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The arrival of chikungunya on the Caribbean island of Curaçao

The important role of social workers

Odette van Brummen-Girigori and Auronette Girigori

Introduction

Chikungunya is an alphavirus member of the Togaviridae family (Robinson, 1955), first described in 1952 when an outbreak was observed in southern Tanzania (Pialoux et al., 2007). The term chikungunya is derived from an African Makonde word ‘kungunyala’ which means ‘that which bends up’, following the stooped posture adopted as a result of the arthritic symptoms of the disease (Mohan et al., 2010). The virus is transmitted by the aedine mosquito species, which also transmit Zika and Dengue viruses; the main disease vectors are Aedes aegypti and Aedes albopictus (Pialoux et al., 2007; Schuffenecker et al., 2006; Tsetsarkin et al., 2007). The virus is transmitted to humans through bites from female aedine mosquitoes infected with the chikungunya virus. These mosquitoes may bite at any time, but they are most active outdoors in the early morning (dawn) or late afternoon (dusk) (Chow et al., 2015). Mosquitoes inside the home are active both night and day.

Chikungunya infections generally cause fever, headache, myalgia, maculopapular rashes, acute joint swelling, persistent arthritis, and even life-threatening neurological or cardiovascular complications (Lee et al., 2012; Pellot et al., 2012). Additionally, days of acute illness can be followed by weeks, months, and even years of disabling joint pain, loss of mobility, fatigue, decreased dexterity, and an inability to perform daily tasks (Caglioti et al., 2013; Thirberville et al., 2013). Moreover, some patients report additional complaints involving the eyes, heart, and nervous system. Chikungunya virus infections rarely seriously impact overall health, but they may contribute towards death, usually among elderly people with weak immune systems (Chow et al., 2015). The pathogenesis of chikungunya is not well understood, and there is no vaccine or specific antiviral treatment (Abdelnabi et al., 2015; Weaver et al., 2012). Therefore, treatment focuses on alleviating its symptoms (De Lamballerie et al., 2008; WHO, 2016).

In recent years, the chikungunya virus has caused outbreaks over a large geographical area. Between 2004 and 2011, approximately 6 million cases of chikungunya infection have been reported in countries across Africa, Asia, and Europe (e.g. Thirberville et al., 2013; Suhrbier et al., 2012). The first cases of chikungunya in the Caribbean were reported on the island of St. Martin (Cassadou et al., 2014) in 2013. Six months later it reached Curaçao. Specifically, the Analytical Diagnostic Centre (ADC) reported the first suspected cases of chikungunya to the Public...
Health Office in Curaçao in May 2014. Between August 2014 and the beginning of 2015, other inhabitants of Curaçao succumbing to this virus were surprised by its symptoms, as this had not previously been common on their Island. According to the Public Health Office of Curaçao, approximately 20,000 inhabitants of Curaçao succumbed to the chikungunya virus, covering over 10 per cent of the population.

Due to this massive outbreak, the States of Curaçao requested that the Algemene Rekenkamer Curaçao (ARC) (Curaçao’s Audit Office) investigate to what extent the chikungunya virus was addressed by the Ministry of Health, the Environment, and Nature between 2012 and January 2015. This investigation sought insights into the measures taken by the Ministry to prevent the spread of the disease and confront the outbreak. Furthermore, this investigation made recommendations regarding the procedures, skills, and quantity of staff required to respond adequately to similar virus outbreaks in the future (ARC, 2016). Several studies on chikungunya virus infection have been conducted in various other countries, including Thailand (Rudnick and Hammon, 1962), India (Myers et al., 1965), La Reunion (Schuffenecker et al., 2006; Charrel et al., 2007; Geradin et al., 2008), Italy (Rezza et al., 2007), France (Granadam et al., 2011; Gould et al., 2010), China (Wu et al., 2012), and the Caribbean Sea Islands (Leparc-Goffart et al., 2014), but only a few in Curaçao (e.g. Anfasa et al., 2017). Recently, Anfasa and colleagues (2017) published the first report about the emergence of chikungunya in Curaçao. Their phylogenetic analysis showed that the chikungunya outbreak was caused by an Asian genotype. Additionally, they found an association between hyperferritinaemia with chronic chikungunya.

However, no study has been conducted from a social work perspective to assess the experiences and living environments of the inhabitants of Curaçao who succumbed to the chikungunya virus. This study fills this gap and clarifies how green social workers can contribute to eliminating the future spread of chikungunya and related viruses. Green social work (Dominelli, 2012a) has been introducing new issues in debates about the environment including making disaster interventions key elements in the repertoire of knowledge, skills, capacity-building, and curriculum formulation of social workers. Social workers can intervene and enhance people’s well-being because they can have an important voice and play a key role in environmental issues, whether these are caused by climate change, industrial accidents, or human conflict (Dominelli, 2013b).

The aim of green social work is defined as

work[ing] for the reform of socio-political and economic forces that have a deleterious impact upon the quality of life or poor marginalized populations and secure the policy changes and social transformation necessary for enhancing the well-being of people and the planet today and in the future.

(Dominelli, 2012: 25)

It is essential that green social work continues to develop in Curaçao so as to encourage its inhabitants and all stakeholders to engage in developing culturally relevant and locality-specific health activities to safeguard the environment and avoid further major outbreaks of diseases occurring. Green social workers in Curaçao, will have to provide sustainable alternatives through collaborative participation and action (see Dominelli, 2014). Examining environmental issues from a green social work perspective is crucial in exploring possible community initiatives that social workers can promote to enhance people’s quality of life without damaging the environment. Our study adds to the literature by examining how Curaçao’s inhabitants coped with the chikungunya virus infection, and what steps they took to deal with their symptoms and complaints. Finally, this study assessed the population’s opinion regarding the possible reasons for

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The study investigated the following research questions:

1. How did the chikungunya virus manifest among those who became infected?
2. What steps did the inhabitants of Curaçao take to alleviate their symptoms after becoming infected with chikungunya virus?
3. What constituted the living environments of people who succumbed to chikungunya virus?
4. According to its inhabitants, what were the reasons for the massive outbreak of the chikungunya virus in Curaçao?

Methodological considerations

Participants

The final sample consisted of 240 participants; 10 respondents who did not return completed survey questionnaires were removed. Women in the sample were slightly older than men. The sample included 61.6 per cent women with a mean age of 36.65 years (SD = 18.40) and 38.4 per cent men with a mean age of 33.39 years (SD = 17.42). All participants lived in Curaçao during the study period (January to March 2015). The sample consisted of respondents born in Curaçao (84.8 per cent), and those born in other countries including Holland (5.7 per cent), the Dominican Republic (2.4 per cent), Colombia (1.4 per cent), and surrounding islands such as Bonaire, Aruba, St. Kitts, and St. Martin. Among the respondents, 21.9 per cent indicated they had no education or a low educational level, 53.8 per cent attained a medium educational level, and 24.3 per cent a high educational level. Also, 35.3 per cent of respondents revealed they had no income, 32.1 per cent indicated low income, 29.4 per cent had middle incomes and 3.2 per cent claimed a high income.

Methodology

This study was approved by the Ethical Committee for Social Sciences at the University of Curaçao, Dr Moises da Costa Gomez. The data collection took place in several neighbourhoods of Curaçao during the early months of 2015. The sampling was purposive (Bryman, 2013). Respondents were asked to participate voluntarily in this study if they had succumbed to the chikungunya virus. Informed consent was obtained from each participant before they were asked to complete the questionnaire and their willingness to continue was checked out throughout the interview. A hard copy of the survey questionnaire was distributed to each participant. At the end of the interview, participants were asked to indicate whether they would be interested in participating in future chikungunya research. The survey questionnaire was offered in Papiamentu and English and required approximately 15 minutes to complete. Papiamentu is the native language of Aruba, Bonaire, and Curaçao. It is a Creole language in part derived from African languages, with considerable influence from Spanish and Portuguese, alongside some influence from Amerindian, English, French, and Dutch. Papiamentu is the language most commonly spoken in Curaçao, followed by Dutch, Spanish, and English. The collected data were entered into IBM SPSS Statistics for Windows and analyzed by the principal researcher, Odette van Brummen-Girigori. Data were stored in a locked closet at the Research Centre of
the University of Curaçao, under Dr Moises da Costa Gomez. Participant anonymity and confidentiality were ensured by the principal researcher.

Survey questionnaire

Hard copies of the survey questionnaires were distributed. Each survey questionnaire consisted of four sections: demography, disease symptoms, post-infection actions, and living environment. The demographic section included questions about participants’ age, place of birth, educational and income levels. In the second section, the respondents indicated which symptoms they had experienced and for how long (in days). A total of 16 symptoms were provided. These included walking difficulties, complications when standing, sleepiness, weakness, fever, and headache. Additionally, a category for other symptoms and space to describe them was provided. In the third section, respondents were requested to indicate what steps they took after becoming infected by the chikungunya virus, including visiting a doctor and having their blood tested, which products they used to combat their symptoms including whether they had used natural products to treat their symptoms. In the fourth section, the living environment (e.g. environment in which they lived, including their yard/gardens and homes) and possible reasons for the chikungunya outbreak were assessed.

The respondents were asked to indicate on a scale from 1 (completely disagree) to 5 (completely agree) the extent to which they were in (dis)agreement with certain statements. Examples of statements regarding their living environments included: ‘In general, the street where I live was clean’, ‘People dumped old stuff/garbage in my neighbourhood’, ‘In my street, there were places where water collected and (possibly) created a good environment for mosquitoes’, ‘I had drums and cans in my garden where the mosquitoes could lay eggs’, ‘I had garbage on a regular basis in my backyard’, and ‘I had enough insecticide to kill mosquitoes’.

Examples of statements regarding the possible sources of the chikungunya outbreak included, ‘A lot of people got chikungunya because water pooled in particular places due to trash on the streets, providing breeding grounds for mosquitoes’, ‘People that throw garbage on the streets or in public areas must be penalized’, ‘The government must do more to protect people; e.g., clean up the streets and insist people clean up their yards’, and ‘The government did not sufficiently prepare the residents for chikungunya’.

Results

The first research question asked how the chikungunya virus symptoms manifested among those who had become infected. The results showed that respondents had experienced chikungunya-associated symptoms for an average of 11.31 days (range: 2–90 days) and were extremely ill for an average of 7.21 days (range: 1–30 days). However, working people returned to work after an average of 3.93 days (range: 1–35 days). More than half of the respondents (52.1 per cent) claimed to have had a relapse after they thought they had recovered. Over two-thirds of them (67.5 per cent) did not know where (location-wise) they had been bitten by the infected mosquito (vector). Remarkably, 36.4 per cent of respondents indicated that not everyone in their household had become infected. This is an interesting finding which merits further investigation. It suggests that in some cases the victims were not bitten by the vector at home.

As shown in Table 28.1, the respondents reported having experienced muscle and joint pain, walking difficulties, problems when standing, weakness, fever, drowsiness, headache, rash, flu symptoms, diarrhoea, swollen glands, peeling skin, vomiting, and other symptoms.
The arrival of chikungunya

Differences in chikungunya symptoms among diverse groups. As illustrated in Table 28.2, respondents who had a relapse after the first round of chikungunya had walking difficulties, problems when standing, sleepiness, weakness, and muscle pains/joint problems for significantly longer periods of time than those who did not have a relapse. In addition, a t-test analysis showed that respondents with a history of Dengue Fever reported experiencing weakness for significantly longer periods of time than those without a history of Dengue Fever. Finally, no significant differences were observed between male and female respondents regarding the symptoms of chikungunya ($p > 0.05$).

Complaints after chikungunya infection. At the time of the survey, many respondents still had several complaints associated with the chikungunya virus infection, including joint pain, walking difficulties, problems when standing, weakness, swollen glands, and vision problems (Table 28.3).

<table>
<thead>
<tr>
<th>Complaints</th>
<th>Prevalence</th>
<th>$M_{days}$</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Muscle pain and joint problems</td>
<td>90.7%</td>
<td>9.42</td>
<td>14.09</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>2 Walking difficulties</td>
<td>90.5%</td>
<td>6.55</td>
<td>10.15</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>3 Standing difficulties</td>
<td>87.2%</td>
<td>7.45</td>
<td>13.02</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>4 Weakness</td>
<td>86.2%</td>
<td>5.58</td>
<td>4.43</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>5 Fever</td>
<td>77.7%</td>
<td>3.44</td>
<td>2.15</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>6 Drowsiness</td>
<td>76.4%</td>
<td>5.84</td>
<td>8.00</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>7 Headache</td>
<td>76.3%</td>
<td>4.17</td>
<td>2.44</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>8 Rash</td>
<td>52.3%</td>
<td>3.95</td>
<td>3.83</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>9 Influenza-like symptoms</td>
<td>41.8%</td>
<td>5.50</td>
<td>4.82</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>10 Diarrhoea</td>
<td>40.5%</td>
<td>3.82</td>
<td>3.17</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>11 Swollen glands</td>
<td>38.6%</td>
<td>4.28</td>
<td>3.03</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>12 Skin peeling</td>
<td>31.9%</td>
<td>8.94</td>
<td>14.13</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>13 Vomiting</td>
<td>31.4%</td>
<td>3.38</td>
<td>3.65</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>14 Other complaints: accelerated heart rate, palpitations, dizziness, itching, and chills</td>
<td>21.2%</td>
<td>8.38</td>
<td>6.55</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>15 Vision problems</td>
<td>20.8%</td>
<td>7.23</td>
<td>14.61</td>
<td>1</td>
<td>60</td>
</tr>
</tbody>
</table>

Note: $M_{days}$ = mean number of days

Table 28.2 Mean values of participants who had a relapse after the first manifestation of the chikungunya virus infection and those with a history of dengue fever

<table>
<thead>
<tr>
<th>Status</th>
<th>Complaints</th>
<th>No</th>
<th>SD</th>
<th>Yes</th>
<th>SD</th>
<th>Comparison</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$t$</td>
<td>$d$</td>
<td>LL</td>
</tr>
<tr>
<td>Relapse</td>
<td>Walking</td>
<td>4.32</td>
<td>5.16</td>
<td>9.24</td>
<td>13.62</td>
<td>-2.86*</td>
<td>-.48</td>
</tr>
<tr>
<td></td>
<td>Standing</td>
<td>3.74</td>
<td>3.85</td>
<td>11.91</td>
<td>18.12</td>
<td>-3.68*</td>
<td>-.64</td>
</tr>
<tr>
<td></td>
<td>Weakness</td>
<td>4.76</td>
<td>4.21</td>
<td>6.53</td>
<td>4.51</td>
<td>-2.21*</td>
<td>-.41</td>
</tr>
<tr>
<td></td>
<td>Drowsiness</td>
<td>3.89</td>
<td>3.22</td>
<td>8.53</td>
<td>11.63</td>
<td>-2.98*</td>
<td>-.58</td>
</tr>
<tr>
<td></td>
<td>Joint pain</td>
<td>4.76</td>
<td>4.21</td>
<td>6.53</td>
<td>4.51</td>
<td>-2.02*</td>
<td>-.41</td>
</tr>
<tr>
<td>Past Dengue fever</td>
<td>Weakness</td>
<td>5.15</td>
<td>4.23</td>
<td>7.24</td>
<td>15.03</td>
<td>-2.11*</td>
<td>-.15</td>
</tr>
</tbody>
</table>

Note: $d$ = Cohen’s $d$ (Effect size of between-group differences); 95% CI = 95% confidence interval of Cohen’s $d$; LL = lower limit; UL = upper limit; * $p < 0.05$ (two-tailed)
The second research question asked what steps the inhabitants of Curaçao had taken after becoming infected with the chikungunya virus. The results showed that 36.4 per cent of respondents had visited a doctor and that 31.7 per cent had their blood tested. The majority of those who visited a doctor received a prescription for anti-inflammatory drugs (e.g. Aspirin or Dolo-neurobion). In this study, 12.5 per cent of respondents indicated that they had used a pharmaceutical product. In contrast, 31.3 per cent of respondents indicated that they had used natural products including papaya leaves, mango leaves, lemongrass, and oregano to treat the symptoms. Chi-square analysis showed that those who used natural products instead of pharmaceutical products reported less muscle pain ($\chi^2 (1, N = 100) = 4.81, p = 0.02$), fever ($\chi^2 (1, N = 101) = 3.91, p = 0.04$), and influenza-like symptoms ($\chi^2 (1, N = 99) = 3.85, p = 0.04$). The t-test analysis showed that those who used natural products only reported significantly fewer days of fever ($t(50) = 2.99, M_{\text{pharma}} = 4.88, SD = 3.56; M_{\text{natural}} = 2.85, SD = 115, p = 0.00$). However, those who used pharmaceutical products reported fewer walking difficulties ($\chi^2 (1, N = 98) = 3.45, p = 0.05$) and a shorter duration for these symptoms than those using natural products ($t (50) = -2.31, M_{\text{pharma}} = 3.33, SD = 1.71; M_{\text{natural}} = 7.12, SD = 7.34, p = 0.02$). These findings merit further investigation by medical experts.

The third research question assessed the living environment of people infected by the chikungunya virus. The results showed that only 42.5 per cent of respondents could fully state that their neighbourhood was clean; while 53.4 per cent thought that their own street was clean. Moreover, 24.4 per cent of respondents admitted that they had containers and barrels in their garden which could become potential breeding places for the vector. Additionally, 17.1 per cent of respondents regularly had bulky waste in their garden that was not cleaned up. Almost one in three (31.8 per cent) reported waste being dumped in their streets, and 37.0 per cent reported pooling in their streets, creating possible breeding grounds for mosquitoes. Also, 36.3 per cent of respondents indicated that they had enough insecticide at home at the time they were infected by the chikungunya virus. Moreover, 38.6 per cent of respondents had an electric fly swatter, 40.2 per cent a mosquito swatter, 16 per cent had a ‘mosquito trap’, and 33.3 per cent regularly applied a substance to their bodies (e.g. repellent) to protect themselves against mosquito bites before leaving home.

The fourth research question asked the inhabitants of Curaçao to identify the possible reasons for the chikungunya virus outbreak. The majority of respondents (60.4 per cent) believed that many in Curaçao had become infected due to multiple sites containing dumped bulky waste, which may have created breeding grounds for mosquitoes. Furthermore, 79.5 per cent of them believed that there were many individuals who polluted the environment without penalty. For example, 29.1 per cent of the respondents indicated that they did their best to protect themselves, but were unsuccessful because their neighbours did not clean up their yards to remove potential mosquito breeding sites. Nevertheless, 82.5 per cent of respondents felt that the government should take

<table>
<thead>
<tr>
<th>Complaints</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle pain and joint problems</td>
<td>67.2%</td>
</tr>
<tr>
<td>Walking problems</td>
<td>12.2%</td>
</tr>
<tr>
<td>Standing problems</td>
<td>6.9%</td>
</tr>
<tr>
<td>Weakness</td>
<td>2.3%</td>
</tr>
<tr>
<td>Swollen glands</td>
<td>2.3%</td>
</tr>
<tr>
<td>Vision problems</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

*Table 28.3 Chikungunya-associated symptoms*
measures to force individuals who do not keep their streets and/or garden clean to do so, and when necessary, government should impose hefty fines to protect non-polluters. Apart from that, 70.1 per cent of respondents believed that the government had not provided sufficient information in a timely manner to prepare them adequately for the arrival of the chikungunya virus. Finally, 81.3 per cent of respondents believed that the government should procure funds to conduct research on chikungunya and 81.1 per cent stated that the government should urgently cooperate with other international organisations to prevent Curaçao from facing future chikungunya epidemics. Zika, another disease spread by *Aedes aegypti*, may create havoc among the population of Curaçao unless urgent preventative measures are taken, because some people living in Curaçao succumbed to this virus during the last months of 2016. Removing potential mosquito breeding sites would be very useful in this regard. This was a lesson learned in Southern Europe after World War II when swamps were drained to eradicate the (Anopheles) mosquito that transmitted the malaria virus (Majori, 2012).

**Discussion**

The present study assessed the experiences, living environments, and opinions regarding the chikungunya outbreak among people who succumbed to the chikungunya virus in Curaçao. Our results showed that the manifestations of the infection were diverse: not everyone reported the same symptoms or duration. Significant differences were observed in the symptoms reported by the respondents who had had a relapse after the initial symptoms of chikungunya appeared and those with a history of Dengue Fever. The majority of respondents indicated they had experienced muscle pain, joint pain, walking difficulties, problems when standing, weakness, fever, drowsiness, and headaches. A lower proportion of them reported complaints such as accelerated heart rate, heart palpitations, dizziness, itching, and vision problems. In general, the symptoms reported in Curaçao were similar to those reported elsewhere (Rezza et al., 2007; Chattopadhyay et al., 2016; WHO, 2016).

Suspicion of chikungunya should be treated with prompt medical attention and correct diagnosis (e.g. CDC, 2014; Thirberville et al., 2013). However, only one-third of respondents visited a doctor, and only one-third had their blood tested. A significant number of respondents indicated that they had used natural products such as mango leaves, papaya leaves, oregano, and lemongrass to treat their symptoms. The results of the current study showed that the use of natural products appeared to be more effective in relieving certain symptoms compared to the use of pharmaceutical products. However, additional research is necessary to validate this observation. We did not ask the respondents when they started to use the natural or pharmaceutical products after experiencing the symptoms of chikungunya virus infection. In addition, we do not know if those who had more walking difficulties used the natural products immediately or after the walking difficulties appeared. In other words, we cannot exclude the possibility that the timing of the use of the pharmaceutical or natural products was a confounding variable. Thus, these findings merit further research by medical experts.

Furthermore, respondents who succumbed to the chikungunya virus returned to work after an average of four days, while the respondents reported experiencing chikungunya symptoms for an average of 11 days. This observation may be due to the rules and instructions of the Social Insurance Law on Curaçao (see Bonafasia, 2016). However, it is important to emphasise that expecting and demanding infected employees to return to work may increase the risk of spreading the virus in the workplace. Non-infected co-workers may be infected if a non-infected vector bites an infected co-worker at the workplace and consequently bites a non-infected co-worker. Therefore, developing a policy regarding the isolation of infected individuals during the
transmission period instead of requiring their return to work too soon is necessary. The same is true for students who return to school while still sick.

In addition, the results of this study revealed that only around 40 per cent of the respondents could fully claim that their neighbourhood was clean. Several respondents admitted having containers and barrels in their garden that had not been removed. Furthermore, almost one in three respondents stated that bulky waste items had been dumped in their streets, even though there is evidence that *Aedes aegypti* lay their eggs, and their larvae and pupae develop in standing water, containers, rubbish, and tires that collect rainwater (e.g. Higa, 2011; pamphlet of Ministry of Health, the Environment, and Nature, 2016; Weaver and Reisen, 2010; WHO, 2016). Moreover, only approximately one-third of respondents indicated that they took sufficient protective measures, including the application of insect repellents (e.g. pamphlet of the Ministry of Health, the Environment and Nature (2016) and Nasci et al. (2013); clothing that covers as much skin as possible; sprayed insecticides; or used products recommended to reduce the chances of being bitten by mosquitoes (e.g. WHO, 2016).

Moreover, the majority of respondents indicated that they did not receive sufficient information from the government in a timely manner to prepare adequately for the arrival of chikungunya on the island. These findings are concordant with the conclusions in the report of the ARC (2016). For example, pamphlets with information regarding chikungunya were not distributed on time, and not every target group was reached; the pamphlets were initially only available in Papiamentu, the most commonly spoken language on the island. Furthermore, the general practitioners and other stakeholders in healthcare were not informed in a timely manner (not until April–May 2014).

Similarly, a significant number of respondents indicated that there were many people who polluted the environment without repercussion because hefty fines were not imposed by the government. Therefore, we may conclude that in general, not enough preventive measures were taken. Yet, a well-functioning public health infrastructure could have helped to prevent the massive outbreak of infection, especially because the chikungunya outbreak was vector and water-related (see also Bhatia and Narain, 2009). Therefore, the chikungunya epidemic on the island of Curacao may also be an indicator of a weakness in the public health system and a failure to anticipate and respond adequately to the emerging epidemic. More specifically, the investigation conducted by the ARC (2016) confirmed that the Ministry of Health, the Environment, and Nature quantitatively and qualitatively did not have sufficient staff available before or during the outbreak of chikungunya. Furthermore, it was concluded that the Ministry of Health Environment and Nature had a lack of protection products and (technical) equipment for vector control in stock. Besides that, the mosquito control was only intensified by more human resources in December 2014 when the outbreak had been ongoing for a few months already.

Thus, there is a need to improve the efficacy and efficiency of the public health system in Curacao in order to prevent emerging diseases (ARC, 2016). For this reason, the government should work more intensively on increasing public awareness to prevent Curacao from being overtaken by Zika, Mayaro or similar viruses in the short term. For example, the government should take more active measures when inhabitants are found to be negligent in eliminating possible breeding places and actively enforce environmental laws (see the report of ARC (2015) entitled: *Randvoorwaarden Uitvoering Mileubeleid* (Preconditions for carrying out the Environment Policy). It is also important that the inhabitants of Curacao realise that only a holistic approach, in which there is mutual cooperation among different stakeholders in mitigating risk factors and implementing control strategies, will protect them against the further expansion of chikungunya, Zika, Denque, Mayaro, or other viruses (see Bhatia and Narain, 2009; WHO, 2016).
Additionally, green social workers can play an important role in encouraging the inhabitants of Curaçao to engage in health activities to safeguard the environment and prevent a major disease outbreak in the future. This can be accomplished according to equitable and ethically sound principles (see also Dominelli, 2012, 2013a). Inspired by Dominelli’s (2012a) green social work model, the authors suggest that social workers in Curaçao undertake the following tasks:

1. **Doing no harm to the physical environment** whereby social workers explain to the community the importance of not polluting the environment and not creating breeding grounds for mosquitoes.

2. **Consciousness-raising** whereby social workers help the community of Curaçao adopt preventative measures, such as visiting schools, community centres, and homes for older people and disabled people, and coordinate with health professionals and government officials to produce an effective, holistic intervention to: mitigate risk and provide effective responses; develop resilience; and prevent the further spread of disease. Furthermore, social workers can facilitate discussions across relevant disciplines, institutions, schools, and societies.

3. **Lobbying** for preventive measures taken at local level. For instance, social workers can help to inform public policy and practice on a regular basis. It is also desirable that more companies besides the health organisations (e.g. medical centres and doctor’s surgeries or clinics) unify and contribute to preventing vector-related outbreaks. Large insurance companies on Curaçao did this by offering and distributing pamphlets. In other words, a multidisciplinary and multifaceted approach is necessary to generate the desired results.

4. **Mobilising communities** whereby social workers can stimulate residents/clients/service users during their daily practice to take preventive measures (including by referring to pamphlets from Ennia, 2016; the Ministry of Health, the Environment, and Nature, 2016; and the WHO, 2016) and reminding them of the difficulties faced by those affected by the chikungunya virus.

5. **Coproducing solutions**, whereby social worker researchers continue to investigate the underlying motives of those who pollute the environment and consequently design interventions aimed at behaviour modification. Besides that, research should be performed by medical experts to review the symptomatology of chikungunya and explore other unanswered questions. Specifically, future studies should investigate the ingredients present in papaya leaves, mango leaves, and other natural products that appeared to inhibit the symptoms of chikungunya virus infection. Social workers and social work researchers may also assist in these research tasks.

6. **Dialoguing** with social scientists, medical scientists, physical scientists, other professionals, and policymakers to change policies at local, national, and international levels. The community of Curaçao can also be reached through productive partnerships with the mass media and several non-governmental organisations which have a wider reach and greater credibility within the wider community of Curaçao.

7. **Developing curricula** by arranging lectures, because it is important that the community of Curaçao is well-informed in order to support public health interventions aimed at behaviour modification.

**Conclusion**

This chapter demonstrates that green social workers play critical roles in undertaking research that links human behaviour to environmental challenges that undermine well-being. It also
highlights how they can engage local residents in behavioural change including cleaning up mosquito breeding grounds that are created through everyday routines like the inadequate disposal of garbage. This is a promising start for Curacao, but greening the profession has further to go to become more confident in its capacity to be a significant player in this area and sit as equal professionals alongside the others sitting at the environmental mitigation table in the pursuit of social justice and healthy, resilient, sustainable communities.

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References


The arrival of chikungunya


van Brummen-Girigori and Girigori


