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A Life Course Perspective on Stress and Health Among Caregivers of Children With Asthma in Detroit

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Abstract

Low-income caregivers raising children with asthma experience many obstacles to their own health, including stress. To understand and describe their daily experiences, researchers conducted 40 qualitative interviews supplemented with descriptive quantitative surveys in Detroit, Michigan, as part of a community-based participatory research partnership of Community Action Against Asthma. Prevalence of chronic illness is noticeably higher among participants than the general US population. Caregivers identified stress processes that may influence disproportionate health outcomes and risk-related behaviors over their lifetime. Applying a life course perspective, findings suggest that public health interventions should address family-level comorbidities, increase instrumental social support, and acknowledge practical coping mechanisms.

Keywords

caregivers; childhood asthma; chronic disease; life stressors

Acute and chronic stress is associated with reduced immune functioning and a host of chronic illnesses such as depression, diabetes, obesity, digestive conditions, and headaches.^{1,2} For caregivers of children with asthma, stress has been explored in the context of health as a risk factor and outcome; physiologically, psychologically, and epigenetically; and at individual, family, and neighborhood units of analysis.^{3–6} This variation suggests the importance of stress, a physiologic reaction to emotional or physical threats,⁷ for the health of these caregivers. For low-income caregivers, additional life stressors often related to underlying, ongoing financial issues may affect health. Given that tremendous disparities in childhood asthma exist,^{8,9} investigation of stress is needed to better understand its role in caregiver health among the growing number of low-income families of color with children with asthma.

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The phrase “caregiver stress” often connotes discussion of aging—an adult caring for a parent or spouse with dementia or multiple chronic illnesses in need of assistance with activities of daily living. Yet, a growing literature applies the term to those caring for children with chronic illnesses taking on duties beyond typical parenting. These include simultaneous management of the illness and family, attainment of additional health resources, and preservation of the self.¹⁰

Caregiving generally increases stress^{11–13} and depression,^{14–16} worsens individual overall health,¹⁷ and is a risk factor for death.^{18,19} Managing a chronic illness entails limitations on daily activities, potential medication or medical technology dependency, ongoing treatment at home or school, and extra health maintenance.²⁰ By definition, these daily caregiving tasks are stressors, characterized by change, uncertainty, lack of control, or anxiety.^{21,22}

More nuanced explorations of caregiver health consider the timing, duration, and context of a caregiver’s roles from a life course perspective.²³ The life course health development (LCHD) model as a conceptual frame-work suggests that one’s health pathways are established over their lifetime, through early or critical experiences, cumulative or interactive exposures, and a host of risk-oriented or protective factors.^{24,25} Researchers applying the LCHD model have identified social support and coping style as moderators of stress, which vary across caregivers’ age and roles.²³ Researchers often explore these variables among caregivers within the field of gerontology.²¹ Practitioners have also used the LCHD model to guide maternal and child health interventions, where programs engage a variety of sectors (eg, housing, education, labor) to improve overall family health.²⁴ Public health may benefit by integrating both of these literatures to better conceptualize the needs of caregivers of children with asthma.

Furthermore, the LCHD model says that additional life stressors may exist for marginalized families of children with asthma, resulting in compounding risk factors and poorer mental and physical health outcomes for caregivers. Low-income caregivers may confront stress from difficulties with housing, transportation, health care, or childcare in addition to asthma-related stressors.^{26–28} Researchers repeatedly indicate that socioeconomic position and race are associated with chronic stress, depression, and worse health.^{29–31} Research also shows that lower income levels and related circumstances account for much of the health disparity between white and black Americans, but additional differential factors do remain and contribute to further disparities.^{32,33}

To support the health of caregivers, more must be known about how lifetime and asthma-related stressors shape the stress process for low-income caregivers of children with asthma. This study explored the daily experiences of caregivers of children with asthma living in concentrated poverty in Detroit. By doing so, their unique perspectives on stressors, social support, and coping highlight the needs and opportunities for caregiver mental and physical health interventions innately aligned with an LCHD model.

METHODS

Procedures

This research was part of Community Action Against Asthma (CAAA), an academic community partnership since 1998 that uses a community-based participatory research approach to explore causes of and potential interventions for childhood asthma in the Detroit metropolitan region.^{34–35} For this study, caregivers of children with asthma were sampled from ongoing CAAA household intervention and exposure studies. These original CAAA studies recruited low-income families through administration of an epidemiologic screening questionnaire designed to identify those with children with current asthma symptoms.

Project staff contacted participants in the CAAA studies by phone to describe this additional study and schedule interviews with interested caregivers. This was done gradually between May and August 2009. The study team met biweekly to discuss interview protocol and emergent themes in responses across interviewees. When approximately 35 interviews were conducted, the study team determined that they achieved theoretical saturation,³⁶ hearing similar themes from participants in the context of study questions. At that time, researchers conducted the remaining 5 scheduled interviews and concluded the study. Three researchers conducted interviews with caregivers at their homes, lasting approximately 1½ hours each. A translator assisted during 2 of these interviews where the caregiver preferred to participate in Spanish. All participants provided informed consent, and 39 of the 40 participants consented to having their interview audio-taped. For their participation, all participants received US \$30 at the completion of interviews. The University of Michigan Institutional Review Board approved the procedures of this study.

Data collection

The interview guide for qualitative data collection consisted of 27 semistructured, open-ended questions about experiences of the caregivers with their child's asthma, asthma's effects on family and caregiver life, and caregiver health. All interviewees were asked all questions, although ordering varied slightly, based on topics that emerged in responses. Table 1 provides sample interview questions.

Subsequent surveys included 57 quantitative questions to provide supplemental descriptive data regarding participant demographics, child asthma frequency and severity, and caregiver health, offering context to qualitative data in the following text. In particular, descriptive summaries from 2 scales are reported in the following text: the Norbeck Social Support Scale Questionnaire (NSSQ) and the Center for Epidemiological Studies Depression Scale (CES-D). The NSSQ ($\alpha = .69-.98$) includes 10 items assessing instrumental and emotional support using a 4-item Likert scale ranging from "always" to "never" by asking questions on the frequency of social support in particular instances (eg, when needing transportation assistance, when needing to discuss worries or fears).^{37,38} The CES-D ($\alpha = .85-.90$), also reported in the following text, assesses depressive symptoms asking respondents to indicate frequency of emotional experiences for 20-items using a 4-item Likert scale ranging from "rarely or none of the time" to "most or all of the time."³⁹ One interviewee declined to respond to questions pertaining to her own health.

Data analysis

The research team used QSR NVivo 8.0 software (QSR International Pty Ltd., Burlington, MA) to manage and code qualitative data that were transcribed from audiotape and deidentified. Two researchers open coded several transcripts. Open coding requires researchers going line by line to cull codes representing notable themes or anomalies in interview text.⁴⁰ This resulted in approximately 100 codes, including "work life," "other family responsibilities," "lessons learned," "coping strategies," and "parenting experiences." Through an iterative process, researchers then coded 2 additional transcripts, consolidating these 100 codes into 70 codes. A code-book was established and used to assist focused coding of all 40 transcripts in QSR NVivo 8.0. To accompany qualitative results, means, standard deviations, and frequencies were also calculated for quantitative data using Statistical Package for the Social Sciences (SPSS) 18 (SPSS Inc., Chicago, IL).

Researchers attempted to increase study validity by assessing credibility and confirmability of the data, criteria established by Lincoln and Guba⁴¹ for qualitative studies.

To do this, upon completion of analyses, findings and preliminary conclusions were presented to the entire CAAA Steering Committee, which consists of university researchers, community-based organizations' staff, and community health workers who work closely with study participants. At this time, Steering Committee members interpreted results while triangulating findings with those from other CAAA studies. In addition, researchers held several meetings with community health workers to discuss results in the context of their daily experiences conducting household visits.

RESULTS

Description of caregivers

Of the 40 caregivers in this study, 31 were mothers, 6 were grandmothers, and 3 were fathers. As shown in demographic summaries in Table 2, 25 of the participants were divorced, separated, or never married, and 32 identified as African American or black. Eleven did not have a high school diploma. Caregiver age ranged from 20 to 58 years with a mean age of 39.4 years. Households typically comprised 4 individuals in residence with 2 additional children, on average, spending time in households regularly during the day without residing there. The median annual family income of participants was approximately \$10 000 per year. Of the 40 participants, 24 worked outside of the home an average of 29.5 hours per week. Among 39 of the participants, 8 lost a job because of absences when they were sick. Also, 33 caregivers had private health insurance or Medicaid plans, but 13 (82.5%) did respond that at least one family member was currently uninsured.

Underlying family health outcomes

Childhood asthma—The 40 study participants discussed caring for a total of 57 children with asthma symptoms, whereas 13 cared for children experiencing multiple symptoms. Children with asthma were 7.5 years of age, on average, and approximately 72.5% had started exhibiting asthma symptoms between birth and 1 year of age. A doctor had diagnosed 51 of these children with asthma. In the past 12 months, 53 had taken prescribed medications, inhalers, or nebulizers, and 27 took prescribed treatments daily. Seven of the children stayed overnight in the hospital for wheezing, dry cough, tightness of the chest, or shortness of breath during the year preceding the interview.

Caregiver health—Nearly all caregivers in this study had been diagnosed with at least one chronic health issue of their own. Sixteen caregivers (41%) had a lifetime asthma diagnosis. Furthermore, among the 39 who answered personal health questions, prevalence of other chronic illnesses was high: arthritis (28.2%), diabetes (17.9%), frequent headaches (48.7%), hypertension (28.2%), chronic pain (35.9%) and difficulty walking (28.2%). Table 3 shows that most of these rates among the study population are much higher than those among the general US population.

Mental health issues were prevalent among study participants, as indicated by qualitative and quantitative findings. Assessed using the CES-D,³⁹ 17 (42.5%) of participants reported depressive symptoms, scoring 16 or higher. Many described these high levels of distress, often related to economic instability:

I'm usually upstairs in my room. When I'm up in my room, I just cry. All the time. And I don't know why. I just cry. I know this comes from me being without an income, because I was so used to taking care of myself.

Another caregiver explained:

I cry at night, but other than that I'm doing fine. I just pray about it. That's pretty much that. But I mean, you know, everyday life is stressful, you know, as far as the

jobs and the stuff you have to deal with every day, but other than that ... I'm doing pretty good.

For a few, physical health affected emotional health, as one caregiver noted, "Yeah, I have depression sometimes because of my weight and not being able to walk so far."

Asthma-related stressors

Study participants described caring for their child with asthma, which entailed many chronic stressors from diagnosis to daily management of the illness to planning for the future. Many mothers carried guilt at diagnosis, "I kept on saying, 'I did everything the right way,' so, you know, I don't smoke, I don't drink ... so how did he get that?" Others reflected on the progression from asthma diagnosis until the present, "I really couldn't do anything because I was always running back and forth to the hospital with them ... but now I have it under control." Some become accustomed to the stress of asthma:

It took a lot of personal stress about me being off of work so I'm able to get to her, but yeah it do drain you out because when she sick it lingers 2, 3 days, sometimes 4, and she just can't hold nothing down. She's just weak and so it's like I'm just, yeah, I be tired. But, she getting older and I guess I'm getting used to it, you know.

Thinking about their child's life course, many caregivers regularly consider their child's future with asthma, "My biggest fear, I don't want him to be somewhere and not equipped. So, I'm trying to get him to be where he needs to be because I'm not always going to be there."

Day-to-day asthma management can be unpredictable and challenging, often eliciting acute instances of stress also. One mother explained, "Every time it happens I'm overwhelmed because... [she's] not a bad kid. So I know when I see her school on my phone I say, 'Oh my God.'" Transportation to receive medical care can also be an acute stressor for many caregivers:

... and I don't drive and we're taking cabs and stuff to where you got to go ... and you had two little ones and they both had the asthma and you had five, six kids altogether and you can't leave them at home, you got to drag them along with you —that was a stressful time.

With increased interactions with medical professionals, caregivers sometimes told of stressful circumstances, including fearing hospitals or experiences of discrimination. One mother regularly felt medical professionals will "put anything over" on her when she takes her child to receive care, "... but then you have to let them know. No, I know for a fact that this is not how it goes, that this is what you supposed to do. They still try and play games with your intelligence."

Social support

The mean scores on the NSSQ indicated that participants have a level of social support between "sometimes" and "most of the time" (mean \pm SD = 2.450 \pm 1.35). Although individual items on the NSSQ have not been separately validated, they offered further descriptives: participants found the least social support when needing to borrow money (Mean = 3.72, SD \pm 1.69) and the most support when identifying someone who makes them feel loved (mean \pm SD = 1.68 \pm 0.92), often noting qualitatively that this was, in fact, their child with asthma. Other responses to questions related to support in childcare, transportation, and sickness, all fell between "sometimes" and "most of the time" on average.

Social support and caregiving—Some participants described receiving social support from family members who help care for children, assist with transportation, or talk through asthma experiences. Many participants' family members or friends experience childhood asthma also, enabling support systems, for example, "Basically, my sister, her oldest daughter has asthma, so we're able to talk to each other a lot." Some caregivers described family support more generally,

I got my hands full on a lot of things. So, right now, my family is helping me deal with it. I was just in a bad relationship and was in a bad breakup. It took a toll on my children. It just took a toll on me. So, dealing with that, I ran to my family. The family knows best, even if you think they don't.

Still, many did not trust their family or feel safe knowing their child could have an asthma attack when they were not present. One mother of two children with asthma explained having her sister watch one child while she stayed in the hospital with the other, "It can be stressful. I'm worried about him. My sister isn't going to watch him like I watch him in the middle of the night." Another grandmother had similar concerns:

Oh no, no, no, no. She's not going to sleep anywhere because I don't know what that environment is. I don't know if they're doing things in there that might trigger her asthma and then the last time I let her go and spend the night with her mother in April, she called me, "Granny, come and get me." I don't have a car!

Caregivers also offered recommendations to increase social support. One grandmother described a grandparent caregiver support group in Detroit. Although it was not asthma-specific, she highlighted the emotional and social benefits of meeting with other grandparent caregivers. Several interviewees recommended support groups when asked what advice they had for future programming to assist families of children with asthma, "We could all talk about what works, what doesn't work, and maybe we can come together as a team and just support one another."

Social support and caregiver health—Nearly all of the caregivers lived with their own chronic illness, and description of their related experiences illustrated how social support affected their own health behavior in diverse ways. Some participants noted that self-care is necessary to be able to care for their child, and many mothers were motivated to be healthy because they had little social support, "I try to stay as healthy as possible so I can do everything for my kids because ... I don't have a safety net. My mother is deceased." Another mother expressed self-care as a priority:

I know, like, if I stay at the rate I was going. I'm trying to eat more healthy, drink more water ... so just trying to be more healthier for my kids so that I know I'll be around longer, you know, to help them. If I can hold on for extra years, I'm going to go as far as I can go.

For others, their own health was overshadowed by their caregiving responsibilities, illustrated by sentiments such as, "Overall, no I don't do a very good job. I don't have time, and I have to take care of too many other things," and, "Pretty much better on taking care of them than me." For some, many years had passed between their own doctor visits, as one caregiver said, "I'm supposed to get mammograms, and I've never had one. I saw the gynecologist last about 12 years ago," and another explained, "Last time I went, they was like, we can't find them [medical records] They had to search out the archives." One woman described how her 10-year-old grandson expressed concern for her lack of self-care:

Half of the time I put my sickness aside when he gets sick because I mean, just that I've lived my whole life, and he's just coming up. I try to sit him down and talk to him and explain to him what's going on and how serious his condition is, and he

said, “Well Grandma, I’m not going to worry about that now,” he said, “I know you be worried if I’m getting sick, but you need to just sit down sometimes and take care of yourself.”

Many caregivers also discussed receiving low levels of social support when they were ill and may have needed it most, as one mother depicted:

I sit back sometimes and just think about everything I went through with, you know, all the brothers and sisters never helped me did nothing. You know, even when I was in the hospital, they never came and saw me. When I was in the hospital for a month. They never called.... You know, so, basically I’ve been putting it all on my own, you know, but I’m not going to let it get me down because I be tired, but I pushes myself to do what I have to do. You know, because if I don’t do it, who will do it?

A grandmother caregiver examined the challenges of compounding stressors, including her own morbidity, morbidity of those around her, and lack of support in raising her grandchild:

My daughter? Like she hasn’t seen her since April. So I’m mostly her primary caregiver. Every once in a while, her grandfather will come over. Only because he’s sick, too. And when he come over because he’s sick or if I call him, he’ll come right over ... because sometimes I realize I do get worked up when she’s sick, and most of the time either her grandfather come over, like last night [I] was really, really sick. He came over, he said, “You can’t be sick.”

Coping strategies

The aforementioned stressors sometimes led caregivers to describe what coping strategies they relied on to offset the effects of asthma- and non-asthma-related stressful conditions. These included laughter, meditation, prayer, time management, conscious self-awareness of emotional reactions, and the seeking out of social support from other caregivers. Daily prayer was frequently referenced, as one caregiver paused during the interview to pray, “God give me breath in my body...” and another explained, “I know that God will handle it all.” Also, some caregivers discussed how they shared their coping mechanisms with their children, teaching them to pray or meditate. One mother described meditation with her son, “... trying to get him to meditate ... I [have] been telling him ‘you have control of your life, don’t let it have control over you.’ We’re going to do this deep breathing...” Finally, self-awareness in adapting to chronic stressors related to their child’s asthma appears to be a complex, long-term coping process that begins at diagnosis and follows the course of childhood asthma.⁴⁹ As one mother explains:

You have to have a lot of patience, because you will find yourself getting frustrated and I think it’s from fear, at least for me it is, from fear. Patience, I learned that and I learned that you can make things happen.... You can make a difference in your environment to affect those around you. That’s what I’ve got out of it, fear ... I’ve had real fear. I don’t know, fear is fear, they say, but, I don’t know, it’s fear for yourself, that’s different. But, when it’s fear for your children, that’s the eye of the thing. I think I cope with it by acknowledging it.

DISCUSSION

Caregiver stress and health

This study suggests that family-level comorbidity may be a reality for many families living in poverty with children with asthma to which asthma-related and life stressors may contribute. Although we cannot show statistical correlational or causal relationships between caregiver stress and health in this study, the prevalence of stress-related health outcomes

was notable. Even though some participants described the mental health benefits of their social support networks and coping mechanisms, many more expressed sentiments of helplessness, hopelessness, or lack of control while describing stressors related to their daily living. As seen in Table 2, participant rates of depression and frequent headaches are approximately 4 and 5 times of the national averages, respectively. Study participants' prevalence of depression was also markedly higher (43%) than the general population of Detroit (12%) for whom poverty is an underlying issue.⁵⁰ Depression may be underreported in Detroit, however. Although long-term economic insecurity is a known predictor of depression,⁵¹ this risk factor likely interacts with caregiver health in ways that elicit additional research.

For caregivers of children with asthma, health over their life course may be at an increased, compounded risk for multiple stress-related reasons. Ongoing financial strain worsens health outcomes,⁵¹ and this underlying stress may increase with the management demands of asthma. Geronimus and colleagues⁵² used national data sets to examine US population levels of allostatic load, a physiologic indicator of stress accumulated over the lifespan, finding that “poor and nonpoor black women had the highest and second highest probability of high allostatic load scores, respectively, and the highest excess scores compared with their male or white counterparts,”^(p826) a concept declared the “weathering effect” to depict long-term adaptation to life stressors. Family structure is also highly correlated with income, and 25 caregivers in this study were single, never married, separated, or divorced. A recent related longitudinal investigation is among the first to report that nonmarital child-bearing is negatively correlated with midlife health for black and white women.⁵³ In addition, grandparents later in their life course are at greater risk for declining health status than younger caregivers,⁵⁴ and they may likely be managing both their child's asthma and own health issues. In this study, 6 grandparents were children's primary caregivers. Finally, lack of instrumental social support may make prioritizing caregivers' own physical or mental health care difficult during large segments of their adulthood when they may be caring for multiple persons.

Implications for practice

An LCHD framework recognizes health as a developmental process and “posits that interventions that reduce risks and increase protective factors can change the health trajectory of individuals and populations.”²⁴(p5) Increased health risks among participants indicate that caregiver health screening or family medical homes may increase protective factors across the lifespan and help address health disparities broadly. Many providers agree that the recommendations of the American Academy of Pediatrics for screening of caregivers' psychosocial needs and families' social and economic needs are valuable, but many clinicians do not do so.^{55,56} Pediatricians could screen for maternal depression, as one relevant health outcome, but feasible practices for assessment and care are relatively untested.⁵⁷ As another strategy, family medical homes are comprehensive medical care facilities that intend to address child, youth, and adult care needs concomitantly, recognizing family context. Family medical homes or screening may improve the holistic treatment of family health issues while connecting caregivers to advocacy or social services for childhood asthma or their own chronic illnesses.^{55,57} From a life course perspective, whether addressing the health of a young single parent or a grandmother with years of diverse caregiving experiences, family medical homes or screening may instigate or improve medical response to a caregiver's physical or mental health needs as appropriate at their stage in life.

As suggested by participants and reinforced by an LCHD model, increased health care access may not sufficiently address caregiver health, which is also influenced by one's social context. Caregivers of children with asthma may benefit from public health

interventions that increase social support to buffer stress. Among the types of social support, emotional support is most often related to health,⁵⁸ but this was not apparent in this study or for others researching social support in extremely low-income populations.⁵⁹ Many interviewees indicated moderate to high levels of emotional support, yet described lower levels of instrumental support. Social support from peers may assist caregivers to address major stressors (eg, child's new asthma diagnosis), locate resources for their or their child's chronic illness management, share coping mechanisms that reduce stress, or identify top medical care with few economic resources. Even though many caregivers described having lived with their child's asthma since infancy with continually increasing control of its management, participants also explained stressors that differed but continued along the course of their child's illness—from diagnosis to management to preparing for the future. To address these stressors, Flores and colleagues⁶⁰ conducted a randomized controlled trial to assess the effects of a trained "parent mentor," who had experienced long-term care of a child with asthma, matched to a caregiver with a child newly diagnosed with asthma. Their participants experienced reduced childhood asthma symptoms, emergency department visits, costs, and missed days of work. Future related studies might also benefit from close assessment of caregiver effects, such as caregiver health-seeking behaviors or hospitalizations and differences in these outcomes, based on caregiver age, role, and responsibilities.

With 40 study participants, we were unable to assess group differences or show potential longitudinal associations among quantitative items, such as social support, depression, and demographics. Future studies may improve upon these findings by assessing how asthma severity and control are associated with both asthma- and non-asthma-related stress levels and how these different types of stressors interact to affect health outcomes among low-income caregivers. Furthermore, although all caregivers were from low-income families, we were unable to assess differences in health for those caregivers who were working and those who were not. Additional studies may assess how social support and health vary on the basis of sources of lifetime stressors, whether related to work, family, or other institutions. In this study, complementary quantitative findings are not intended to unpack statistical relationships between stress and health; however, they provided a valuable opportunity to contextualize caregiver descriptions of stressors, social support, and coping.

CONCLUSIONS

The relationship between stress, caregiver health, and childhood asthma is complex, contextual, and multidirectional. As the LCHD models suggest, a lifetime of compounding, continuous risk factors are likely to influence well-being of all caregivers. In particular, caregivers with multiple caregiving roles over the majority of their adulthood and moderate or low levels of instrumental social support may experience increased risks and fewer protective measures, increasing levels of chronic illness. Caregiver health is often promoted for the sake of improving childhood asthma management, but reducing life stressors for the sake of the growing number of low-income caregivers should also remain a public health goal.

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Table 1

Sample Interview Questions

1	On a day [child] has asthma symptoms, what is that like?
2	How does [child's] asthma affect your everyday life?
3	Can you tell me about your health?
4	What have you learned from taking care of [child's] asthma that has helped you to take care of yourself?
5	What tips or strategies would you give to another caregiver whose child is newly diagnosed with asthma?

Table 2

Demographic Description of Study Participants (N = 40)

	n	% of Sample
Gender (n = 40)		
Female	37	92.5
Age, y (n = 39)		
30	5	12.5
31–40	17	42.5
41–50	12	30.0
51	5	12.5
Race (n = 37)		
Black/African American	32	80.0
White	0	0.0
Multiracial	3	7.5
Other	2	5.0
Hispanic (n = 37)	3	7.5
Education (n = 40)		
<High school	2	5.0
Some high school	9	22.5
High school or general equivalency diploma	9	22.5
Some college	14	35.0
Associate's or bachelor's degree	6	15.0
Annual Income, \$ (n = 38)		
<10 000	19	47.5
10 001–20 000	9	22.5
20 001–30 000	4	10.0
>30 001	6	15.0
Marital Status (n = 40)		
Married	13	32.5
Domestic partner	2	5.0
Single—never married	21	52.5
Divorced or separated	4	10.0

Table 3

Prevalence of Diagnosed Chronic Illness Among Caregivers Compared With Approximate Prevalence in the General US Adult Population (>18 years) (N = 39)

	% of Study Population	% of Detroit Population ⁴²	% of Michigan Population ⁴²	% of US Population
Arthritis	28	31.6	31.9	22 ⁴³
Asthma (lifetime)	41	18.0	15.8	13 ⁴⁴
Chronic pain	36	<i>_a</i>	<i>_a</i>	5–20 ^{45,46}
Depression	43	12.1	9.6	9 ⁴⁷
Diabetes	18	16.7	10.1	11 ⁴⁴
Frequent headaches	49	<i>_a</i>	<i>_a</i>	10 ⁴⁸
Hypertension	28	39.3	30.4	33 ⁴⁴

^aNo known data sources are available to calculate this prevalence rate.