



# DISPARITIES IN Asthma *Who's at Risk?*

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# DISPARITIES IN Asthma *Who's at Risk?*

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## Introduction

The Institute of Medicine (IOM) defines disparities in health care as those differences in the quality of healthcare that are due to the healthcare system, as well as those differences that result from discrimination. In this case, discrimination refers to "differences in care that result from biases, prejudices, stereotyping and uncertainty in clinical communication and decision making." In addition, differential outcomes may be due to inherent patient preferences, cultural influences, environmental factors or genetic differences.<sup>1</sup>

## Epidemiology of Asthma Disparities

Asthma in the United States continues to be characterized by alarmingly persistent, if not increasing, healthcare disparities. Recently, the Centers for Disease Control and Prevention (CDC) reviewed asthma prevalence, disease characteristics and self-management education in the United States over the period of 2001–2009. The overall prevalence of asthma increased 12.3% from 7.3% (20.3 million persons) in 2001 to 8.2% (24.6 million persons) in 2009. This increase in prevalence was most notable among the young, minorities, women and the poor. Prevalence among children (< 18 years of age) was 9.6%, and was highest among poor children (13.5%) and among non-Hispanic African American children (17.0%). Among adults, prevalence was greatest in women (9.7%) and poor adults (10.6%). More

uninsured persons with asthma than similarly diagnosed insured persons reported being unable to buy prescription medications (40.3% vs. 11.5%). Uninsured persons with asthma were less likely to have seen or talked to a primary care physician (58.8% vs. 85.6%) or specialist (19.5% vs. 36.9%) than insured persons with asthma.<sup>2</sup>

While the current CDC report demonstrates a remarkable rise in the overall prevalence of asthma in the US, the noted pattern of disparities is not new. This pattern seems counterintuitive to the perceived advances in access to care and purportedly enhanced awareness of these disparities.

Low-income populations, minorities and children living in the inner city experience more emergency department (ED) visits, hospitalizations and deaths due to asthma than the general population.<sup>3</sup> Specifically, African American children have three to six times higher rates of ED visits, hospitalizations and mortality attributable to asthma compared to white children. Higher asthma morbidity is also noted in Hispanic children, particularly of Puerto Rican descent.<sup>4-6</sup>

Similar trends persisted in a large diverse population of military dependents where differences in access to care and socioeconomic status were less likely.<sup>7</sup> Another recent CDC study examined racial and ethnic disparities and associated factors in asthma-related ED and urgent care center (UCC) visits among US adults with respect to income strata among more than 200,000 respondents between 2001-2009.<sup>8</sup>

The average annual prevalence rates for ED/UCC utilization were highest among Puerto Ricans (24.8%) followed by non-Hispanic American Indian/Alaskan Natives (22.1%), non-Hispanic African Americans (20.4%), other Hispanics (17.3%), Asians (11.0%) and non-Hispanic whites (10.1%). Lower socioeconomic status, obesity and serious psychological distress were all associated with higher odds of asthma-related ER/UCC visits. Puerto Ricans with the lowest incomes, non-Hispanic American Indian/Alaskan Natives, and non-Hispanic African Americans in every income strata had significantly higher odds of asthma-related ED/UCC

visits than non-Hispanic whites in the highest income stratum. The data suggest that disparities in asthma-related ED/UCC visits persist after accounting for income and other socioeconomic factors.<sup>8</sup>

A recent study utilized the National Asthma Survey to characterize racial and ethnic disparities in asthma medication usage and health care utilization among children. Of the 1,485 children surveyed, 55% were white, 25% were Hispanic and 20% were African American. In comparison to white children, twice as many African American children had asthma-related ED visits (39% vs. 18%) and hospitalizations (12% vs. 5%). Though the National Asthma Education and Prevention Program clearly states that inhaled corticosteroids (ICS) are the preferred treatment for mild to moderate persistent asthma in children,<sup>9</sup> significantly fewer African American and Hispanic children reported using these agents in the prior 3 months (21% and 22% respectively) compared to white children (33%). In addition, 26% of African American children and 19% of Hispanic children reported receiving a daily dose of short acting beta-agonists (SABAs) compared with 12% of white children. In this survey, ED visits were positively correlated with SABA use and were negatively correlated with ICS use when stratified by race/ethnicity. This large multistate study revealed a dramatic underuse of inhaled steroids in children. Additionally, African American and Hispanic children demonstrated significantly more indicators of poor asthma control including higher daily use of SABAs, increased use of the emergency department and lower use of inhaled steroids. These trends persisted independent of symptom control or lack thereof.<sup>10</sup>

Socioeconomic factors are frequently thought to contribute to asthma disparities in both children and adults. In a cross-sectional study of childhood asthma in an integrated middle class population of children, the lifetime prevalence of asthma was twice as high among African Americans as compared to white children.<sup>11</sup>

This finding suggested that even in middle class communities unmeasured factors (e.g. varying access to medical care, discrimination based on race,

dissimilar access to housing, differing patterns of healthcare utilization) and perhaps biologic factors (e.g. genetic variations in environmental vulnerabilities)<sup>12</sup> may contribute to these disparities. A similar study of middle class children found that African American children demonstrated lower lung function, increased airway reactivity and a higher prevalence of atopy than white children of the same socioeconomic demographic.<sup>13</sup>

A study of adult members of a health maintenance organization (HMO) in which financial barriers to healthcare were minimized, African American members were more likely to use the ED and less likely to use a primary care provider for asthma-related visits than white members. Referral to an asthma specialist was also less likely among African American members than among white members.<sup>14</sup>

While disparities in asthma prevalence are clearly evident among certain ethnic and gender groups, disparities in asthma morbidity are even more significant. This may suggest that a number of distinct factors converge to make asthma more morbid among certain ethnic groups, particularly Hispanics and African Americans.<sup>15</sup>

In New York City, a study of all hospital discharges obtained from the New York State Department of Health revealed that both hospitalizations and death rates for all ages among Hispanics and African Americans were 3-5 times those among whites.<sup>16</sup> These rates were highly related with residence in the city's poorest neighborhoods, making it difficult to separate the impact of ethnicity from that of poverty. A similar study done in Boston demonstrated a high degree of correlation between asthma hospitalization rates and both neighborhood poverty rates and the proportion of non-white residents.<sup>17</sup>

The issue may be even more complex among Hispanics who exhibit considerable ethnic heterogeneity within this group. A large study in Chicago demonstrated substantial heterogeneity in lifetime asthma prevalence within Hispanic subgroups. Hispanics of non-Mexican origin had greater odds of having asthma than did non-Hispanic

whites. However, Hispanics of Mexican origin had asthma prevalence rates that were indistinguishable from non-Hispanic whites. Nativity may have also been important in that only immigrant Mexicans had asthma prevalence rates lower than non-Hispanic whites.<sup>18</sup>

In contradistinction to the location of other studies of Hispanic populations, Chicago is noted for its large Mexican population. Much of the literature investigating this apparent Hispanic health paradox in asthma and other disease states has focused on how acculturation might erode this immigrant advantage.<sup>19,20</sup> Clearly, this is an area deserving of more focused research as unique environmental or genetic factors might play a significant role.

### **Genetic and Social Environment Interactions**

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Numerous studies have documented the persistent racial and ethnic disparities that characterize asthma. Increasingly, attention is being devoted to the study of various factors or processes that might explain these disparities. Such research would seem to be the requisite platform for developing actionable strategies to address these disparities in an effective and sustainable fashion.

A useful hypothesis states that disparities may result from variation in genes and their interaction with the environment. A recent pediatric study examined the effects of the social environment on genetic processes. Specifically, the study noted that genetic pathways that are involved in regulating inflammation and catecholamine response signaling varied by socioeconomic status (SES). Children of low SES overexpressed genes that regulated various inflammatory responses such as chemokine activity, stress response and wound responses. In contrast, children of high SES group overexpressed genes that may be involved in containing damage caused by inflammation. The authors hypothesized that SES thereby might have an effect on children's interpretation of their social world which alters neuroendocrine and inflammatory signaling processes. They proposed that children in the low SES

group were more likely to perceive threat in ambiguous situations that activated these processes.<sup>21</sup>

The significance may relate to the fact that inflammatory and catecholamine signaling pathways are primary targets for asthma medications. The social environment may play a role in the modifying the efficacy of asthma therapy.

More research is indicated in this area as refined techniques for genetic analyses become available. Additional areas of interest will include pharmacogenetics and pharmacogenomics. The relevance of these discoveries and associations will also depend on applicability to clinical data and more discernment of the potential relationship between genetic factors, environmental influences and post-transcriptional impact on clinical outcomes.

### **Role of the Urban Environment**

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The urban environment appears to play a significant role in asthma disparities. Dwellings in urban areas frequently contain levels of pollutants that may contribute to increased asthma morbidity. These include environmental tobacco smoke (ETS), nitrogen dioxide, ozone and particulate matter in addition to indoor allergens such as cockroach, mold, house dust mite and pet dander. A recent study compared asthma symptoms and lung function in children living in an urban environment to those living in a rural environment. Children in the urban environment were more likely to have respiratory infections that triggered asthma symptoms and reduced lung function. They were also more likely to be sensitized to pet dander. Children in the rural environment appeared to have a lower risk for the development of asthma and sensitization to airborne allergens.<sup>22</sup>

The authors speculated that children in the urban environment might be at increased risk for slower functional lung growth and increased asthma prevalence. The study also noted significant nutritional differences in that urban dwelling children had diets characterized by increased consumption of snacks, fast food and sweetened beverages. Children in the

rural environment consumed diets characterized by increased consumption of fresh fruits and vegetables and fish rich in omega-3 fatty acids that might protect against development of asthma. These foods were not typically found in the diet of urban children.

The type and quality of housing in the urban environment might also play a role in asthma disparity. A study of 4,853 children demonstrated a relationship between housing type and childhood onset asthma even after adjusting for individual and community level demographic and economic factors.<sup>23</sup>

Residents of private family homes had the lowest odds of current asthma when compared with residents of public housing. Ethnicity appeared to be a cofactor in that African American and Puerto Rican children were more likely to reside in public housing while White and Asian were more likely to live in private family homes. Residents of public housing were more likely to report the presence of cockroaches, rats or water leaks and less likely to report use of an air conditioner. The authors concluded that variations in housing that are related to differences in socioeconomic status might account for asthma disparities in these communities.

A cross-sectional study examined parental perceptions of their neighborhoods and the general and respiratory health of low-income Chicago families. Specifically, concerns about collective efficacy and physical/social order correlated with a higher risk of both poor general and respiratory health outcomes including those related to asthma.<sup>24</sup>

In a related study, these authors demonstrated that a higher prevalence of poor respiratory health was associated with a higher level of "housing stressors". These stressors included housing security, mobility, comfort, safety, finances, dynamic household memberships and relationships with neighbors and landlords.<sup>25</sup>

The specific respiratory outcomes that were affected included controllability of asthma, exercise tolerance, nocturnal awakening, frequency of rescue medication use and the number of unplanned visits to the emergency department, physician's office or clinic. The

authors posited that the increased number of stressors and inherent difficulties in managing these stressors may compete with if not overwhelm the parent's time and motivation to manage the child's asthma.

The increase in respiratory allergic diseases in urban areas has been linked to air pollution. The most abundant air pollutants in the urban areas with high vehicular traffic are respirable particulate matter, nitrogen dioxide and ozone.<sup>26</sup> These pollutants and allergens impair lung function and increase airway reactivity in predisposed subjects.<sup>27</sup>

Additionally, diesel exhaust emissions are quite prevalent in the urban environment, particularly in neighborhoods that are proximal to congested vehicular traffic corridors. Such emissions may modulate the immune response by increasing IgE synthesis and facilitate allergic sensitization in atopic subjects and thereby the subsequent development of clinical symptoms.<sup>28</sup>

## Symptom Perception

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Symptom perception is critical to effective asthma self-management. Inaccurate symptom perception can undermine even the best-constructed asthma management plans.

A study conducted of 512 children in Rhode Island examined the relationship between perceived peak expiratory flow rate and actual data from a handheld spirometer. The study demonstrated that lower pulmonary perception scores were associated with younger age, female sex, lower intelligence and poverty. Puerto Rican children had the lowest accuracy and the highest magnification followed by non-Puerto Rican Rhode Island Hispanics. Both of these groups differed significantly from non-Hispanic white children. Perceptual accuracy scores were also associated with most indices of asthma morbidity.<sup>29</sup>

Inconsistent symptom descriptors or dissimilar use of terms between the health care provider and patient can also influence management. A focus group study in Nashville found significant difference in asthma symptom descriptors and perception of dyspnea among

African Americans with the diagnosis of asthma. Specifically, chest tightness and wheezing were most common. Less commonly reported symptoms included cough, nocturnal awakenings, chest pain, dizziness, sweating and "shortness of breath".<sup>30</sup>

Another study of African American adolescents and their caretakers revealed that few respondents (5.8%) referred to wheezing as a "whistling sound" despite the fact that such terminology is commonly used in asthma education programs and epidemiologic studies of asthma symptom prevalence. In this unique study, respondents viewed a video of an adolescent wheezing and were asked to describe the adolescent's breathing. Of the participants, 62% of care givers and 41% of the adolescents described symptoms other than wheezing, including cough, shortness of breath and an "asthma attack"; however, 21% of the care providers and 11.8% of the adolescents characterized wheezing as something that is heard or felt.<sup>31</sup>

These studies highlight the problematic nature of both symptom perception and the terminology used to describe those symptoms. The accurate recognition of symptoms by patients is important in enabling healthcare providers to diagnose and manage their patients with asthma. Moreover, understanding the patient's perception and the associated terminology used by the patient may facilitate more effective communication between providers and patients, thereby enhancing the provider's effectiveness in both diagnosis and management.

### **Provider, Caretaker and Patient Communication**

Studies have demonstrated that communication between the healthcare provider and caretaker clearly has a positive impact on pediatric asthma outcomes.<sup>32</sup> Moreover; focused provider educational programs have been demonstrated to improve those outcomes. A landmark study evaluated the impact of an interactive provider seminar based on self-

regulation theory on 1) the treatment practices and communications and education behavior of physicians, 2) the health status and medical care utilization of their pediatric patients with asthma and 3) the satisfaction with care of the subject's parents. Specifically, the enhanced communication between provider and caretaker resulted in an increased likelihood that the patient was prescribed an inhaled anti-inflammatory agent, and that education occurred on the proper use of a metered dose inhaler. After this intervention, children seen by physicians who had completed the seminar and were placed on inhaled steroids had significantly fewer symptoms, fewer emergency department visits and fewer hospitalizations.<sup>33</sup>

Physicians' attitudes toward their asthma patients may well influence the quality of communication and consequently the quality of the asthma care.<sup>34</sup> Impairments in communication limit effectual partnerships in the management of chronic diseases such as asthma.<sup>35</sup>

Additionally, an office based study of primary care providers found that the physicians engaged in less patient centered communication with African American patients than with white patients. Perhaps not surprisingly, a positive effect was less apparent for African American patients and their physicians when compared to whites and their physicians.<sup>36</sup>

Bias and stereotyping may also limit the effectiveness of provider-patient communication. There appear to be fundamental human information processing mechanisms that lead to inconsistencies between the providers' intent to provide equal treatment and actual medical decision making that appears to be influenced by a patient's race. In one study, authors pointed out that providers might unconsciously act in a manner that confirms these stereotypes, influencing the manner in which they interpret patient behaviors and clinical findings.<sup>37</sup> There is evidence that many physicians believe that African Americans, as a group, are less adherent.<sup>38</sup> This may lead to less offered care which may alter asthma outcomes. Clearly, more research is needed in this area.

## Adherence

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Adherence to clinical visits and prescribed management plans is considered critical to effective asthma therapy that ultimately sustains symptom control. In a study of 1,485 children that examined racial and ethnic disparities in asthma medication use and healthcare utilization, sustained adherence clearly resulted in reduced asthma-related healthcare utilization. Significantly fewer African American and Hispanic children reported using inhaled corticosteroid therapy in the past 3 months compared with white children. More African American children (26%) and Hispanic children were reported to receive at least one daily dose of a short acting beta-agonist (SABA) than white children (12%) over the same study period. African American children were twice as likely to have had at least one asthma-related hospitalization during the prior twelve months as white children. Emergency department visits were positively correlated with SABA use and negatively correlated with the use of inhaled corticosteroids in all groups.<sup>9</sup>

A recent study examined adherence and its predictors in low-income African American children with persistent asthma. This study measured adherence, observed meter dose inhaler (MDI)/spacer technique and explored exposure to environmental tobacco smoke (ETS). The mean daily adherence rate for inhaled fluticasone was 59% while the adherence rate for daily oral montelukast was 70%. Medication adherence did not correlate with proper inhaler technique or ETS exposure as measured by urinary creatinine/cotinine ratios. Older parental age at the time of birth of the first child and receipt of Medicaid or State Children's Health Insurance Program benefits (SCHIP) were associated with higher mean daily-inhaled fluticasone adherence rates. Children with higher levels of depressive symptoms exhibited poorer MDI technique. ETS exposure was only associated with poorer caretaker asthma knowledge. Higher degrees of asthma knowledge at the first visit was associated with a significant increase in adherence at the last study visit.<sup>39</sup>

Medication beliefs by minority groups may also play a significant role in adherence to daily therapy. Concerns about safety of daily ICS use and the potential development of tolerance to ICS with daily use are both predictors of decreased adherence. In one study, minority patients had nearly a sevenfold higher adjusted odds of endorsing negative beliefs about their asthma medications than white patients.<sup>40</sup>

A randomized trial was conducted in 250 inner-city children with asthma enrolled in a program aimed to improve adherence. The study examined the longitudinal effects of a home-based educational program combined with adherence feedback. In the group that received asthma education with adherence feedback, short-term improvements in adherence were noted. However, this improvement decreased over time. In addition, no difference in sustained adherence was found between the two groups over time. While the study demonstrated that education improved adherence in the short term, adherence feedback did not have added benefit over education alone.<sup>41</sup>

## Access and Healthcare Setting

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Recent data has shown that access to healthcare and the clinical settings may impact asthma outcomes. In a large (n=822,900) study of military dependents in which differences in access to care and socioeconomic status were minimized, African American and Hispanic children were more likely to be diagnosed with asthma than white children. Minority children were still more likely to have asthma-related emergency department visits and potentially avoidable asthma-related hospitalizations than white children in the same healthcare system. African American and Hispanic children were also less likely to see an asthma specialist. Remarkably, in this same study, African American children were more likely to have filled a prescription for ICS than white children.<sup>7</sup>

In a study evaluating the prevalence of uncontrolled asthma in pediatric patients visiting a primary care provider (PCP) for any reason, 46% of the 2,429 children had uncontrolled asthma. The authors noted

that 35% of the children that were seen for a non-respiratory complaint had uncontrolled asthma and 54% being seen for a respiratory complaint had uncontrolled asthma. When this data was stratified by ethnicity, the prevalence of uncontrolled asthma in African American children was 44% for those being seen for a non-respiratory complaint and 60% for those being seen for a respiratory complaint. In Hispanic children, the prevalence of uncontrolled asthma was 32% and 51% in those children being seen for non-respiratory and respiratory primary complaints respectively. This study demonstrated a high prevalence of uncontrolled asthma in the primary care setting. Remarkably, there was high prevalence of uncontrolled asthma in children with no prior history or diagnosis of asthma.<sup>42</sup>

In a study examining asthma care provided in clinical settings serving a large (> 25%) percentage of minority patients, children with persistent asthma seen in community health centers or hospital clinics were less likely to receive a prescription for inhaled steroids than those children seen in multi-specialty group practices. In community health centers and hospital clinics serving larger minority populations, children were more likely to have never received a prescription for inhaled steroids than children seen in similar centers serving fewer minorities.<sup>43</sup> This study suggests that practice setting might mediate observed associations between inhaled steroid use and race/ethnicity.

### **Vitamin D Metabolism and Asthma**

Poor nutritional status is often observed in low SES families and may be a factor in the observed disparities in pediatric asthma. A review of data from the National Health and Nutrition Examination Survey demonstrated that non-Hispanic African American adolescents had 20 times the risk of Vitamin D deficiency than non-Hispanic whites and the risk of deficiency in this group was double for females as compared to males.<sup>44</sup> The latter finding may be even more significant given the fact that asthma prevalence is greater for African American

females than males after puberty.

In a study examining 25-hydroxyvitamin D levels in otherwise healthy, low-income, minority children in Atlanta, GA, a high prevalence of decreased Vitamin D levels was noted in both African American and Hispanic children. Interestingly, there was no relationship between dietary Vitamin D intake and serum levels of Vitamin D or calcium. There was, however an inverse relationship between fat intake and serum levels of both Vitamin D and calcium.<sup>45</sup>

In a separate study, decreased Vitamin D levels in children with asthma were associated with increased oral corticosteroid use. Of the participants, 47% of the children had levels in the insufficient range (<30 ng/ml) and 17% had levels in the deficient range (<20ng/ml). There was also an association between decreased Vitamin D levels and atopy (positive skin sensitivity to common aeroallergens) and reduced lung function (reduced FEV1 % predicted and reduced FEV1/FVC ratios).<sup>46</sup> A study of African-American children with asthma in inner-city Washington DC, demonstrated a significantly higher prevalence of Vitamin D deficiency in that population when compared with non-asthma controls of the same demographic.<sup>47</sup>

Vitamin D levels may also play a role in the severity of asthma exacerbations.<sup>48</sup> An analysis of serum collected from participants in the Childhood Asthma Management Program (CAMP) demonstrated that African-American participants had the lowest mean levels of Vitamin D. After controlling for age, sex, body mass index (BMI), income and treatment group, insufficient levels of Vitamin D were associated with higher odds of asthma-related hospitalizations or emergency department visits. Asthma exacerbations were highest in the group of participants who were both Vitamin D insufficient and not taking inhaled corticosteroids.<sup>49</sup>

### **Community Violence**

As previously discussed, asthma disparities characterized by increasing trends in asthma prevalence and

asthma morbidity seem to disproportionately affect non-white children in the urban environment.<sup>2</sup> Variations in asthma morbidity among large cities and among neighborhoods within those cities has been observed.<sup>16</sup> These cannot be explained by variations in socioeconomic status.

In a study of 851 caretakers of children with asthma, increased exposure to community-based violence was associated with increased days with wheezing, sleep disruption for both the child and the caretaker, and reduction in playtime. Caretaker reports indicative of increased exposure to violence in the past 6 months included but were not limited to fights which involved a weapon, violent arguments with neighbors, sexual assault or rape, robbery or mugging and gang activity. The authors found that 38% of caretakers reported being afraid that their child would be harmed by violence in the neighborhood and elected to keep their child indoors as a result. The caretakers who had higher violence exposure scores were more likely to be minorities, less likely to report at least 1 employed adult in the home, had greater perceived stress, ruminated more about adverse life events, smoked more often and skipped asthma medications more often than caretaker with lower violence exposure scores.<sup>50</sup>

A recent study examined 231 children with asthma and their caretakers in an urban environment. Child participants were predominately African American (93%) and male (61%) with a mean age of 8.4 years. The primary caretakers were most likely to be birth mothers (87%) with a high school or less education (70%). Median annual household income was less than \$30,000 in 56% of the households. Exposure to violence was reported by 22% of the caretakers. Among the children whose caretakers reported exposure to violence, there was a lower use of a primary care provider for asthma care and an increased number of emergency department visits for asthma when compared to those whose caretakers were not exposed to violence.<sup>51</sup>

Community violence clearly imparts added psychosocial stressors for both patients with asthma and their caretakers. These stressors result in

increased anxiety and incite both reactive and protective behaviors. Some of these behaviors such as increased caretaker smoking and increased exposures to indoor allergens and irritants lead predictably to increased asthma morbidity. Additionally, higher exposure to community violence and the associated stress may lead to more challenges and adaptive behaviors to maintain safety. The demands of maintaining safety for both the caretaker and the asthma patient may compete with adherence to the asthma medication regimen and timely clinical visits.

## Conclusions

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Persistent disparities in prevalence, healthcare utilization and morbidity attributable to asthma continue to increase primarily among minority and poor populations.<sup>48</sup> The current review documents these disparities and several areas of investigation into possible associations and mechanisms inherent in these disparities. Regrettably, the current body of work is largely descriptive and, as such offers little in terms of actionable strategies to attenuate or decrease these disparities.

Nonetheless, a strong case can be made for additional targeted research in a number of areas. The growth of significant insight into genetic markers and even genetic processes in asthma epidemiology, physiology and management offers hope for new diagnostic and therapeutic paradigms as this field expands. Additional understanding of the role of the urban environment and perhaps more importantly developmental insights into aspects of this environment that contribute to asthma morbidity are both clearly indicated. Such understanding may provide useful information from which urban planners and social scientists can develop strategies to minimize the functional and social toxicity of these environments.

Specifically, the culture of violence that exists in many urban areas clearly competes with individual and community resources dedicated to improving

asthma outcomes. The resultant fear and reactive or adaptive behaviors challenge the ability of caretakers and patients alike to sustain the effective medical management required to achieve asthma control. This culture and the associated psychosocial stressors may actually alter the very pathophysiology of asthma in residents of certain urban communities.

Symptom perception or misperception may be a critical factor at the very foundation of the ineffective self-management of asthma. Sustained and effective self-management is presumed to be the cornerstone of any strategy to affect asthma control. Education in this regard must become more relevant and as such truly reflect the cultural, literacy and linguistic identities of the targeted populations. Educators must become more facile in designing educational programs that address these factors. Increased patient participation in the design and development of such programs would seem to be an area deserving of more study.

Communication between the care team (providers and educators) must become more effective. This review demonstrates that the presumption that more effective education and interaction is more time consuming is simply not the case. Effective communication should actually increase the efficiency of both the clinical encounter and any educational intervention.<sup>52</sup>

It also appears that ethnic differences in Vitamin D metabolism may play a role in both the prevalence and morbidity of asthma in populations characterized by significant asthma disparities. Given the relative safety and efficacy of Vitamin D supplementation, it would seem only rational that screening for deficiency within such populations should become an essential strategy.

The impact of culture on health care practices, medication beliefs and effective self-management has received only limited study. Asthma, like any chronic disease, requires an acceptance of the concept of maintenance healthcare to achieve and sustain control. Many in both the African American and Hispanic community see healthcare as a situational need; quite simply something to access when they

are sick. Disparate utilization of urgent care centers and emergency departments for asthma care among these populations as described in this review would seem to substantiate this observation. Similarly, cultural influences may have an effect on the taking of daily maintenance therapy as required in persistent asthma. Fears of tolerance and/or dependency as noted in this review may greatly limit adherence in this regard. Awareness by healthcare providers of the challenges imparted by these fears and beliefs is a critical component of effective asthma education and management. Similarly, the distrust among minority populations that is displayed for providers and educators must also be considered. This distrust may be rooted in past transgressions (i.e. the Tuskegee study of syphilis) or unfortunate prior encounters with insensitive or providers who are misunderstood due to their communication skills.

Healthcare providers often believe they are effective communicators based more on the breadth of their knowledge about diseases than their ability to effectively transfer that knowledge to their patients. Different styles of language use often compound this problem. Attempts to “dummy down” communication about often-complex disease states do not suffice for cultural competency or accommodation for low literacy. Often simple direct speech using an economy of words may be more helpful. Many minorities prefer this type of straight-forward exchange as it is a style they find comfortable and utilize within their own culture. While many healthcare providers intentionally or unintentionally assume a paternalistic approach as they interact with patients, many minorities may more appreciate a transactional approach that facilitates two-way communication and questioning.

Care plans, education and discussions that are targeted toward self-empowerment facilitated by bi-directional exchange may be more effective than the traditional didactic approaches. Such exchange may also foster “ownership” of the clinical problem and inculcates a sense of personal responsibility for the management of that problem.

As an example of a successful community program,

Not One More Life, Inc (NOML) [www.notonemorelife.org](http://www.notonemorelife.org) is a 501(c) 3 non-profit founded in Atlanta, GA in 2003. NOML partners with communities of faith to provide free programs of education, screening, counseling and referral to minority and lower socioeconomic populations characterized by disparate morbidity and mortality attributable to asthma or other respiratory disease. Since its inception, NOML has provided 130 community based programs in which we have reached in excess of 5,000 participants. NOML has also expanded to 12 other US metropolitan area in which it has trained local cadres of both professional and lay volunteers to replicate our model. NOML recently opened Atlanta's only free pulmonary clinic.

Unpublished data from NOML's Atlanta base shows that 88.3 % of participants are African American, 43% have increased respiratory symptoms and/or abnormal lung function. Participants so identified are followed up by phone at 1, 3, 6 and 12 months after each program. Only 21% of participants report a diagnosis of asthma despite the above findings. Of the population that acknowledges a prior diagnosis of asthma, 21% report at least one hospitalization and only 19% report a current use of an inhaled corticosteroid. The data show that 58% of the total participants acknowledge access to a primary care provider though many report no healthcare visit in over a year. This trend has increased steadily in the current economic downturn. NOML has demonstrated that nearly 90% of participants informed of abnormal lung

function subsequently have a respiratory-focused physician visit.<sup>53</sup>

NOML provides a viable educational platform by partnering with communities of faith that occupy a position of trust in at risk communities. NOML provides straight-forward education about respiratory disorders that emphasizes the excessive burden of such disorders among the minority and the poor. The didactic portion is factual, concise and object oriented with culturally sensitive images and language. These presentations consistently evoke extended question and answer periods in which the educational process is allowed to continue. Each participant receives one-on-one counseling by a physician, physician assistant or nurse practitioner. In each didactic presentation and individual counseling session, the concepts of ownership and self-responsibility are consistently emphasized as the cornerstones required to achieving the effective self-management requisite to establishing effective asthma control. This control is discussed as a form of emancipation, quite simply the freedom inherent in minimizing restriction of daily work and recreational activities. This transactional partnership with participants offers a novel and effective means to reduce asthma disparities in NOML's minority communities. Additionally, the deployment of many of these strategies in a case management context appears to greatly enhance effective patient management in NOML's free clinic.<sup>53</sup>

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