difficult to obtain.

- **Decrease Drug Use:** Children in intergenerational mentoring programs have shown a 46% reduction in drug use. Among minorities, that statistic increased to 70%.

- **Increase Stability:** Intergenerational contact provides opportunities to find role models that are available through SBHC programs on a regular basis.

SBHCs are growing in recognition through funding from the government, private donors and public organizations. The Patient Protection and Affordable Care Act in Section 4101(b) authorizes a grant program that will provide over $200 million for construction and equipment needs over the next four years, with a continuation of $50 million for operations.[59] In addition, the State Children's Health Insurance Program (SCHIP) is now a provider for covered services in SBHCs. The continued support of these centers is an essential component to the health and future success of America.

The SBHC Structure & Services

Based on the NASBHC survey in 2008, 96% are located within the school building, 1% are in mobile units or in facilities off campus and only 3% in detached facilities on school grounds[60]
There are three types of programs:

School Based- located inside the school or on school grounds that is staffed by a team of nurse practitioners, physicians, social workers, psychologists, nutritionists, dentists and administrators. They work together with school nurses, counselors, teachers and staff to provide a comprehensive service to their student and community patients.

Off-Campus School Linked- located off site, usually serves more than one school with a larger scope of services and referrals than the school based health centers. These centers operate with longer hours than a typical school day. (86 linked centers)

Mobile Based- operates from traveling vans that have limited medical services.

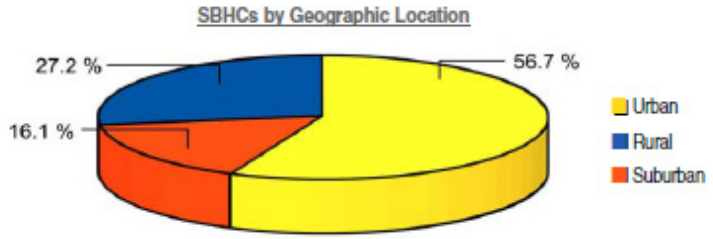


Figure 31. SBHC Geographic locations chart.

Financially, SBHCs are supported through public insurance, such as Medicaid, the Children's Health Insurance Program, Tri-Care, private foundations, sponsor organizations, school districts, as well as from the federal and state governments. The sponsors (community health centers, local healthcare organization, a hospital or local health department) play a large role, as they take on administrative responsibility. The majority of SBHC have specified that it is through donation that new construction, renovation, maintenance and rent are taken care of.[61]

Staffing generally falls into 3 models:

Primary Care: The most basic model. Usually operated by a nurse practitioner, or physician's assistant under the supervision of a physician (usually administrative role). 61% of these physicians provide less than 4 hours of clinical service.[62] Only a small percentage of this model provides services from social workers, health education or dentists. Mental health is not offered.

Primary Care – Mental Health: The majority of SBHCs run under this model. The staff typically includes primary care providers in addition to a mental health professional

(includes a licensed clinical social worker, psychologist or substance abuse counselor). Medical and administrative support is almost identical to the Primary Care model.

Primary Care – Mental Health Plus: This model includes the greatest range of services. It includes all services found in the Primary Care – Mental Health model, but also typically incorporates health education, social services case management, nutritionists, dentists, podiatrists- depending on availability.

General clinical services provided in a typical SBHC include comprehensive health assessments, vision and hearing screenings, immunizations, treatment of acute illnesses, lab services, prescription medications, asthma treatment, among others. Mental health and counseling services comprise of case management, referrals, crisis intervention, grief and loss therapy, tobacco and substance use counseling, among others. Of the 1900+ centers, 877 offer reproductive Health services in middle and high schools (6^{th}-12^{th} grades) that include abstinence counseling, on-site treatment for sexually-transmitted infections, HIV/AIDS counseling and diagnostic services, such as pregnancy testing.[64] Contraceptive counseling is sometimes limited and only 40% are allowed to distribute contraceptives.[65] Oral health is often marginalized, but it is a good indicator of overall health. Most centers provide basic

Figure 32. Primary care and Mental health SBHC services.

oral health education, with about half offering dental screenings. 20% of SBHCs provide dental check-ups and fillings, with even fewer that perform specialty care (orthodontics, root canals).[66]

Primary Care Service Provided On-Site

1.	Immunizations	85.0 %
2.	Screening (Vision, Hearing, Scoliosis)	92.7 %
3.	Standardized Behavioral Risk Assessment	86.0 %
4.	Anticipatory Guidance	90.1 %
5.	Sports Physicals	92.1 %
6.	Comprehensive Health Assessments	96.6 %
7.	Treatment of Acute Illness	96.1 %
8.	Treatment of Chronic Illness	86.8 %
9.	Assessment of Psychological Development	73.3 %
10.	Nutrition Counseling	90.6 %
11.	Asthma Treatment	94.6 %
12.	Care for Infants of Students	31.7 %
13.	Lab Tests	87.0 %
14.	Prescriptions for Medications	96.0 %
15.	Medications Dispensed to be Taken Home	60.6 %
16.	Medications Administered in the Health Center	92.0 %

Mental Health Services Typically Provided On-Site

Crisis Intervention
Referrals
Mental Health Assessment
Screening
Grief and Loss Therapy
Skill-Building
Brief (Solution-Focused) Therapy
Conflict Resolution/Mediation
Tobacco Use Counseling
Mental Health Diagnosis
Substance Use Counseling

Summary

School Based Health Centers live as a partnership between schools and health organizations for the mental and physical well-being of school aged children. It is an imperative part of the success of a student in his or her development into productive members of society that begins at youth. SBHCs are guided by seven principles that include: supporting the school, responding to the community, focusing on the student, delivering comprehensive care, advancing health promotion activities, implementing effective systems and providing leadership in child and adolescent health. Some provide the absolute basic services, while others include specialties with visiting providers such as psychologists, dentists, podiatrists, among others.

SBHCs can have the most impact in primarily underserved communities where many families do not have health insurance or the means to promote positive health without assistance. Locating these centers in a convenient site with reduced or no costs encourages proper and more importantly, a continuity of care. In addition, research has shown that the healthier the student, the higher the academic performance. SBHCs are also in a position to enhance social skills, decrease drug use and increase stability by providing intergenerational and community ties. These factors combined can lead to more students completing high school and continuing

onto higher education. Lastly, healthier children and families can impact the entire healthcare system by decreasing the number of patients utilizing the emergency department as primary care and their first and only option for healthcare services. The overall strain on the system will decrease as non-emergent cases are not tying up more expensive resources that many times are non-compensated services.

The experience that a patient may have at the SBHC can be determined by a simple, yet complex factor of locating the center. Social factors of general accessibility to the facility and demographics of the patients, physical site constraints and conditions should be cross referenced to determine a school and the specific placement on site. When selecting a staffing model, it is imperative to go beyond Primary Care as funding allows. SBHC should plan to address the increasing needs of mental health services to provide essential services with physical spaces allocated for these private or group consult functions.

03

The Architecture of School Based Health Centers

The architectural setting of SBHCs are varied in building type and style. Traditionally, many are imbedded in the hosting school, others are located in bungalows or completely detached facilities on site. Due to the dependence on funding, most centers have minimal facilities with little attention to the image of the facility in the community. The interiors usually mimic smaller, ambulatory care or community health clinics. The growing need of SBHCs and recognition of their importance as important civic institutions in their community has increased awareness among designers and center administrators for a supportive physical facility and environment that better meets the needs and well-being of their constituents.

Issues in Building SBHCs

Affordability. With current budget cuts in nearly every state, funding for projects like SHBCs will inevitably suffers regardless of their need in schools and communities, as most centers are funded from the state governments (76%) and/or local governments (37%). Many also receive financial support from private foundations (50%) but not enough to fully sustain these centers.[67] The Public Health Service Act Section 330 that was enacted to provide health care for underserved populations unfortunately funds only 23% of SBHCs today.[68] The limited amount of public sources of funding do not have to limit decisions to sacrifice design features and advancing building systems that support positive health outcomes.

Within the next four years, Congress has set aside $200 million in funding for new construction, renovation and equipment for SBHCs through the Patient Protection and Affordable Care Act in Section 4101a.[69] Schools that receive financial support can implement cost saving construction methods that go beyond the initial investment. Given they exist on the margins of funding, School Based Health Centers need to be designed in ways that are both economical in their initial construction costs but also cost efficient and effective to operate and maintain.

The physical design of SBHCs should also demonstrate best practices in healthy and sustainable design on behalf of the users of the facility as well as the environment. At the 2005 World

Summit, it was stressed that sustainability requires an understanding and implementation of the "triple bottom line, in which economy, social equity and environment are addressed."[70] The goal in any development, including the SBHC, is to find the delicate balance between these three elements. Finding this balance requires understanding of the environmental effects on health, the benefits of sustainable growth and building, as well as its economic implications.

Environmental Contributors to Negative Health Outcomes. The connection between the physical building environment and positive and negative health outcomes is compelling. Sick building syndrome as identified by the Environmental Protection Agency includes acute health and comfort effects that are linked to the time spend inside a building in which no specific illness or cause as identified.[71] Many of these complaints by occupants are related to indoor air quality that can cause headaches, aches, eye irritations, allergies, dizziness, nausea, fatigue, among others. The National Institute for Occupational Safety and Health (subset of the CDC) reveal the main contributors to SBS as poor ventilation, off gassing of chemicals (furniture, carpets, veneer materials, cleaning agents) and biological contaminants (bacteria, mold, pollen, dust).[72] These indoor biological contaminants build up in the air and can exacerbate conditions such as asthma. Unfortunately these conditions are prevalent in many older healthcare and educational buildings, especially those serving low income

populations. Research suggests that with the reduction of risk factors from these pollutants, asthma diagnoses can be decreased up to 39% which can save the U.S. $402 million dollars.[73] Many of the children served by these facilities are already high risk populations for asthma and the physical settings for SBHCs should not be a contributing risk factor.

The Typical Settings for SBHCs

Equipment	Patient Waiting Area
Exam table & stool	Non-fixed furniture
Foot stool	Patient education display
Waste receptacle	Clock
Gooseneck Lamp	

Exam Room
Min. 8'X9'
Exam table should be accessible from 4 sides
Private and soundproof
Door limits view into exam area

Figure 33. Minimal guidelines for SBHCs from the Texas Department of State Health Services.

Figure 34. A modular pre-manufactured SBHC.

Lack of Design Direction. The settings for School Based Health Centers vary from trailer bungalows, converted classrooms, detached facilities and centers that are in mixed-use buildings. Minimal considerations have been placed on design that supports the well-being of patients and staff members. A minimum standard of rooms and requirements are recommended by the Adolescent Medicine Journal based on the number of students enrolled.

Figures 33 show minimal guidelines provided by the Texas Department of State Health Services that are in conjunction with the AMJ's recommendations.[74] Unfortunately, they do not provide direction towards successful implementation or how the facility can create a healing environment. Relationships between spaces and how it affects patients and staff are also not considered. For example, the guideline recommends an exam room to be 72 square feet with basic privacy features such as limiting views and soundproofing. However it does not emphasize important adjacencies between the exam room to other functions that may increase staff efficiency. Also, the patient waiting area is only recommended to have non-fixed furniture, a clock and patient education display. As the first point of contact for patients, the waiting area should be designed with privacy sensitivity and an overall positive patient experience. The guidelines provided simply do not provide the level of direction needed to accomplish the successful design of a SBHC.

School based health centers are housed in a variety of settings. Modular pre-manufactured centers are the most widespread setting for SBHCs, from extremely urban cities, to suburban neighborhoods, to rural communities. This is due to its low start up costs and the ability to use existing or commonly used resources for a make shift center. Size restrictions keep the services in these settings to the most basic. They are typically limited to primary care and may sometimes incorporate a few additional services such as dental care. Centers are often located on-site, away from main entries to the school but also publicly accessible.

Figure 35. A school embedded center.

In urban settings with a larger student population, the SBHC is often embedded within the existing school. Similarly to trailer-types, the embedded SBHC can operate at a lower cost to the organization running the center by using available spaces in the school. Examples include converting administrative office spaces, collocating with the school nurse's office and/or other available space on campus like a bungalow. This solution unfortunately is limited to students and possibly staff, as the need for security on campus would limit access for other community members.

Figure 36. Westwood Family Health Center in Denver, Colorado.

Some suburban neighborhoods support SBHCs housed in a larger free standing facility. The Westwood Family Health Center in Denver, Colorado is an example of a contemporary center

Figure 37. A mixed used SBHC connected to the Morris Heights Health Center in the Bronx, New York.

built in 2003 that is located on the campus of the local elementary school. It provides a wide scope of services including: pharmacy pick up, laboratory, family medicine, family planning, mental health and health insurance specialists. Its success derives from being in a central, walkable location to community functions such as a senior living and development center as well as the Denver Indian Center. It is also a part of the Denver Health system that aids in it management and staffing.

Lastly, there are centers emerging in urban areas that are not located on a school campus but are embedded or connected to apartment buildings or other civic institutions. For example, the Morris Heights Health Center in New York is collocating with a senior living community. Since in 1982, MHHC has partnered with 10 schools in the Bronx to serve over 10,000 students from kindergarten to 12th grade. Services are provided both on campus at each school as well as at the larger center. It focuses efforts to encourage healthy life choices, provide urgent care, prevent teen pregnancy, keep students in school and graduate, along with a host of services that integrate the community members as a whole. This hybrid model offers an opportunity to sharing resources and providing a wider range of benefits to maximize health outcomes for the community and students at large.

Summary

Although the chosen architectural form and style are determined by various factors including funding, available sites, health care model, community culture and many others, the environment of care should not be compromised. The focus should remain on delivering quality care in every design decision. The four most common types of SBHCs represent solutions that have both organically grown within a school or intentionally planned. Planning and implementation should be inclusive from selecting a site, placement, physical design and services based on research and worksessions with key stakeholders. Stakeholders such as community members, students, staff, school administrators, local healthcare organizations, and designers should meet regularly to determine the immediate and future goals of the SBHC, regardless of type.

04

Site Selection Criteria & Programming

Selecting a site for a School Based Health Center goes beyond providing service to school aged children. It has the ability to impact the health of an entire community. Beyond the community, design of new construction must take into consideration the physical impact on the environment and the message of its holistic importance being sent with its presence. In addition to these considerations, SBHCs should then be constructed in medically and underserved at-risk neighborhoods for the leading health threats in students.

Understanding the Socio-economic Conditions and Demographics

Sites for School Based Health Centers should be appropriately selected according to locations with the greatest disparities and challenges. To properly serve a population, a general understanding of the number of people and their demographic profile must be researched as community identities and cultural traditions play a large role in healthcare decisions. Demographic statistics on the neighborhood, the school district, down to the school itself will provide a well-informed basis to make relevant decisions such as the range and scope of services that are most needed on any given site.

Analyze the most critical health concerns. It is crucial to be able to locate where the most pressing health concerns are prevalent. Statistics obtained from public health sources and census data can reveal areas that are in the most need of a SBHC. Reviewing statistics of school enrollment and the particular health needs can be used as a good indicator to determine the proper size, resources and programs. For example, one community may have a higher rate of drug and alcohol abuse and require more counseling services to meet the demand.

Capacity for Expanding and Evolving Services. Prevalent health issues are not always constant and therefore SBHCs should expect changing demands. Physical expansion may be needed for growing populations in schools and the community. Therefore, initially planning for change can save costs and create a better overall design than an ad-hoc addition. Appropriately locating the building on the site for possible additions and renovations (if land area permits) and the shape of the footprint are major factors that can determine the ease and financial consequences. For example planning in modules that can be expanded on either side of the building is more practical and can save costs in construction and schedule than building a form that is uniquely shaped and highly customized.

Los Angeles: A Case Study

The diversity of a large urban metropolitan city, like Los Angeles, can serve as a model to other cities that can prepare for a range of physical and mental health needs and well-being of their community. In 2011, the U.S. Census approximates Los Angeles, California with a population of 9.8 million people, the second most populous city in the United States.[77] Los Angeles is steadily growing, with an increasing percentage of foreign born persons and a high percentage of American-born ethnic minorities.

The Los Angeles Unified School District has a total enrollment of over 919,000 students in 1,235 schools and centers that include K-12 and adult education centers as of October 2011.[78] It encompasses over 710 square miles of Los Angeles County, including 8 entire cities and 23 partial cities.[79] With a large range of people in culture, ethnicity and income, the challenges to determine needs provides a comprehensive cross section of issues that would need to be considered in other cities around the country.

Socio-economic Disparities of Los Angeles. The connections between major health issues in America and socio-economic disadvantaged demographics are not coincidental. The circumstances that come with the barriers associated with financially struggling individuals and families many times result in difficulties making informed and healthful decisions.

Accessing health care services is one of many obstacles. In Los Angeles County, South and East Los Angeles have fewer hospitals than their wealthier counterparts in West Los Angeles. Most of the private hospitals world class hospitals are located in the more prestigious communities like UCLA Medical Center or in expensive private, for-profit facilities such as Cedar-Sinai. For those inside Los Angeles proper, the east and south are closer in distance to community and county hospitals such as USC Medical/LA County Hospital and UCLA Olive View Medical Center. Unfortunately, the wait to see a doctor for an emergency can be up to 12 hours with waits for an appointment taking 2-3 months.[80] The disparity causes patients that cannot afford or find transportation to better hospitals to skip care altogether or have their conditions unnecessarily worsen. Finding care becomes convenient by locating SBHCs in schools of greatest need whereby giving access to the community. This ease in access will encourage patients to seek treatment for health conditions earlier and prevent possible chronic illnesses and higher associated medical costs.

Health Issues Among Youth and Los Angeles. In 2009, Los Angeles Unified School District developed a report of the most prevalent health issues associated with their student population against state and national statistics. These figures help to understand exactly which schools and neighborhoods are in the most need of attention. The top indicators of need were

determined in the LAUSD to be Chlamydia infection rates, students on the free/reduced meal program, Obesity & Fitness rates and live birth rates. Each of these indicators is not exclusive to Los Angeles County, but nationally represents health issues that require attention.

Chlamydia rates. Chlamydia is the most common bacterial STI in the US. The CDC reports over 1.3 million cases a year,[81] with many going undetected because of its symptomless traits. This disease can cause a host of irreversible reproductive problems, including infertility. Although sex education has always been a controversial topic, especially in the public school system, it is crucial to understand that the issue is present and prevailing among the student population. It not only affects the health of the individual, but also those that come in contact with the infected.

In the Los Angeles Unified School District (LAUSD) boundary among 15-19 year olds, there are about 240 cases for every 5,000 students. California is the 16th highest in the nation, with the national average at 347 cases for every 100,000 people.[82] These alarmingly high rates among the youth are reflective of a health epidemic. Figure 38 shows students at Panorama HS, Los Angeles HS, Manual Arts HS, Dorsey HS, Crenshaw HS, Washington HS, Jefferson HS, Locke HS, Gardena HS, Fremont HS and Santee HS have the highest rates of infection.

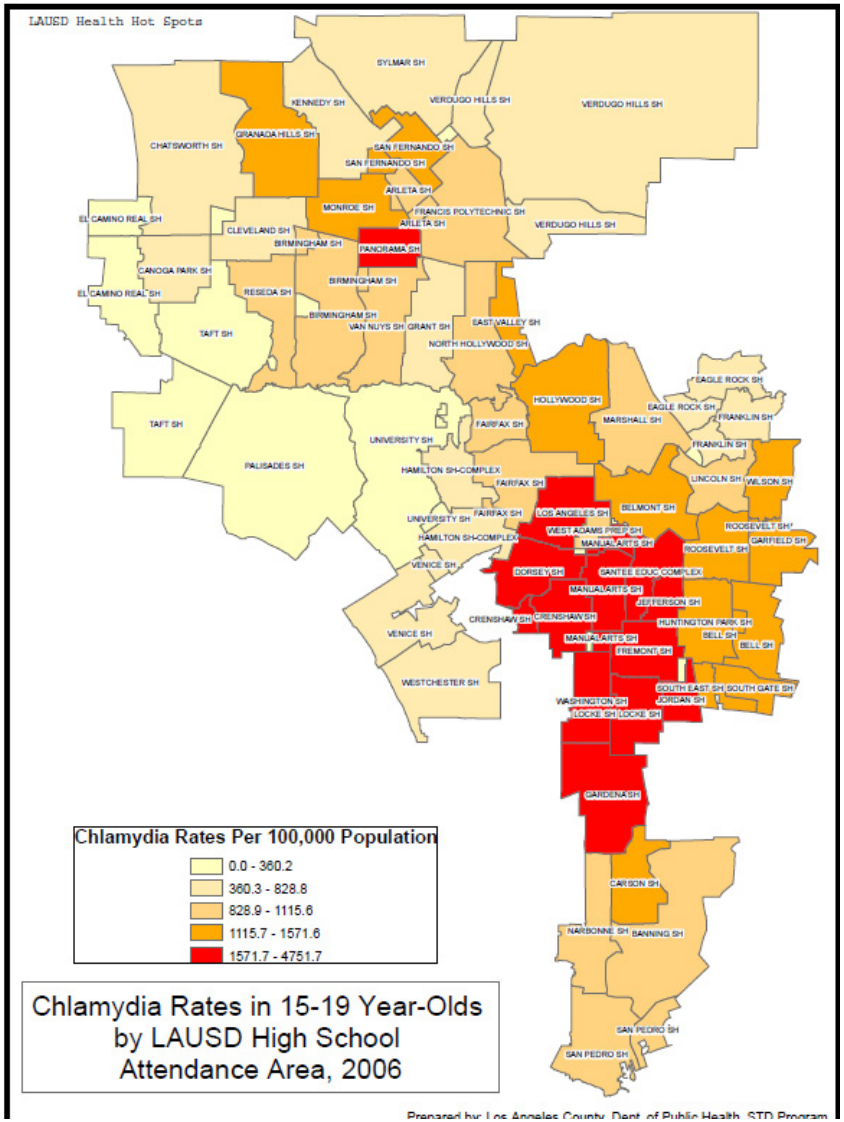


Figure 38. Chlamydia rates in the LAUSD-2008.

Live Birth Rates. Statistics show that teen pregnancies have been slowly declining in the U.S. as a whole, but there are still 40.5 live births for every 1,000 females in the 15-19 age range.[83] Medical risks such as the lack of proper prenatal care, high blood pressure, higher incidences of STDs that can infect the uterus and higher risk of postpartum depression are a few of the negative health outcomes surrounding teen pregnancy. In addition, the growing child is at a higher risk for a premature birth (which can lead to respiratory, digestive, vision, cognitive) and low birth weight.

In the LAUSD boundary, there is an average of 224 live births for every 2,500 female students in the age range of 15-19 years.[84] This rate is more than double the national average. Monroe HS, Belmont HS, West Adams HS, Roosevelt, Garfield HS, Lincoln HS, Fremont HS, Bell HS, Locke HS, Washington HS, Santee HS, Huntington HS have the highest number of live births in Los Angeles county from 2006 statistics.

Free or Reduced Meal Program. Looking at statistics of students on the Free or Reduced Meal Program is essential to the SBHC. This is one of the primary factors that determine funding and need for a center. The higher percentage of students enrolled indicates the higher percentage of students from families below the poverty level that may not be able to

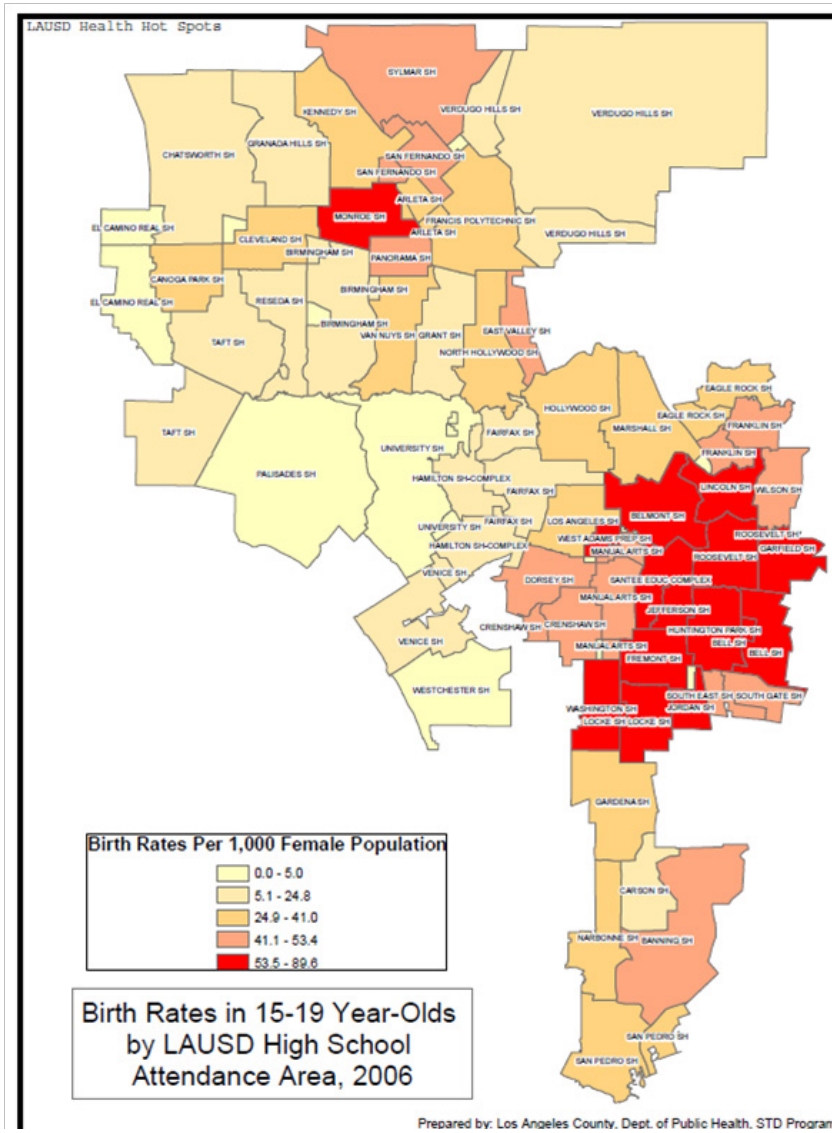


Figure 39. Live birth rates in the LAUSD, 2008.

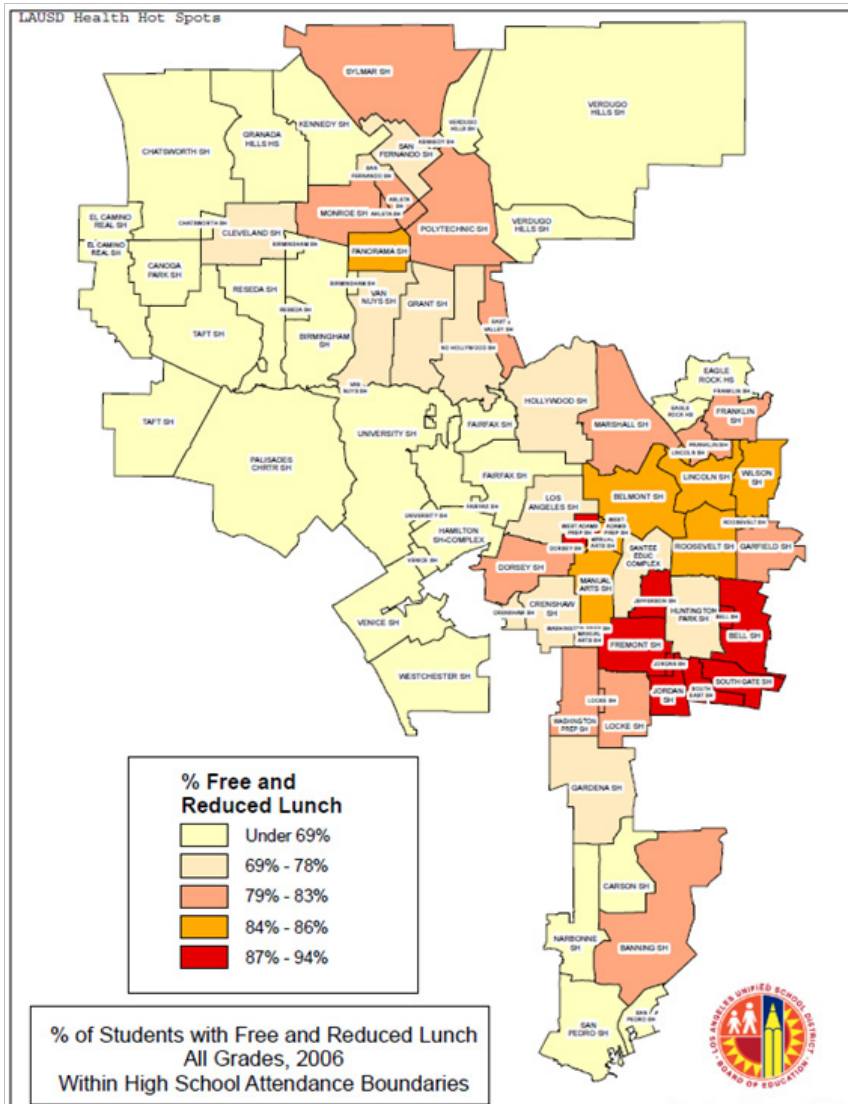


Figure 40. Percentage of students on the Free and Reduced Lunch Program in the LAUSD, 2006.

afford basic health care.

Students on this federal program are from households with an income of less than 133% of the federal poverty level.[85] Collecting data based on eligibility and enrollment in this program can indicate the income levels from families with the number of students in the household. It also reveals which schools are deficient in enrolling students that are eligible. Increasing enrollment of those eligible students is critical as this program is a requirement at many school based health centers for offering reduced or free services.

About 65% of LAUSD students are eligible to participate in free or reduced meal services. According to the LA Times report, only half utilized this program, finding that families either do not know how to apply or that students choose not to use the ticket system because of social shame from peers.[86] LAUSD is creating a new system to alleviate this stress by offering a debit card system that allows students to “blend in” with their peers that are not on the program. These efforts, along with SBHC case worker support can encourage more families to utilize the available care. In Los Angeles County, West Adams HS, Jefferson HS, Fremont HS, Jordan HS, South East HS, South Gate HS and Bell HS have the highest percentages of students eligible and on the program.

Obesity Rates & Fitness Assessment. With the high rates of obesity in children and adults, understanding the various causes and identifying fitness levels are vital in determining overall health. The CDC reports that childhood obesity has more than tripled in the last 30 years. Between 1980 to 2008 obesity in children aged 6-11 years increase from 7% to almost 20% with adolescents aged 12-19 years increased from 5% to 18%.[87] The negative health effects from obesity and the lack of physical activity make tracking of these rates imperative. Unfortunately, obesity is prevalent among the lower income brackets partially because of the low cost of unhealthy foods. It is cheaper and more convenient to buy a McDonalds double cheeseburger for $.99, than to prepare a meal with fresh vegetables and whole foods. At a typical grocery store, a pound of broccoli is $1.99 per pound. Often, tired parent working 12-hour shift at minimum wage will many times opt for the cheaper, fast food cheeseburger than home cooking of a balanced meal.

In the LAUSD boundary, body composition testing on 5th, 7th and 9th grade students showed 39% of students failing to meet healthy standards. In aerobic fitness testing, over 50% of students did not pass the average benchmark set by the state of California.[88]

It is not a by chance that many of the same high schools reappear on each of these high risk

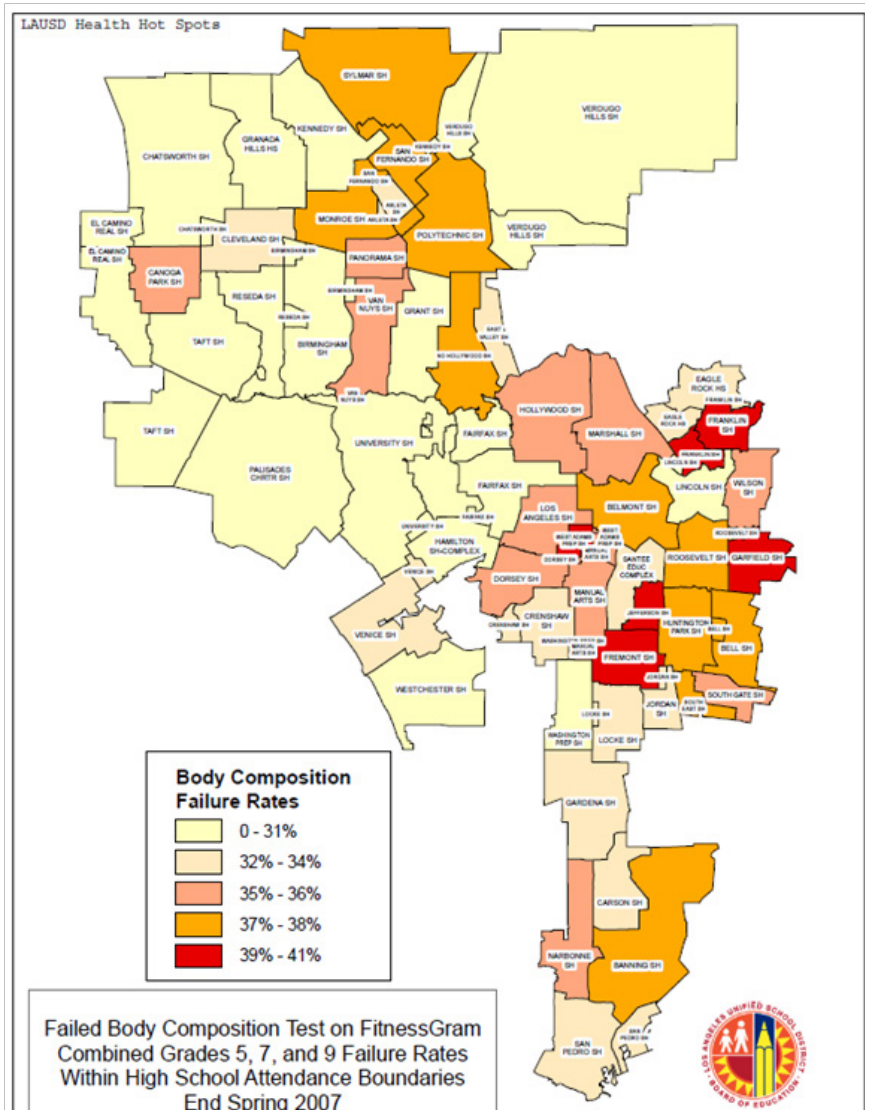


Figure 41. Body Composition failure rates in the LAUSD, 2007.

categories. The correlation between low income and serious health issues are shown clearly in these statistics. Bell HS, Dorsey HS, Garfield HS, Monroe HS and Panorama HS are in the most fragile condition. They currently only have a school nurse's office to manage the large range of issues that are plaguing these high schools, some of which enroll over 2,000 students. Los Angeles can serve as a prime example to illustrate the need for SBHC at every density level.

Although this thesis focuses on higher density areas, such as south Los Angeles, schools like Monroe and Panorama HS are identified as a an active problem in suburban Los Angeles as well. These neighborhoods are often forgotten, as the suburbs are assumed to be better off financially. As low income households are increasingly moving into the poorer LA suburbs, the same trends seen in south LA are regrettably being replicated. Currently, the growing poor suburban neighborhoods have even less options to health care than their urban city counterparts. Barriers such as transportation and the scarcity of low-income health centers in suburban Los Angeles are additional factors that are better addressed in the city of Los Angeles with a more robust bus and metro system as well as more low-income centers.

Site Selection Criteria

It is important to site a SBHC in an appropriate position for ease and secure access for students, parents and community members. Each site will have unique constraints and qualities, but general considerations of circulation patterns, cultural context, climate and geography, and building orientation are common among all projects.

Security and Accessibility. The dual use of the center by students and community members requires that entries and exits that are exclusive to each group, as operation hours for the school may be different than the center's hours. It will be imperative to be able to secure and monitor student entry as well as public entry. Although the two paths of traffic may not coincide, flexibility for operational change should be considered. When locating the SBHC within an academic building, locate it on the ground floor with a separate lockable entrance from the outside. When locating the SBHC on campus in a separate building, it should be isolated from outdoor academic areas used for recess or physical education with fencing and separate gates. Finally, it should be within walking distance from the main campus along a safe path.

Connection to the Community. Physical visibility to the larger community can give a sense of presence and connection to the school. It will encourage attendance in programs and/or classes that are offered through the center, as well as utilization of the center for its health services. A design solution to achieve this kind of connection to the community is to locate the facility on a highly visible corner of the site that faces the street. It should be visible to the public and provide easy access without disrupting daily educational activities.

Understanding the community is critical. Design should be in response to the culture and demographics of the neighborhood. For example, if the area is predominately one ethnicity or religion, the design should reflect both specific programmatic needs and an image that is appropriate and welcoming to the culture[s] it serves.

Figure 42. Willingness to walk.

Access to Public Transportation: Considerations for pedestrian, student and vehicular traffic must be considered for locating an off-site freestanding facility. In this scenario, the ideal location would be in close proximity to public transit or a drop off point for parents. The distance to bus and metro routes and stations and predicting travel times are other factors that may aid in deciding a location. LEED guidelines suggest that facilities should be within ½ mile walking distance to a commuter rail/subway station or ¼ mile walking distance from two bus stops.[89] Although these conditions are not required, it is a good benchmark as an objective, as most people would choose against public transit if the distance exceeds this range.

Vehicular Access: In the scenario of an on-campus freestanding facility, it is important to understand school operations. Students typically start school around 8:00 am and end anywhere between 12:30 pm to 3:30 pm. Elementary schools may have adjusted times for their pre-school and kindergarten students that commence before noon in a more secure area of campus. Therefore, locating vehicular entries or drop-offs should be mindful to offset the congestion that can be created during these stressed hours. Entrances and separate parking for the center (if provided) to the SBHC should not cross the main traffic patterns of the school. Figure 46 shows Gardena Valley Christian School's solution for car traffic on school

Figure 43. Planning access routes for school traffic.

days. Creating a traffic pattern and route report for the school as well as potential path for the SBHC is critical to avoid congestion, stress and increase safety. This analysis should include specific time frames at the beginning and end of the school day, when school is not in session and any other foreseen site-specific conditional times that can effect traffic patterns.

The Case for On-site Centers

Figure 44. A community built without urban sprawl considerations.

Today, 50% of Americans live in the suburbs.[75] The overwhelming dominance of the automobile after World War II alongside industrialization has contributed to this movement as it became easier for working families to seek housing in more residential communities. This was a time of perceived unlimited resources and land as compared to today, in which both commodities are becoming more scarce. Many unintended consequences from this movement have manifested in the health of the environment, economy and people. Particularly, urban sprawl has been linked to detrimental health outcomes such as respiratory illness, a decrease in physical activities, physical and mental health issues, and negative environmental impact at the local level from heat island effect, reduced water quality and increased runoff quantity, waste management and various pollutants.

The degradation of the environment and personal health due to sprawl has had a domino effect, including in the healthcare setting. It has caused difficulties for communities living on the outer reaches to have easy access to care. The further patients travel to seek care, the less likely they will be willing to engage in preventative services as well as needed care. This is especially true in low income medically under-served suburban or ex-urban communities, where ownership of an automobile is less prevalent and access to reliable, frequent and affordable public transportation can be limited.

Conditions and diseases are not always a directly connected to the physical and social environment, but there can be strong correlations. When an element such as physical access is limited to a vehicle, lack of public transit systems and/or highly zoned neighborhoods, it can create behaviors that do not support health. To help address the negative effects of urban sprawl on medically under-served communities, the siting and location of SBHCs should be carefully considered. Relevant "Smart Growth" principles[76] applicable to SBHcs include:

1. Employ mix land uses by locating centers on school properties
2. Take advantage of compact building design
3. Create walkable neighborhoods
4. Foster distinctive, attractive communities with a strong sense of place
5. Strengthen and direct development towards existing communities

6. Provide a variety of transportation choices. The selection of site can increase accessibility to the center for more people. Locating the site closer to transit lines create opportunities to cast a wider net of patients while decreasing vehicles that exhaust potentially harmful emissions.

7. Encourage community and stakeholder collaboration in development decisions. Collaboration allows for a more robust consideration of issues that can guide a design decision. In a SBHC, it can help to right size services if there is a neighborhood clinic or organization willing to partner. These types of associations can be mutually beneficial for both parties in addition to possibly reducing building footprint.

The main objectives that promote long term sustainable and healthful strategies for SBHCs include locating the facility in walkable neighborhoods with mixed-use developments that encourages a sense of community. Particularly, best practice approaches support restoring existing sites or locating an on-site SBHC with sustainable building features and employing public transit as a means to get to and from the center.

Facility Programming

The relationship between site selection and programming are undoubtedly connected. At times site selection may dictate or limit program content and in other times, the scope and nature of programmatic needs may dictate the selection of a site. The physical size of each facility will need to be determined specifically for the projected needs for the school and community, the availability of land, the financial resources, or in any combination. The selection of an appropriate site and program are therefore heavily dependent on these factors and interdependent. Sometimes, the program will need to flex to fit the constraints of the site. In other cases, the site will need to accommodate to the scope of the program based on the needs of the community.

A constrained program might include the basic rooms needed for medical and mental health consult, exams and treatment, with supporting administrative spaces. An expanded program can include conference rooms, educational classroom spaces, dental exam rooms and break or fitness areas. Figures 45 and 46 on the following pages describe a master template for program areas, each space, its major furnishings and the functional relationships and important adjacencies for optimal efficiency for staff and convenience for patients.

SBHC: Basic Program

Room Name	SF/	Description	Major furnishings & equipment	Functional relationships
Exam Room	80	Diagnosis & treatment area	Exam table, stool, waste receptacle, lockable cabinet, sink, laptop, lamp	Near Lab.
Counseling Room	120	For mental health, consultations, staff work room	Seating, laptop	Should be in quiet area, possible access/views to nature. Privacy
Waiting area	-	Shared public space	Seating, side tables, TV	Views/access to nature recommended
Lab	120	Take blood work, stock medications	Refrigerator, microscope, sink, waste receptacles, lockable cabinets, laptop	Near exam room
Med Records		Secure storage of files	Lockable cabinets, copier, workstation	Near reception/waiting area
Restrooms		ADA public restroom	Toilet, sink, auto dispensers	
Office	80	Administration	Laptop, desk, chair	Near conference room
Conference Rm		For meetings, gatherings	Conf. desk, chairs, screen	Near office
Classrooms	480 (12x16)	Community/patient use for physical & educational activities	Foldable tables and chairs, screen, storage	Adjacent to classrooms, accessib independently from clinic area b connected. Views to nature recommended
Dental Exam Rm	150	Routine and preventative dental work	Dental chair, lockable cabinets, stool, lamp	
Physical Fitness Rm/Gym	960 (30x32)	Cardio & weight lifting for patients and community members	Machines, weights, mats	Adjacent to classrooms, accessib independently from clinic area b connected. Access to outdoors recommended
Staff Break Room	Min 250	Allow staff to relieve stress, converse, relax	Kitchenette, refrigerator, tables, chairs, vending, games	Access/views to nature rec.
Staff Support	120	Secure storage of files	Lockable cabinets, copier, workstation	Near conference room, offices

Figure 45. The Basic Program of the SBHC.

SBHC: Additional Program (Expanded)

Room Name	SF/	Description	Major furnishings & equipment	Functional relationships
Exam Room	80	Diagnosis & treatment area	Exam table, stool, waste receptacle, lockable cabinet, sink, laptop, lamp	Near Lab.
Counseling Room	120	For mental health, consultations, staff work room	Seating, laptop	Should be in quiet area, possible access/views to nature. Privacy
Waiting area	-	Shared public space	Seating, side tables, TV	Views/access to nature recommended
Lab	120	Take blood work, stock medications	Refrigerator, microscope, sink, waste receptacles, lockable cabinets, laptop	Near exam room
Med Records		Secure storage of files	Lockable cabinets, copier, workstation	Near reception/waiting are
Restrooms		ADA public restroom	Toilet, sink, auto dispensers	
Office	80	Administration	Laptop, desk, chair	Near conference room
Dental Exam Rm	150	Routine and preventative dental work	Dental chair, lockable cabinets, stool, lamp	
Staff Break Room	Min 250	Allow staff to relieve stress, converse, relax	Kitchenette, refrigerator, tables, chairs, vending, games	Access/views to nature rec
Staff Support	120	Secure storage of files	Lockable cabinets, copier, workstation	Near conference room, offi

Figure 46. The Extended Program of the SBHC.

Summary

It is important to site the facility in an appropriate location for comfortable and secure access for students and community members. Each site will have unique constraints and qualities, but general considerations of access, site circulation, neighborhood context (including cultural), physical features, future expansion and climate. Most high schools in LA that were identified with the greatest need are in highly urban and dense areas in which locating a detached facility on school grounds will need to be strategic. The options may include repurposing existing buildings on-campus, introducing a trailer on the edge of campus (if open to the larger community), renting a space close to campus or constructing an entirely new facility. Regardless, choosing a site is crucial to the success of a SBHC.

The diversity of a large urban metropolitan city, like Los Angeles, can serve as a model that shows a range of physical and mental health needs. With such diversity in ethnicities and income ranges, needs were based on the top health concerns in the Los Angeles Unified School District. Disparities seen are not exclusive to Los Angeles County, but represent health issues that require attention across the nation. Mapping and clearly identifying specific issues to locations is the strongest tool to identify populations that are in the greatest need for SBHCs.

In addition to considering factors for selecting a site, understanding the operational and design goals are crucial to a successful SBHC. The appropriate selection of a site and definition of a program, while critical, are alone not enough to ensure the adequate accommodation of community and student needs in the design of a SBHC. The following chapter outlines important Guiding Principles and Design Guidelines to consider in the design of any new center.

05

Guiding Principles & Design Guidelines

The Guiding Principles are not design solutions, but are the higher level goals for the SBHC. The two guiding principles for a successful SBHC are to Promote Patient Centered Care and Promote Family and Community Connections. They are intended to inform the Design Guidelines of a broader vision to operate by. Each design decision made on a project should reflect these principle(s) to ensure a successful SBHC.

The 6 Design Guidelines that provide solutions to these principles include:

1. Modular Construction
2. Indoor Flexibility
3. Health and Sustainable Environments
4. Privacy Levels in Waiting Areas
5. Connection to Nature
6. Transitional Indoor/Outdoor Spaces

Guiding Principle 1: Promote Patient Centered Care

Choices
give the patient options in selecting a plan that fits their goals without compromising clinically necessary treatment

Affordable and Accessible
to more people

School Based Health Centers are in a strategic position to promote patient centered care to empower youth and their families to take charge of their health from an early age. Providing greater access to information to medically under-served communities is critical to creating more informed consumers of healthcare and who demand involvement in their own care.

For example, students today are exposed to the myriad of websites dedicated to self-diagnosis and in depth research on conditions. To promote the patient care beyond the walls of the SBHC, providers can help their participants to navigate through and respond to the change in how healthcare can be delivered. To do this, the physical design may be impacted to include a consult room or group areas that teach methods and resources for finding reliable medical information.

The Institute of Medicine describes patient-centered care to mean, "considering patients' cultural traditions, personal preferences and values, family situations, social circumstances and lifestyles." In 2001, the IOM produced a report called, *Crossing the Quality Chasm: A New Health System for the 21st Century.*[90] This report described the main characteristics of patient-centered care to include the following tenants:

Dignity and Respect: *Health care practitioners listen to and honor patient and family perspectives and choices. Patient and family knowledge, values, beliefs and cultural backgrounds are incorporated into the planning and delivery of care.*

Collaboration: *Patients, families, health care practitioners and hospital leaders collaborate in policy and program development, implementation and evaluation; in health care facility design; and in professional education, as well as in the delivery of care*

Information Sharing: *Health care practitioners communicate and share complete and unbiased information with patients and families in ways that are affirming and useful. Patients and families receive timely, complete and accurate information in order to effectively participate in care and decision-making.*

Participation: *Patients and families are encouraged and supported in participating in care and decision-making at the level they choose. (IOM, 2001)*

Simplicity
in the financial and clinical recommendations

Personalized Care
not a cookie cutter treatment regime

Promotes
the patient's physical, emotional and financial independence

Patient-centered care is not complete without the family. "Family" is not just a biological relationship in this model. It encompasses any relationship, whether it is a biological, legal or

emotional connection. Their involvement is intended to support the well-being and recovery of the patient, not to release control and decision making from the patient. Typically, patients that are younger, older or that have debilitating chronic conditions rely on family assistance to make decisions on care. Family-centered care holds many of the same principles and goals that patient-centered care holds. The primary difference is that family-centered care is a collaborative process in decision making and care giving, whereas patient-centered care is

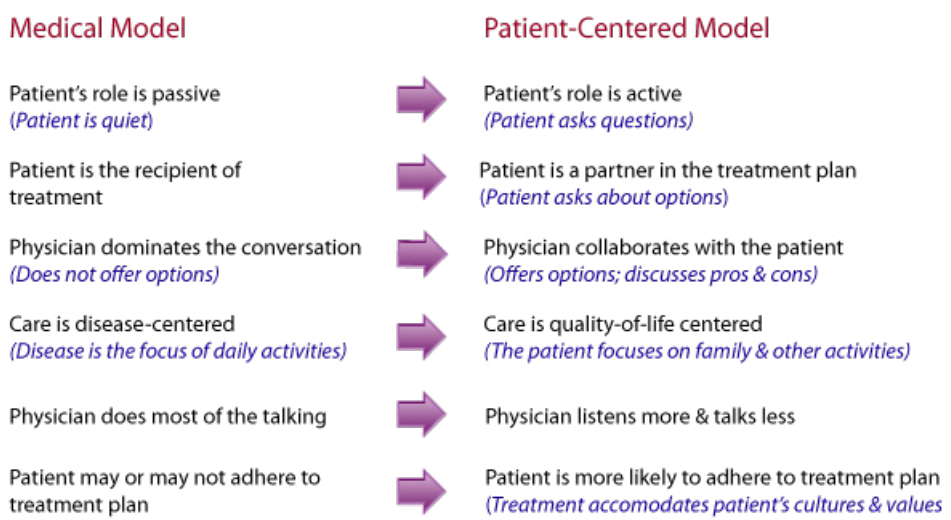


Figure 47. The difference between a traditional medical model and the Patient-Centered model. (IOM, 2001)

ultimately an individual process.

A key benefit in implementing patient and family-centered care that can help the SBHC is that health can become a proactive approach, rather than a reactive action. The positive evolutionary growth of the SBHC linked to a patient-centered model of care should guide its physical design in conjunction with its operational philosophy. It does not have to incur costs but only requires a change in attitude in communication and effort among all members of the healthcare group. For example, extra thought given to patient privacy may dictate a certain location for check-in or another chair in an exam room for a friend or family member. Investment in physical design and the education of staff to support this approach is strongly recommended.

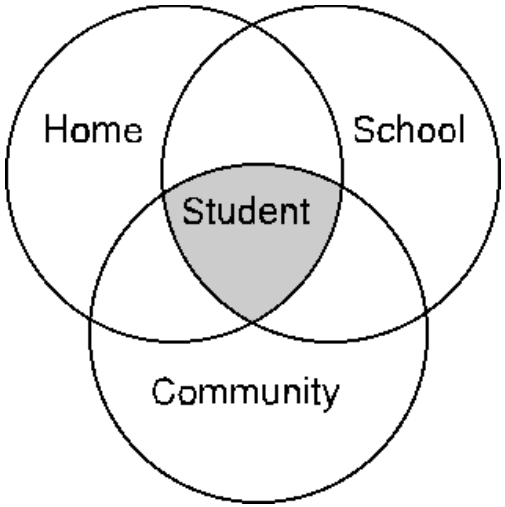


Figure 48. Venn diagram showing the intersection of home, school and the community in relation to the student.

Guiding Principle 2: Promote Family and Community Connections

The goal of every health facility, regardless of size and type, should be to promote the health and wellness of its patients, their families and supporting community. The importance of family and community connections and intergenerational learning has been declining in an ever present individualistic culture. To sensitively and appropriately promote these connections, it is crucial to understand key factors such as race/ethnicity, culture, class, along with the causes and solutions of the achievement gap in student academic performance. The SEDL National Center for Family and Community Connections with Schools conduct continual studies to support involvement, programs and strategies to increase the school-family-community connection that particularly address these key factors. It is important for all School Based Health Centers and future designers of SBHCs to understand this research to keep design elements that support these connections in the facility to the best of their abilities.

The conclusions of this report reveal four major findings related to family, community and school connections among minority and low income populations[91] that include:

1. Programs and interventions that engage families in supporting their children's learning at home are linked to improved student achievement.

2. The more families support their children's learning and educational progress, both in quantity and over time, the more their children tend to do well in school and continue their

education.

3. Families of all cultural backgrounds, education and income levels can, and often do have a positive influence on their children's learning.

4. Family and community involvement that is linked to student learning has greater effect on achievement than more general forms of involvement.

The SBHC itself and how it is built can form direct and indirect relationships that can heavily influence the goals of promoting family and community connections while helping to increase academic performance in its students. Accessibility and locating the center for the larger community and the ability to support connections appropriately by providing the necessary physical space. Whether it is a designated interior space, a room that can be easily adapted for various uses, a transitional indoor outdoor place, or a completely outdoor area, the SBHC should encourage these types of interaction. This principle can be manifested in various ways, such as patient education programs housed in a multi-purpose room, public spaces for farmer's markets and health promotion.

SBHCs typically do not have unlimited funding for construction. They are located in areas of critical need and should be open as soon as possible. With both funding and schedule as

The guiding principles are meant to inform, support and complement the design guidelines on a visionary level. Each design guideline will embody at least one, most often more than one guiding principle. The design guidelines are the individual bones that create the skeletal structure of the guiding principles that in turn create the body that is the School Based Health Center.

Design Guideline 1: Modular Construction

major factors, modular construction offers a realistic solution that can successfully address these requirements.

Modular construction is a method of building that is prefabricated and consists of multiple modules of a particular segment. These pieces are delivered to the site for assembly by trucks or cranes. Contrary to popular belief, mobile homes do not represent the full capacity of design freedom that modular construction can offer. It has been seen as a lower grade option of designing and building. Today, many restaurants, homes, office buildings, retail stores, churches and healthcare clinics are adopting this method for both temporary and permanent

Figure 49. St. Peter's Hospital is a competition winner for a modular healthcare facility, located in Chertsy, Surrey.

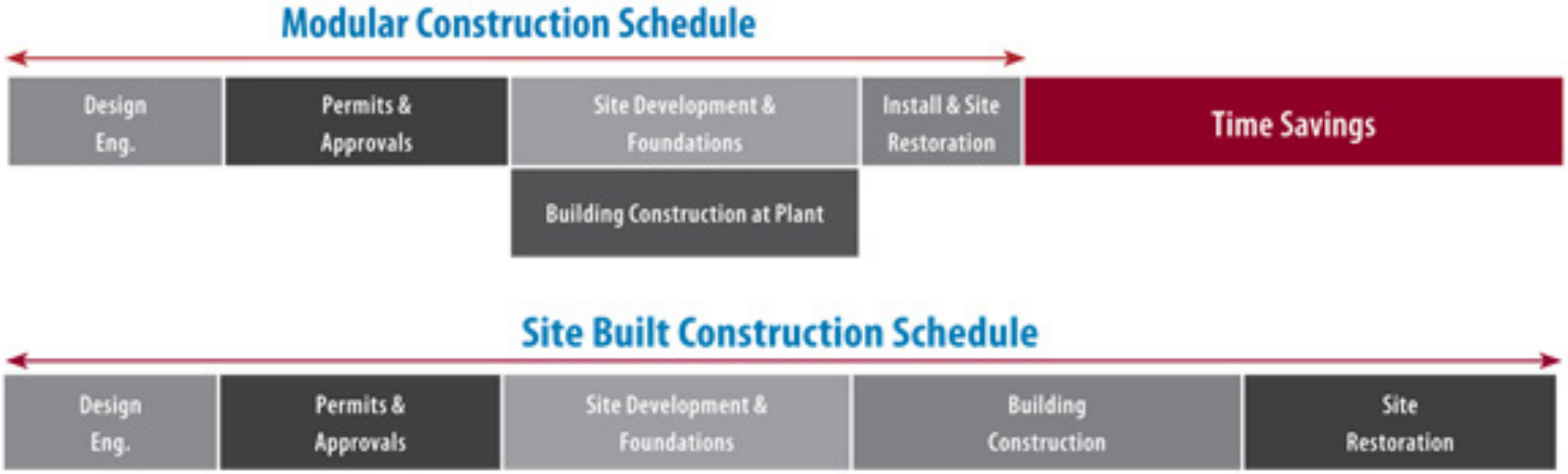


Figure 50. Difference between a Modular Construction schedule and a Site Built Construction schedule.

structures. The advances in this type of construction has manifested in the ability for designers to create a custom, traditionally built facility, while reaping the benefits of modular construction. The four main benefits include: increased construction speed, significant savings in construction costs, environmental benefits and quality control.

Construction speed. Time in design and engineering that is saved through modular construction contributes to a quicker process in pre-designed facilities and/or modular pieces. While the modules are being produced off location, the site can be prepared simultaneously. On a school campus, the speed of construction is particularly important. The vehicular and pedestrian congestion of school children and parents can cause considerable traffic, as well as expose pollutants and waste to students and staff. In addition, weather rarely plays into delaying production or progress because modular pieces are assembled indoors.

Construction Costs. Decreasing the number of days on site accounts for considerable monetary savings from less cost in on-site management, equipment rentals, labor and the opportunity costs of opening the facility early or on time. In addition, the mass production of module systems saves expenditures by ordering materials in bulk quantities.

Quality Control and Safety. Pre-fabricated pieces are constructed off site in a factory

setting. This allows an additional level of quality control that is closely monitored and tested for strength prior to arriving on site. Extra measures and strength are taken to withstand transportation that translates into a more durable structure.

Environmental and Health Benefits. Building off site can reduce pollution and the physical and chemical wastes produced by the labor force and machinery needed to build, and limits exposure to toxic construction materials and waste to students on-site. Also, the exact knowledge of material needs will reduce overproduction and mistakes in orders. This not only affects costs but the labor, time and transportation for inevitable errors.

There are two types of modular construction: permanent and re-locatable. Permanent Modular Construction (PMC) are 60%-90% fabricated off-site and assembled in its intended end location.[93] The same building codes regarding standards and the number of stories apply to PMCs as traditional construction methods.

The key difference in re-locatable buildings is the ability to rapidly deploy these structures that allows for a faster occupancy. Often, flexibility in the interior functional space is high as the intent of transfer and the possibility of multiple uses. Additionally flexibility is also offered as the prefabricated pieces are designed to be taken apart and reassembled and refurbished

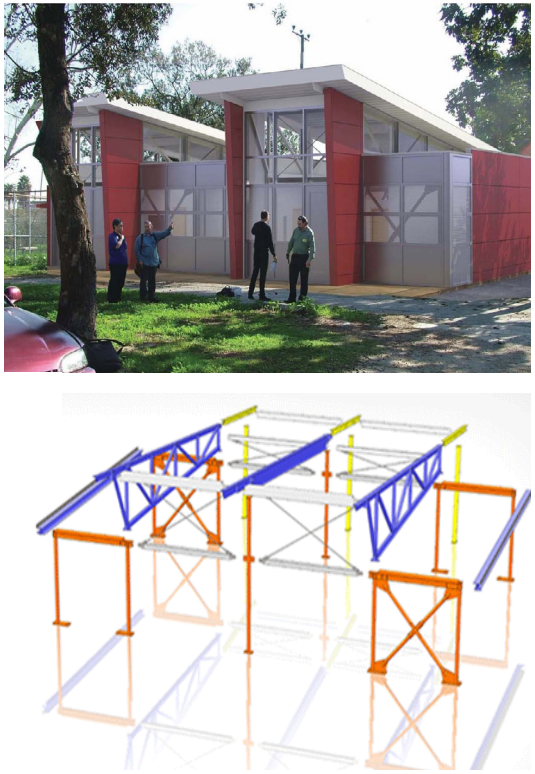


Figure 51. The Project Frog system at the Fremont SBHC.

into new needs. In some cases at the end of its life, the building can be completely recycled. Like PMC, pieces can be brought onto the site or entirely build and brought in and placed by a crane. This is also a more economical option and less legally complicated because it is not tied any specific property.[94]

Case Study: Permanent Modular Construction: Fremont SBHC

Located in South Los Angeles, the Fremont Clinic is a modular prototype that integrates the community to promote healthy living. Its planned opening in the winter of 2012 provides a large range of services such as family planning, pre-natal care, an on-site pharmacy, men's and women's health, mental health, substance abuse services for approximately 4,600 students, staff and community members.

The facility is about 2,500 square-feet on a 1.5 acre farm site. The design is a simple modular steel structure that is easily constructed, cost effective and quick to build. It offers clerestory windows to allow natural light through each modular section. Unlike other modular facilities, there is flexibility in choosing exterior skin that allows a customized facade that can be adapted to each neighborhood. In addition, it houses a community garden that will grow food for the

farmer's market and teach courses on the importance of nutrition and physical activity. There is also a greenhouse area designed as a multi-use classroom space.

The floor plan of this modular design can be expanded on either side for future expansion without much of a disturbance. Most centers will not have the luxury of 1.5 acres of land to build a SBHC as the Fremont Center, but will have limited access to nature. For facilities that are restricted in square footage, options for indirect access to nature can be achieved through building design elements, such as clerestories, interior courtyards and maximizing opportunities for exterior views. Planning of vertical expansion in the initial design and partnerships with local health facilities are also options to consider.

Appropriately Choosing A System. A modular SBHC can be located in various types of communities, from densely populated cities, suburban neighborhoods to rural communities. Although needs will always change, there are common aspects and issues that are particular to specific densities.

In an urban city, both the permanent modular and the re-locatable form can be advantageous depending on the situation. In a historically underserved population area such as South Los Angeles, the scope of intervention is larger with greater needs. A larger facility with a lasting

Figure 52. Demonstrates the ease of expanding modules on either side of the Project Frog system.

presence would indicate the need for a PMC on a school campus that can afford the physical space and the cost of construction. Many Los Angeles SBHCs have chosen to locate modular centers on the perimeter of the campus in previously under utilized recreational space. Often these are centers that provide only the basic care due to their typically smaller size. Regardless, thoughtful planning in placement and design can make a significant difference in patient experience.

In a suburban neighborhood, the likelihood of availability of land is higher than urban cities. A larger site can support a larger and permanent facility that incorporates the use of outdoor spaces for health promotion. PMCs like Project Frog can be a solution that can be flexible for growth in various types of health services such as mental health and classes.

In rural communities, the lack of resources, labor and funding are major barriers to supporting a traditionally constructed facility. Although land is abundant, the skill set coupled with the financial inability may not allow external designers and contractors to build. Modular construction can prove to be the best option in this case.

For example, the Horizon Elementary and Middle Schools chose a PMC center as their solution. This center is located in a small city in the northeastern region of Spokane, Washington with

a population of less than 50,000 residents.[95] For both convenience and practicality, the site for the SBHC was chosen to the right of the elementary school for ease of construction, less disturbance of school function and ease of access from school roads. This arrangement is common in smaller towns as it allows the ability to share resources for both schools and budget for a larger facility with a greater range of services. The solution of choosing a re-locatable center that may be permanent or temporary, can be the logical option when there is a lack skill set of building, when budgets require minimal costs, or to adapt to future changes.

The ability to adapt to changing needs is an essential quality for a successful SBHC. In the case of a permanent structure, both building program and building expansion can be easily modified by designing the interiors to accept change. An immediate benefit is the ability to

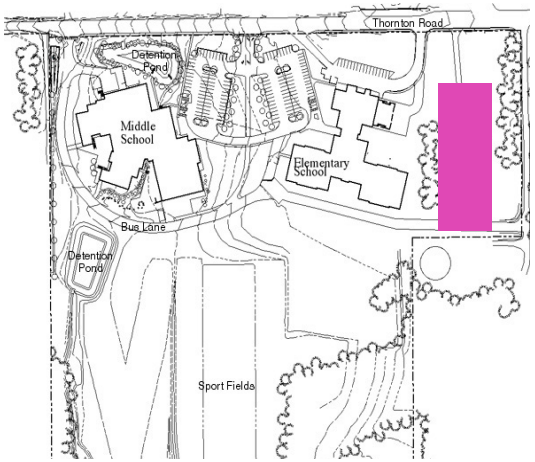


Figure 53. A new SBHC located in a rural location that serves the community, the elementary and middle schools.

Design Guideline 2: Indoor Flexibility

Figure 54. An example of entire wall composed of sliding door.

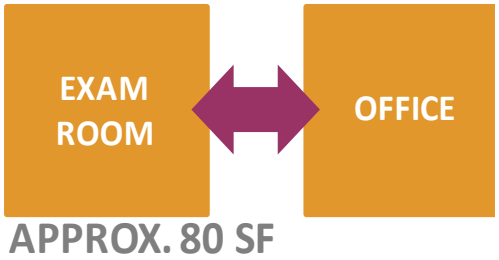


Figure 55. Adapting an exam room to an office and vice versa.

house various types of programs in the same multi-use spaces during different times of the day. This can be a financially and sustainably valuable choice because the facility may not require additional, unneeded rooms.

Flexibility in multi-room design can combine two or more functionally different spaces into a single larger area fit for gatherings and assembly. For example, a waiting area that is adjacent to an educational classroom can become a community or emergency gathering area. Multi-room design can also allow similarly sized rooms with different purposes to convert into each other in the future. An office that is typically 80 SF can easily be adapted to become an exam room. Treatment rooms that are typically 120 SF can be renovated to become conference rooms, offices, dental exam rooms or counseling rooms. It is important to consider non-permanent furniture and casework in these types of flex spaces to have minimal cost and construction disturbance if the changes need to be made.

To effectively achieve multi-room design, a few key attributes are necessary: adaptable walls and partitions with minimal non-permanent furnishings. Sliding tracks and doors can offer the facility flexible rooms and spaces that are adaptable as needed. Existing centers can renovate by installing adaptable walls to partition larger areas into smaller rooms. Permanent furniture

such as cabinetwork and shelving should be avoided, especially in re-locatable modulars.

Traditional Japanese housing and architecture provide good models for flexible indoor design. A feature of Japanese architecture that can be applicable to the SBHC is the sliding door, called the shoji. A shoji can be a door, window or a room divider that can allow various levels of transparency and privacy as needed.[96] The major difference between a Shoji screen and the needs in a SBHC is the need for acoustical separation. Careful consideration should be given to the design, location and detailing of movable partitions. Minimizing permanent walls to those needed for utilities and privacy enables flexibility to freely reconfigure interior spaces as well as increase space that would be required for a fully swinging door. Flexibility is invaluable in a healthcare facility as demands constantly change based on reimbursement funding and patient need. The sliding door concept can be applied to a contemporary standard with semi-permanent wall dividers or partitions without ceiling tracks. This will also allow a better air flow if natural ventilation is implemented, as the walls could be rearranged as required. In addition, applying the element of a translucent wall, door or window can allow more light and with a more understated and softer atmosphere.

The SBHC can be a place that practices and promotes well-being in a healthy building. A

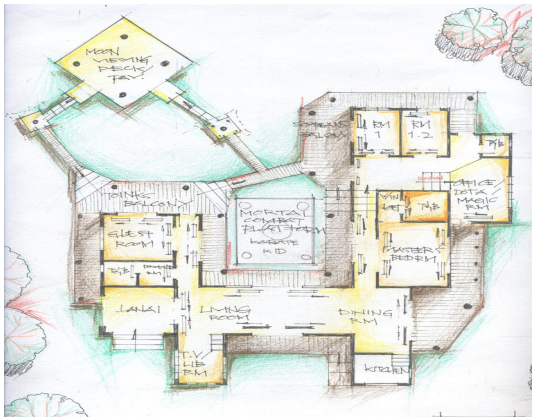


Figure 56. A traditional Japanese home.

Figure 57. The Japanese Shoji screen is a low cost solution for flex spaces in smaller healthcare facilities.

Design Guideline 3: Health + Sustainable Environments

Figure 58. The potential savings in sustainable building.

healthy and sustainable design can reinforce and teach patients about how the physical building environment can impact the health of individuals, the community and globally in a positive manner from construction to occupancy and maintenance.

Designing for a sustainable SBHC is not only good for the environment but also good for health. On average, the USGBC has found that green buildings cost 13% less in maintenance, use 26% less energy with 33% less greenhouse gas emissions and a 27% higher satisfaction rate among occupants.[97] The concept is, less disruption from wastes and consumption from construction and maintenance, the lower the impact on the environment and health. Careless construction can add to the depletion of natural resources, fossil fuels, water, underground metals and minerals at a rate that cannot be reproduced by nature as quickly as consumed. In addition, using synthetic chemicals contributes to off gassing that can be detrimental to one's health, especially in an enclosed space.

For a SBHC, the ideal location would be on school grounds. This in itself is a sustainable strategy as it uses an already impacted site for a more dense and intense use. Another option would be to use a brown field site that has been identified as abandoned can aid in the revitalization of that particular site. Both strategies also avoid previously undeveloped sites

from being destroyed. Economically, these sites additionally are often lower in cost and may be subsidized by the government as an incentive.

Controlling indoor air quality and minimizing outdoor pollutants are vital to creating a healthy and sustainable environment. The primary goal of any health care environment, including SBHCs, should be to "do no harm" and provide a healthy workplace and haven to care for people. Poor indoor air has been linked to numerous ailments such as fatigue, headaches, respiratory illnesses, skin rashes and even cancers.[98] Everyday contaminants such as mold and dust can cause deficient air quality, as well as faulty HVAC systems. Designers can avoid the implementation of particular paints, sealants, carpets and interior features that are known to contain harmful chemicals such as formaldehyde, Volatile Organic Compounds, and Chlorofluorocarbons. Natural ventilation and specified "environmentally friendly" products can drastically improve interior air quality.

The use of naturally renewable resources reduces the need to consume raw materials that are more difficult to replace and deplete non-renewable energy for extraction. Advances in material technology as well as using unprocessed or minimally processed materials has allowed for building with renewables such as high density cork, aerated concrete, cotton

Figure 59. Possible effects of SBS and poor indoor air quality.

Figure 62. Natural cork flooring in a clinic corridor.

Figure 63. Counters and wall veneers that mimic natural wood.

insulation, adobe and structural bamboo.

Economical yet sustainable materials such as cork can be interior design elements that characterize nature. The naturally warm color can be utilized or can be dyed to fit any color palette. Cork can be used as flooring, counter tops and accent pieces in key areas of the SBHC that are more public. The low cost and effective qualities of these materials a particularly good choice for SBHCs. This impermeable material is also hypoallergenic, and can contribute to a healthier center. Due to its extreme fire resistance and ability to hold heavy loads, this is a great building material to use as flooring. Cork flooring doubles in benefit for staff and providers that are on their feet all day. The natural softness of the cork helps to absorb the constant shock that the joints must endure on a daily basis.

Aerated concrete has multiple benefits that can eliminate or reduce the need for insulation as well as reduce heat loss up to 40%.[99] It reduces the need of producing new materials and can save energy throughout the life of the building.

Another great material that the SBHC can use is structural bamboo for framing, facades and decorative elements in ceilings. Although this option may be more costly than traditional alternatives, it brings natural elements into the interior for a more satisfying experience for all its users while contributing to responsible consumption of natural resources. This material may be best employed in limited applications and public areas such as the waiting room. In addition, with cost savings from other areas such as modular construction or building on a brownfield/existing site, budget can be allocated for the use of bamboo until structural bamboo can become an affordable option.

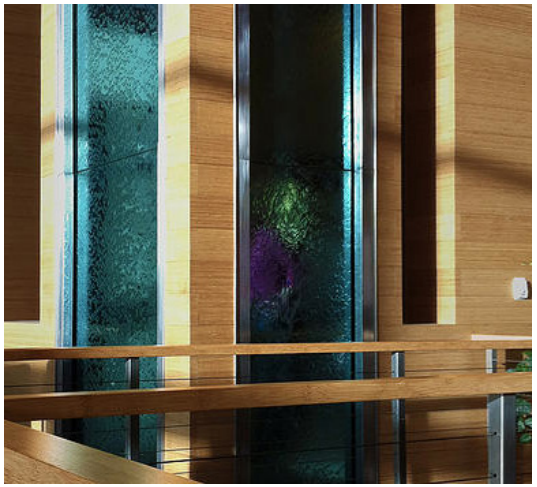


Figure 62. Interior bamboo elements.

Figure 63. Exterior facade of structural bamboo.

Case Studies: Sustainability + Modular Construction

Figure 64. The low cost yet engaging interior of the SmartSpace at the Carroll School.

The SmartSpace at the Carroll School provides an excellent case study for a low-cost, yet environmentally friendly center. This facility is LEED certified, re-locatable classroom. It stands at 1,575 square feet with two distinct spaces, one larger classroom and a smaller offset room. Many communities that may not be able to afford a larger and lavish SBHC facility can employ the design strategies utilized here. According to current SBHC guidelines, this facility size can approximately serve a student body of 700 students, which is a typical high school population in urban cities. This classroom features use of recycled materials (steel, MDF wallboard, bamboo), strategic placement of windows and building orientation to maximize natural daylight and natural ventilation, white roofing and suns shades to reflect sunlight and heat gain and a sun tunnel system to diffuse direct sunlight. Bright colors, clean contemporary lines and key accent pieces were implemented to offset the financial limitations in design.

A smaller high school of approximately 400-500 students can look to the Performance IQ classroom as a model for sustainable modular construction. The facility has a full steel moment frame, with concrete floors, 6” steel studs and 5/8” drywall underlayment. It has proven to be a resilient structure made from recycled materials and products whenever possible. The high ceilings and clerestory windows provide natural lighting with interior energy consumption exceeding California’s Energy Efficient Standards (Title 24) by 26% and

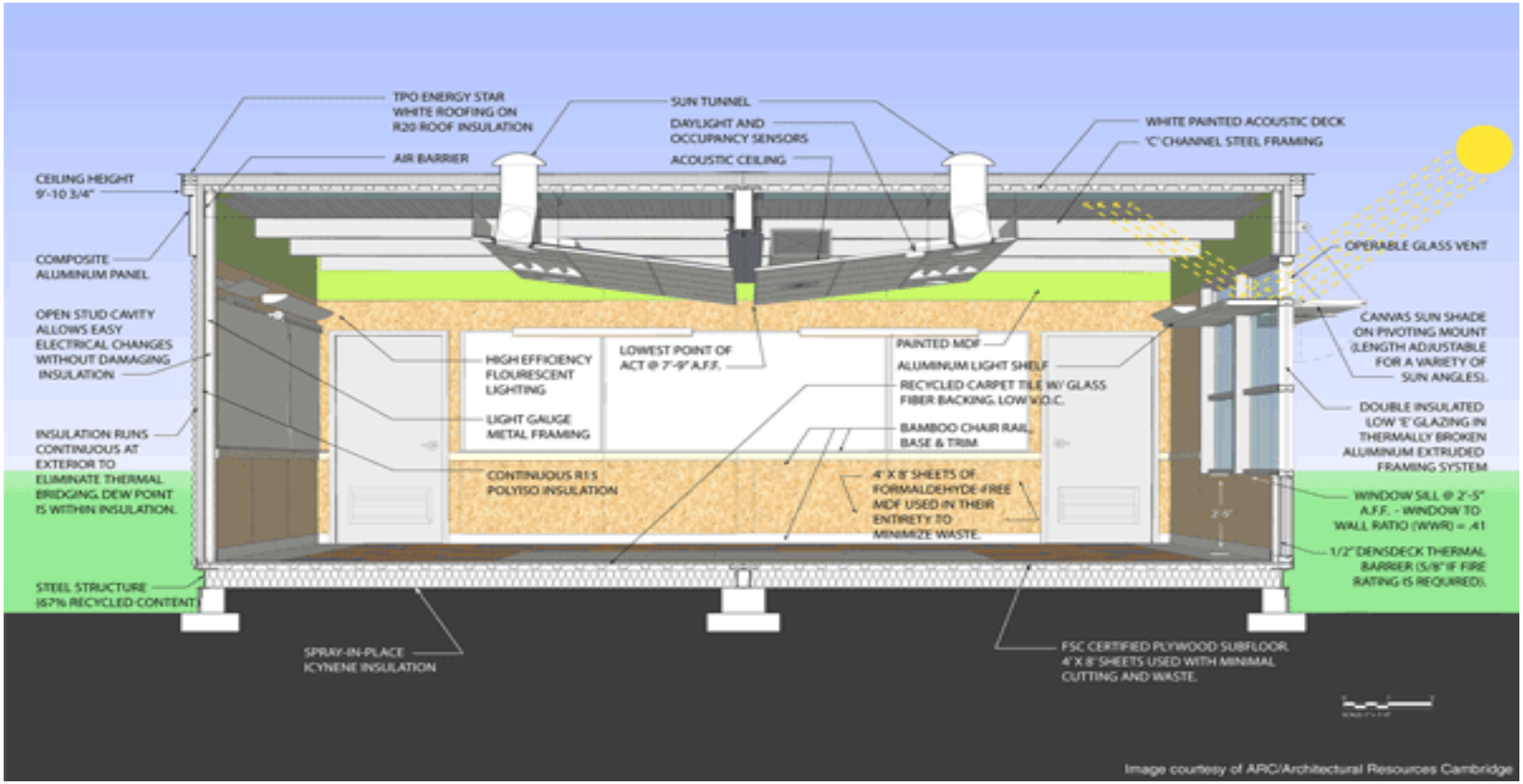


Figure 65. The various implemented green systems and solutions in the Carroll School.

an overall energy efficiency exceeding the benchmark by 40%.[100] Construction of this facility can be completed up to 40% faster. Architecturally, the design has a contemporary style that is simple yet elegant.

The Harvard Yard Child Care Center is located in Cambridge, Massachusetts on the Harvard University Campus. It is an example of a successful implementation of a sustainable re-locatable facility. Although it is not a SBHC, the program of the interior reflects the flexibility and a comparable square footage. Anderson and Anderson Architects designed this 720 SF facility to push the boundaries of the re-locatable modular with: higher ceilings, improved acoustics with quieter mechanical systems and higher insulation levels, reduced energy consumption, natural ventilation and daylight through solar tube skylights in every room with aluminum sunshade louvers.

Figures 66,67,68. The Harvard Yard Child Care Center.

Design Guideline 4: Privacy Levels in Waiting Areas

Figure 69. A poor example of privacy in a typical waiting area in a health clinic.

In smaller facilities such as the SBHC, the likelihood of minimal privacy is common. The added angst may come from keeping privacy among fellow classmates, friends and community members. Health issues involving family planning, mental health among other particularly sensitive conditions can make the SBHC a stressful environment. Unfortunately, a negative experience may deter more introverted and insecure patients from returning for follow up care or from seeking health care in general.

Protecting Patient Confidentiality & Privacy. Privacy is the right of individuals to keep information about themselves from being disclosed.[101] It is the patient that decides who, when and where to share their information. Confidentiality, is how providers and staff must handle patient information. It is not uncommon in some settings where sensitive information such as addresses, phone numbers, social security numbers and medical conditions is often asked of the patient in the waiting area.

Figure 70. Lack of privacy leading to stress and eventual negative health outcomes.

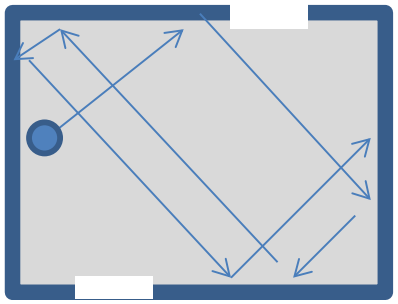


Figure 71. The reflection of sound off walls.

Acoustical elements. Patients can often feel uncomfortable in releasing personal information in an open space with others present. This may result in an incomplete medical history or other applicable information that can potentially effect treatment and health outcomes. Speech privacy can help reduce medical errors as it allows for open conversations between patients, families and healthcare providers without apprehension. Acoustical privacy is has also been to have shown an increase in patient and staff satisfaction.[102]

In one study, sound absorbing materials were installed in corridors of a hematology oncology unit over half of the ceiling and upper wall surface. It reduced sound pressure levels in the unit by 5 dB and significantly reduced reverberation times. Staff and patients perceived an improved acoustical privacy in the corridors and adjacent rooms, with many dissatisfied before the installation and almost all of them satisfied after the installation.[103]

Traditionally, hard flooring, counter and wall surfaces are chosen in healthcare settings because they are easily cleaned to prevent the spread of bad bacteria. Although high traffic and easily soiled areas still must adhere to easily cleanable materials, alternative solutions such as acoustic ceiling panels, tiles, clouds and carpets are effective measures to absorb sound. The geometries of sound travel can be predicted to accurately and efficiently locate these design features. Understanding sound path can help guide placement of rooms and

furniture as well as determine key locations for acoustical treatments.

A room's acoustic signature involves four acoustic properties: sound strength (G in dB), sound propagation (DL in dB), speech clarity (D in %) and reverberance (T in seconds). These qualities then should be adjusted depending on the typical activities that take place in the space, as well as the physical characteristics such as the dimensional volume and materials. Waiting areas, consultation spaces, exam and treatment rooms in SBHCs should consider sound strength to reduce general noise levels and sound propagation to reduce the spread of speech. In larger facilities that may have atrium spaces or higher ceilings, acoustical lanterns may provide acoustical control as well as add a decorative element to the space.

Visual elements can be used to vary degrees of privacy. A patient's health can be a sensitive issue that can warrant the desire for open support from others, complete isolation or something in between. In addition, school based health centers that are open to the community will see patients of diverse ages and conditions. The physical arrangement of furniture and architectural elements can be designed to accommodate various levels of visual separation or interaction chosen by the patient.

Adjacencies and Program Configuration. A gradual shift from public to more private functions can create an additional level of comfort for patients. Community based activities that may not necessary be related to clinical purposes should be located near the waiting area and entrance. These spaces can include educational classrooms and fitness areas. Offices, exam rooms and treatment rooms should be located at the "back of house" to ensure security and isolation. Preferably, a unifying outdoor courtyard or multiple smaller outdoor spaces should be incorporated to provide users relief from stress and help separate areas with conflicting needs. Within modular construction, the shape of the module can create nooks for outdoor space. For example, if one module is an L-Shape, the juxtaposition of two modules can create an open courtyard in the center.

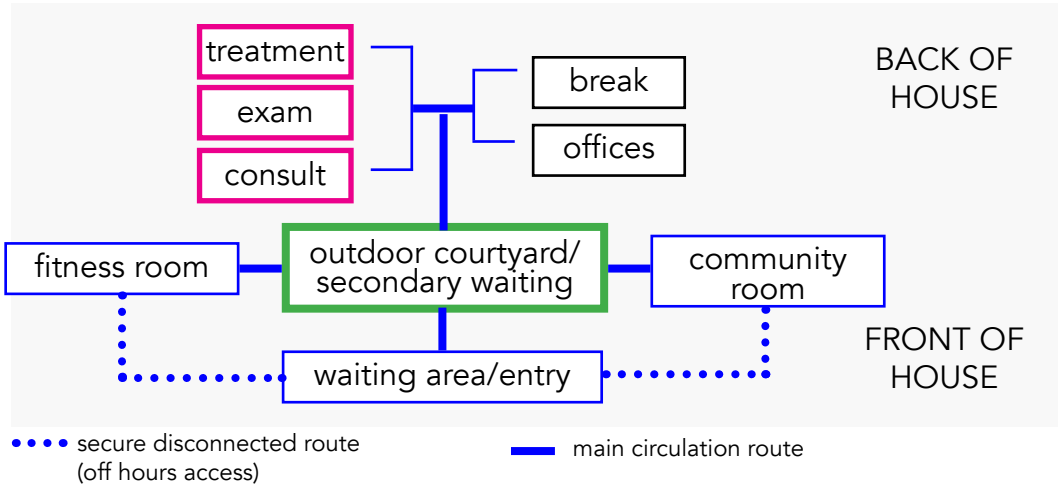


Figure 72. Potential relationships between rooms.

Use of partial height walls, screens. This technique can separate more public functions without completely isolating rooms. It gives the appearances of a larger and more open space in a smaller facility such as a SBHC. This can give ease to patients that are claustrophobic or become nervous in healthcare settings. Particularly in waiting areas, partially translucent panels or glass partitions can effectively enlarge a confined area.

Design a privacy alcove. In smaller centers in which the waiting area and check-in are combined in one space, a privacy alcove can alleviate the tension of being seen and/or overheard.

Install movable & fixed furniture. A typical waiting room in a doctor's office, clinic and hospital often include rows of chairs in close proximity with no separation. In an inherently stressful environment, levels of shared space can cause anxiety and stress. In singular waiting areas, providing movable and informal seating that can be arranged in the space in multiple ways can enable patients to have control over their proximity to others. In larger spaces, installing booths can allow student patients to bring their school work to complete while waiting. Creating varying types of furniture settings allows "zones of activity" in an otherwise linear and monotone space.

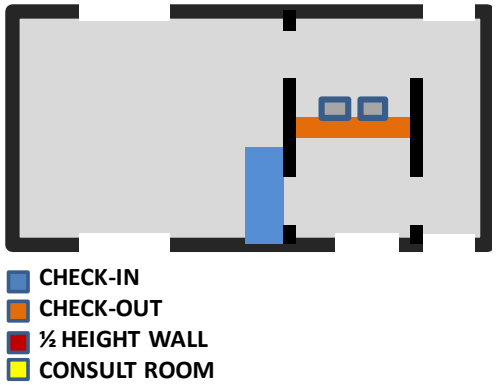


Figure 73. Privacy alcove for conversation.

Figure 74. Configuring furniture into zones with varying layouts.

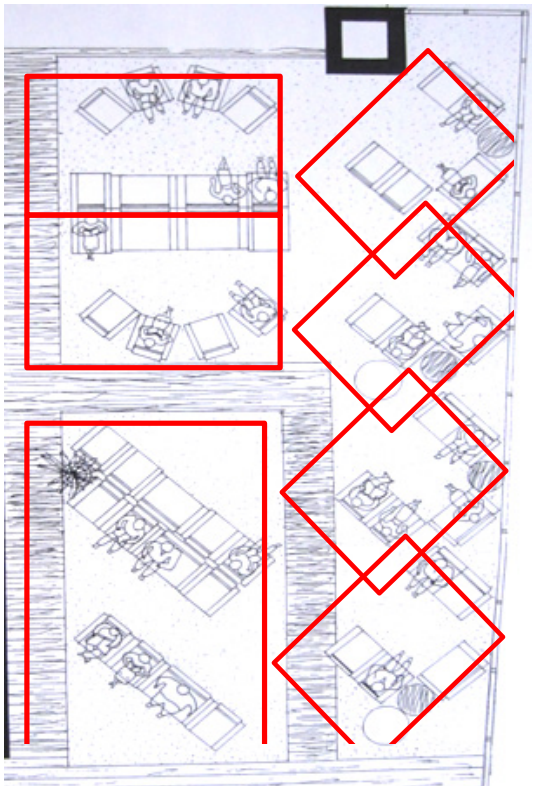


Figure 75. Another example of furniture placement for privacy.

Design multiple waiting areas. To increase comfort levels for patients, waiting areas should be sectioned by age groups. A 16 year old student may not feel comfortable being in the same waiting area as a 4 year old child brought in by a family member, or a 79 year old community patient with diabetes. Each room or area should cater to its age range, for example, children under 10 may have a room with brighter and bolder colors with toys appropriate to that age range. Whereas, the teenager's waiting area can provide reading material, gaming and materials on health education.

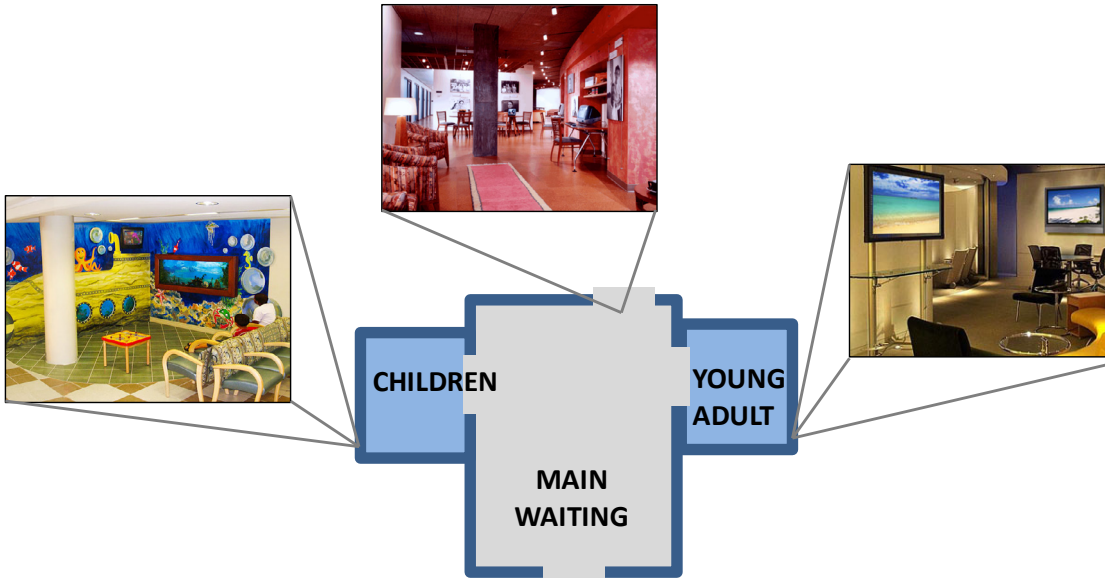


Figure 76. Multiple waiting areas for different age groups.

Design Guideline 5: Connection to Nature

Unfamiliarity of one's surroundings, the threat of severe illness and the loss of independence can cause anxiety that can have adverse effects on treatment outcomes.[104] Introducing calming elements that mimic nature, applying soothing colors and giving a sense of control to the patient can contribute to a positive experience and better health outcomes.

Figure 77. Fully collapsable screens for flexibility, daylighting, natural ventilation and access to the outdoors.

Integrating nature should be a key design feature in every healthcare facility including SBHCs. Particularly, contact with nature has been shown to enhance emotional, cognitive and values-related development in children (middle childhood and early adolescence).[105] Evidence shows that contact with nature is good for one's health. It has improved attention among children with ADD, decreased mortality rates among seniors, lowered blood pressure and anxiety among dental patients, assisted in better pain control among bronchoscopy patients.[106]

A study in Japan done with 250 subjects compared the cortisol levels, blood pressure, and pulse in a city setting and various mountainous settings to measure physiological effects. Groups were exposed to urban and nature views as well as physically walking through both sites. Results showed lower levels of cortisol, pulse and blood pressure.[107] These particular physiological elements are important to control as they are indicators of immunity and risk for acute and chronic illnesses.[108] For example, cortisol, controlled by stressors, can pose

Figure 78. Wood veneers on ceiling.

Figure 79. Access or views to nature through courtyards or gardens.

threatening effects on the immune system, blood sugar and metabolism.[109] High blood pressure, or hypertension, is crucial to manage as it increases chances for stroke, heart attack, chronic kidney disease and heart failure.[110]

Implementing "green" strategies can have positive mental health outcomes. Studies have shown that exposure to daylight or full spectrum artificial lighting reduces depression. A study found patients hospitalized for depression have had faster recoveries in rooms with sunlight. The same study discovered that eastern facing rooms with the sunrise had shorter stays than patients in western facing rooms.[111] Access and views to nature and gardens have even better health outcomes in reducing stress and pain in recovery. Studies reveal physiological changes in blood pressure and healthier heart activity in patients exposed to views to nature.[112] The particular stresses that may come from merging a highly personal aspect like health services with an academic and social setting creates the unique need for a calming and restorative settings. In addition, the frequency and continuity of the same patients throughout their academic career creates a stronger need for a center that encourages patients to return for their health needs in the future. This cycle can then increase patients being seen for preventative and general health maintenance, rather than a reactive measure.

Architecture solutions include introducing natural materials, access and views to nature. 'People with access to nearby natural settings have been found to be healthier overall than other individuals. The longer-term, indirect impacts (of 'nearby nature') also include increased levels of satisfaction with one's home, one's job and with life in general.[117]

Views to nature. Stresses from unfamiliar environments and healthcare situations can be alleviated with views into landscaping. The level of exposure will depend on the type of space and its adjacent program. For example, patient privacy should be considered as views and sound from and into meditation gardens can offer too much exposure. Whereas, public courtyards may be centrally located in view from main corridors and be accessed from waiting and break areas. Views to nature are typically reserved for public spaces, but views to nature from exam and treatment rooms can significantly benefit the patients during their visit. Due to the nature of the activities in these rooms, windows should be located higher than eyesight. Although shading devices can allow lowered heights of windows, the likelihood of being able to remain open is minimal in a room requiring high levels of privacy. Clerestory windows offer an architecturally stimulating solution to providing natural daylight as well as views for both exam and treatment rooms. Particularly in a treatment room where patients are lying on an exam table can benefit from sight lines that are provided through clerestories. Figure

Figure 80. Clerestory windows can offer views from the patient bed while maintaining privacy.

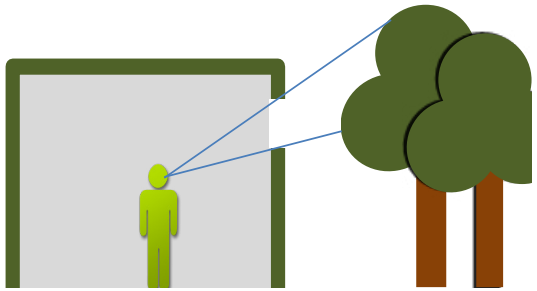


Figure 81. Windows placed higher than the average sight line to protect patient privacy.

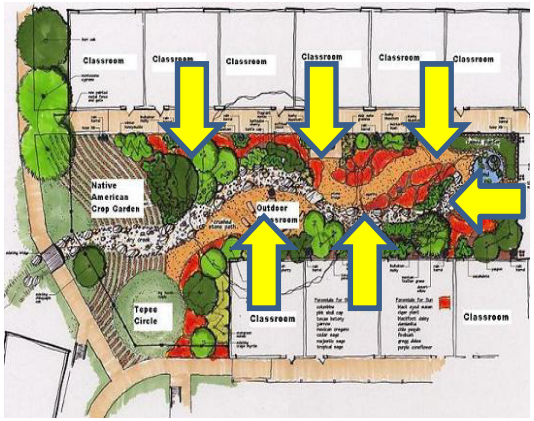


Figure 82. Increased number of interior spaces with access and/or views.

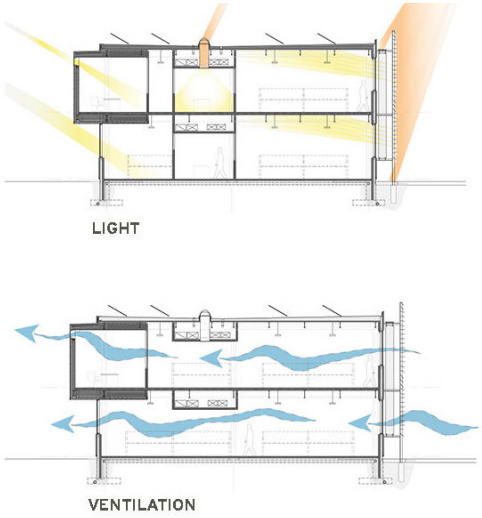


Figure 83. Optimal ventilation and light.

82 shows a U-shaped plan that allows views from almost every room into a walkable outdoor courtyard. An alternative option is to partially or completely wrap the main corridor around a courtyard that can allow views and added daylight for patients and staff moving between spaces.

Access to nature can come with healing gardens, courtyards and the existing landscaping on site. There are a wide range gardens that are specific to various health facility types, such as restorative gardens for psychiatric hospitals, meditation gardens for religious and faith based centers, and healing gardens for acute care clinics. They can be used as a tool for recovery and stress relief. Locating these outdoor spaces will depend on their functional intent. In a SBHC that serves community members and younger patients, security will be a top concern. Providing more than one outdoor space to accommodate both secure and non-secure area is ideal. Typical features incorporate natural shading with trees, water elements, comfortable outdoor furnishings and horticulture. The Fremont SBHC in Los Angeles, California designed a community gardening area to grow fresh vegetables and fruits for consumption. It not only brings people together, but also encourages healthy diets and locally grown foods.

With funding a primary influence in design decisions, incorporating exterior landscaping is

usually seen as an added cost. In these situations, bringing nature to the interiors can be an alternative solution. Clerestory windows and/or a larger number of appropriately placed windows can provide both natural lighting and view to trees and the skies. Healthcare facilities, such as school based health centers, must be cautious of the location of windows for patient privacy and security of the property.

Daylighting. Daylighting has shown to not only improve academic performance and provide health benefits, but also save energy and operational costs. Healthcare facilities are generally known to have thick building footprints that are powered by bright and sometimes uncomfortable fluorescent light. A study done by the Department of Education from 2000-2007 with over 21,000 student participants in California, Colorado and Washington have shown statistical evidence to support that daylighting was associated with a 7%-18% performance improvement in test scores.[118] In another study in 90 Swedish elementary school students, a link between behaviors, health and cortisol levels were tracked over a year in four classrooms in various levels of daylight.[119] The results showed non-daylit rooms had an increasing rate of disturbances in basic hormone patterns that could have influenced concentration and potential physical and mental growth.

Figure 84. Operable windows can provide personal control of temperature and light.

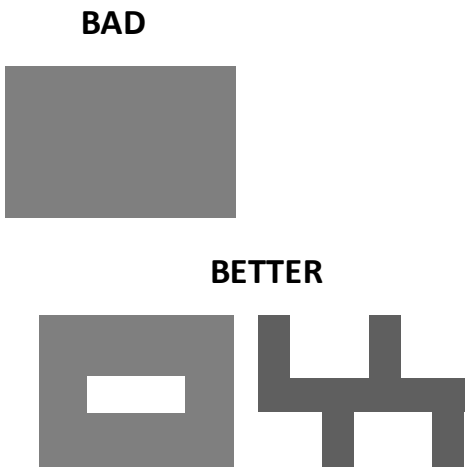


Figure 85. Demonstrates floor plates that are more condusive to natural ventilation and daylighting.

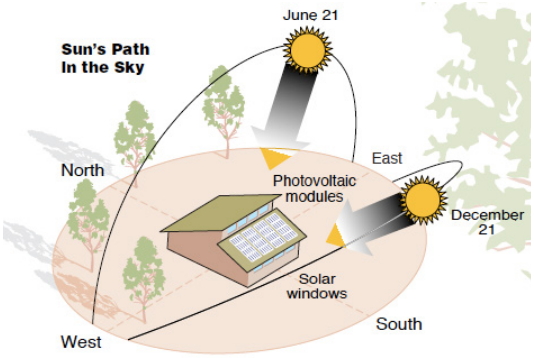


Figure 86. Sun paths for the winter and summer solstice.

Architectural solutions to improve the experience for patients and staff include designing for a footprint that has more surface area of its facade exposed. This can be achieved through building orientation, central courtyards, narrow floor plates, clerestory windows and sunshades. A few manipulations can maximize the winter and summer sun as a resource for energy and daylight. Waiting areas, community spaces, conference rooms and offices should be located on the East/West axis to gain from the sun's path. Light shelves can further direct the winter path that comes in at a lower angle and summer paths that are at a higher angle.

A case study in a North Carolina school that implemented daylighting indicated savings from decreased energy consumption. The Durant Road Middle School reduces their energy use for lighting and HVAC systems provides a 50%-60% through daylighting and mixed mode ventilation. Annually this amounts to over $21,000 in savings.[120] The architectural features used to achieve daylighting for Durant Road Middle School include orienting the building lengthwise on the East/West axis with daylighting monitors on glazing on the South and North facing roofs for daylighting in classrooms, cafeterias, gyms and hallways. The East and West sides are absent of glazing. The overall footprint of the buildings have courtyards and arrow "arms" to break up on otherwise massive block with daylight and ventilation opportunities.

Natural Ventilation. "The very first canon of nursing, the first and the last thing upon which a nurse's attention must be fixed, the first essential to the patient, without which all the rest you can do for him is as nothing, with which I had almost said you may leave all the rest alone, is this: to keep the air he breathes as pure as the external air, without chilling him." Florence Nightengale.

Figure 87. Patients in a TB sanatorium treated with fresh air.

In the recent history of healthcare, TB sanatoria used the theory of fresh air therapy and infection control in the pre-antibiotic era all over the world. With the invention the mechanical HVAC systems and the Modernist Movement, this notion fell by the wayside. Most commercial and healthcare building types in the U.S. became hermetically sealed boxes without operable windows, as the HVAC systems were trusted to filter air at healthy levels. Unfortunately, HVAC systems require regular maintenance that is highly dependant on operations. There is no guarantee of HVAC upkeep. The CDC recommends high risk buildings, such as healthcare facilities, to have 10-12 air changes every hour to effectively reduce infections airborne particles.[121] Naturally ventilated healthcare facilities have shown to be effective in meeting CDC recommendations.

A study was done in Peru in 8 hospitals, of which 5 were pre-1950 and 3 were post-1970.

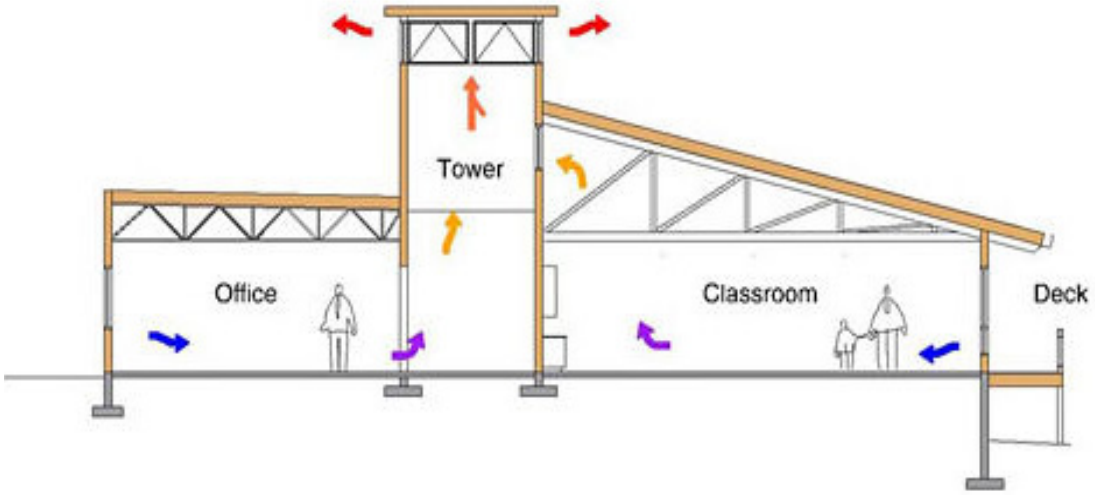
70 naturally ventilated rooms (emergency rooms, waiting areas, respiratory isolation rooms and medical wards) were analyzed against 12 mechanically ventilated rooms. In the naturally ventilated rooms, up to 28 air exchanges were recorded.[122] Infection risks were determined by using the Wells-Riley equation. The hesitation to employ naturally ventilated healthcare facilities in the United States has been unfortunate for the potential positive health outcomes of patients and the well being of staff. The very nature of the SBHC as a smaller facility without the code requirements of a large hospital allows the ability to implement natural ventilation.

There are two simple building techniques to naturally ventilate a building: cross ventilation and the stack effect. Cross ventilation requires that the building have openings positioned to promote and allow the horizontal flow of air and wind through a building or space. This can prove difficult in larger buildings that do not have thin floor plates, or in buildings that have perpendicular obstructions that prevent airflow movement. Therefore, a thinner floor plate is critical for a natural ventilation system. The Whole Building Design Guide recommends a maximum width of 45 feet for a successful design.[123]

The stack effect is created when air is pull in and upward through a vent. It takes the phenomenon of rising hot air for air change. Ridge vents, supply and exhaust openings allow

air to travel effectively throughout the building. Natural ventilation can work in temperate climates with a predictable and stable flow of air for the majority of the year. A hybrid of a naturally and mechanically ventilated healthcare facility is the most reasonable solution to employ at this time.

Implementing natural ventilation can be further applied through the Engawa concept. The traditionally narrow footprint and high ceilings, natural cross ventilation and natural lighting are design features of the Engawa that can be adapted to the SBHC. This will not only save energy costs from decreasing the use of mechanical ventilation and electricity, but also increase



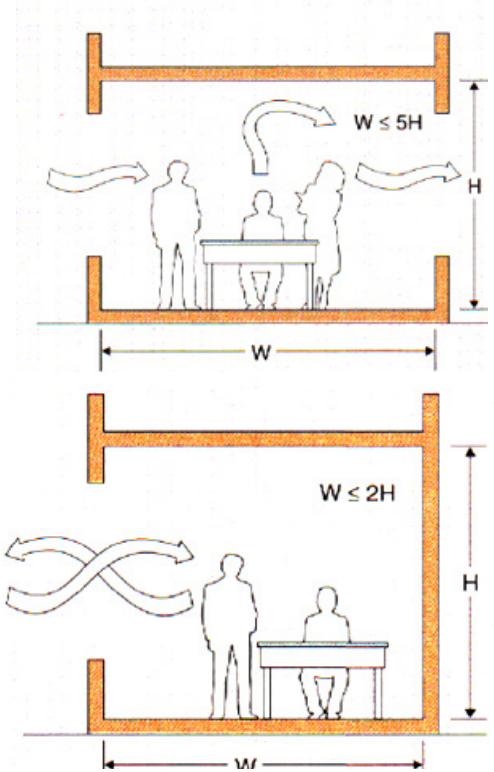


Figure 88. Optimal air flow with height and width ratios.

Figure 89. Diagram of air movement.

the satisfaction of patients and staff. Figure 91 shows an example of a traditional Japanese house floor plan that when the module is multiplied and shifted, opportunities for outdoor spaces, Engawa inspired walkways and natural ventilation and lighting are easily incorporated.

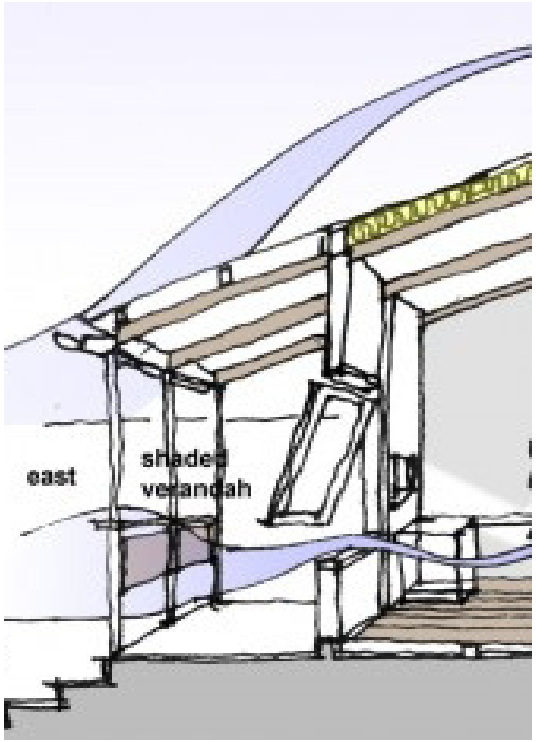


Figure 90. Air movement through transitional spaces into the indoors.

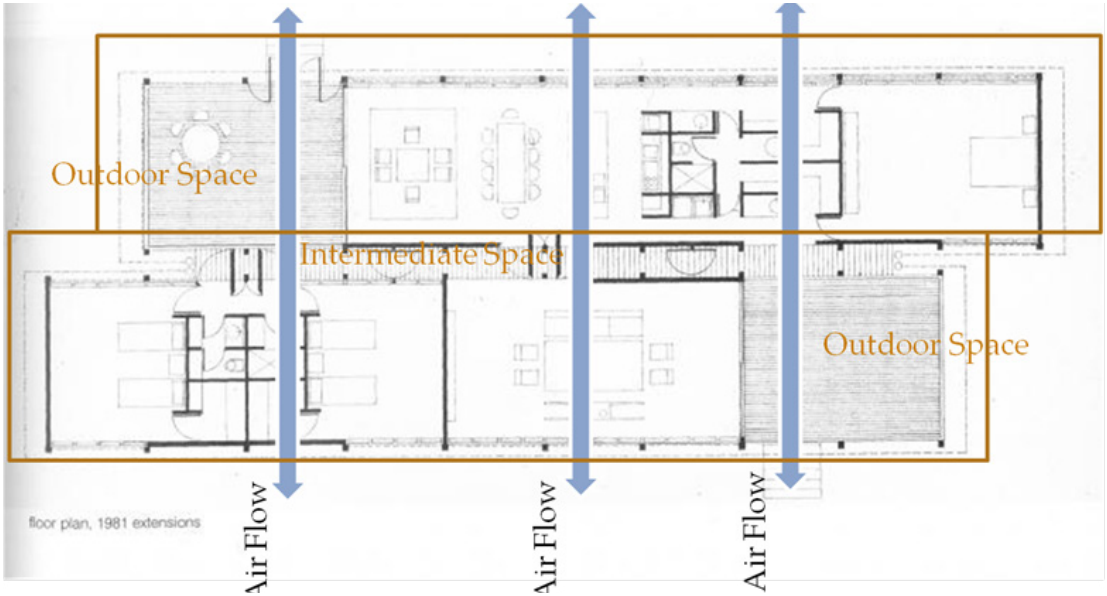


Figure 91. An overlay of a traditional Japanese floorplan as a modular system with the engawa used as outdoor spaces and open air corridors.

Design Guideline 6: Transitional Indoor/Outdoor Spaces

A transitional indoor/outdoor space provides opportunities for respite, lounging, reduction of congestion in waiting areas, protection from the elements and a buffer between a completely conditioned space to the outdoors. This area can be designed as open-air space or have down screens for privacy and added shelter from adverse weather.

Traditional Japanese homes are known for incorporating sliding doors, simplistic floor plans and Engawas, or a porch-like transition space to the outdoors. The Engawa mediates to the outdoors with a covered roof for protection against rain and sun. These spaces can be found along the length of the home and/or on the end(s). The dimensions vary from a few feet in width to over 10 feet. Usually Engawas on the shorter end of the home are larger, square-like areas that are entries into the home. A contemporary application to the SBHC can incorporate outdoor Engawas for waiting areas, or respite areas of nature as well as circulation within the facility, especially in temperate climates.

Figure 92. The Engawa as an open transition to the exterior courtyard.

Figure 93. Traditional Japanese Engawa space used as a corridor space.

Another example of a transitional space is seen in the Charleston Single House. The defining feature is the exposed side porch along the “front” of the home. This covered porch on both ground and second levels provided not only visual privacy from neighboring homes, but also allowed for natural ventilation with the thinner floor plate. This strategy is particularly effective in hot and humid climates, as the heat must penetrate an additional layer of the building before the interior spaces.

Figure 94. The Charleston Single House porch.

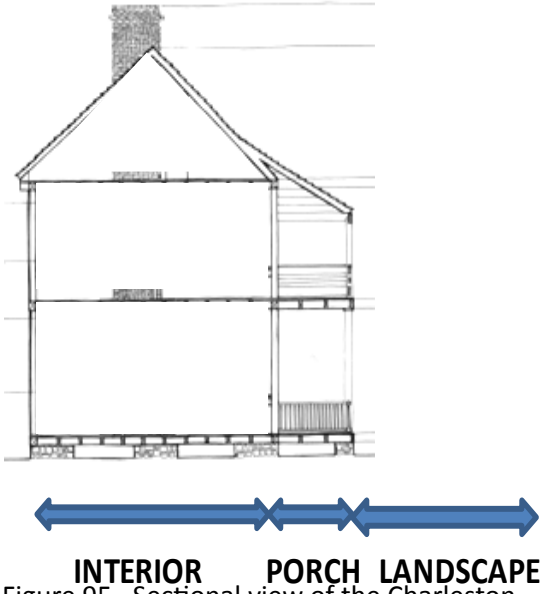


Figure 95. Sectional view of the Charleston Single House.

Conclusion & Recommendations for Further Study

The underserved youth in the public school system are often forgotten. The major health issues in children that plague the United States are magnified in socio-economically disadvantaged communities. Studies have shown that communication, transportation and financial barriers severely limit access to healthcare, even when it is available. The devastating outcomes are seen in poor academic performance and high risk health behaviors that are resulting in substance abuse, teen pregnancies, obesity and chronic illnesses.

School Based Health Centers can be a line of defense that aim to fill this gap in the healthcare network. Findings from literature and research show the positive health outcomes and increase in grades that have resulted directly from the presence of a center.

Unfortunately, physical design has not been addressed in most SBHCs as an important factor when creating a new facility. Funding is usually the main culprit, although many decisions that impact design may not increase costs, but actually decrease costs in the short and long term life of the building and the health of the patients. Guiding principles to promote the patient, community and staff's overall health and well-being can be achieved directly and indirectly through a focus on a supportive and healing physical environment with the implementation of these design guidelines.

As School Based Health Centers become increasingly common in communities, it will be important to track the evolution of needs and effectiveness through post-occupancy evaluations. Recommendations for further study include the follwing measurables, but not limited to:

1. Demographic information of patients and staff
2. Services provided
3. Efficiency of space
4. Overall satisfaction of experience (acousics, privacy levels, stress levels, etc.)
5. Academic correlations to mental and physical health

Traditionally, this information is collected by a third-party after a minimum of six months of occupancy through survey, walk-throughs, interviews and focus groups by various user types such as patients, visitors, staff and community members. With this knowledge base, a higher level of design can be achieved in the future as the rapidly changing healthcare scene will call upon these centers for a vital role for a healthy and successful population.

Figures Cited

01. Students at library. http://www.sri.com/work/projects/national-effectiveness-study-first-step-success. August 2012.

02. Physically active students at school. http://lexisperth.com/2011/05/, August 2012.

A SBHC at the Richland Parish School System in Louisiana. 3 April 2012.

03. SBHC in Louisiana. http://www.richland.k12.la.us/health/. 15 November 2012

04. Urban sprawl in California. http://www.ecolibrary.org/page/DP1000. 15 November 2012.

05. Top 10 U.S. Children's Health Concerns. http://mottnpch.org/. 8 March 2012.

06. Gradual weight gain in a child. http://www.thenutritionpost.com/eatright/weight-gain-inevitable-as-you-age.html . 8 March 2012.

07. Nutrition facts in foods. http://nutritionfacts.org/. 17 November 2012.

08. Smart snacking in schools. http://www.fns.usda.gov/sites/default/files/images/schooltoolkit_smartsnacks.jpg

09. Obesity rates in the US. http://calorielab.com/news/wp-images/post-images/fattest-states-2014-big.jpg

10. Access to supermarkets. http://enterpriseresilienceblog.typepad.com/enterprise_resilience_man/current_affairs/page/2/. 5 December 2012.

11. Asthma related school absences. http://www.cdc.gov/asthma/nhis/09/data.htm. 7 October 2012.

12. Teen pregnancy statistics. http://www.thenationalcampaign.org/resources/default.aspx. 8 October 2012.

13. Healthy school lunches. http://www.bendbulletin.com/article/20120219/NEWS0107/202190354/. 15 November 2012.

14. School science fair. https://onedublin.files.wordpress.com/2010/03/john-green-elementary-science-fair-march-2010-1.jpg March 2012

15. Community bake sale. http://cakepower.blogspot.com/2010/03/our-school-bake-sale-

for-haiti-1-of-4.html. 7 March 2012.

16. English spoken in High School student homes. Kim, 2012.

17. English spoken in Elementary student homes. Kim, 2012.

18. Delayed care statistics. Centers for Disease Control and Prevention, National Health Interview Survey, 2007-2009. March 2012.

19. Relationship between access and distance. http://mtdh.ruralinstitute.umt.edu/blog/wp-content/uploads/Strategic-Plan102512-FINAL-2.pdf. 13 March 2012.

20. Delayed care due to costs. http://www.ficklefinger.net/blog/. 17 March 2012.

21. Higher medical costs from overused Emergency Departments. http://www.empireblue.com/eralt/. 2 April 2012.

22. Unnecessary ER visits. http://www.ficklefinger.net/blog/2011/11/04/potential-savings-from-the-elimination-of-unnecessary-er-visits/. 17 March 2012.

23. Medical cost savings by utilizing SBHCs. http://www.empireblue.com/eralt/. 2 April 2012.

24. Relationship between absenteeism and academic performance. http://www.nccp.org/publications/pub_771.html. 17 March 2012.

25. Relationship between high risk behaviors and grades. http://www.cdc.gov/healthyyouth/health_and_academics/data.htm. 6 December 2011.

26. Types of high risk behaviors. http://healthpopuli.com/2010/06/04/risky-business-the-state-of-u-s-high-schoolers-health/. 6 December 2011.

27. Relationship between life expectancy and education levels. http://blog.vcu.edu/human_needs/2012/10/advances-in-public-health-have.html. 8 December 2011.

28. Over 1900 SBHCs in the U.S. http://healthpopuli.com/2010/06/04/risky-business-the-state-of-u-s-high-schoolers-health/. 19 October 2011.

29. A medical assistant aiding a student. http://urbanplacesandspaces.blogspot.com/2005/10/more-ideas-health-care-vs-hospital.html. 12 October 2011.

30. Ethnic profile of SBHCs. http://healthpopuli.com/2010/06/04/risky-business-the-state-of-u-s-high-schoolers-health/. 19 October 2011.

31. SBHC geographical locations. http://healthpopuli.com/2010/06/04/risky-business-the-state-of-u-s-high-schoolers-health/. 19 October 2011.

32. SBHC Primary Care and Mental Health services. http://healthpopuli.com/2010/06/04/risky-business-the-state-of-u-s-high-schoolers-health/. 19 October 2011.

33. Texas Department of Health SBHC guidelines. Kim, 2012.

34. A trailer type SBHC. http://www.ramtechgroup.com/blog/tag/portable-classrooms. 19 October 2011.

35. A school embedded SBHC. http://www.wvsbha.org/sbhc/new-river-elementary-school-based-health-center/. 22 October 2011.

36. Westwood Family Health Center. http://www.denverhealth.org/ForPatientsandVisitors/OurLocations/WestwoodCommunityHealthCenter.aspx. 19 October 2011.

37. Morris Heights Health Center. http://www.enterprisecommunity.com/financing-and-development/new-markets-tax-credits/portfolio-and-approach/harrison-circle. 19 October 2011.

38. LAUSD Chlamydia rates in 2008. Proposed Strategic Plan for the Establishment of School Health Centers in High Priority Geographic Areas. February 2009. 22 December 2011.

39. LAUSD Live birth rates in 2008. Proposed Strategic Plan for the Establishment of School Health Centers in High Priority Geographic Areas. February 2009. 22 December 2011.

40. LAUSD Students on Free/Reduced Lunch Program in 2008. Proposed Strategic Plan for the Establishment of School Health Centers in High Priority Geographic Areas. February 2009. 22 December 2011.

41. LAUSD Body composition failure rates in 2008. Proposed Strategic Plan for the Establishment of School Health Centers in High Priority Geographic Areas. February 2009. 22 December 2011.

42. Willingness to walk. http://goodideapublichealth.tumblr.com/post/39930300266/

transit-oriented-communities-are-healthier. November 2013.

43. Planning vehicular traffic routes. http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/PropertyToolBox/StateSchools/Design/TrafficManagement.aspx. 11 November 2012.

44. An urban sprawl community. http://www.publichealthgrandrounds.unc.edu/urban/. 19 October 2011.

45. SBHC Basic program. Kim, 2012.

46. SBHC Additional program (Expanded). Kim, 2012.

47. Patient-centered model. http://instructionaldesignfusions.wordpress.com/2011/03/10/patient-centered-care/ . 2 October 2012.

48. Venn Diagram of home, school, community and student. https://cdn.media78.whipplehill.net/ftpimages/323/push/12098/family-invol-fig1.gif. 12 December 2014.

49. St. Peter's Hospital, a modular facility. http://www.yorkon.co.uk/news-releases.html/57. 14 October 2012.

50. Modular and site built construction schedule. http://www.modular.org/htmlPage.aspx?name=About_Modular_Construction. 14 October 2012.

51. Fremont SBHC and Project Frog. http://www.projectfrog.com/partners/upcoming_projects/. 14 October 2012.

52. Project Frog modular system. http://www.projectfrog.com/buildings/healthcare/. 14 October 2012.

53. Rural SBHC. http://www.ncsl.org/portals/1/documents/health/HRSBHC.pdf/. 29 September 2011.

54. Example of a sliding door. http://www.designbuild-network.com/contractors/joinery/dorma/dorma4.html. 20 September 2011.

55. Flexibility of rooms. Kim, 2011.

56. Traditional Japanese home. http://irving-zero.deviantart.com/art/my-japanese-house-

floor-plan-30242867. 11 November 2011.

57. Japanese Shoji screen door. http://ristomarijanikointokyo.blogspot.com/2010/09/chapter-10-last-blog-jewel-in.html. 22 November 2011.

58. Potential savings in sustainable building. http://www.dailykos.com/story/2008/11/20/664372/-LEEDing-the-way-to-a-Green-Collar-job-w-poll

59. Possible effects of SBS. http://www.ilo.org/iloenc/images/stories/Part01/SYS_imgs/SYS020T1.jpg. 22 November 2011.

60. Natural cork flooring. http://www.allsurfacedesign.com/products/flooring/cork.aspx 22 November 2011.

61. Natural wood surfaces. http://www.gustafs.com/en/surfaces/nature-veneers__231

62. Interior bamboo elements. http://static.wixstatic.com/media/da42be_7c80184e394e45f3b69b65189d9169dc.jpg_srz_551_399_75_22_0.50_1.20_0.00_jpg_srz. 3 December 2014.

63. Exterior façade of structural bamboo. http://www.lamboo-rainscreen.com/#!panel-solutions/c1d4u. 3 December 2014.

64. SmartSpace at the Carroll School. http://www.modular.org/htmlPage.aspx?name=Modular_Green_Classrooms. 14 November 2012.

65. Interior green features at the Carroll School. SmartSpace at the Carroll School. http://www.modular.org/htmlPage.aspx?name=Modular_Green_Classrooms. 14 November 2012.

66. Delivery of a module at Harvard Yard. http://www.triumphmodular.com/blog/portable-green-classroom. 14 November 2012.

67. Interior view of Harvard Yard. http://www.triumphmodular.com/blog/portable-green-classroom. 14 November 2012.

68. Completed view of Harvard Yard. http://www.triumphmodular.com/blog/portable-green-classroom. 14 November 2012.

69. Lack of privacy in waiting rooms. http://well.blogs.nytimes.com/2008/06/18/should-undercover-patients-check-up-on-doctors/. 10 January 2012.

70. Privacy, stress and negative health outcomes. Kim, 2011.

71. Reflection of sounds. Kim, 2011.

72. Potential adjacencies to increase patient privacy. Kim, 2011.

73. Privacy alcove. Kim, 2012.

74. Furniture zoning for privacy. Kim, 2011.

75. Age specific waiting areas. Kim, 2011.

76. Courtyard with water features. http://www.statileandtodd.com/portfoliocat/water-features/. 10 January 2012.

77. Collapsible screen wall. http://www.krausbanners.com/php/folding-glass-walls.php. 10 January 2012.

78. Wood veneers on ceiling. http://www.environmentalinteriors.com/Projects.aspx. 14 November 2011.

79. Views to nature. http://www.flickr.com/photos/cocomsp/4648519048/. 14 November 2011.

80. Clerestory windows in Treatment Room. Kim, 2012.

81. Placement of windows. Kim, 2012.

82. Exam rooms facing courtyard. Kim, 2012.

83. Optimal daylighting and ventilation. http://www.aiatopten.org/node/54. 14 July 2014.

84. Operable windows. http://ecohomeresource.com/2010/03/using-windows-to-save-on-energ.html. 14 November 2011.

85. Daylighting and natural ventilation. http://www.cmhc-schl.gc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu_009.cfm. 14 November 2011.

86. Winter and summer sun paths. http://greenpassivesolar.com/passive-solar/scientific-principles/movement-of-the-sun/. 14 November 2011.

87. TB sanatorium. http://ncmuseumofhistory.org/exhibits/healthandhealing/topic/13/. 7

December 2011.

88. Air movement. http://utzero.utk.edu/SmartLab/ventilation.shtml. 7 December 2011.

89. Optimal air flow dimensions. http://arch.ced.berkeley.edu/vitalsigns/res/downloads/rp/airflow/HEER1-BG.PDF/. 7 December 2011.

90. Air movement through transitional spaces. http://www.solaripedia.com/13/251/2650/shillong_house_section_ventilation_sketch.html. 7 December 2011.

91. Diagram of airflow in a traditional Japanese floorplan. Kim, 2011.

92. Japanese Engawa. http://www.earthembassy.org/2010/02/. 7 December 2011.

93. Engawa as a transitional space. http://www.earthembassy.org/2010/02/. 7 December 2011.

94. Charleston Single House. http://www.buysellchs.com/static/uploads/buysellchs/blog_charleston_single_double_house_2.jpg. 2 November 2014.

95. Section of the Charleston Single House. http://watchesser.com/charleston-single-house-plans/. 7 December 2011.

References

1 University of Michigan. 2011 CS Mott Top 10 Child Health Concerns. 2011. Web. 12 December 2011. http://mottnpch.org/reports-surveys/top-10-child-health-concerns-exercise-obesity-smoking-lead-list

2 Strozer, J., Juszczak, L., & Ammerman, A. (2010). 2007-2008 National School-Based Health Care Census. Washington, DC: National Assembly on School-Based Health Care.

3 LAUSD District Data. N.p., n.d. Web. 4 Sept. 2011.

4 University of Michigan. 2011 CS Mott Top 10 Child Health Concerns. 2011. Web. 12 December 2011. <http://mottnpch.org/reports-surveys/top-10-child-health-concerns-exercise-obesity-smoking-lead-list>

5 Krebs NF, Himes JH, Jacobson D, Nicklas TA, Guilday P, Styne D. Assessment of child and adolescent overweight and obesity. Pediatrics (2007): 120: S193–S228.

6 Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US children and adolescents, 2007–2008. Journal of the American Medical Association (2010): 303(3):242–249.

7 Dietz WH. Overweight in childhood and adolescence. New England Journal of Medicine (2004); 350:855-857.

8 Daniels SR, Arnett DK, Eckel RH, et al. Overweight in children and adolescents: pathophysiology, consequences, prevention, and treatment. Circulation (2005): 111;1999–2002.

9 Kushi LH, Byers T, Doyle C, Bandera EV, McCullough M, Gansler T, et al. American Cancer Society guidelines on nutrition and physical activity for cancer prevention: reducing the risk of cancer with healthy food choices and physical activity. CA: A Cancer Journal for Clinicians (2006):56:254–281.

10 Freedman DS, Khan LK, Dietz WH, Srinivasan SA, Berenson GS. Relationship of childhood obesity to coronary heart disease risk factors in adulthood: the Bogalusa Heart Study. Pediatrics (2001): 108:712–718.

11 Centers for Disease Control and Prevention: National Center for Health Statistics, National Health Interview Survey Raw Data, 2009. American Lung Association Research and Program Services Division. (2009).

12 Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Healthy Youth! Health Topics: Asthma. August 2009.

13 Centers for Disease Control and Prevention: National Center for Health Statistics, National Health Interview Survey Raw Data, 2009. Analysis by the American Lung Association Research and Program Services Division. (2009).

14. Ibid.

15 Hamilton BE, Martin JA, Ventura SJ. Births: Preliminary data for 2011. National Vital Statistics Reports. 2012;61(5). Table 2.

16 The National Campaign to Prevent Teen Pregnancy. (2002). Not Just Another Single Issue: Teen Pregnancy Prevention's Link to Other Critical Social Issues. Retrieved March 1, 2012.

17 Hofferth, SL, Reid, L., Mott and Frank L. (2001). "The Effects of Early Childbearing On Schooling over Time". Family Planning Perspectives 33 (6)

18 Loto, OM; Ezechi, OC; Kalu, BKE; Loto, Anthonia B; Ezechi, Lilian O; Ogunniyi, SO (2004). "Poor obstetric performance of teenagers: is it age- or quality of care-related?" Journal of Obstetrics & Gynaecology 24 (4): 395.

19 Kaye K et al., The Fog Zone: How Misperceptions, Magical Thinking, and Ambivalence

Put Young Adults at Risk for Unplanned Pregnancy, Washington, DC: National Campaign to Prevent Teen and Unplanned Pregnancy, 2009.

20 U.S. Department of Health and Human Services. Leading Health Indicators. http://www.healthypeople.gov/LHI/. 2002.

21 Centers for Disease Control and Prevention. Youth risk behavior surveillance—United States. (2005): MMWR, 55(SS04): 1–131.

22 Kochanek KD, Xu JQ, Murphy SL, et al. "Deaths: Preliminary data for 2009." National vital statistics Reports; Vol 59 No 4. Hyattsville, MD: National Center for Health Statistics. (2011): 17-20.

23 Capps, R., Fix, M., Murray, J., Ost, J., Passel, J. S., & Herwantoro, S. The new demography of America's schools: Immigration and the No Child Left Behind Act. Washington, DC: The Urban Institute. (2005).

24 Delgado-Gaitan, C. (1987). Parent perceptions of school: Supportive environments for children. Learning and the Language Minority Student. New York: Newbury House.

25 Driscoll, G., Study: Over 100,000 Californians likely to miss out on healthcare due to language barriers. UCLA Newsroom. 2012. <http://newsroom.ucla.edu/portal/ucla/study-over-100-000-californians-229676.aspx>

26 Scribner, J.D., Young, M.D., & Pedroza, A. (1999). Building collaborative relationships with parents. New York: Teachers College Press.

27 Finders, M., & Lewis, C. Why some parents don't come to school. Educational Leadership (1994): 51, 50-54.

28 Bindman, AB, Grumback, K, Osmond, D. et al. Preventable hospitalizations and access to care. Journal of the American Medical Association (1995): 274 (4), 305-311

29 Guidry JJ., Aday LA., Zhang D. Transportation as a barrier to cancer treatment. Cancer Practice. (1997): 5 (6) 361-366

30 Flores, G. “Access Barriers to Health Care for Latino Children,” Pediatric and Adolescent Medicine (1998): 1119-1125.

31 Elizabeth Butrick, “Factors in Nonattendance in Extended Evening Clinics in Contra Costa County,” unpublished paper for Contra Costa Health Services (1999).

32 Williams,C., Drago, R., Miller, K., “44 Million U.S. Workers Lacked Paid Sick Days in 2010: 77 Percent of Food Service Workers Lacked Access,” Institute for Women’s Policy Research (IWPR) (2011).

33 Reiss, J., Rankin, N., Pietrangelo, K. “Sick in the City: What the Lack of Paid Leave Means for Working New Yorkers,” A Better Balance and Community Service Society of New York, Oct. 2009, p. 12.

34 Heymann, J., Earle, A., Egleston, B. “Parental Availability for the Care of Sick Children,” Pediatrics (1996).

35 Reiss, et. al., Sick in the City, p. 12

36 Ibid.

37 Nelson,D., Thomson, B., Bland, S., et.al. Trends in Perceived Cost in Medical Care: 1991-1996. American Journal of Public Health (1999): 89 (9), 1410-1414.

38 California Health Care Foundation. “Overuse of Emergency Departments Among Insured Californians” October 2006. Web. Retrieved on March 3, 2012.

39 KM Thies. Identifying the educational implications of chronic illness in school children. Journal of School Health (1999): 69 (10), 392-397.

40 Lynch EW, Lewis RB, Murphy DS. Educational services for children with chronic illnesses: Perspectives of educators and families. Exceptional Children (1999): 59:210-22

41 Valdes K., Williamson C., Wanger M. The national longitudinal transition study (NLTS) of special education students. Statistical Almanac Volume 9: Youth Categorized as Other Health Impaired (1990).

42 Dworkin, PH. School failure. Pediatric Review (1989): 88(4):610-617.

43 National Association for Sport and Physical Education. New Study Proves Physically Fit Kids Perform Better Academically. December 10, 2002.

44 Ibid.

45 Centers for Disease Control and Prevention. The association between school based physical activity, including physical education, and academic performance. Atlanta, GA: U.S. Department of Health and Human Services; 2010.

46 Strozer, J., Juszczak, L., & Ammerman, A. 2007-2008 National School-Based Health Care Census. Washington, DC: National Assembly on School-Based Health Care.

47 Ibid.

48 Ibid.

49 Olson, L., Tang, S., & Newacheck, P. (2012). Health Policy Studies. American Academy of Pediatrics, Elk Grove Village, IL.

50 Strozer, J., Juszczak, L., & Ammerman, A. (2010). 2007-2008 National School-Based Health Care Census. Washington, DC: National Assembly on School-Based Health Care.

51 Basch CE. Healthier Students Are Better Learners: A Missing Link in School Reforms to Close the Achievement Gap. Campaign for Educational Equality; 2010 March. 109 pg. Report No.:6.

52 Strozer, J., Juszczak, L., & Ammerman, A. (2010). 2007-2008 National School-Based Health Care Census. Washington, DC: National Assembly on School-Based Health Care.

53 Van Cura M. The relationship between school-based health centers, rates of early dismissal from school and loss of seat time. Journal of School Health (2010): 80 (8): 371-377.

54 Walker SC, Kerns S, Lyon AR, Brun EJ, Cosgrove TJ. Impact of school-based health center use on academic outcomes. Journal of Adolescent Health (2010): 46(3):251-25.

55 Ibid.

56 Adams EK, Johnson V. An elementary SBHC: can it reduce Medicaid costs? Pediatrics 2000 Apr;105(4 Pt 1):780-8.

56 Wade TJ and Guo JJ. Linking improvements in health-related quality of life to reductions in Medicaid costs among students who use school-based health centers. American Journal of Public Health (2010): 9 (100): 1611-1616.

57 Kaplan, M., Intergenerational Programs and Policy: From Vision to Practice Conference. November 7, 2008.

58 Health Foundation of Greater Cincinnati (2005). Evaluation of Healthcare Costs and Utilization among Medicaid Recipients in Schools with School-Based Health Centers. Cincinnati, OH.

59 Strozer, J., Juszczak, L., & Ammerman, A. (2010). 2007-2008 National School-Based Health Care Census. Washington, DC: National Assembly on School-Based Health Care.

60 Ibid.

61 “School-Based Health Center Capital Program Technical Assistance.” School-Based Health Center Capital Program Technical Assistance. N.p., n.d. Web. 17 Aug. 2012.

62 Strozer, J., Juszczak, L., & Ammerman, A. (2010). 2007-2008 National School-Based Health Care Census. Washington, DC: National Assembly on School-Based Health Care.

63 Ibid.

64 Ibid.

65 Ibid.

66 Ibid.

67 Ibid.

68 Ibid.

69 Oral Health Opportunities in School-Based Health Centers. (2010, October 1). Retrieved March 3, 2012, from http://www.sbh4all.org/atf/cf/{cd9949f2-2761-42fb-bc7a-cee165c701d9}/ORAL HEALTH OPPORTUNITIES IN SBHCS ISSUE BRIEF 11-10.PDF

70 United Nations General Assembly (2005). 2005 World Summit Outcome, Resolution A/60/1, Adopted by the General Assembly on 15 September 2005. Retrieved on: 2009-02-17.

71 Indoor Air Facts No. 4 (revised) Sick Building Syndrome. (1991, February 1). Retrieved January 11, 2012, from http://www.epa.gov/iaq/pdfs/sick_building_factsheet.pdf

72 Indoor Air Quality Investigation. (1999, January 20). Retrieved March 3, 2012 from

https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_2.html

73 Anderberg, S. “Industrial metabolism and linkages between economics, ethics, and the environment”. Ecological Economics (1998). 24: 311–320.

74 Texas Department of State Health Services. What a School Based Health Center Looks Like. http://www.dshs.state.tx.us/schoolhealth/healctrlooks.shtm. June 2012.

75 U.S. population now 300 million and growing. (2006, October 17). Retrieved January 25, 2011, from http://www.cnn.com/2006/US/10/17/300.million.over/index.html?iref=allsearch

76 “Why Smart Growth?” Smart Growth Online. Web. 06 Jan. 2012. http://smartgrowth.org/why.php

77 United States. Census Bureau. California State Statistics: The National Data Book. Washington: US Census Bureau, 17 Jan. 2011. Web. 12 Aug. 2011.

78 LAUSD District Data. N.p., n.d. Web. 4 Sept. 2011.

79 Los Angeles, California. (n.d.). Retrieved July 2014, from http://www.city-data.com/city/Los-Angeles-California.html#b

80 Rice, S., and Cohen, E. “Don’t Die Waiting in the ER.” CNN. Cable News Network, 13 Jan. 2011. Web. 06 Jan. 2012.

81 “STD Facts.” Centers for Disease Control and Prevention. 21 Dec. 2012. Web. 1 Nov. 2012.

82 “Birth Data.” Centers for Disease Control and Prevention. 04 Dec. 2012. Web. 06 Jan. 2012.

83 Ibid.

84 Watanabe, Teresa. “L.A. Schools’ Healthful Lunch Menu Panned by Students.” Los Angeles Times. Los Angeles Times, 17 Dec. 2011. Web. 11 Aug. 2012..

85 Ibid.

86 Ibid.

87 Ogden, C., Carroll, M., Kit, B., & Flegal, K. (2012, January 17). Prevalence of Obesity in the United States. Center for Disease Control and Prevention, Retrieved June 17, 2012, from http://www.cdc.gov/nchs/data/databriefs/db82.htm#x2013;2010

88 “Physical Fitness Testing (PFT).” - Testing (CA Dept of Education). N.p., n.d. Web. 06 Jan. 2012.

89 Green Building Rating System For New Construction & Major Renovations. N.p., Nov. 2003. Web. 11 Nov. 2012.

90 “Report.” Crossing the Quality Chasm: A New Health System for the 21st Century. Institutes of Medicine, 1 Mar. 2001. Web. 06 Jan. 2013.

91 American Hospital Association, Institute for Family-Centered Care. Strategies for Leadership: Patient and Family-Centered Care. Chicago, IL: American Hospital Association; 2004. Web. Retrieved on March 3, 2012.

92 “Exposure to Stress, Occupational Hazards in Hospitals.” The Department of Health and Human Services. DHHS (NIOSH) Publication No. 2008–136. July 2008.

93 Kobasa, S. C. The Hardy Personality: Toward a Social Psychology of Stress and Health. Social Psychology of Health and Illness (1982): 1-25.

94 The Becker's Hospital Review published an article in January 2012

95 Kobet, R. Modular Building and the USGBC's LEED Building Rating System. Pennsylvania. http://modular.org/marketing/documents/Modular_09V3LEED.pdf 2009

96 Ibid.

97 Spokane, Washington. (n.d.). Retrieved March 2012, from http://en.wikipedia.org/wiki/Spokane,_Washington

98 JAANUS / shouji. (n.d.). Retrieved March 7, 2012, from http://www.aisf.or.jp/~jaanus/deta/s/shouji.htm

Kats, G. (2003). The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force.

101 Air quality guidelines for Europe, 2nd ed. Copenhagen, World Health Organization Regional Office for Europe, 2000 (WHO Regional Publications, European Series, No. 91).

102 Aerated Concrete. (n.d.). Retrieved June 2, 2012 from http://imaginationforpeople.org/en/project/aerated-concrete/edit/references/#references

103 California's Building Energy Efficiency Standards (Title 24). http://www.energy.ca.gov/title24/2012standards/

104 Goldman, J. "Protecting Privacy to Improve Health Care," 17 Health Affairs 47-60 (1998).

105 Joseph, A., & Ulrich, R. Sound control for improved outcomes in healthcare settings. The Center for Health Design. 2007. Web. Retrieved November 14 2012, from http://store.healthdesign.org/catalogsearch/result/?q=Sound+Control+for+Improved+Outcomes+in+Healthcare+Settings.

106 Jensen, K., and E. Arens, 2004. Acoustic Quality in Office Workstations, as Assessed by Occupant Surveys. Proceedings, Indoor Air 2005, Sept. 4-9, Beijing, China.

107 Kaplan, R. and Kaplan, S. The Experience of Nature: A Psychological Perspective. (1989) Cambridge University Press, Cambridge, New York.

108 Kellert SR. Experiencing nature: affective, cognitive, and evaluative development in children. Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations. Cambridge, Mass: MIT Press (2002): 117–151.

109 Takano T, Nakamura K, Watanabe M. Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. J Epidemiol Community Health (2002): 56:913–918.

110 Faber Taylor A., Kuo FE, Sullivan WC. Coping with ADD: the surprising connection to green play settings. Environment Behavior (2001): 33:54–77.

111 Park, Bum-Jin, Yuko Tsunetsugu, Hideki Ishii, Suguru Furuhashi, Hideki Hirano, Takahide Kagawa, and Yoshifumi Miyazaki. "Physiological Effects of Shinrin-yoku (taking in the Atmosphere of the Forest) in a Mixed Forest in Shinano Town, Japan." Scandinavian Journal of Forest Research 23.3 (2008): 278-83. Print.

112 Scott, Elizabeth (22 September 2011). "Cortisol and Stress: How Cortisol Affects Your Body, and How To Stay Healthy in the Face of Stress". <http://stress.about.com/od/stresshealth/a/cortisol.htm.> Retrieved 4 April 2012.

113 Ibid.

114 Diette GB, Lechtzin N, Haponik E, Devrotes A, Rubin HR. Distraction therapy with nature sights and sounds reduces pain during flexible bronchoscopy: a complementary approach to routine analgesia. Chest. 2003;123:941–948.

115 Benedetti et al (2001) Morning sunlight reduces length of hospitalisations in bipolar depression. Journal of Affective Disorders, 62:221-2

116 Ulrich, R. (1999) Effects of gardens on health outcomes: Theory and research. Cooper Marcus & Barnes (Eds.), Healing Gardens: New York: Wiley.

117 Kaplan, R. and Kaplan, S. (1989) The Experience of Nature: A Psychological Perspective. Cambridge University Press, Cambridge, New York.

118 Daylighting in Schools. Center for Green Schools, 19 Aug. 1999. Web. 17 June 2012.

119 Heschong Mahone Group. Daylighting in Schools, An Investigation into the Relationship Between Daylighting and Human Performance. 2000 http://www.centerforgreenschools.org/docs/heschong-mahone-daylighting-study.pdf

120 Nicklas, M., Bailey, G. Energy Performance of Daylit Schools in North Carolina. Innovative Design, Inc. 2003. http://www.centerforgreenschools.org/docs/energy-performance-of-daylit-schools.pdf

121 Sehulster LM, Chinn RYW, Arduino MJ, Carpenter J, Donlan R, Ashford D, Besser R, Fields B, McNeil MM, Whitney C, Wong S, Juranek D, Cleveland J. Guidelines for environmental infection control in health-care facilities. Recommendations from CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). Chicago IL; American Society for Healthcare Engineering/American Hospital Association; 2004.

122 Wilson P (2007) Is Natural Ventilation a Useful Tool to Prevent the Airborne Spread of TB? PLoS Med 4(2): e77. doi:10.1371/journal.pmed.0040077.

123 Walker, A. Natural Ventilation. http://www.wbdg.org/resources/naturalventilation.php#ar. 2012.