

Knowledge, Attitude & Perceptions of Chikungunya Infection Among Affected Individuals From Dhaka City.

A project submitted

by

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Dedicated to my parents

Certification Statement

This is to certify that the project titled “Knowledge & Attitude Perceptions of Chikungunya Infection Among Affected Individuals Belonging to the Non-Healthcare Backgrounds in Dhaka” submitted for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy from the Department of Pharmacy, BRAC University constitutes my own work under the supervision of **Mohammad Kawsar Sharif Siam**, Senior Lecturer, Department of Pharmacy, BRAC University that appropriate credit is given where I have used the language, ideas or writings of another.

Signed,

Countersigned by the Supervisor

Acknowledgment

Praise be to Allah Whose blessing and compassion have guided me in my studies and my works throughout my academic career including this very project.

This research could also not have been completed without the support of many people who are gratefully accredited here.

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Abstract

Chikungunya is a viral infection caused by the chikungunya virus propagated by the same kind of mosquito responsible for spreading Dengue and the Zika virus. Recently, the outbreak of chikungunya affected a considerable fragment of the population in Bangladesh causing a nationwide epidemic. The aim of this study was to gauge, understand and compare the public perception of the disease between people of educational background in the healthcare sciences and people of educational background in non-healthcare sciences as well as discern effective methods to help the population prevent themselves from being afflicted by the disease while also recognizing ways of providing relief to those who are already affected.

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List of Acronyms

CHIKV = Chikungunya Virus

WHO = World Health Organization

SIGN = Singapore Immunology Network

RT-PCR = Reverse Transcriptase Polymerase Chain Reaction

CDC = Center for Disease Control and Prevention

1 Introduction

Chikungunya is a viral infection transmitted between people by contaminated female mosquitoes and the causative agent for this disease is CHIKV, an alphavirus that is categorized as a part of the *Togaviridae* family (Sudeep & Parashar, 2008). Chikungunya is responsible for triggering dengue like symptoms such as severe bouts of fever and extreme joint ache, sore joints, myalgia, headache, weakness, nausea, vomiting and rash, especially maculopapular rash in around half of the patients and occasionally, vesicular bullous lesions and ulcers (Edelman et al., 2000). Pain in the joints can often be crippling and last for fluctuating periods of time. Affected persons may exhibit similar clinical signs to dengue and zika and thus can sometimes be misdiagnosed in regions where the latter diseases are prevalent. Since we do not have any cure for this disease at the moment, current treatment mostly emphasizes on alleviating the symptoms instead. Infection is spread through the bite of *Aedes* mosquitoes, primarily *Aedes aegypti* and *Aedes albopictus* which are the main vector of chikungunya virus, CHIKV (Sudeep & Parashar, 2008). The propinquity of mosquito breeding location to human residence is a remarkable hazard intermediary for chikungunya. Chikungunya was first identified in 1952 in Africa following an outburst on the Makonde Plateau which is a fringe territory in between northern Mozambique and southeast Tanzania. Isolation of the responsible virus was done from the serum of a febrile patient from this zone. A 12-kb single-stranded, positive-sense RNA virus is basically what makes up CHIKV, closely resembling another mosquito-borne virus named O'nyong nyong that was first recognized in 1959 in Uganda with indications such as fever, joint pain and rashes but differing in its vector of transmission, propagated rather by the *Anopheles* mosquito instead of *Aedes* (Powers, Brault, Tesh, & Weaver, 2000; Zeller, Van Bortel, & Sudre, 2016). About the etymology of the disease, the meaning of the word "chikungunya" in the native language of the ethnic tribe residing in Makonde is "that which bends up," stemming from the root verb "kungunyala" which translates as "to dry and shrivel up" or "to become contorted." It refers to the stooped stance created because of the arthritic features displayed by patients of the disease (Sudeep & Parashar, 2008).

1.1 Signs & Symptoms of Chikungunya

Although the signs and symptoms of chikungunya are very much identical to dengue fever and zika, it is also indicated by numerous characteristic symptoms. CHIKV is severely significant in a way that it generates indication in a larger ratio of infected individuals when equated to other alphaviruses, with almost 10–70% of individuals residing in an affected location contracting infection, and approximately 50–97% of the infected rising a clinical presentation (Ganesan, Duan, & Reid, 2017; Yactayo, Staples, Millot, Cibrelus, & Ramon-Pardo, 2016). Therefore, the indication of chikungunya infection can be numerous starting initially with week-long fevers which can be followed by extreme muscle and joint pain, arthritis, Guillain-Barre syndrome, hepatitis, paralysis, vasculitis, encephalitis, myopericarditis and in to some rare cases eye complications such as loss of vision, inflammation of the eye etc. (Heath et al., 2018; Leparc-Goffart, Nougairede, Cassadou, Prat, & De Lamballerie, 2014)

1.1.1 Fever

Chikungunya fever may cause two phases of illness, which are chronic phase and acute phase. This was concluded by looking at the data accumulated from contemporary scourges (Burt, Rolph, Rulli, Mahalingam, & Heise, 2012). Two stages within the acute phase have been identified: one of which is a viral stage ensuing between 5-7 days, during which viremia occurs, and the other being a recuperating stage lasting for 10 days, during which symptoms are enhanced and it is made difficult to identify the virus in the blood (Thiberville et al., 2013; Weaver & Lecuit, 2015). Typically, the sickness starts with an unexpected high fever that keeps going from a couple of days to seven days, and sometimes above ten to fifteen days. The fever might be biphasic – persisting for a few days, then stopping and returning again after a few days with the body temperature elevating to a range between 39-40°C. The intensity of the disease symptoms in the acute phase depends on the level of virus present in the blood, a condition medically defined as viremia, which is responsible for initiating fever in the body (Weaver & Lecuit, 2015). Due to the deployment of antibodies in the blood as a response to the antigen, viremia starts to decrease. However, sleep disturbances, spells of acute exhaustion and headache are seen to persist for at least five to seven days (Chhabra, Mittal, Bhattacharya, Rana, & Lal, 2008).

1.1.2 Joint and muscle pain

Extreme joint pain or rigidity usually occurs after the fever has subsided and usually remains for weeks to months, although in some cases they may persist for years even. It can be incapacitating to the point of impeding the natural movement of the afflicted joints (Capeding et al., 2013). According to an antiviral research on chikungunya, 87–98% of cases reported joint pain including immobilization of the joints that were affected although joint swelling was rare (Thiberville et al., 2013). In major cases, joints of both the arms and legs are found to be most affected following a symmetrical pattern. Patients having disorders such as arthritis are severely affected in their joints (Burt et al., 2012). The most widespread occurrence of pain appear in the joints of the limbs. Muscles or ligaments may also be affected by the disease. Newborns suffer from bouts of fever, skin rashes with fever, irritability, lower or generalized lower limb edema, enhanced sensitivity to pain, various kinds of dermatosis, meningoencephalitis and hemodynamic instability with certain instances developing with neonatal encephalopathy and microcephaly (Marinho, Cunha, Amim Junior, & Prata-Barbosa, 2017; Torres et al., 2016). One sample of children who came in contact with the virus during the perinatal period displayed late performance in neurodevelopment compared to uninfected children (Gérardin et al., 2014). It has been mentioned several times that joint pain with fever stays for weeks or months, even years in some cases, but it is a mystery why this keeps happening. According to an investigation by scientists at the Singapore Immunology Network (SIgN) and the Communicable Diseases Center (CDC), there is a connection between the level of inflammatory cytokines present in the body and the amount of chikungunya virus extant in the system, referred to as the virus load. The answer to why most of the chikungunya affected patients are having severe joint pain could be explained by this research of CDC and SIgN. Around 30 patients showing indications of chikungunya disease were studied after admitting them to CDC in the year 2008 for over a duration of two months. Although most of the patients recuperated entirely, four of the patients encountered frequent joint pain and swelling: three of them in their fingers only and one patient in the knees and shoulders. Examiners from the team initially detected the presence of chikungunya virus from the patients with a group of inflammatory cytokines. Inflammatory cytokines are very tiny protein molecules which are released by cells of the immune system. In the acute level of the disease, patients with increased viral loads were found by the researchers to have surprisingly increased levels of

inflammatory markers as well as pro-inflammatory cytokines, especially interferon-alpha and interleukin-6. One of the pro-inflammatory cytokines, interleukin-17 was detected by the researchers to have utmost importance in the formation of bone tissue and obliteration in the patient's blood during the chronic phase of the chikungunya fever. Interleukin-6 and granulocyte macrophage colony-stimulating factor were found in high amounts in the patients with consistent joint pain. On the contrary, patients who recuperated entirely had increased levels of eotaxin, an anti-inflammatory cytokine. By looking at these results, it can be inferred that viral load during the acute phase could probably influence the sequence and quantity of cytokine secretion while also implying that heightened proportions of specific pro-inflammatory cytokines in the lasting stage of the infection explain the protraction of joint aches even following the subsidence of the fever (Chow et al., 2011; Morrison, 2014).

1.1.3 Skin problems/Rashes

In 40-50% of the cases, a chikungunya-affected individual experienced rashes, particularly maculopapular rash (Thiberville et al., 2013). Most of the patients who experienced skin problems reported that they had developed it in the initial phases of their sickness. During the acute phase of the sickness, around 73% of the affected chikungunya patients faced skin problems in addition to high fever, extreme joint pain and muscle pain. There are 32% cases where patients developed skin disorders after the fever had waned to a certain extent although joint and muscle pain persisted for over a duration of one month. On the contrary, only 8% patients experienced skin disorders after the acute phase of illness. Brownish-black tint around the middle of the face which appears as freckle-like smudges was found to be the most common skin problem of chikungunya. Blisters accompanying high fever were seen manifesting in some cases involving infants which burst easily but the skin around them recovered without causing further problems. In addition to that, some patients experienced erythema nodosum, erythema multiforme, edema of the hands and feet, as well as urticaria. Skin problems were observed exacerbating in patients with prevailing skin disorders such as psoriasis, lichen planus etc. (Inamadar, Palit, Sampagavi, Raghunath, & Deshmukh, 2008; Prashant, Kumar, Basheeruddin, Chowdhary, & Madhu, 2009).

1.1.4 Gastrointestinal complications

Chikungunya patients also experienced gastrointestinal disorders such as abdominal discomfort, diarrhea, nausea and vomiting, etc. (Powers & Logue, 2007; Thiberville et al., 2013). 24% of male patients reported growth of aphthous-like ulcers in the groin region. In other outbreaks, some women were also reported to have suffered from ulceration on the vulva.

1.1.5 Eye problems

Scarcely, eye inflammation may appear in some patients, especially in the shape of uveitis or iridocyclitis (Mahendradas et al., 2008). Finally, majority of the patients were hindered from performing their daily activities due to extreme weakness and joint pain, accompanying high fever (Thiberville et al., 2013).

1.2 Diagnosis of chikungunya

Chikungunya can be detected on the basis of 3 benchmarks – clinical, epidemiological and laboratory. Clinically, severe joint pain coexisting with high fever would inevitably steer to the intuition of chikungunya. Epidemiological benchmark considers if an affected individual has explored an area where chikungunya outbreak has been reported within a duration of twelve days. Reduced lymphocyte count with consistent viremia represents laboratory benchmark (Cirimotich et al., 2017). There are several methods to perform laboratory diagnosis such as virus isolation, serological tests, RT-PCR, etc.

1.2.1 Virus isolation

In spite of being one of the most decisive diagnosis, virus isolation requires one to two weeks for completion while performing it in biosafety level III laboratories (Cunha & Trinta, 2017). Exposing particular cell lines to specimen from entire blood, this technique identifies chikungunya virus specific response (WHO, 2008).

1.2.2 RT-PCR method

Detection of viral RNA can be done during the acute phase of infection by reverse transcriptase-polymerase chain reaction (RT-PCR) in serum samples acquired from affected patients (Panning et al., 2009; Panning, Grywna, Van Esbroeck, Emmerich, & Drosten, 2008). As increased amount of viremia persists in the body for 4-6 days after the initial infection, RT-PCR can be simply done on an acute phase sample within the first 7 days to confirm

chikungunya virus infection. RT-PCR are found to be used for the genotyping of the virus which permits the comparison of virus samples from different geographical origins. RT-PCR can be obtained within a week or two (Parida et al., 2007).

1.2.3 Serological tests

Serological tests such as enzyme-linked immunosorbent assays (ELISA) can be used for detection of both anti-chikungunya (anti-CHIKV) immunoglobulin IgM and IgG antibodies. Although it requires higher amount of blood samples compared to other methods, ELISA results are accessible within 2-3 days. Various tests confirmed that not only are chikungunya specific antibodies highest after the onset of infection, but they also persist in the blood for many months afterwards (Cunha & Trinta, 2017; Lo Presti, Lai, Cella, Zehender, & Ciccozzi, 2014). Arboviruses such as chikungunya, zika and dengue shows similar indication owing to the difficulties in their identification along with their probability of prompt transformation to critical forms which is the reason to consider dengue virus infection as the primary differential diagnosis in chikungunya patients who have been in affected areas. Table 1.2.3.1, prepared by the Fiocruz Agency, reviews the features and occurrences of indications in Chikungunya, Dengue and Zika.

Table 1.2.3.1: Assessment of the symptoms of indicative demonstration^a between Chikungunya, Dengue and Zika.

Signs/Symptoms	Chikungunya	Dengue	Zika
Fever	Above 38 °C (2 to 3 days)	Above 38 °C (4 to 7 days)	No fever or subfebrile \leq 38 °C (1 to 2 days)
Rash	Appears on the 2nd or 5th day 50% of cases	Appears from the 4th day 30–50% of the cases	Appears on the 1st or 2nd day 90–100% of cases
Myalgia	+ / +++	+++ / +++	++ / +++
Arthralgia	+++ / +++	+ / +++	++ / +++
Conjunctivitis	30%	Rare	50–90% of cases

Headache	++/+++	+++/>+++	++/+++
Pruritus	Slight	Slight	Moderate/Intense
Blood dyscrasia	Slight	Moderate	Absent
Neurological impairment	Rare (predominant in neonates)	Rare	More frequent than Dengue and Chikungunya

^aProbable symptomatic exhibition in 80% of Chikungunya virus, 50% of Dengue virus and 20% of Zika virus infection (Marinho et al., 2017).

1.3 Treatment for Chikungunya

For chikungunya fever, there is no distinct antiviral treatment present yet (Caglioti et al., 2013). To avoid confusion with fevers such as dengue, malaria or other bacterial infections, exclusion of other infections must be done. Once different diseases are excluded, administration incorporates hydration, observation of hemodynamic status, gathering and monitoring of blood samples, and antipyretic treatment. Serious arthralgia might be dealt with by the application of non-steroidal anti-inflammatory drugs (NSAIDS) and physiotherapy. It is essential to observe the blood glucose levels among the patients vigilantly. There is no recommendation of using corticosteroids or antiviral agents against chikungunya in any published evidence. Conservative treatment incorporates examining for electrolyte imbalance, pre-renal azotemia, and strict hemodynamic surveillance in view of seriousness of the disease. Unpredictable utilization of corticosteroids, NSAIDS (especially aspirin), and different anti-toxins could bring about gastritis, thrombocytopenia, renal failure, gastrointestinal bleeding and add to general mortality. Commercially, there is no vaccine available for chikungunya (Thiberville et al., 2013).

1.4 Prevention & Control for Chikungunya

In order to prevent the dispersion of Chikungunya virus, controlling the vector may prove to play a major role. When people travel to an area where an outbreak has occurred recently, they are suggested to wear clothes that will fully cover their body, to use mosquito repellents and to inhabit air-conditioned rooms. It is important to avoid mosquito exposure for those who are a suspect of Chikungunya fever in order to obstruct the local transmission of the sickness. Mosquito breeding areas such as stagnant water, weeds and tall grass must be eradicated and

insecticides should be sprayed. The proper education of the locality and public health administrators must be prioritized as it is of utmost importance to vector control and to encumber the transmission of the disease. People who are severely vulnerable to the infection ought to maintain their distance with the areas where outbreaks have been reported recently. As previously mentioned, clothing provides defense from the mosquitoes by reducing the expanse of bare skin during outbreaks of Chikungunya. In addition to that, repellants can also be applied to uncovered skin with proper product label instructions, according to which repellants must contain DEET (N, N-diethyl-3-methylbenzamide), IR3535 (3-[N-acetyl-N-butyl]-aminopropionic acid ethyl ester) or icaridin (1-piperidinecarboxylic acid, 2-(2-hydroxyethyl)-1-methylpropylester) (Rodriguez et al., 2015). Mosquito nets can provide good security to people who prefer sleeping during the daytime, especially children or the elderly. Indoor biting can also be lowered by using mosquito coils or insecticide vaporizers. However, people who travel more frequently, particularly in risky areas, are advised to incorporate the use of repellants, ensure whether their rooms are equipped with screens and maintain proper covering by wearing long-sleeved clothes (Morens & Fauci, 2014; Weaver & Lecuit, 2015)

1.5 Transmission of Chikungunya

Chikungunya has surfaced in almost more than 60 countries throughout Asia, Europe, Africa and the Americas (Singal, 2017). After being infected by the bites of female aedes mosquitoes, the chikungunya virus transmits from human to human. The two most commonly involved species of mosquitoes that are able to spread other mosquito-borne viruses, including dengue, are *Aedes aegypti* and *Aedes albopictus* (Marinho et al., 2017). These mosquitoes prefers to traverse small distances to ingest their blood meals and usually bite during daylight hours, though there may be peaks of activity in the early morning and late afternoon (Liebman et al., 2014). *Aedes aegypti* and *Aedes albopictus* are found biting outdoors, but *Aedes aegypti* will readily feed indoors as well. Once a person is bitten by the infected mosquitoes, onset of illness starts between 4 to 8 days; however, symptoms of the illness can be experienced as early as within the second day or as late as the twelfth day. Vertical transmission usually allows transmission from mother to child during pregnancy or at birth, which is the most uncommon form of transmission. Vertical transmission rates range from between 27.7-48.29% in cases involving maternal viremia present during the time of delivery with neonatal symptoms surfacing 3 to 9 days after birth but research has shown no link to the incidence of

congenital disease (Marinho et al., 2017; Torres et al., 2016). In theory, the possibility of transmission through coming into contact with infected samples of whole blood used in exchange transfusions, blood components or plasma derivatives and through transplanted organs is conceivable but there have been no reported cases of these yet (Burt et al., 2012). There are two principal ways in which the virus enters an area. These are:

1.5.1 Local transmission

This happens when mosquitoes bite infected patients in a region and the virus is transmitted to others who have never been exposed to the virus previously. It was in 2014 when the CDC reported the first local transmission cases regarding the virus in the U.S. Virgin Islands, Florida, and Costa Rica.

1.5.2 Imported cases

These happen when an individual travels to an area undergoing an epidemic of Chikungunya and becomes infected by it, and then returns home with the disease. Around 28 individuals per year in the United States have been infected from 2006 to 2013 as per the accounts of the CDC. In 2014, this number expanded pointedly and, between May 2014 and January 2015, more than 2,300 tourists came back to the United States with the virus. Local transmissions cases are considerably more dangerous because they demonstrate that there are contaminated mosquitoes in a territory which might result in a possible outbreak in the local region. Be that as it may, imported cases can likewise be hazardous as the patient can be bitten by a female mosquito at home and enable the infected mosquito to transfer the virus locally. The local population in the area where the patient resides may not possess any protective measures against the virus since they have not come into contact with it sometime recently, so they might be more vulnerable. This may further result in an outbreak. Risk of transmission of virus persists when it travels through new countries and territories as doctors are not able to distinguish the virus. A patient who returns from a foreign country with the disease or subsequent patients infected via local transmission may stump neighborhood specialists due to them not having dealt with the infection sometime recently. These patients may have a troublesome time getting the correct therapeutic help and might not get vital data about keeping the spread of the virus from affecting others around them. This virus is not able to

pass through human saliva, kissing, breastfeeding, sharing food or generally through human contact. All cases including the virus originate from mosquito bites.

1.6 Disease outbreaks

The very first chikungunya outbreak was recognized in 1952 in Tanzania with similar indications to dengue infection. The causative agent for this disease, CHIKV was isolated in 1953 from the serum of a patient who was suffering from the disease. Later, the virus was isolated frequently from several countries in Central Africa and Southern Africa which included Democratic Republic of Congo, Kenya, Malawi, South Africa, Sudan, The Central African Republic and Uganda in between 1960s to 1990s (Powers & Logue, 2007). In the year of 1999 – 2000, there was an enormous outburst in the Democratic Republic of Congo and several years after that there was another epidemic in Gabon in 2007 although human infections have been at relatively low levels for a number of years before this (Simon, Javelle, Oliver, Leparc-Goffart, & Marimoutou, 2011). During the early February of year 2005, a massive outbreak of chikungunya took place in the several Indian Ocean islands. This outbreak was responsible for a huge number of imported cases, especially in 2006 when Indian Ocean outbreak was at its top level. In addition to massive epidemic in India which happened in 2006 and 2007, some other countries in South-East Asia had impact on it as well. India, Thailand, Maldives, Indonesia and Myanmar have announced over 1.9 million cases since 2005 (Simon et al., 2011). Transmission of chikungunya in Europe was first observed in 2007 which specifically occurred in north-eastern region of Italy in a local outbreak (Jain, Rai, & Chakravarti, 2008). In total, approximately 197 cases were found to be recorded during this epidemic confirming the presence of *Aedes albopictus* in Europe. 2 laboratory-assured autochthonous cases were reported in France, particularly in the French region of the Caribbean islands of St Martin. After that, local transmission of the infection has been affirmed in more than 43 countries and territories in the WHO areas of the Americas. This was reported to be the first official chikungunya epidemic with autochthonous transmission in the Americas (Leparc-Goffart et al., 2014). Documentation of more than 1379788 suspected cases of chikungunya was done in April, 2005 in the Caribbean islands, Latin American regions & the United States of America. The number of deceased cases ascribed to this disease was 191. It was October 2014 when 4 cases of locally acquired chikungunya infection was affirmed in Montpellier, France. In addition to that, 11 local transmission of the disease were

also confirmed in Florida by late 2014 and over 10,000 population of Puerto Rico had already been affected by the infection. However, after the declaration of over 800,000 chikungunya affected individual in Caribbean, a state of emergency was announced by Jamaica. Although the amount of patients in American Samoa, Kiribati, French Polynesia & Samoa has drastically decreased, Cook Islands and Marshall Islands are currently suffering from chikungunya epidemic. From a report of Pan American Health Organization (PAHO) regional agency in 2015, there is 693489 suspected cases and 27,480 confirmed cases of chikungunya in the Americas, with Colombia bearing the most burden with 356079 patients. This number was smaller in 2014 when over 1 million suspected population were reported in the same area.

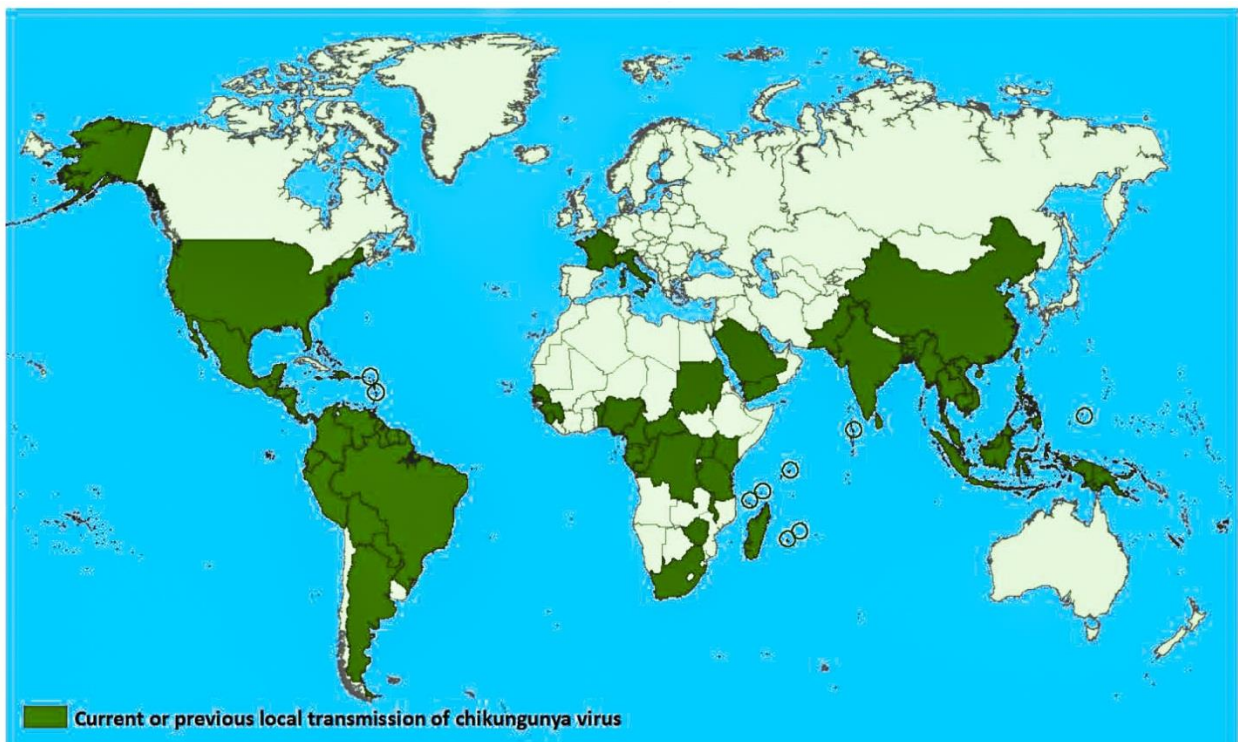


Figure 1.6.1: Geographical distribution of CHIKV.

This excludes regions where imported cases have been recorded. (Source: Chikungunya Virus. (2016, May 12). Retrieved November 04, 2017, from <https://www.cdc.gov/chikungunya/geo/index.html>)

Travelers can carry the virus and bring them wherever they go, increasing the chance to cause an outbreak by bringing the virus to new areas. Outbreak that usually occurs due to imported

cases have a chance to affect 38% to 63% of the population. Table 2 reviews recent significant epidemics of CHIKV in the 2000s (Ganesan et al., 2017).

Table 1.6.1: Recent significant epidemics of CHIKV in the 2000s.

Location	Year/Duration	Affected
French Polynesia	2014 – 2015	66,000
Gabon	2007	20,000
India	2005	1380,000
Lamu Island, Kenya	2004	13,500
La Reunion	2005 – 2006	255,500
Martinique-Guadeloupe	2014	308,000
Mauritius	2006	13,500
Republic of Congo	2011	8000
Thailand	2008 – 2009	49,000

1.7 Situation in Bangladesh

Documentation of more than 120 mosquito types was done in Bangladesh since 1908. Unfortunately, 25 of the surveyed species were found to be of the *Aedes* species, the kind which is responsible for not only dengue fever, yellow fever and west-nile fever but also chikungunya fever. Pertinently, the capital of Bangladesh is currently staggering from the repercussions of a serious epidemic of the mosquito-borne Chikungunya disease. People residing in Dhaka were continuously reported to be affected by Chikungunya fever. The Bangladeshi government's Institute of Epidemiology, Disease Control, and Research (IEDCR) states that the number of confirmed chikungunya cases went up to 750 during the period of April to July. In addition to that, more than 3,000 suspected cases were disclosed during the period of May to July by Dhaka hospitals. Another report from IEDCR marked 23 areas in Dhaka that were declared to be of high risk for contracting the Chikungunya virus. During December 2008, the first chikungunya epidemic in the Rajshahi and Chapainawabganj districts of Bangladesh was inquired by an investigation team from the Institute of

Epidemiology, Disease Control and Research (IEDCR) and International Centre for Diarrheal Disease Research, Bangladesh (ICDDR,B) (ICDDR, 2009), which was actually the third outbreak in the entire country (Chowdhury, Kabir, Das, Mukerrama, & Masud, 2012). During December 2008, the very first chikungunya epidemic occurred in Bangladesh where 32 patients were recognized (Chowdhury et al., 2012). After that, reports of chikungunya started arriving from different parts of Bangladesh. During October 2011, a local health official from Dohar, Dhaka reported an outbreak of fever accompanying joint pain. A local clinic collected some samples in order to run antibody test for dengue and smearing blood for diagnosing malaria. Later, the clinic concluded reporting that the sickness were neither identified as dengue nor malaria. To find out the etiology of the epidemic and the vectors that are associated with the disease, another inquiry team was formed on November 2011 which consisted of medical epidemiologists, FRA (field research assistants), several entomologists and laboratory technicians from the Institute of Epidemiology Disease Control and Research (IEDCR), of the Bangladesh Ministry of Health and Family Welfare, and ICDDR,B (formerly known as the International Centre for Diarrhoeal Disease Research, Bangladesh) (Khatun et al., 2015). A statement by the former IEDCR director delineated that at least 10% of Dhaka City's total population are exceedingly prone to be affected by the mosquito-borne infection this year. The extended monsoon weather from its usual time to September is proving to be especially propitious for the persistence of the outbreak by sustaining appropriate conditions prerequisite for the breeding of mosquitoes. Dhaka South City Corporation, with the help of the current government, not only declared a strategy to release guppy fish in the sewage system and drain water to consume mosquito larvae resulting in the downsizing of the outbreak but also took the initiative to spray insecticides within zones of the city susceptible to the indisposition of mosquito-borne diseases. Still, the researchers are anticipating that the virus might be distributed to whole country by the termination of this monsoon in September to October. An arthritis clinic was established for chikungunya patients, particularly those who are suffering from joint and muscle pain occurring after the fever as residual effects of the disease, in the Department of Rheumatology, Bangabandhu Sheikh Mujib Medical University (BSMMU). Immediately after the inauguration of the clinic on August 13, people swarmed into the ward, making it overcrowded and overburdening the doctors and nurses with work in order to provide suitable services to the patients. As verified by this time case series,

it can be said that chikungunya is not very uncommon in Bangladesh. Due to lack of cognizance and proper diagnostic services, nature of the chikungunya disease and most importantly, pervasiveness of another mosquito-borne disease in Bangladesh, dengue, most cases of chikungunya stays misdiagnosed or undiagnosed (Hassan et al., 2014).

2 Literature Review

Chikungunya is a viral infection which is transmitted to people through female mosquito bites. The causative agent for this illness is CHIKV, an alphavirus belonging to the *Togaviridae* family (Sudeep & Parashar, 2008). It is responsible for triggering high fever, extreme joint ache, headache, myalgia, extreme weakness, nausea and rash (Corrin et al., 2017; Thiberville et al., 2013). Although majority of the people recuperate from the acute sickness within a couple of weeks, there are a fraction of victims who continue to suffer from severe joint ache that may last from several months to years after being infected (Staples, Breiman, & Powers, 2009; Thiberville et al., 2013). Historically, CHIKV has surfaced in Africa, Asia, and the Indian and Pacific Ocean Islands (Thiberville et al., 2013). During 2013, CHIKV was found to disperse to the Americas causing outbursts in countries harboring strains of *Aedes aegypti* and *Aedes albopictus* mosquitoes, the vector for the Chikungunya virus (CHIKV) (Thiberville et al., 2013; Weaver & Forrester, 2015). Documentations of affected individuals travelling to Europe and North America have been recorded and minor outbreaks were also taken into account which occurred as a result of the importation of CHIKV into a place where proper vectors are present (Centre for Disease Control and Prevention, 2015). Chikungunya is a noteworthy concern for public health since the virus has been observed to surface in areas formerly non-endemic, such as the Americas where 1.7 million suspected or confirmed cases have been reported since 2013 (Pan American Health Organization, 2016). Since 2015, Chikungunya has been an alarming disease in USA with around 679 travel-related patients from 44 states as per records from the Centers for Disease Control and Prevention (Centre for Disease Control and Prevention, 2015). In addition to that, several hundred travel-related cases were also reported in Canada since CHIKV was found to spread in the Americas (Corrin et al., 2017).

In 2006, an increase in the incidence of Chikungunya in India prompted testing of serum samples collected from febrile patients from two different surveillance projects in Dhaka, Bangladesh. One hundred seventy-five serum samples were tested. However, none had antibodies against the Chikungunya virus (Khatun et al., 2015). During December 2008, an investigation team from the Institute of Epidemiology, Disease Control and Research (IEDCR) and International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B)

investigated the first outbreak of Chikungunya fever in the Rajshahi and Chapianawabganj districts of Bangladesh, which was in fact the third outbreak in the whole of Bangladesh (Chowdhury et al., 2012; ICDDR, 2009).

Since there is no treatment or vaccine for CHIKV in humans for the time being, intervention measures primarily concentrate on controlling the vectors of the diseases, which are mosquitoes, and preventing frequent mosquito bites in the population (Corrin et al., 2017). Various social factors influence the success rate of these measures including the knowledge, attitude and perception of the public concerning the disease. Therefore, it is crucial to assess and comprehend how vitiated populations perceive and recognize Chikungunya, its transmission cycle and the importance of control initiatives to deduce what methods of prevention would probably succeed in practice. Additionally, to implement future control tactics, it is essential to educate the target population about the reasons for them choosing to take preventative action against mosquito-borne diseases such as CHIKV (Corrin et al., 2017).

3 Methodology

3.1 Research objectives and goals

The primary objective of the research was to gather knowledge, perception and awareness about chikungunya infection among affected individuals who belong to non-healthcare backgrounds in order to understand the disease and to devise methods of prevention as well as alleviation of symptoms of the disease.

3.2 Research design and methods

The study commenced with the construction of a questionnaire required for the survey. Prior to the generation of the questionnaire, papers on chikungunya were assembled from numerous sources and researched in order to gather data vital for the execution of the survey. The findings were then utilized to develop the necessary questionnaire for the survey.

A 46-item questionnaire was utilized to accomplish the intent of the study. The study tool contained four different sections. Section one was prepared to assess the demographical information of the participants; section two was centered around the knowledge of the respondents about chikungunya; section three was more oriented to gather the information about an affected individual, and section four focused on the awareness among the participants. Later, questionnaire was prepared chikungunya-affected people affiliated with non-healthcare professions and backgrounds such as Business, Economics, Engineering, English and Humanities, etc.

People who were affected by chikungunya were asked to fill out the questionnaires with the assurance of keeping their information confidential. The participants were mostly university students and their affected family members. However, the study was carried only in Dhaka, excluding information from other districts of Bangladesh. The study was performed between January 2017 and October 2017 in Dhaka.

3.3 Research questions

Section 1: Demographic Information

Q1. What is your age?

Q2. What is your occupation?

Q3. What is the highest level of education you have completed?

Q4. Which field of education were/are you enrolled in?

Q5. What is your marital status?

Q6. Please specify your area of living.

Q7. Please specify your workplace location.

Q8. How many members do you have in your household?

Q9. Are any members of your household below 18? (If yes, then specify how many?)

Q10. What would be the total income of your family per month?

Section 2: Knowledge about Chikungunya

Q11. From where have you heard about chikungunya?

Q12. Do you know that chikungunya has been reported in Dhaka?

Q13. If above answer is “Yes” then where chikungunya outbreak has been recently reported?

Q14. What type of infection is chikungunya?

Q15. Which infection is closely related to chikungunya infection?

Q16. Do you know the name of mosquito spreading chikungunya?

Q17. During which time chikungunya mosquitos usually bite?

Q18. Does Chikungunya infection transfer through human to human contact?

Q19. Does Chikungunya infection transfer from mother to new born child?

Q20. Do you think chikungunya is preventable disease?

Q21. Is there any vaccine available for chikungunya prevention?

Q22. Is there any drug available for Chikungunya treatment?

Q23. What are the symptom(s) of Chikungunya infection?

Section 3: Chikungunya Registry

- Q24. What method did you take for the treatment of chikungunya?
- Q25. What method was recommended by the physician for treatment?
- Q26. What medications were you prescribed by the physician for chikungunya?
- Q27. Are you on medication for any other condition besides chikungunya?
- Q28. Do you have any pre-existing medical conditions?
- Q29. If “yes”, then what was your pre-existing medical condition?
- Q30. Were the symptoms of your medical condition worsened after being affected by chikungunya?
- Q31. What are the medical conditions that have arisen after being affected by chikungunya?
- Q32. What treatments/services would you expect to receive from your healthcare providers?
- Q33. Have any of your family members got affected by chikungunya? (If yes, then specify how many.)

Section 4: Awareness among Affected Individual*

- Q34. Fever with severe joint pain is the most common symptom of chikungunya.
- Q35. Chikungunya usually results in permanent joint destruction and subsequent abnormalities.
- Q36. Chikungunya can be identified by some tests.
- Q37. Chikungunya patients are advised to take painkillers.
- Q38. Symptoms of chikungunya last for around 7-10 days or even longer.
- Q39. Symptoms of chikungunya usually begin 3–7 days after being bitten by an infected mosquito.
- Q40. Chikungunya infection is most common in monsoon & spring season.
- Q41. Water storage containers/stagnant water is the most common breeding site of chikungunya mosquito.

Q42. Changes in dietary patterns are observed after being affected by chikungunya.

Q43. Chikungunya infection is responsible for immense sleep disturbances.

Q44. People can get Chikungunya twice or more.

*This section gauges public opinion on the basis of statement evaluation questions.

4 Results

Q1: What is your age?

There were 99 total participants. Among them, 55.56% of the students were within the 18-29 years old age group, 24.24% were within the 50-64 years old age group, and 20.20% were within the 30-49 years old age group.

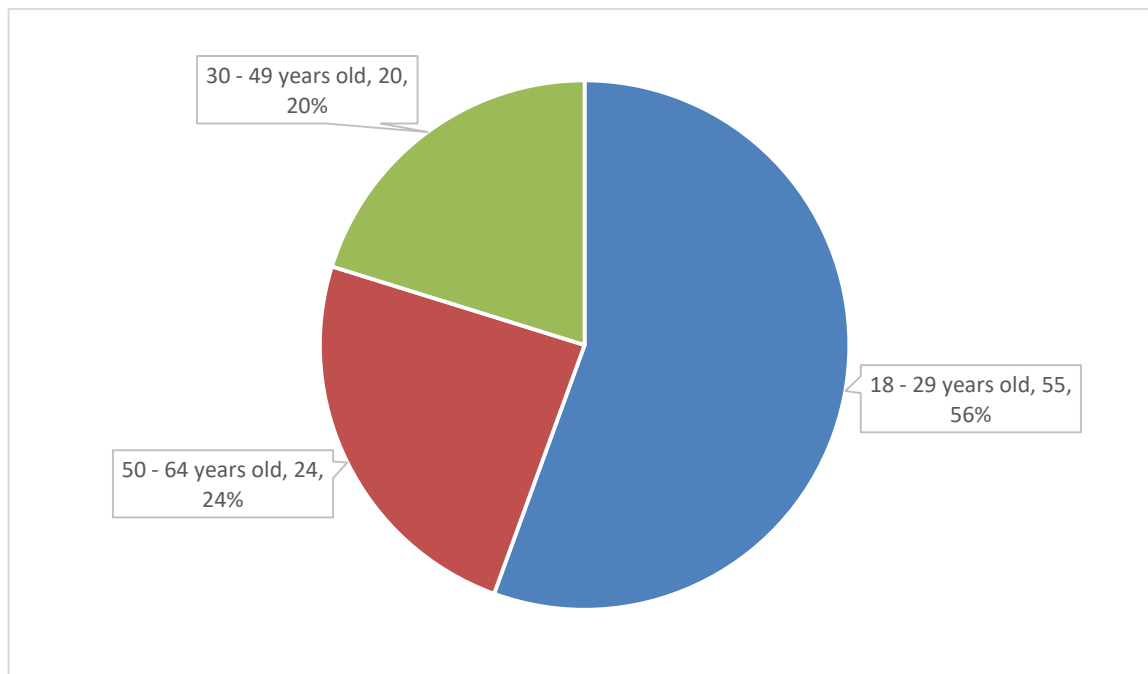


Figure 4.1: Participants with their age group.

Q2: What is your gender?

Out of the total number of 99 participants, 55.56% of them were male and the remaining 44.44% of them were female.

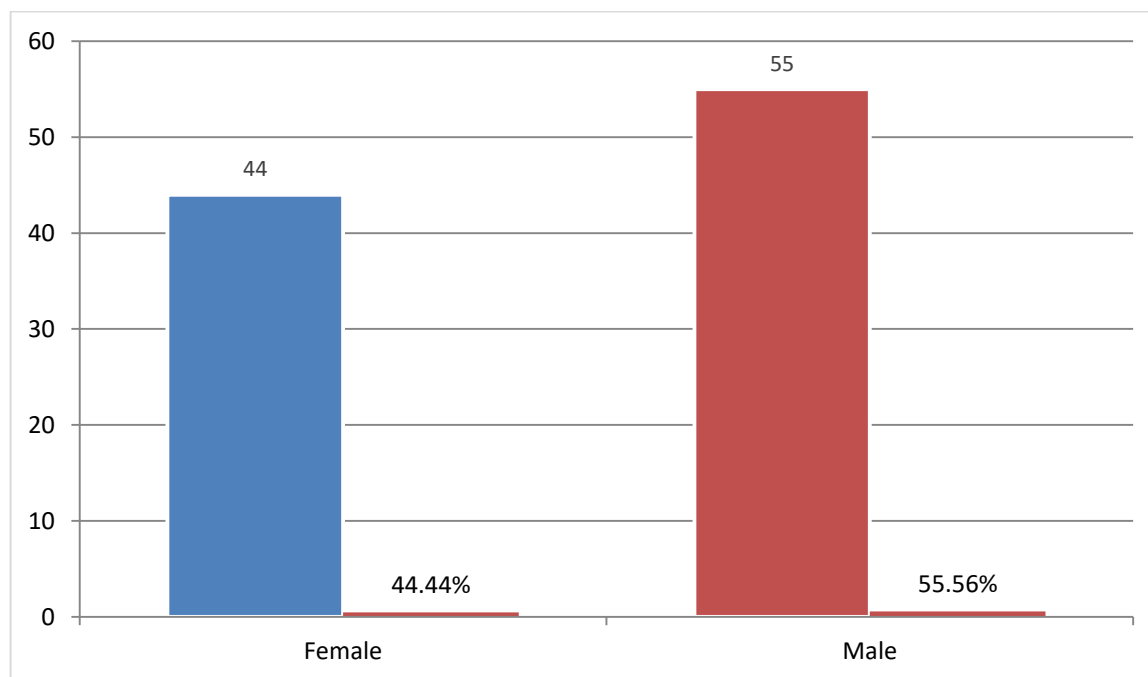


Figure 4.2: Gender of participants.

Q3: What is your occupation?

The total percentage of all the participants consisted of 44.44% students and 29.29% working professionals with the remaining 14.14% and 12.12% being unemployed or self-employed respectively.

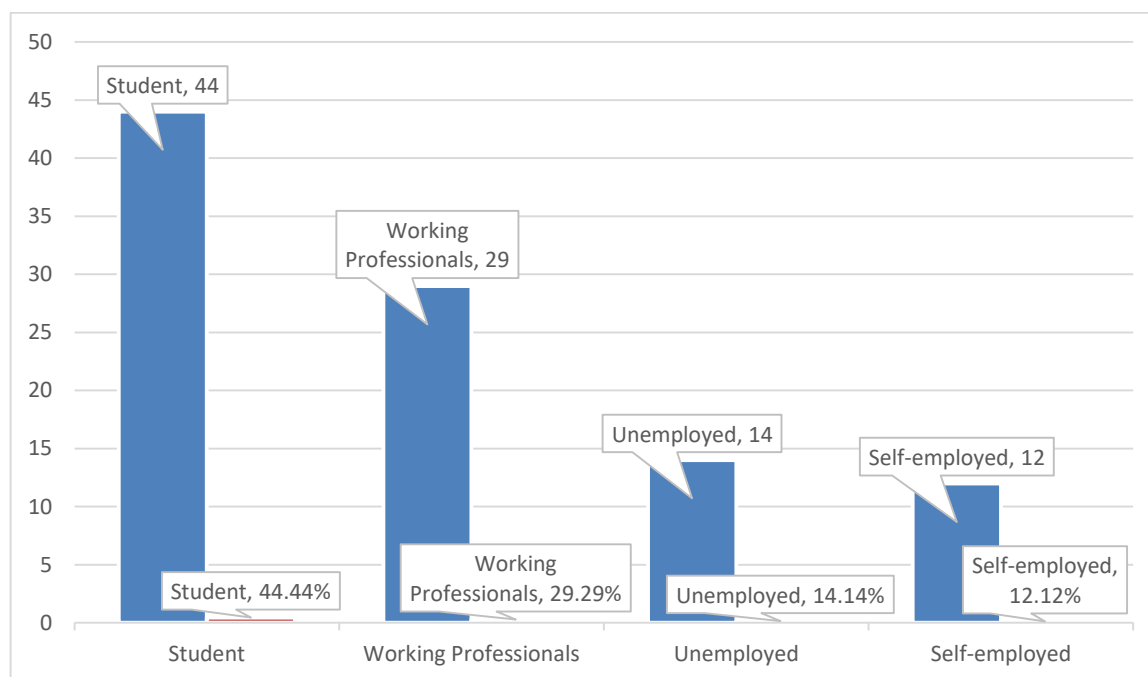


Figure 4.3: Occupation of participants.

Q4: What is the highest level of education you have completed?

The largest majority of the participants were H.S.C/A Levels students making up 40.40% of the total with Undergraduate/Bachelors students and Postgraduate/Masters students constituting two other majorities making up 33.33% and 21.21% of the total respectively. Diploma/Training students and S.S.C/O Levels students were in the minority with each making up 3.03% and 2.02% of the total respectively.

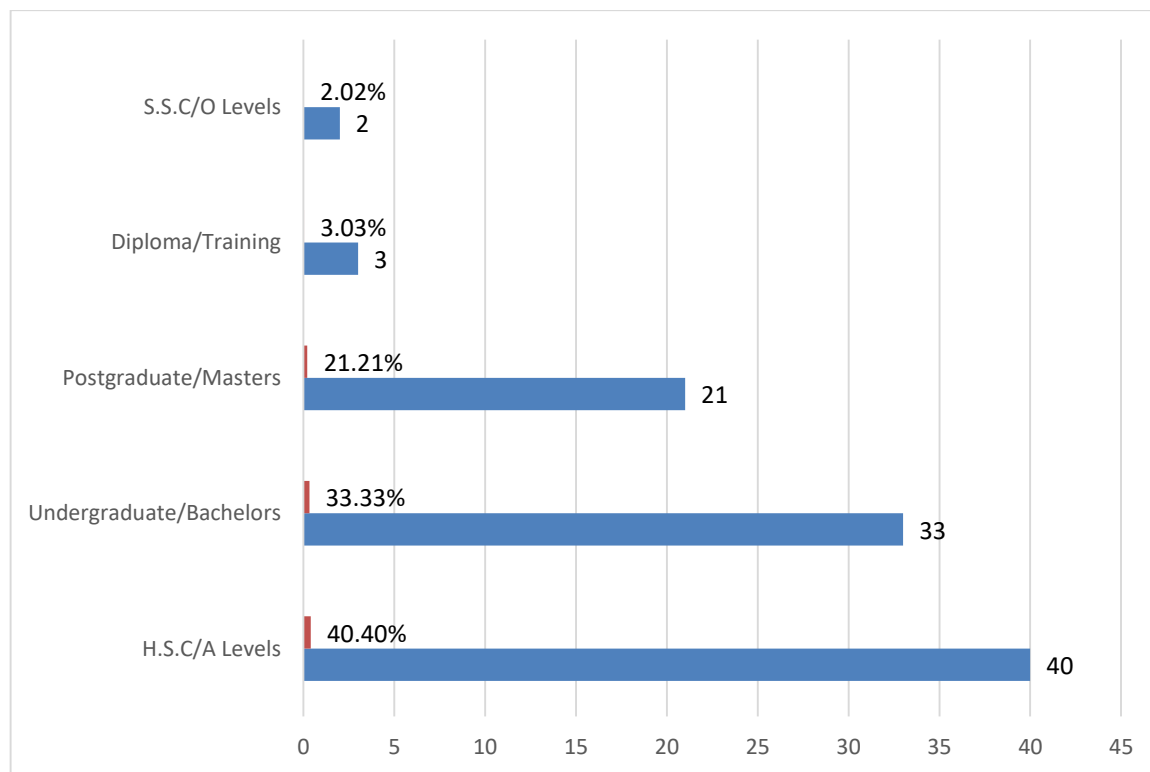


Figure 4.4: Highest level of education completed by the participants.

Q5: Which field of education were/are you enrolled in?

Regarding their educational discipline, 46.46% of the total participants were students in the field of Business Studies; meanwhile, 20.20% of them were students in the Engineering field, 10.10% were students in the field of Economics & Social Sciences, 9.09% were students in the field of English & Humanities, 9.09% were either A level or college students or below, and 5.05% were students in the field of Mathematics & Natural Sciences.

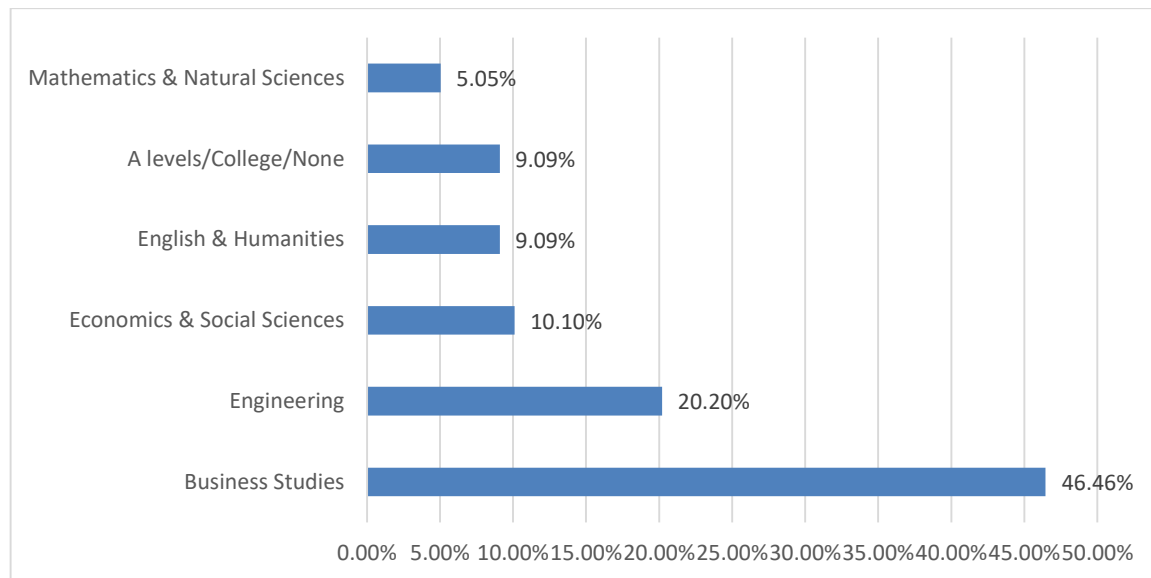


Figure 4.5: Participants with their field of education.

Q6: Please specify your area of living.

When participants were asked to specify their area of living within the city, 16.16% noted Zone A, 30.30% noted Zone B, 26.26% noted Zone C and 27.27% noted Zone D.

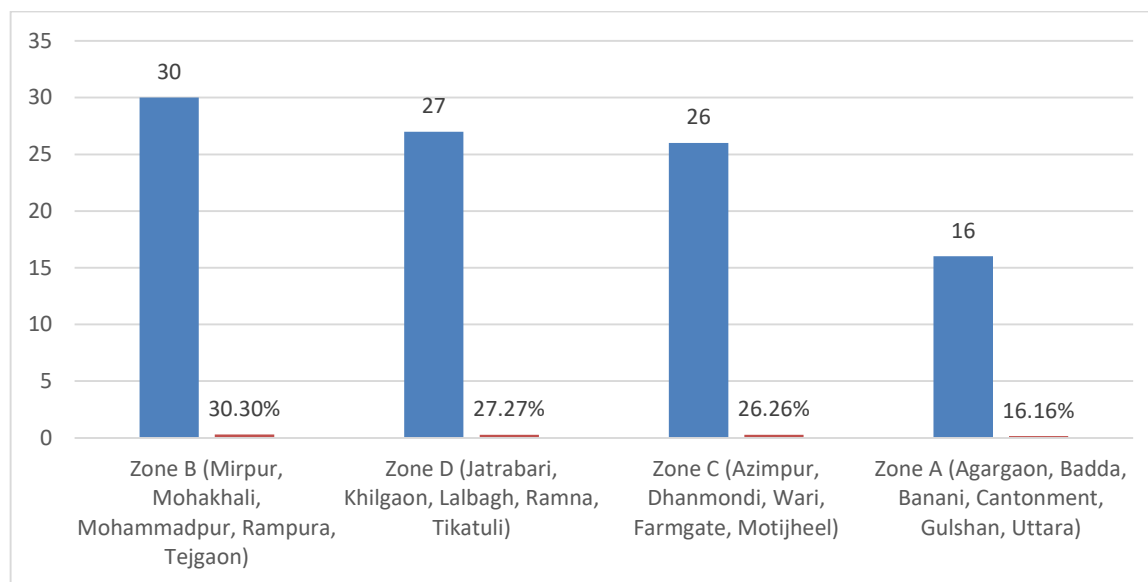


Figure 4.6: Participant's responses to the question regarding their living location.

Q7: Please specify your workplace location:

When participants were asked to specify their workplace location within the city, 24.24% noted Zone A, 43.43% noted Zone B, 22.22% noted Zone C and 10.10% noted Zone D.

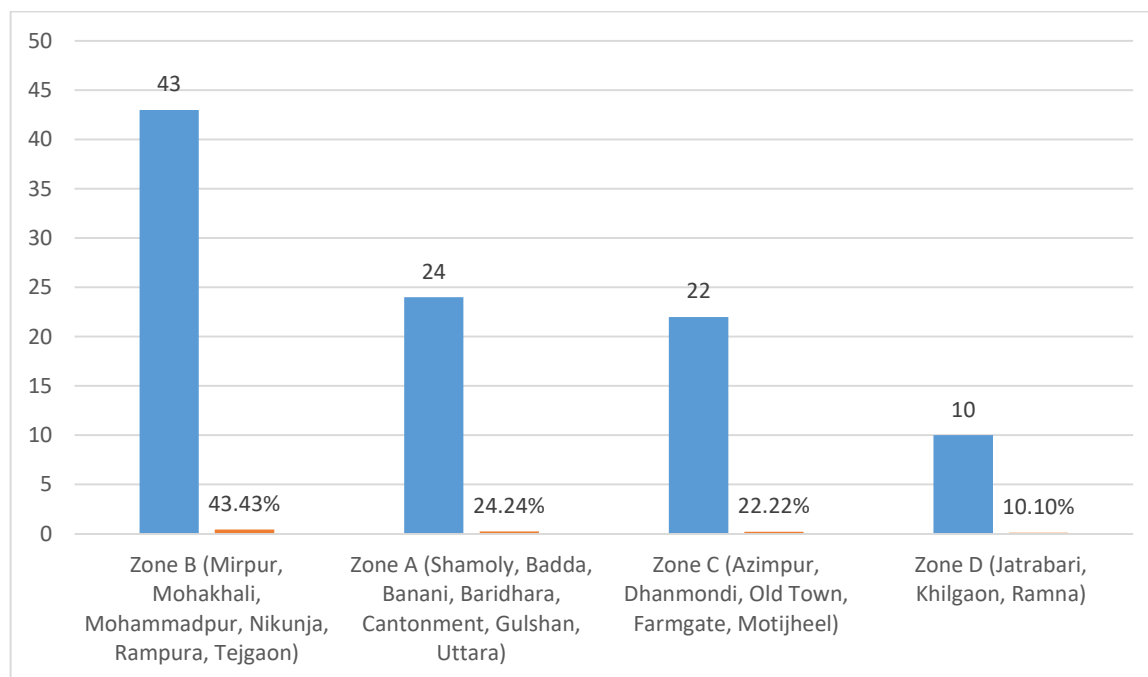


Figure 4.7: Participant's responses to the question regarding their workplace location.

Q8: What is your marital status?

50.51% of the total participants were single while 47% of them were married. Among the remaining, 1.01% was widowed and 1.01% was divorced.

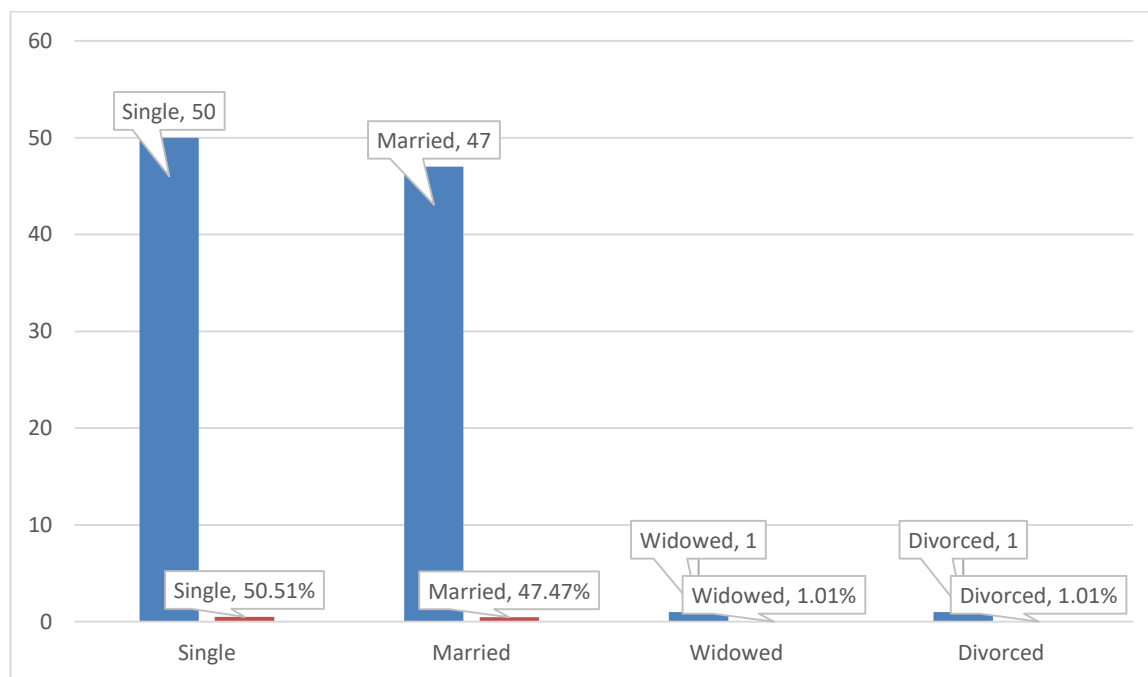


Figure 4.8: Marital status of the participants.

Q9: How many family members do you have in your household?

33.33% participants responded with four family members in their household being the highest and 32.32% reported five members grabbing the second position at the table, followed by 12.12% reports of six members, 11.11% reports of three members, 5.05% of two members as well as seven members and 1.01% of nine members.

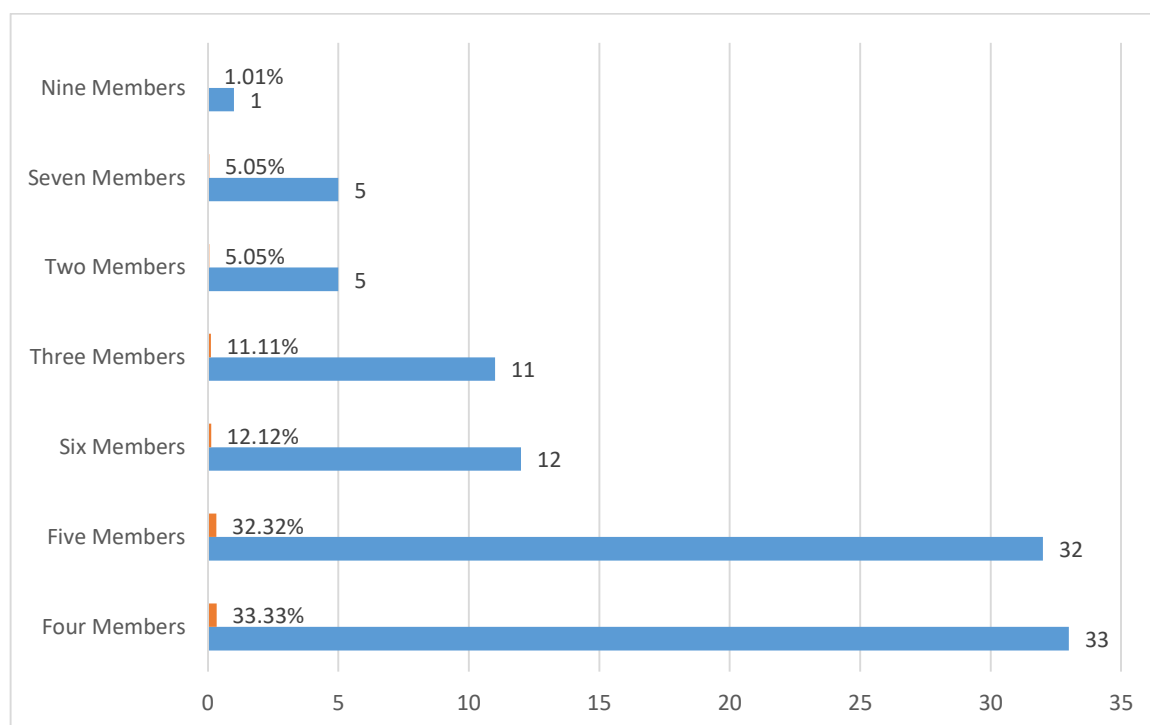


Figure 4.9: Participant's responses to the question regarding the number of family members they have in their household.

Q10: Are any of your family members below 18 years old?

Majority of the participant reported that they don't have any family members below 18 years old with the rate of 57.58% and minor respondents reported that they have one/more family members under 18 years old with a percent of 42.42.

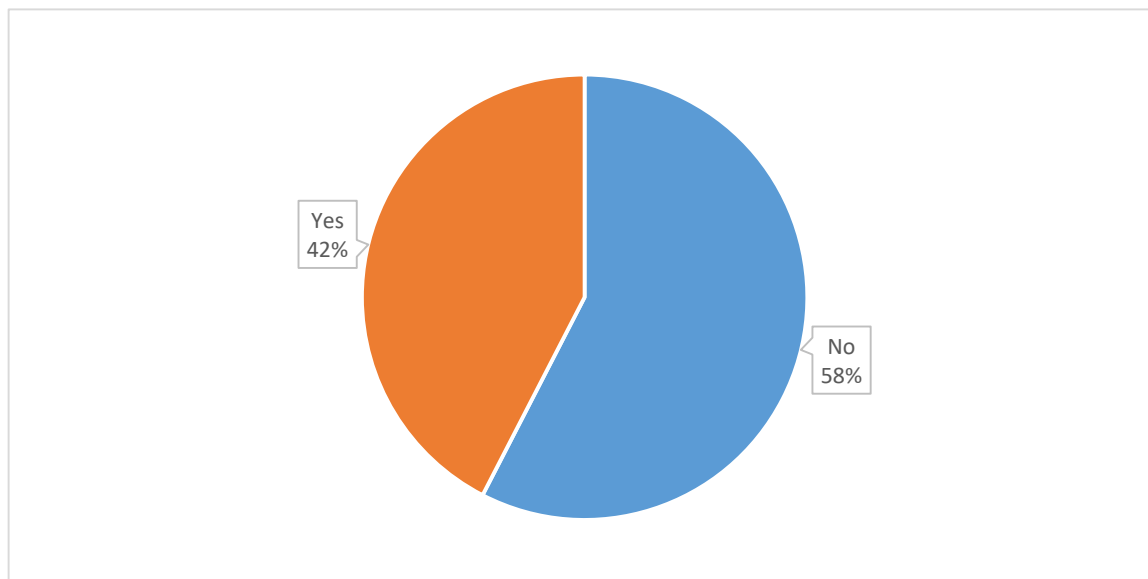


Figure 4.10: Participant's responses regarding to the question whether they have any family members below 18 years old.

Q11: If your answer to the previous question was “yes”, then please specify how many members of your family were below 18 years old?

54.76% participant responded with having one family member below 18 years old, 38.10% reported two members and 7.14% reported three members respectively.

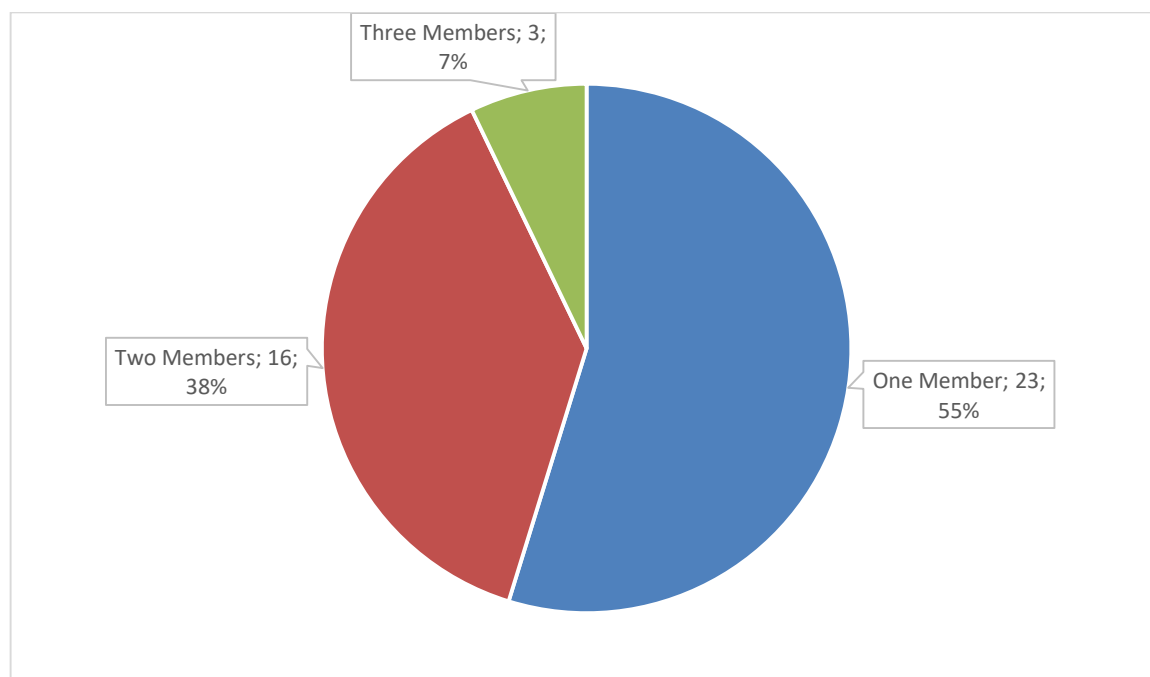


Figure 4.11: Participant’s responses to the question regarding the number of family members they have below 18 years old.

Q12: What would be the total income of your family per month?

45.45% of the total participants were from families earning within 50,000TK – 100,000TK on a monthly basis; 30.30% of them were from families earning above 100,000TK monthly; 23.23% were from families earning within the 20,000 TK – 50,000TK income bracket, and 1.01% of the participants were from families earning below 20,000TK per month.

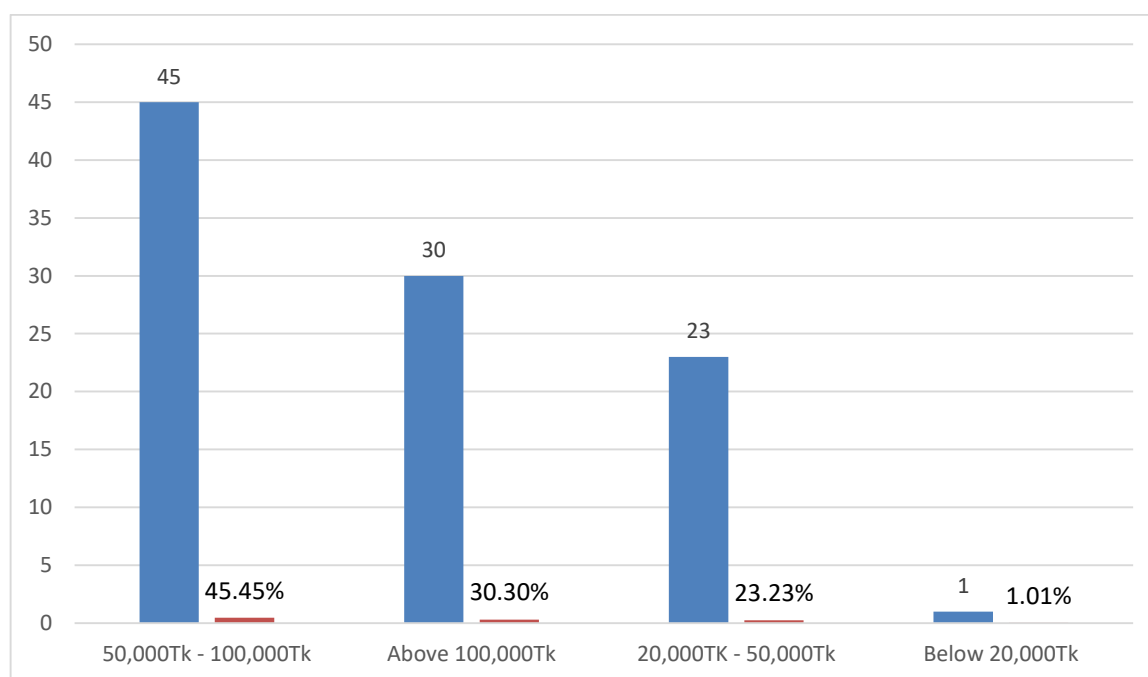


Figure 4.12: Participants with their monthly family income.

Q13: From where have you heard of chikungunya?

Most participants responded to have heard of chikungunya from either social network, their family, television, newspaper or their friends constituting 56.56%, 55.56%, 55.56%, 53.53% and 38.38% respectively.

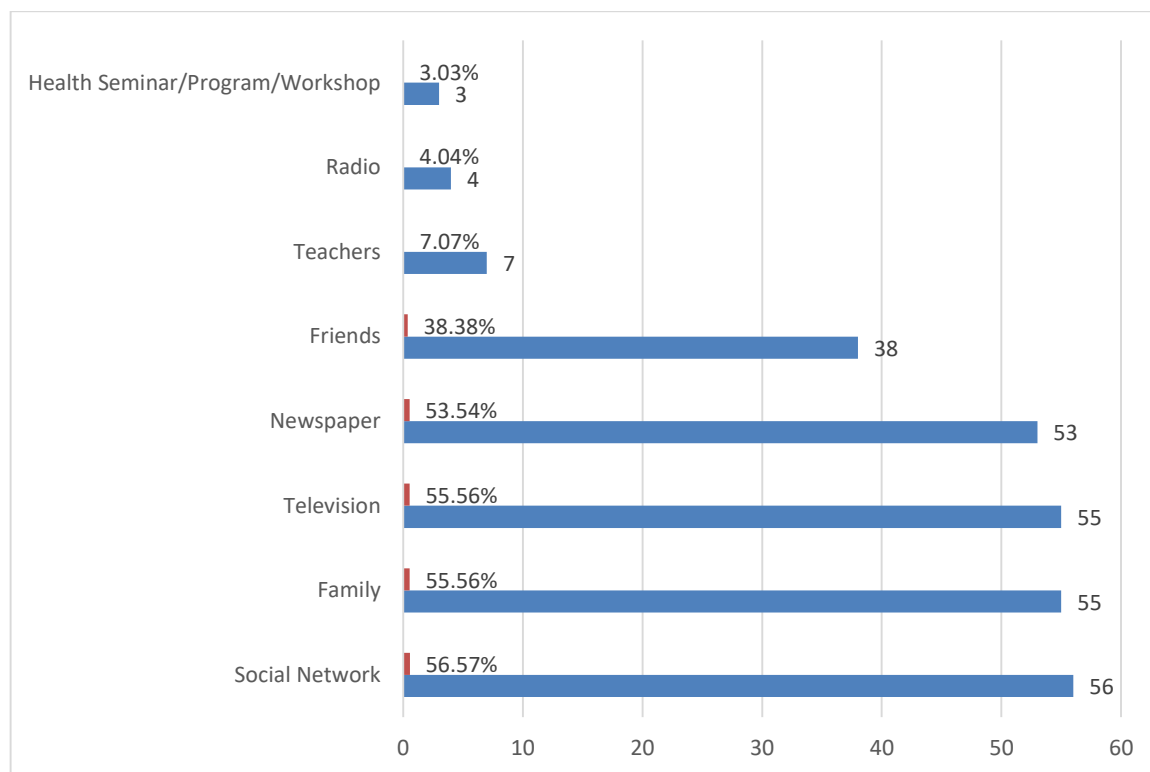


Figure 4.13: Participant's responses to the question regarding where they have heard of chikungunya.

Q14: Do you know that chikungunya has been reported in Dhaka?

85% of the 99 participants responded to have known about chikungunya being reported in Dhaka whereas 14% responded to not have known that.

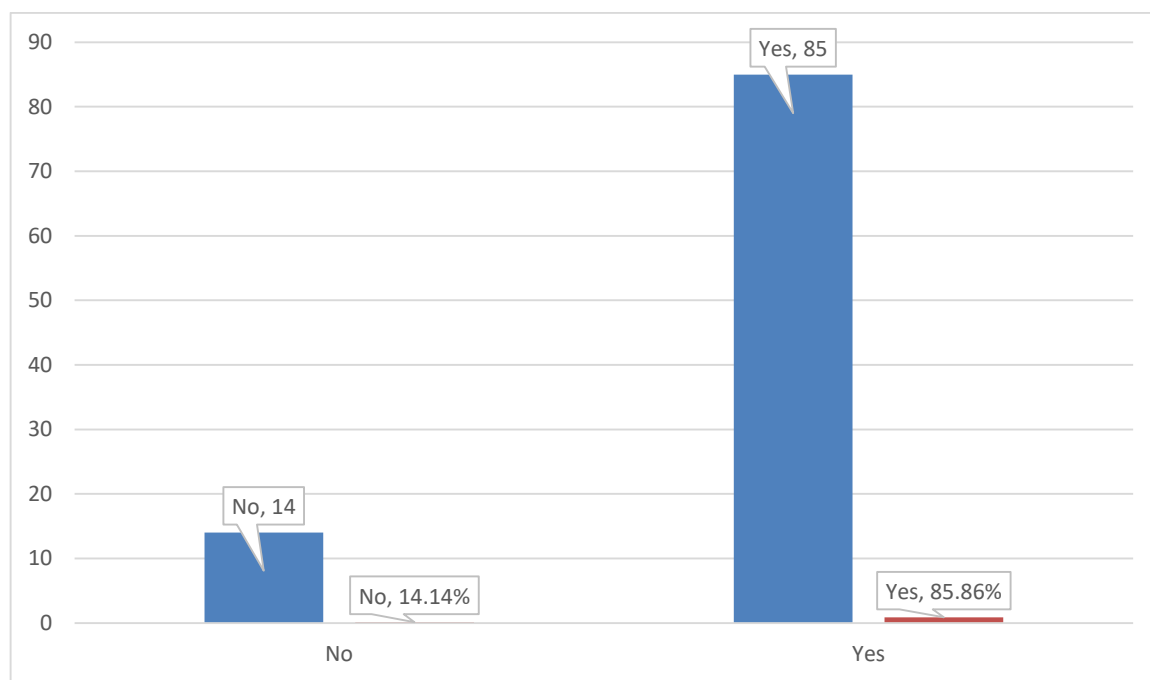


Figure 4.14: Participant's responses to the question regarding whether they know that chikungunya has been reported in Dhaka.

Q15: If your answer to the previous question is “Yes”, then where chikungunya outbreak has been recently reported?

When participants aware of chikungunya being reported in Dhaka were asked to identify locations within the city where chikungunya had been reported, 33.81% (47 respondents) noted Zone B, 28.78% (40 respondents) noted Zone A, 22.30% (31 respondents) noted Zone C and 15.11% (21 respondents) noted Zone D.

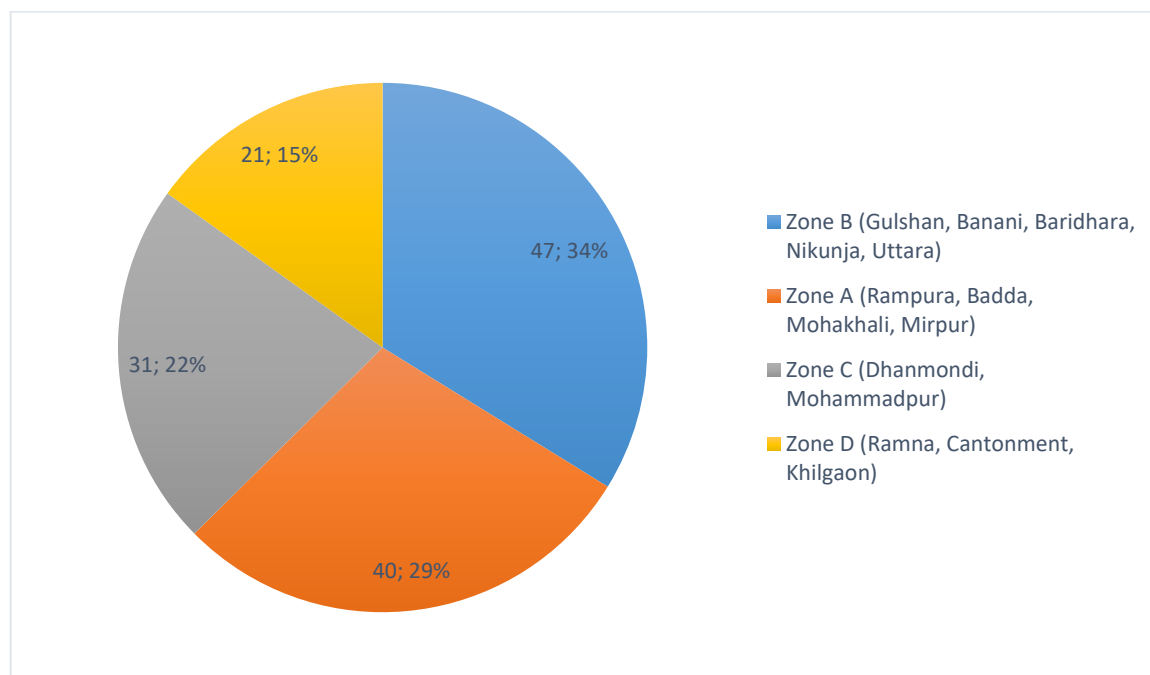


Figure 4.15: Participant’s responses to the question regarding the location where chikungunya outbreak has been recently reported.

Q16: What type of infection is chikungunya?

64.65% of total participants were able to identify chikungunya as a viral infection whereas 9.09% of them misidentified it as a bacterial infection. 26.26% of the participants did not hazard a guess and responded to not knowing what it was.

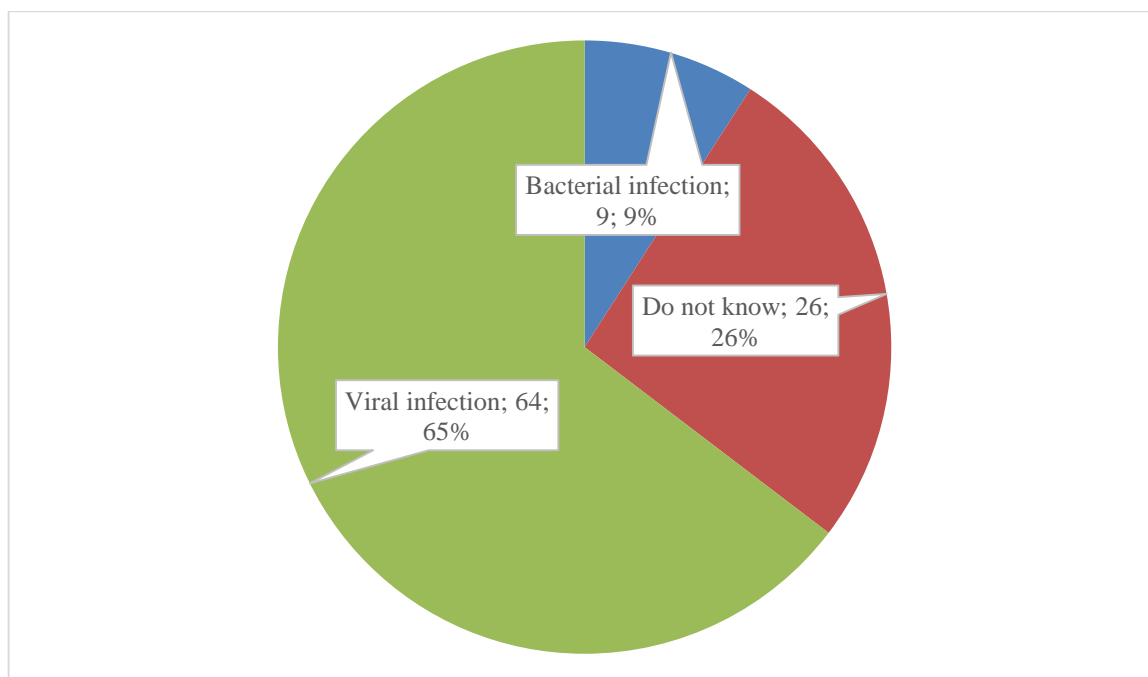


Figure 4.16: Participant's responses to the question regarding the type of infection chikungunya is.

Q17: Which infection is closely related with chikungunya infection?

A majority of the participants managed to identify chikungunya as being related to dengue infection with the number of respondents ascertaining it as such constituting 85.86% of the total number of participants while 14.14% responded to not have known it.

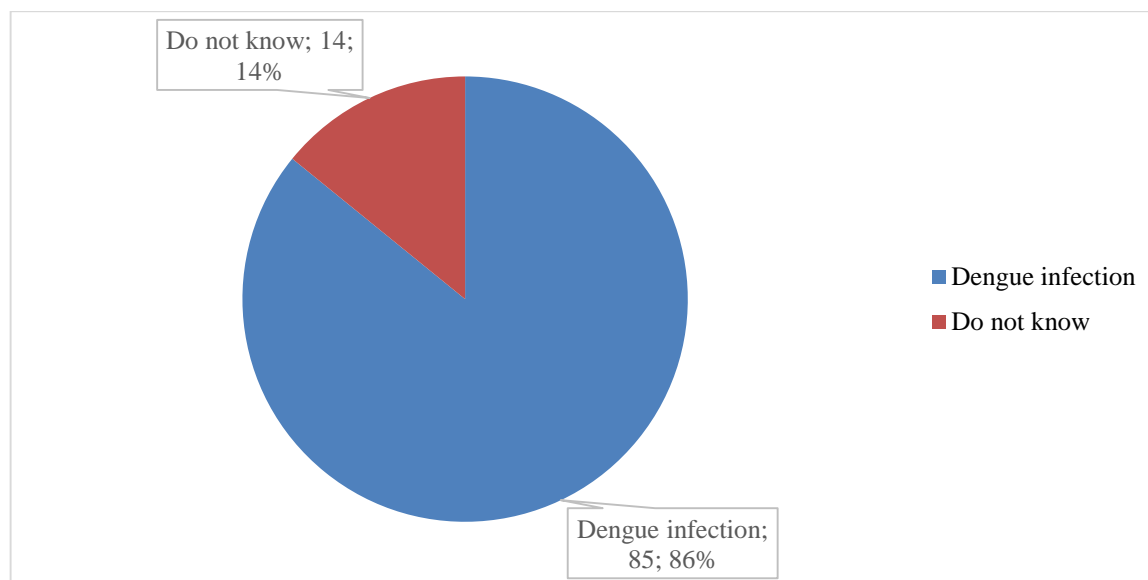


Figure 4.17: Participant's responses to the question regarding infection closely related with chikungunya.

Q18: Do you know the name of the mosquito spreading chikungunya?

55.56% of total participants were able to identify the Aedes mosquito as the name of the species of mosquito responsible for propagation whereas 4.04% identified the vector as the Anopheles mosquito, 5.05% identified both as responsible and 35.35% claimed to not know which of the either was responsible for transmitting the disease.

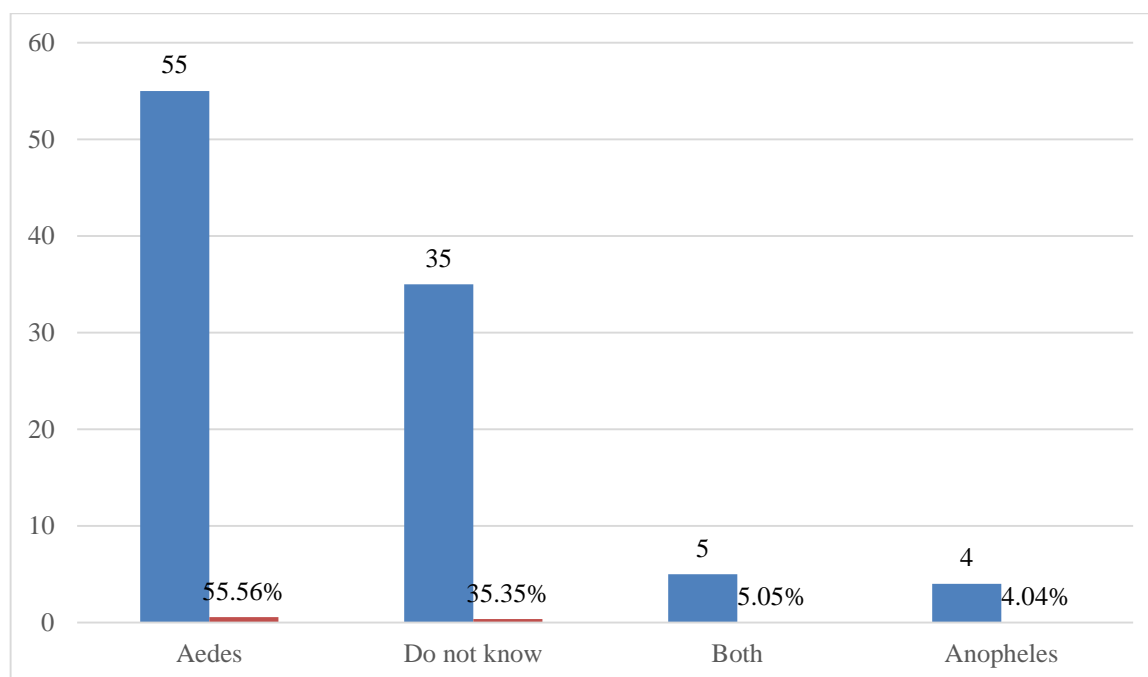


Figure 4.18: Participant's responses to the question regarding whether they know the name of the mosquito responsible for chikungunya.

Q19: What time of the day chikungunya mosquito usually bite?

63.64% of total participants stated that the chikungunya mosquitoes usually bite at day while 8.08% of them stated that they bite during the night. 28.28% stated that they bite at any time indiscriminately.

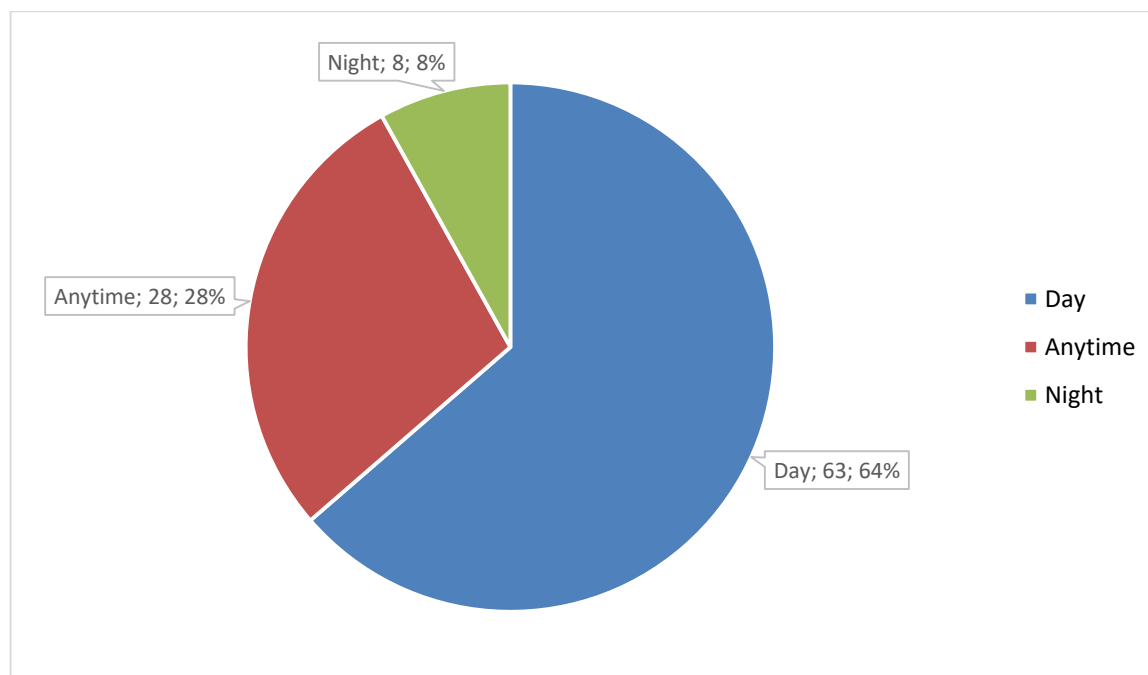


Figure 4.19: Participant's responses to the question regarding the time of day chikungunya mosquitoes usually bite.

Q20: Does chikungunya infection transfer through human to human contact?

The majority of participants are noted to be aware that chikungunya does not transfer through human-to-human contact with 84.85% responding in the negative when questioned if it does whereas 9.09% responded in the affirmative stating that it does transfer from human-to-human contact. 6.06% were not sure of either option.

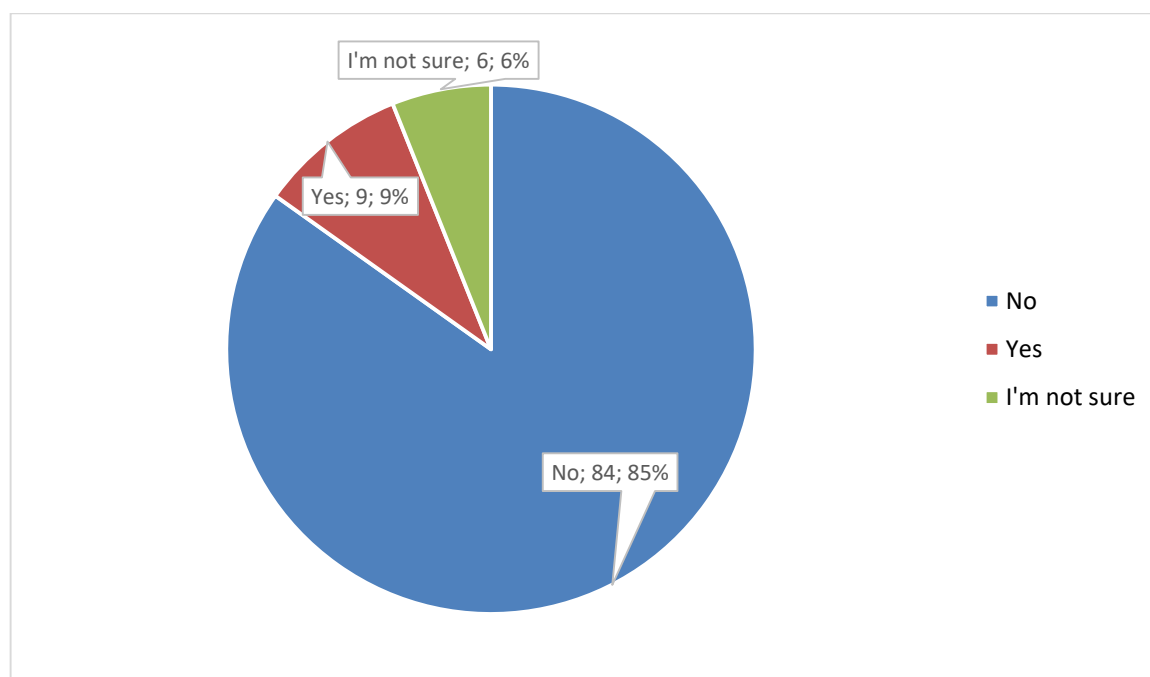


Figure 4.20: Participant's responses to the question regarding whether chikungunya infection transfer from human to human contact.

Q21: Does chikungunya infection transfer from mother to new born child?

59.60% of the 99 participants were not sure if chikungunya infection transfers from mother to newborn child while 25.25% of the participants responding in the negative and 15.15% of the participants responding in the affirmative when asked if it does.

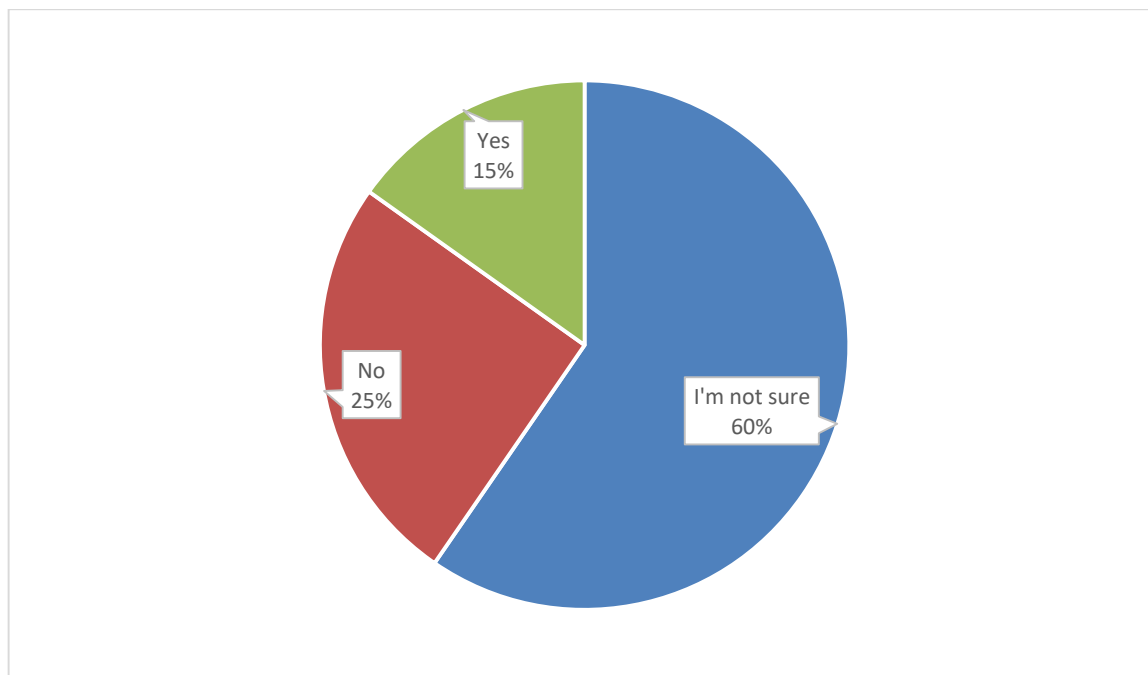


Figure 4.21: Participant's responses to the question regarding whether chikungunya infection transfer from mother to newborn child.

Q22: Do you think chikungunya is a preventable disease?

67.68% of the total participants responded that chikungunya is a preventable disease whereas 13.13% of them responded to believe that it was not, while 19.19% of them being unsure regarding both options.

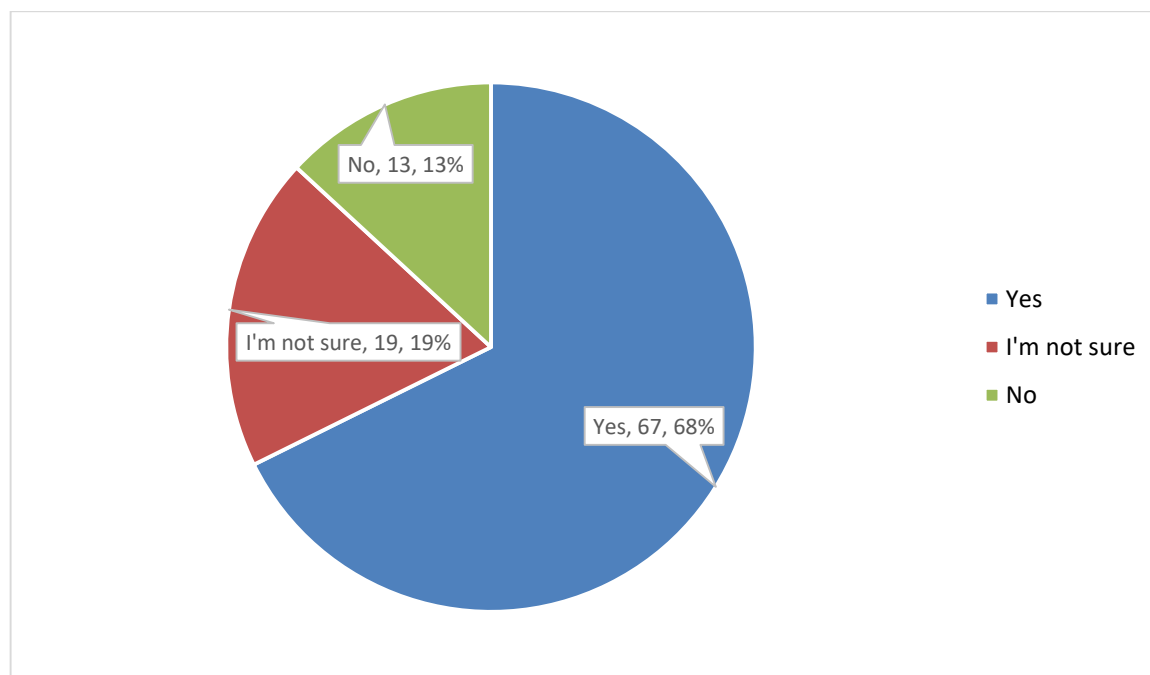


Figure 4.22: Participant's responses to the question regarding whether they think chikungunya infection is a preventable disease.

Q23: Is there any vaccine available for chikungunya prevention?

66.67% of total participants replied that there is currently no vaccine available for chikungunya prevention while 4.04% of the participants claim that there is. 29.29% of total participants are unsure about whether there is one or not.

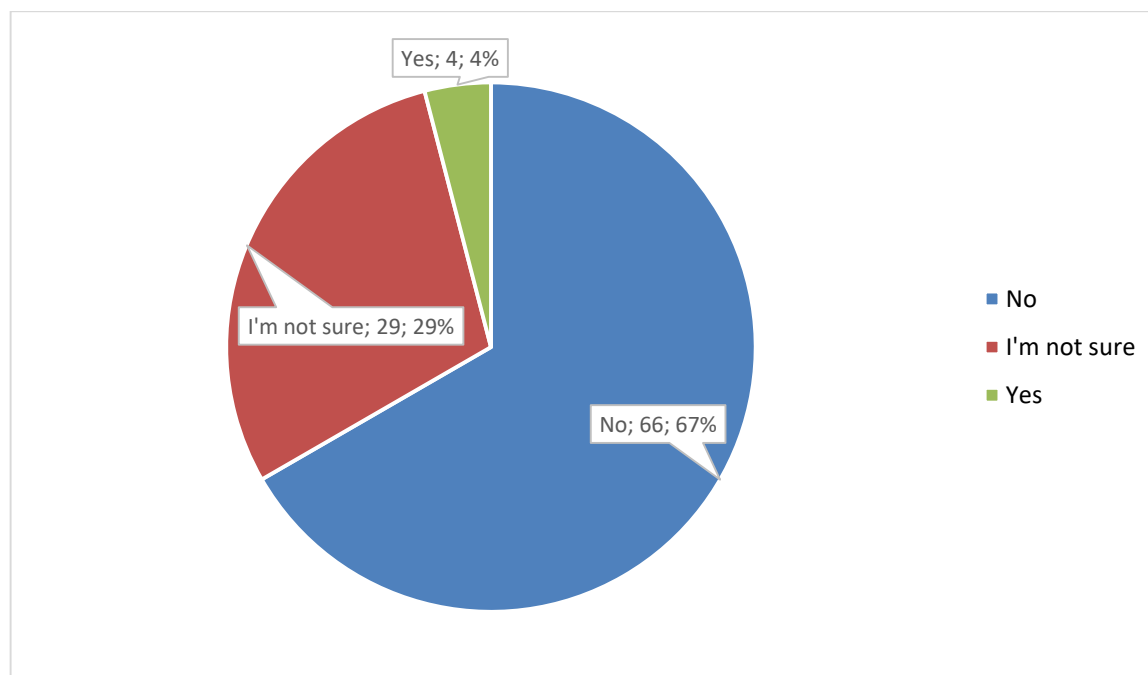


Figure 4.23: Participant's responses to the question regarding whether there is any vaccine available for chikungunya prevention.

Q24: Is there any drug available for chikungunya treatment?

58.59% of the participants responded that there was no drug that is currently available to treat chikungunya whereas 17.17% of them responded that there is and 24.24% of them were not sure if any drug is available for chikungunya treatment or not.

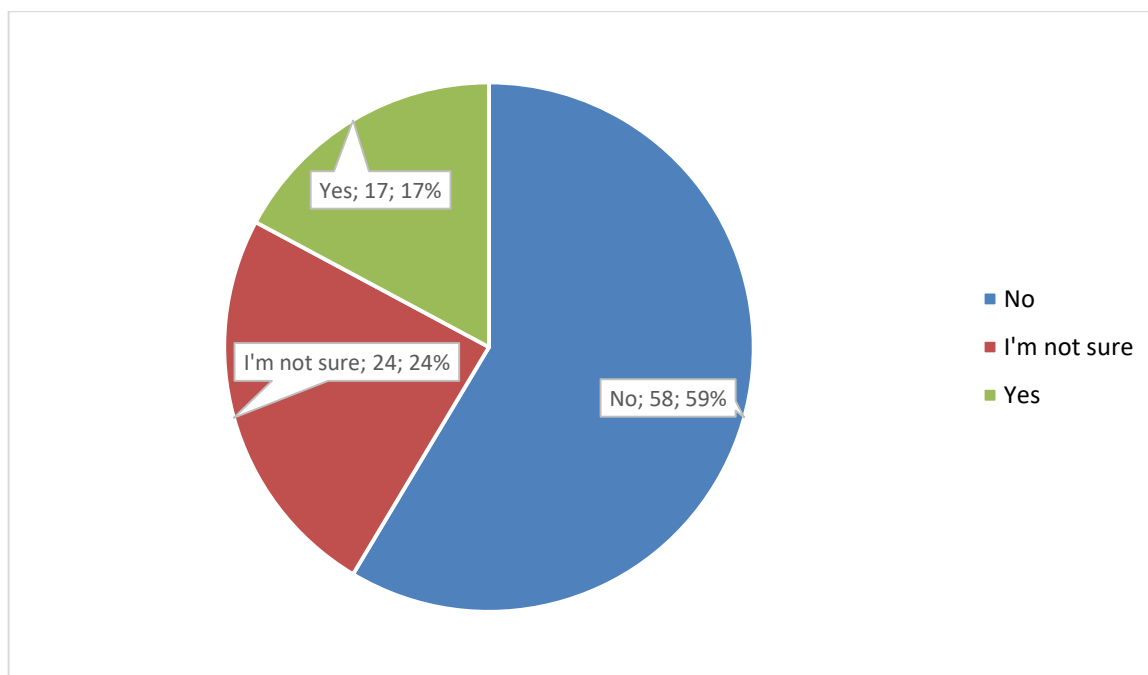


Figure 4.24: Participant's responses to the question regarding whether there is any drug available for chikungunya treatment.

Q25: What are the symptoms of chikungunya infection?

Weighing the participant's responses for the question regarding the symptoms of chikungunya infection, a total of 462 variations have been received and considered with 97.97% of them listing fever, 96.96% of them listing joint pain, 68.68% of them listing muscle pain, 74.74% of them listing rash, 54.54% of them listing headache, 36.36% of them listing fatigue, 24.24% of them listing nausea, 11.11% of them listing edema and 2.02% of them listing loss of appetite as a symptom of the infection among overall responses.

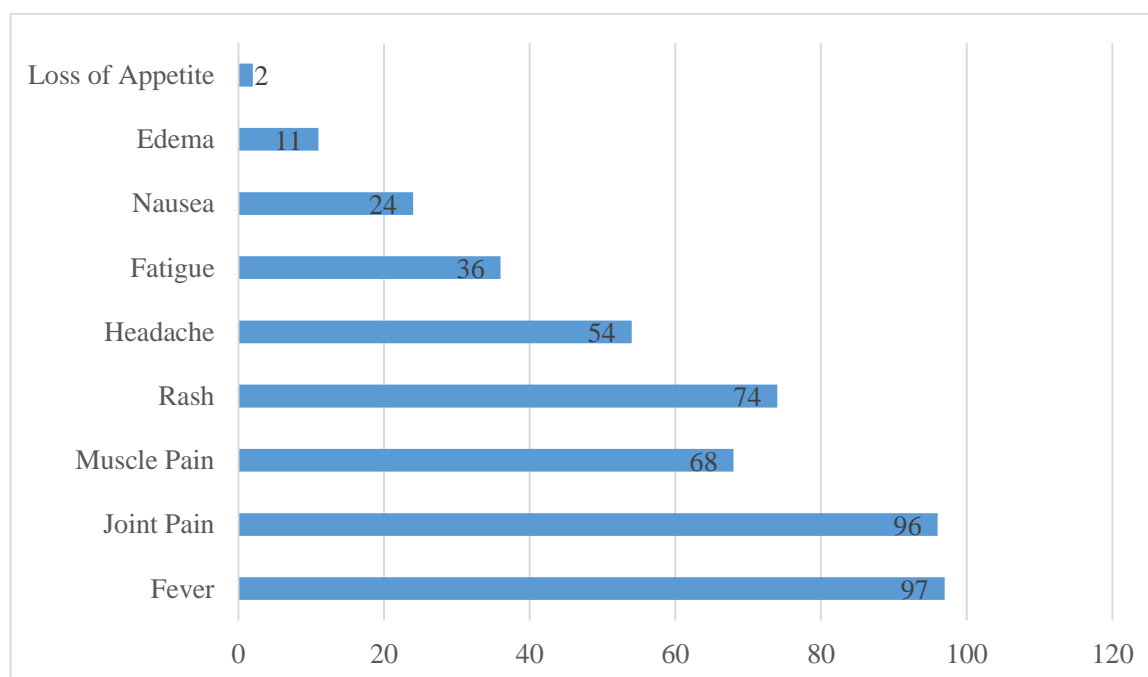


Figure 4.25: Participant's responses to the symptoms of chikungunya.

Table 4.1: Participant's responses to the symptoms of chikungunya.

Q25 Responses	Percentage
Fever	97.97%
Joint Pain	96.96%
Muscle Pain	68.68%
Rash	74.74%
Headache	54.54%
Fatigue	36.36%
Nausea	24.24%
Edema	11.11%
Loss of Appetite	2.02%

Q26: What method of treatment did you take for chikungunya?

The percentage of total participants who opted to seek treatment through home remedy was marginally higher than that of those who opted to seek treatment through hospital or physician visit, each constituting 51.52% and 48.48% of the whole respectively.

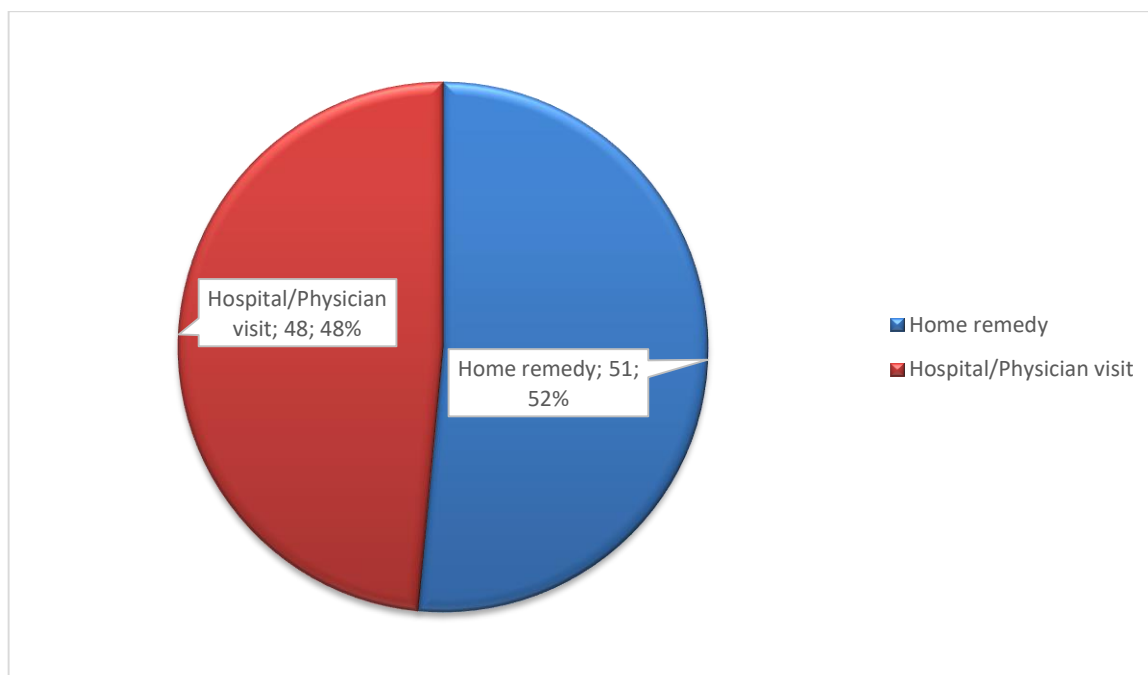


Figure 4.26: Participant's responses to the question regarding the method of treatment they had taken for chikungunya.

Q27: If you have chosen “Hospital/Physician Visit”, then what method was recommended by the physician for treatment?

Among the 48 participants who sought treatment through hospital or physician visits, 89.58% of them were recommended home treatment while 10.42% of them were recommended hospitalization.

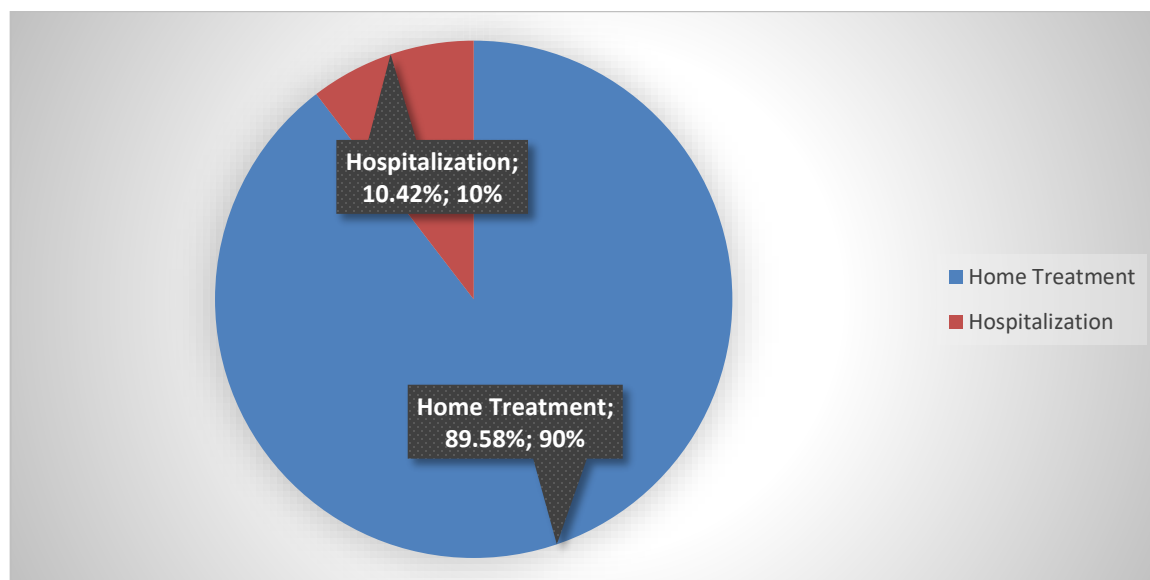


Figure 4.27: Participant's responses to the question regarding the method of treatment recommended by the physician.

Q28: What medications were you prescribed by the physician for chikungunya?

Among the 48 participants who sought treatment through hospital or physician visit, 87.5% of them were prescribed analgesics, 39.5% were prescribed oral rehydration salts, 22.9% were prescribed antibiotics, 2.08% were prescribed antiviral drugs and 2.08% were prescribed vitamin C supplement.

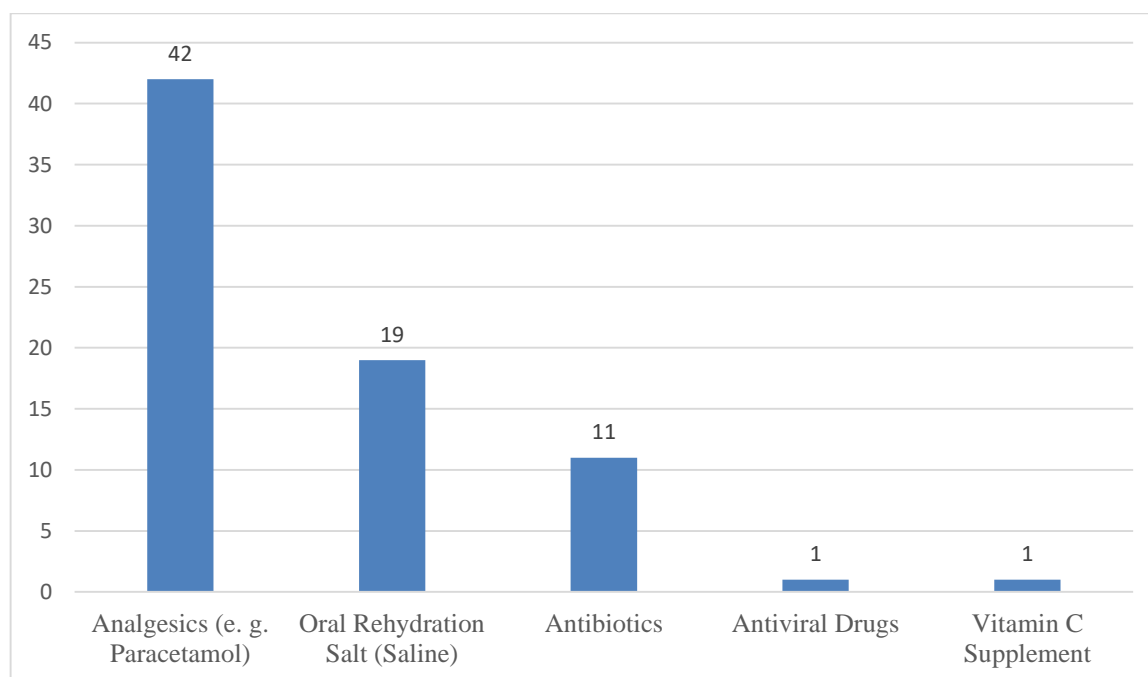


Figure 4.28: Participant's responses to the question regarding the medications prescribed by the physician for the treatment.

Table 4.2: Participant responses to the question regarding the medications prescribed by the physician for the treatment.

Q28 Responses	Count	Percentage
Analgesics (e. g. Paracetamol)	42	87.5%
Oral Rehydration Salt (Saline)	19	39.5%
Antibiotics	11	22.9%
Antiviral Drugs	1	2.08%
Vitamin C Supplement	1	2.08%
Grand Total	48	100.00%

Q29: Are you on medication for any other condition besides chikungunya?

21.21% of the participants responded to have been on medication other than those used to treat chikungunya infection whereas the remaining 78.79% of them were not on any medication besides those used for chikungunya treatment.

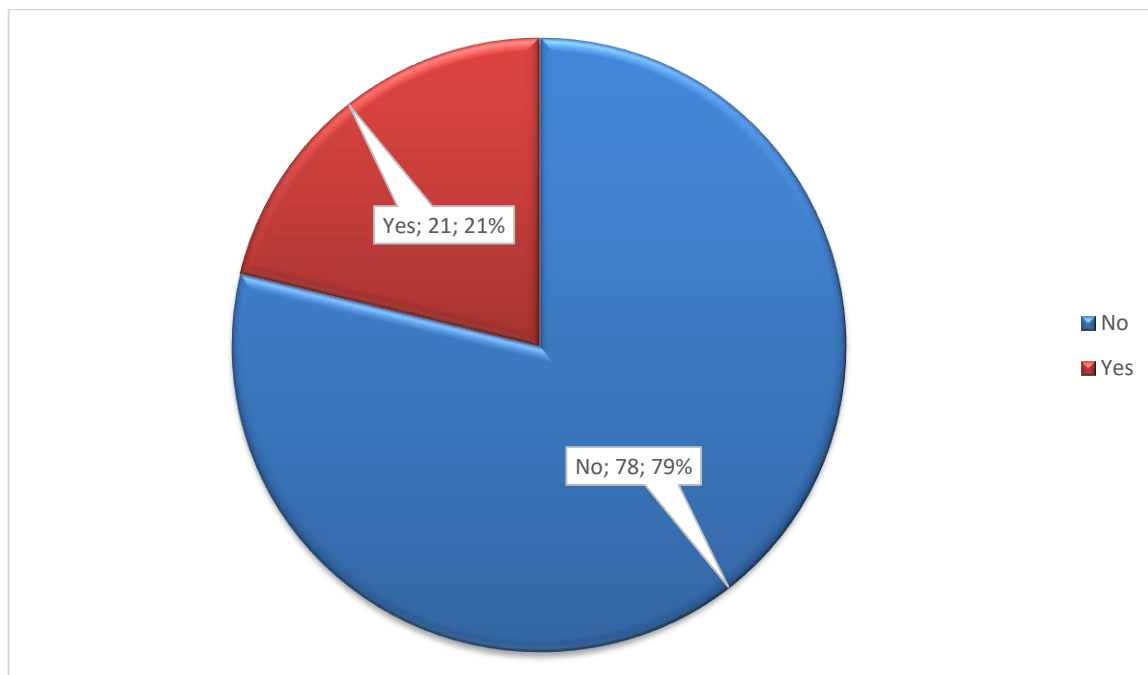


Figure 4.29: Participant's responses to the question regarding whether they are on any medication besides chikungunya.

Q30: If your answer to the above question is “yes”, then please specify the medications you are on for any other condition besides for chikungunya.

Among the 30 participants who were on medication other than those used for chikungunya treatment, 26.67% were on painkillers/NSAIDs, 20.00% were taking antidiabetic agents, 16.67% were taking antihypertensive agents, 13.33% were taking calcium supplement, 10.00% were on antihistamines, 6.67% were on heart medication, 3.33% were on proton pump inhibitors and 3.33% were on thyroid drugs.

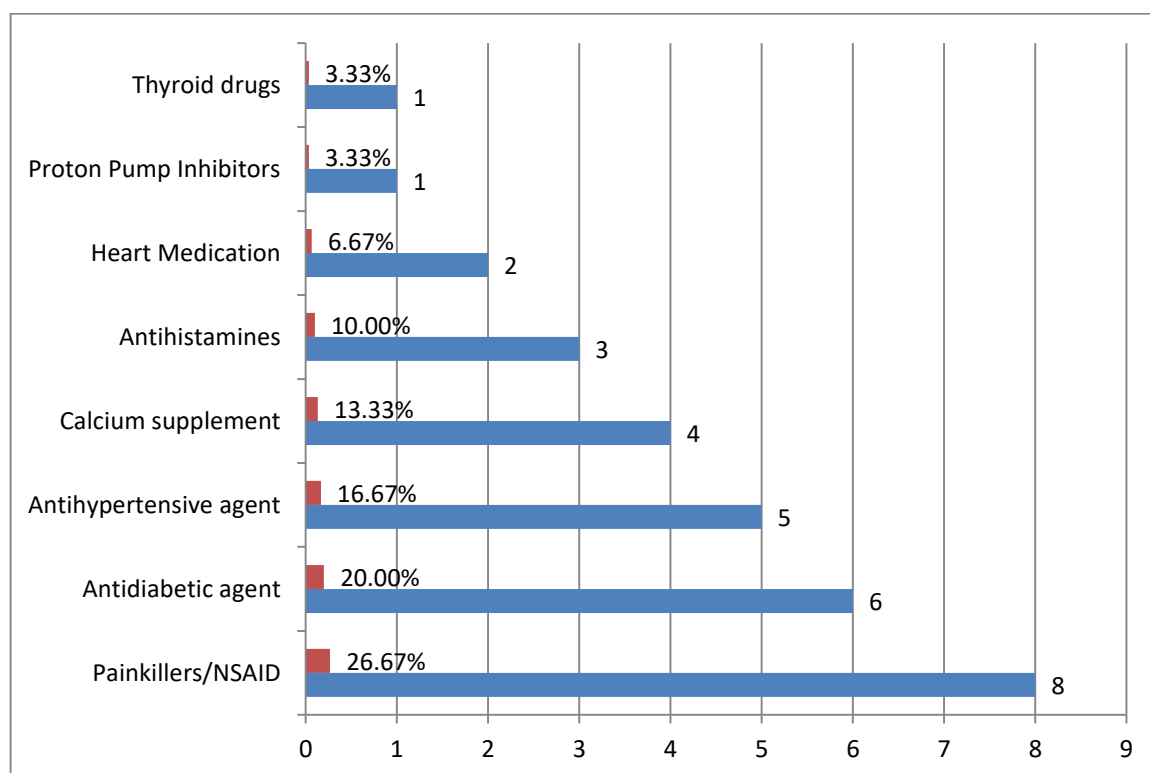


Figure 4.30: Participant's responses to the question regarding the medications they are on besides chikungunya.

Q31: Do you have any pre-existing medical condition?

A majority of the participants responded to have not been diagnosed with any pre-existing medical condition with the number constituting 65.66% of the total while the remaining 34.34% of participants responded to having been diagnosed with a pre-existing medical conditions.

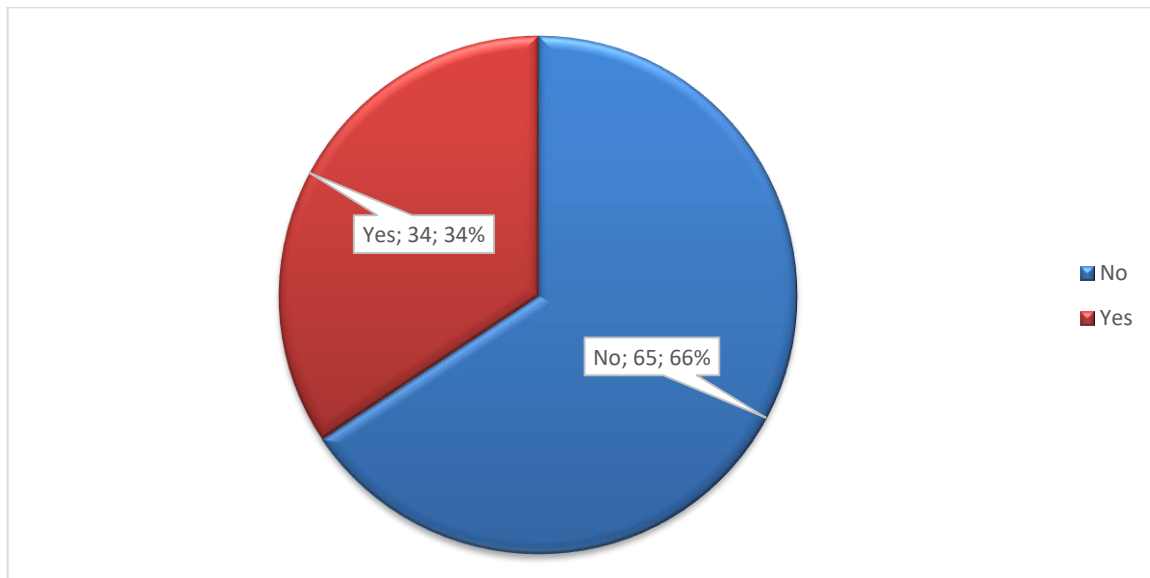


Figure 4.31: Participant's responses to the question regarding whether they have any pre-existing medical condition.

Q32: If you answer to the previous question was “yes”, then what was your pre-existing medical condition?

Among the 43 participants who claimed to have been diagnosed with pre-existing medical conditions, 37.21% claimed to be diagnosed with diabetes, 20.93% claimed to be diagnosed with rheumatoid arthritis, 13.95% claimed to be diagnosed with bone injury, 6.98% claimed to be diagnosed with high or low blood pressure, 6.98% claimed to be diagnosed with spinal cord injury, 4.65% claimed to be diagnosed with heart disease, 2.33% claimed to be diagnosed with anemia, 2.33% claimed to be diagnosed with gastroesophageal reflux disease, 2.33% claimed to be diagnosed with hypothyroidism, and 2.33% claimed to be diagnosed with migraine.

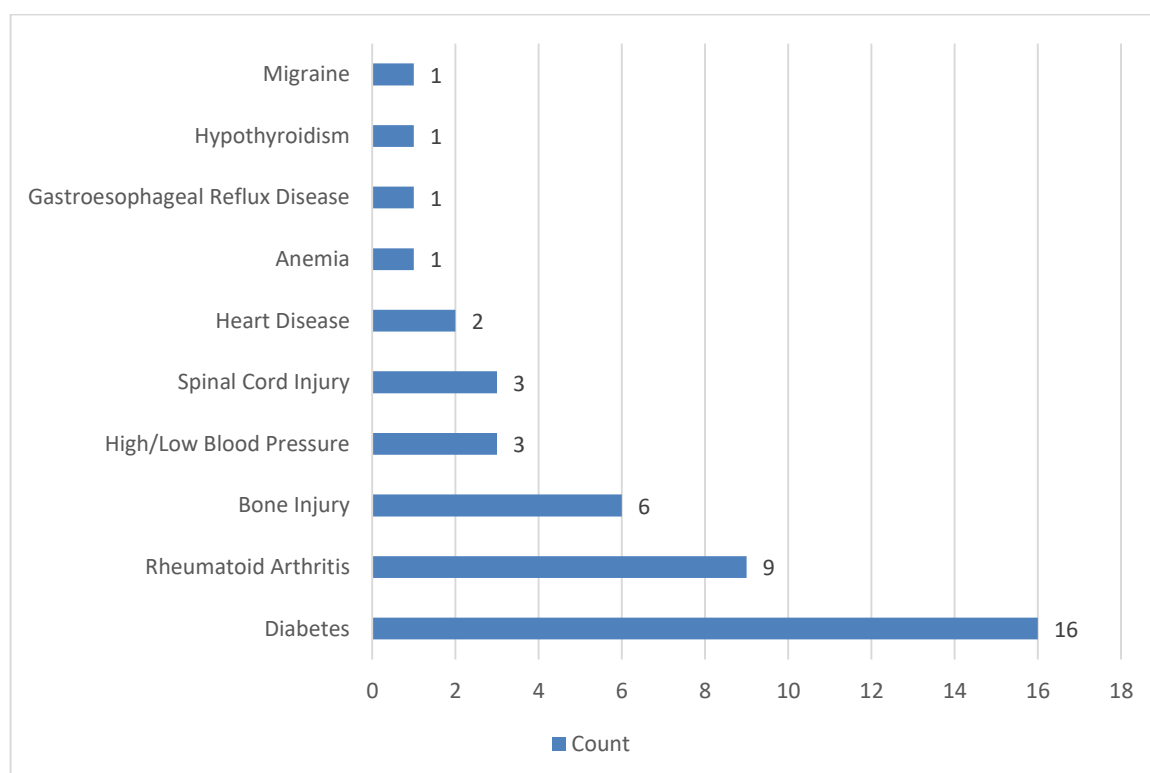


Figure 4.32: Participant's responses to the question regarding their pre-existing medical condition.

Table 4.3: Participant's responses to the question regarding their pre-existing medical condition.

Q32 Responses	Count	Percentage
Diabetes	16	37.21%
Rheumatoid Arthritis	9	20.93%
Bone Injury	6	13.95%
High/Low Blood Pressure	3	6.98%
Spinal Cord Injury	3	6.98%
Heart Disease	2	4.65%
Anemia	1	2.33%
Gastroesophageal Reflux Disease	1	2.33%
Hypothyroidism	1	2.33%
Migraine	1	2.33%
Total	43	100.00%

Q33: If you were suffering from any of the pre-existing medical conditions, were the symptoms of your medical condition worsened after being affected by chikungunya?

Among the 34 participants who claimed to have been diagnosed with a pre-existing medical condition, 64.71% claimed that the symptoms of their pre-existing medical conditions worsened after being inflicted by chikungunya whereas 35.29% claimed that they did not.

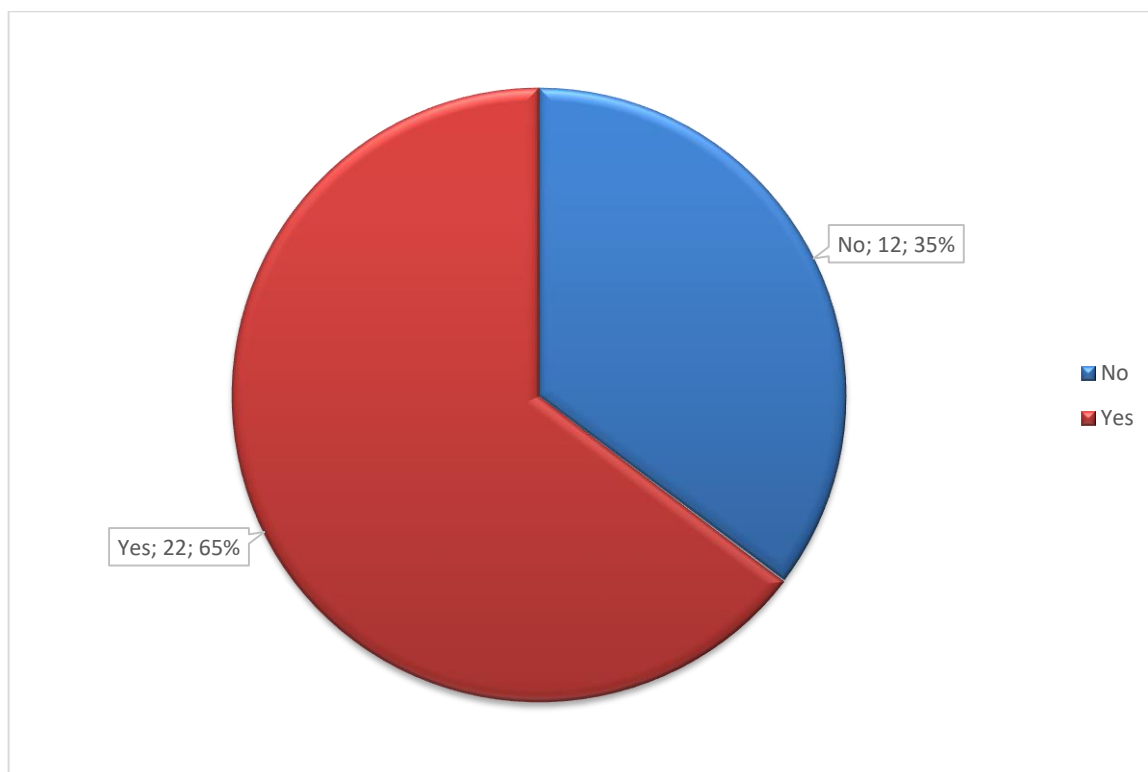


Figure 4.33: Participant's responses to the question regarding whether the symptoms of their pre-existing medical condition worsened after being affected by chikungunya.

Q34: What are the medical conditions that have arisen after being affected by chikungunya?

A total of 66 participants reported to have developed medical condition after being affected by chikungunya with 59.09% of them claiming to have been afflicted by a type of arthritis, 33.33% of them claiming to have been afflicted by skin problems, 19.69% of them claiming to have been afflicted by nerve compression syndrome, 10.60% of them claiming to have been afflicted by immunity to painkillers, 1.19% of them claiming to have been afflicted by mental disorder, edema and hair fall each respectively.

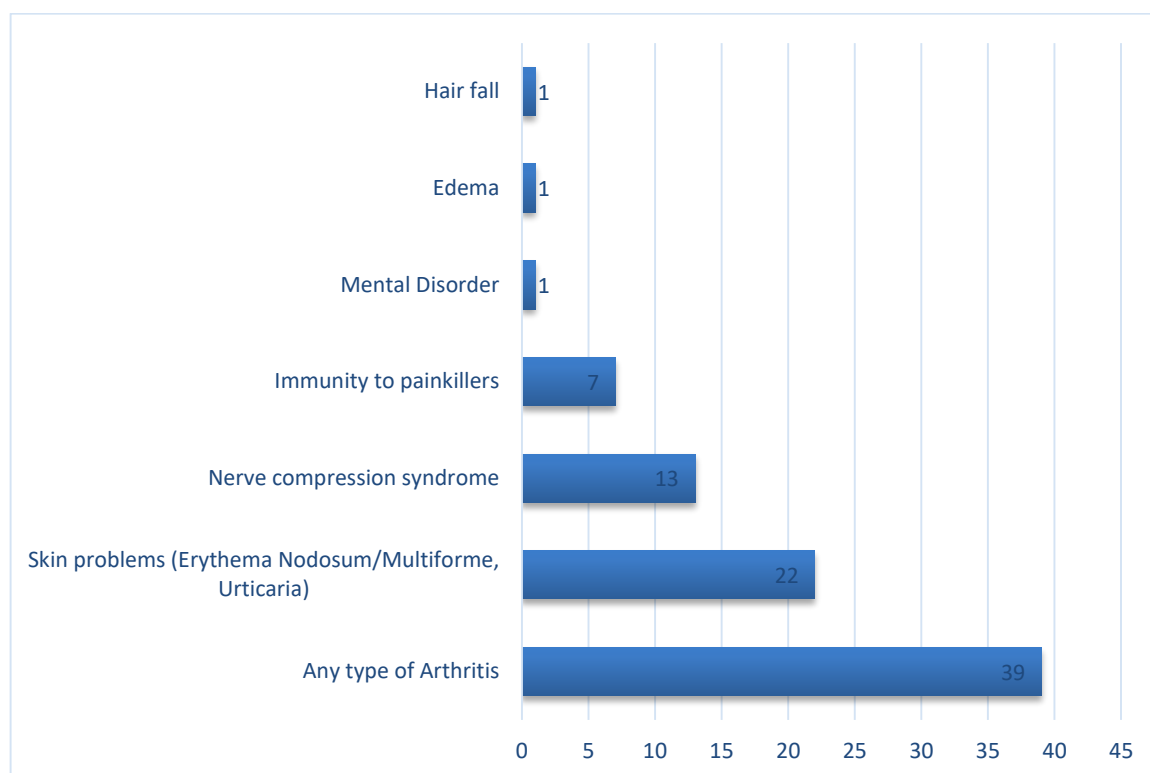


Figure 4.34: Participant's responses to the question regarding the medical conditions that have arisen after being affected by chikungunya.

Table 4.4: Participant's responses to the question regarding the medical conditions that have arisen after being affected by chikungunya.

Q34 Responses	Count	Percentage
Any type of Arthritis	39	59.09%
Skin problems (Erythema Nodosum/Multiforme, Urticaria)	22	33.33%
Nerve compression syndrome	13	19.69%
Immunity to painkillers	7	10.60%
Mental Disorder	1	1.51%
Edema	1	1.51%
Hair fall	1	1.51%
Grand Total	66	100.00%

Q35: What treatments/services would you expect to receive from your healthcare providers?

Among the 190 responses recorded from the participants regarding what treatment/services would they expect to receive from their healthcare providers, 72.72% suggested that there should be proper identification tests for chikungunya, 47.47% suggested that chikungunya patients should be prescribed other painkillers rather than only paracetamol, 37.37 % suggested that chikungunya patients should be prescribed anti-allergic drugs for rashes, 27.27% suggested that chikungunya patients should be more prioritized than other patients to visit the physician, 6.06% suggested nothing, and 1.01% suggested that physiotherapy should be given to chikungunya patients.

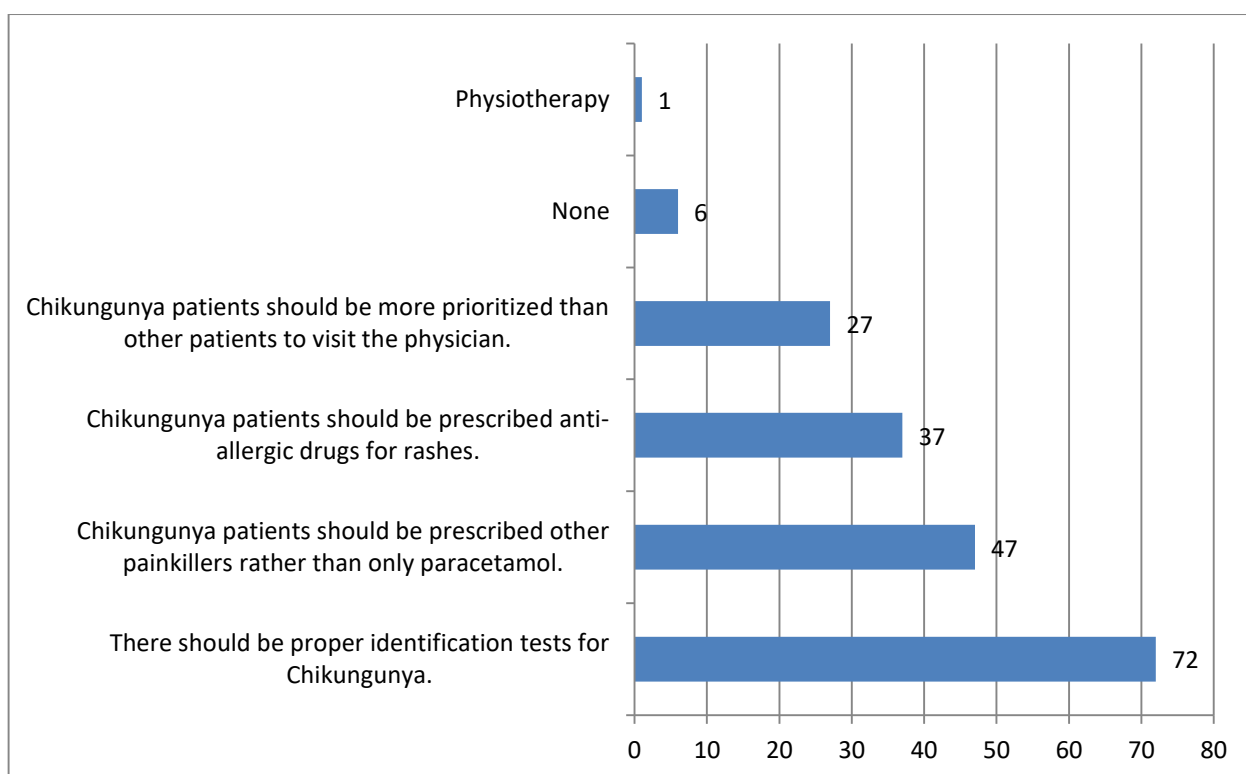


Figure 4.35: Participant's responses to the question regarding the treatment/services they would expect to receive from their healthcare providers.

Table 4.5: Participant responses to the question regarding the treatment/services they would expect to receive from their healthcare providers.

Q35 Responses	Percentage
There should be proper identification tests for Chikungunya.	72.72%
Chikungunya patients should be prescribed other painkillers rather than only paracetamol.	47.47%
Chikungunya patients should be prescribed anti-allergic drugs for rashes.	37.37%
Chikungunya patients should be more prioritized than other patients to visit the physician.	27.27%
None	6.06%
Physiotherapy should be given to chikungunya patients.	1.01%
Grand Total	100.00%

Q36: Have any of your family members gotten affected by chikungunya?

Out of the total number of 99 participants, 64.65% participants reported to have had family members afflicted by chikungunya whereas the remaining 35.35% of them reported to not have had any family members afflicted by chikungunya.

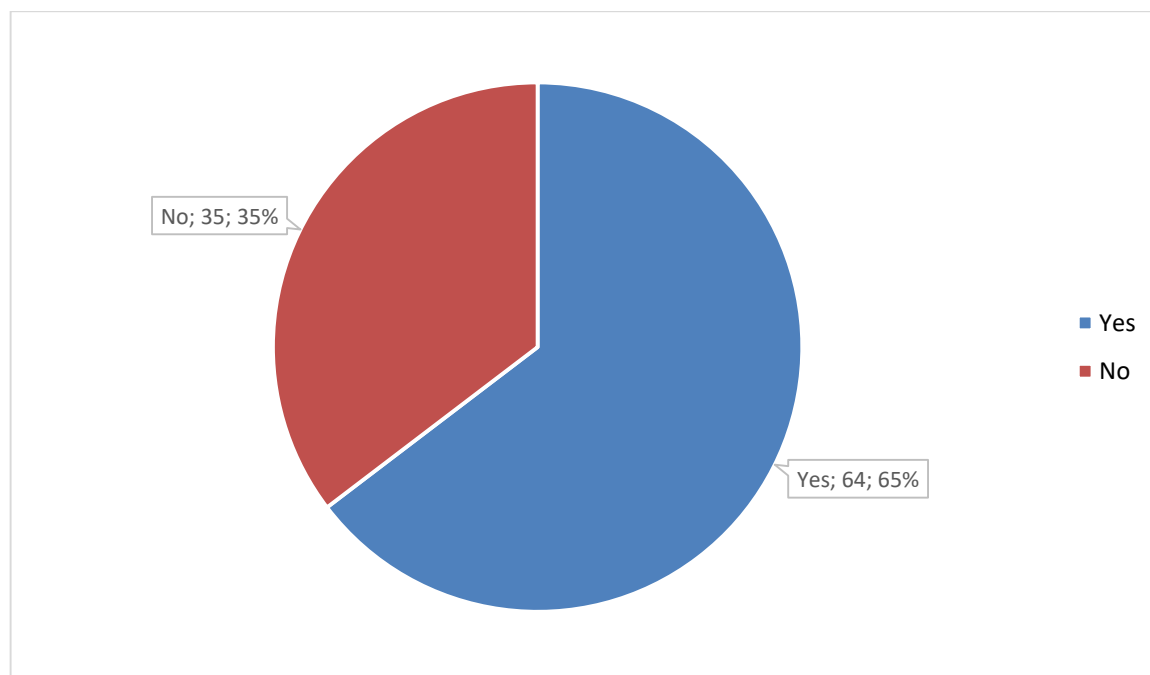


Figure 4.36: Participant's responses to the question regarding whether any of their family members got affected by chikungunya.

Q37: If your answer to the previous question was “yes”, then how many of your family member got affected by chikungunya?

Among the 63 participants with family members afflicted by chikungunya, 34.92% had one member of the family afflicted by chikungunya, 33.33% had two members of the family afflicted by chikungunya, 17.46% had three members of the family afflicted by chikungunya, and 14.29% had four members of the family afflicted by chikungunya.

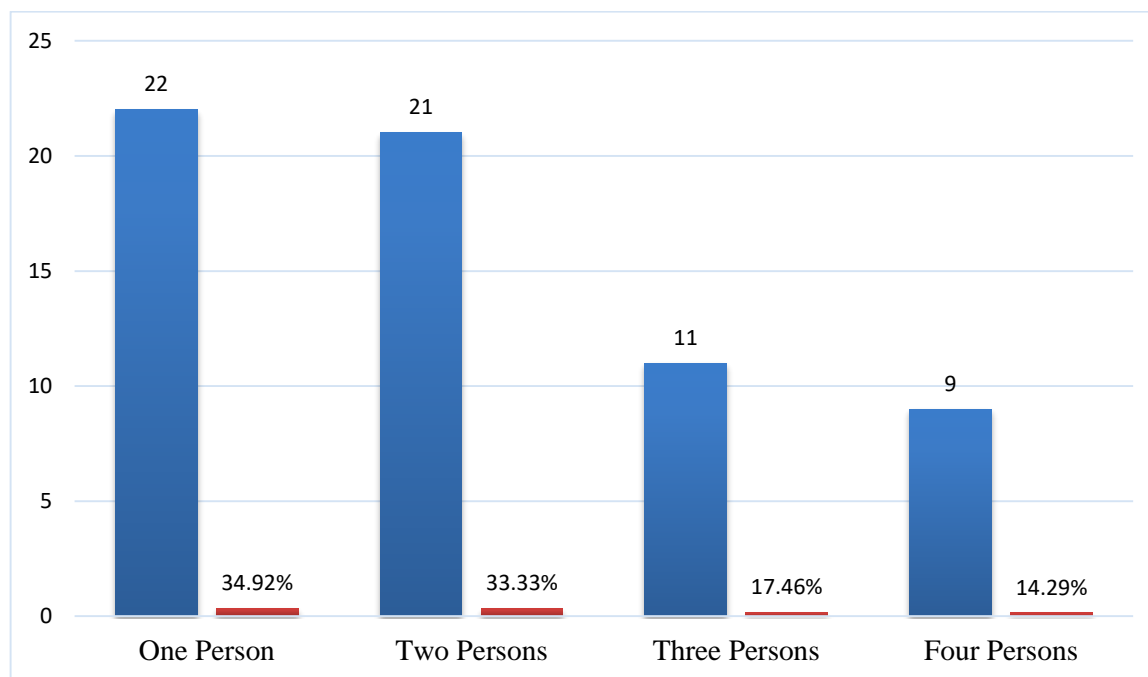


Figure 4.37: Participant's responses to the question regarding the number of their chikungunya affected family member.

Among the three locations with the highest percentages of Chikungunya-afflicted people, those living there display a higher tendency to be infected by the virus than those working in the areas.

Table 4.6: Comparison of chikungunya infection between the three highest areas of affliction in terms of living location and workplace location.

Living location	Affected family members (Average)	Workplace location	Affected family members (Average)
Mirpur	2.15	Mirpur	1.777777778
Dhanmondi	2.142857143	Dhanmondi	2.076923077
Ramna	2.1	Ramna	1.6

Q38: Fever with severe joint pain is the most common symptom of chikungunya.

Among the 99 participants, 94.95% expressed agreement to the correct statement which proclaimed that fever with severe joint pain is the most common symptom of chikungunya while 4.04% of the participants disagreed and 1.01% was neutral.

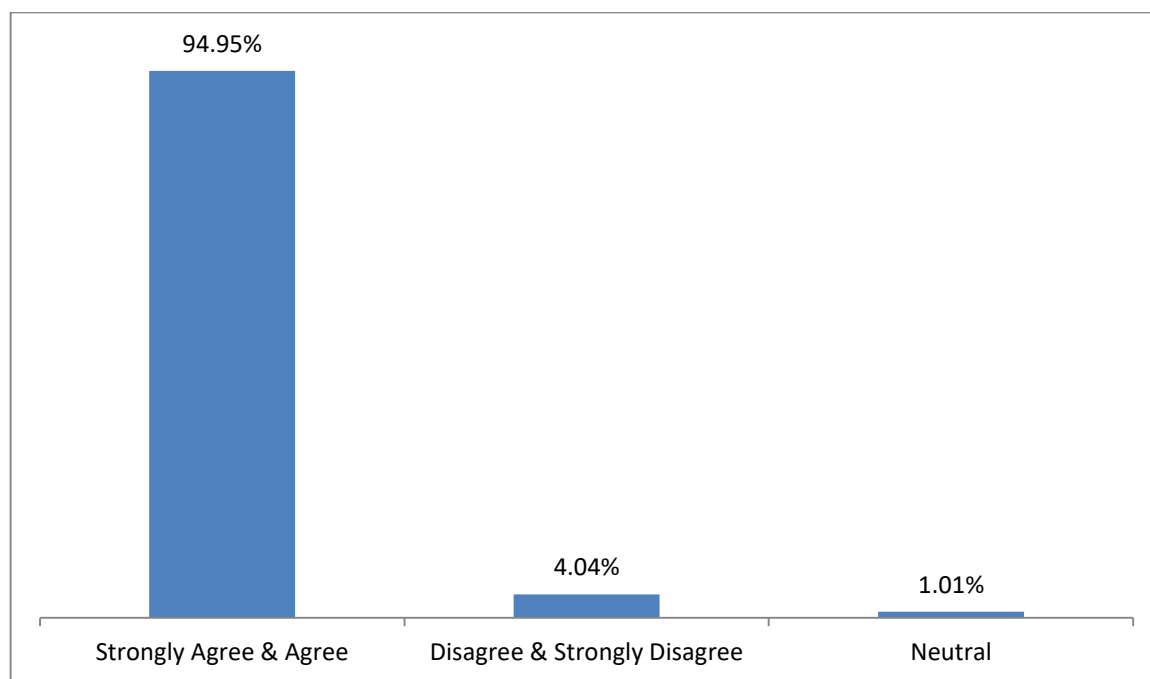


Figure 4.38: Participant's responses regarding the statement that fever with severe joint pain is the most common symptom of chikungunya.

Q39: Chikungunya usually results in permanent joint destruction and subsequent abnormalities.

42.42% of the 99 participants agreed to the false statement claiming that chikungunya usually results in permanent joint destruction and subsequent abnormalities while 32.32% of the participants disagreed and 25.25% expressed neutrality.

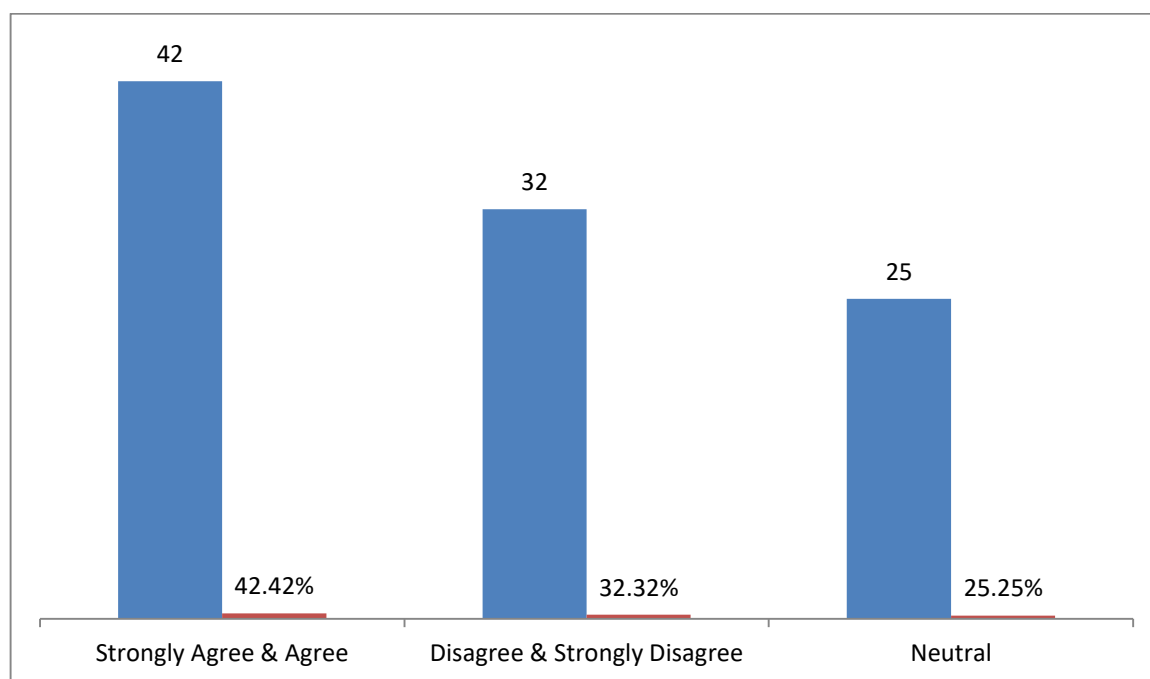


Figure 4.39: Participant's responses regarding the statement that chikungunya usually results in permanent joint destruction and subsequent abnormalities.

Q40: Chikungunya can be identified by some tests.

Regarding the aforementioned correct statement, 49.49% of the participants agreed and 41.41% remained neutral while 9.09% of them disagreed with it.

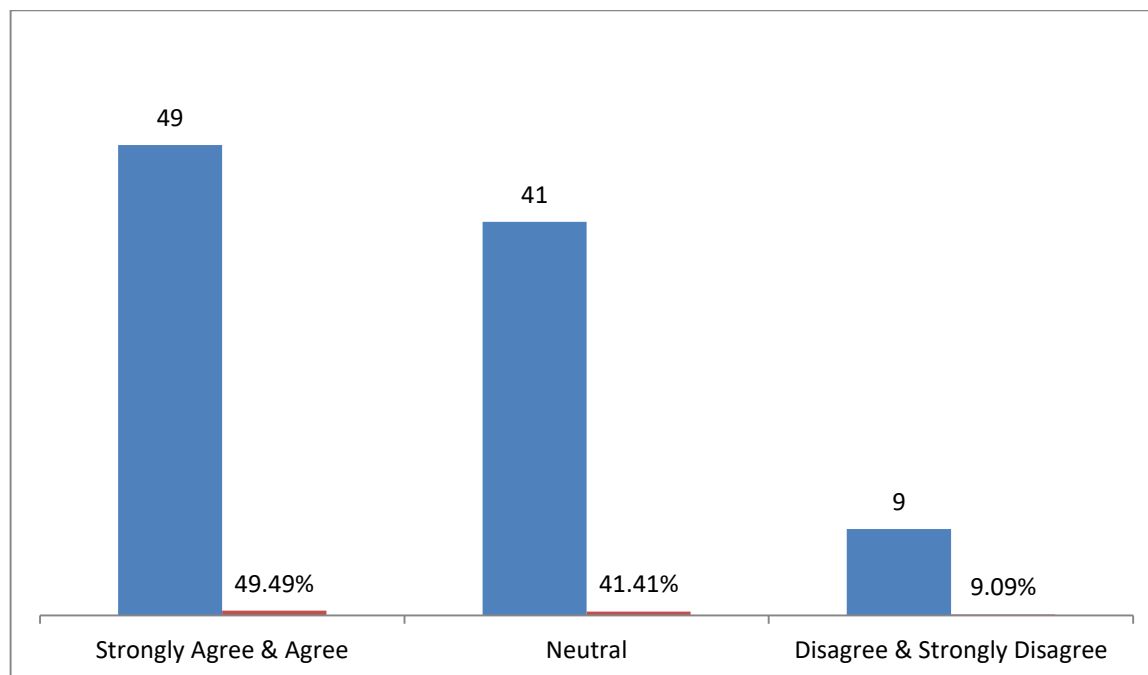


Figure 4.40: Participant's responses regarding the statement that chikungunya can be identified by some tests.

Q41: Chikungunya patients are advised to take painkillers.

More than half the participants agreed to the correct statement claiming chikungunya patients are advised to take painkillers with the opinion constituting 57.58% of total responses. Meanwhile, 24.24% of them were neutral, 18.18% disagreed.

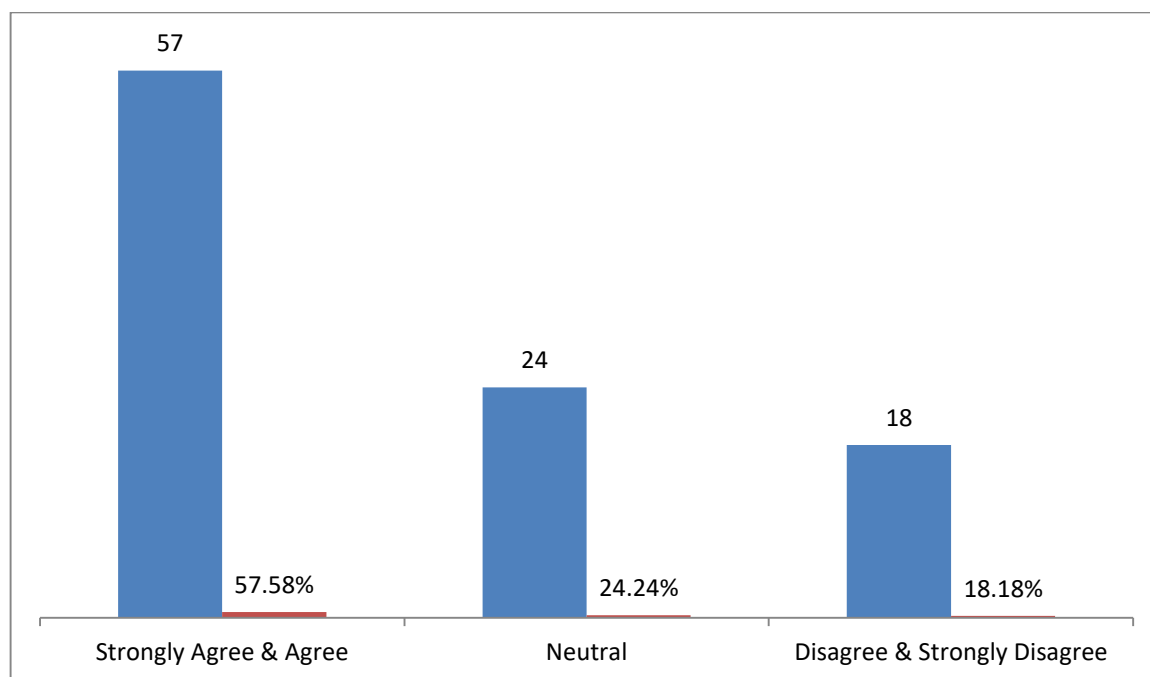


Figure 4.41: Participant's responses regarding the statement that chikungunya patients are advised to take painkillers.

Q42: Symptoms of chikungunya last for around 7-10 days or even longer.

A large majority of the people surveyed were able to accurately evaluate the statement regarding the number of days that the symptoms of chikungunya last with 87.88% either strongly agreeing or agreeing with the correct statement and only a small minority percentage of 3.03% of the total people surveyed disagreeing or strongly disagreeing with it while 9.09% of them remained neutral.

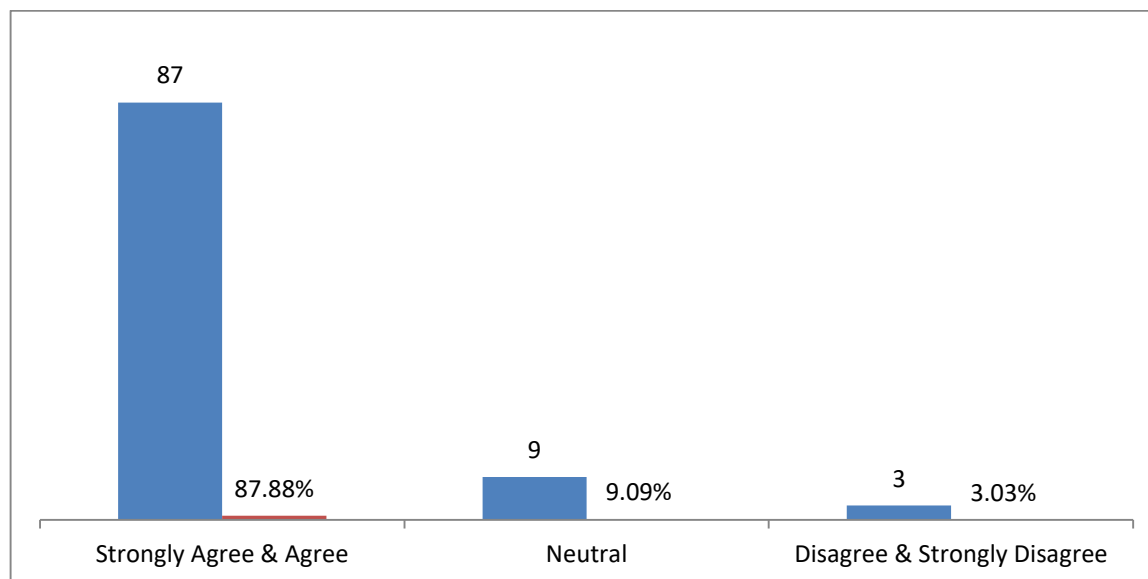


Figure 4.42: Participant's responses regarding the statement that symptoms of chikungunya last for around 7-10 days or even longer.

Q43: Symptoms of chikungunya usually begin 3-7 days after being bitten by an infected mosquito.

The amount of people who either strongly agreed or agreed with the correct statement claiming that symptoms of chikungunya usually begin 3-7 days after being bitten by an infected mosquito is close to the amount of people who remained neutral to it with the percentage of the former being slightly higher than that of the latter, 49.49% and 40.40% respectively. Meanwhile, 10.10% of the people surveyed disagreed.

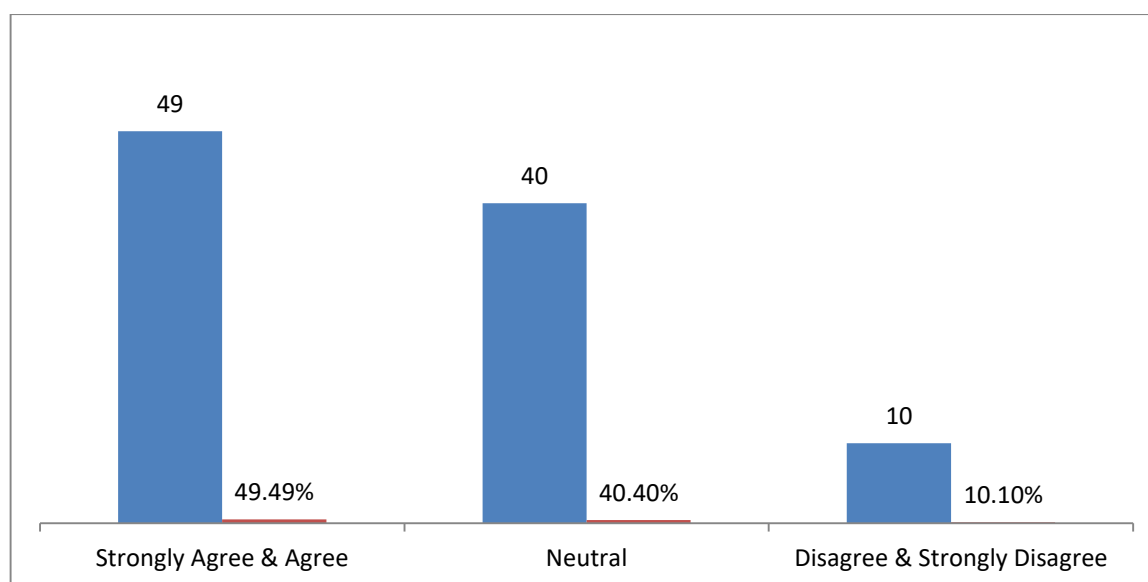


Figure 4.43: Participant's responses regarding the statement that symptoms of chikungunya usually begin 3-7 days after being bitten by an infected mosquito.

Q44: Chikungunya infection is most common in monsoon & spring season.

Majority of participants either agreed with or were neutral to the correct statement claiming that Chikungunya infection is most common in monsoon and spring season with the opinions constituting 45.45% and 48.48% of the total responses respectively. 6.06% of the participants disagreed.

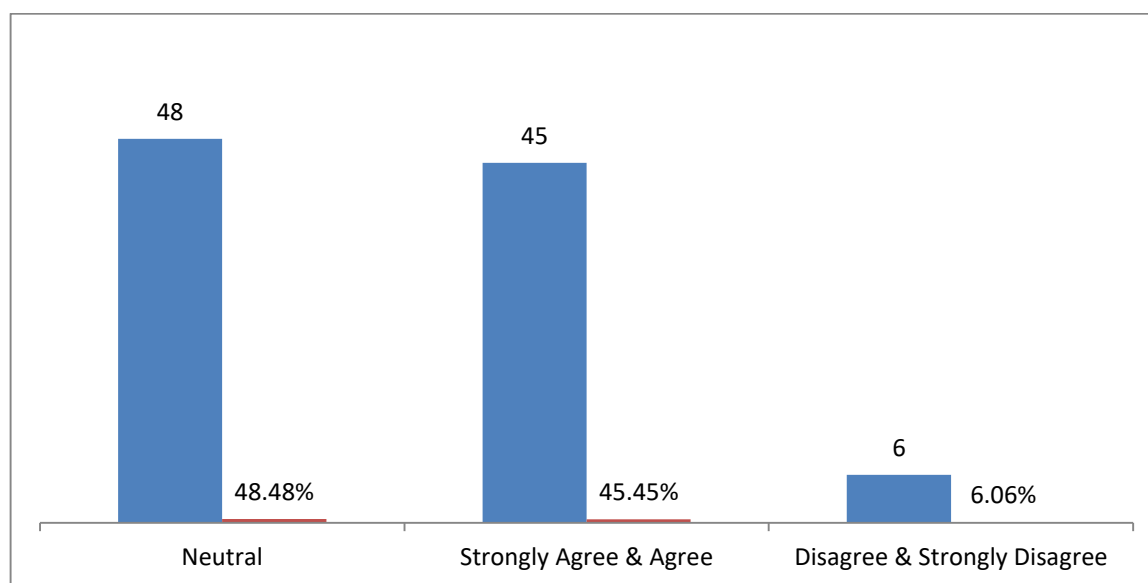


Figure 4.44: Participant's responses regarding the statement that chikungunya infection is most common in monsoon & spring season.

Q45: Water storage containers/stagnant water is the most common breeding site of chikungunya mosquito.

No participant exhibited any form of disagreement to the correct statement claiming that water storage containers/stagnant water is the most common breeding site of chikungunya mosquitoes. More than half the participants agreed with the opinion constituting 84.85% of the total responses while 15.15% expressed neutrality towards the statement.

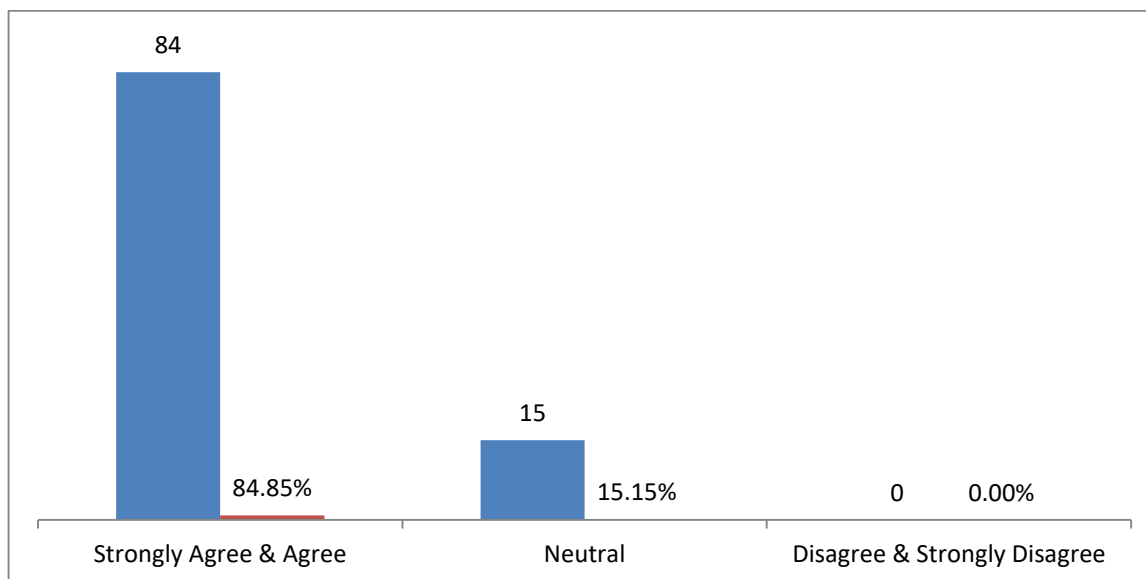


Figure 4.45: Participant's responses regarding the statement that water storage containers/stagnant water is the most common breeding site of chikungunya mosquito.

Q46: Chikungunya infection is responsible for immense sleep disturbances.

6.06% of the participants disagreed with the statement claiming that chikungunya infection is responsible for immense sleep disturbances. Meanwhile, 64.65% of the participants were in agreement with the statement with the remaining 29.29% opting to remain neutral in regards to it.

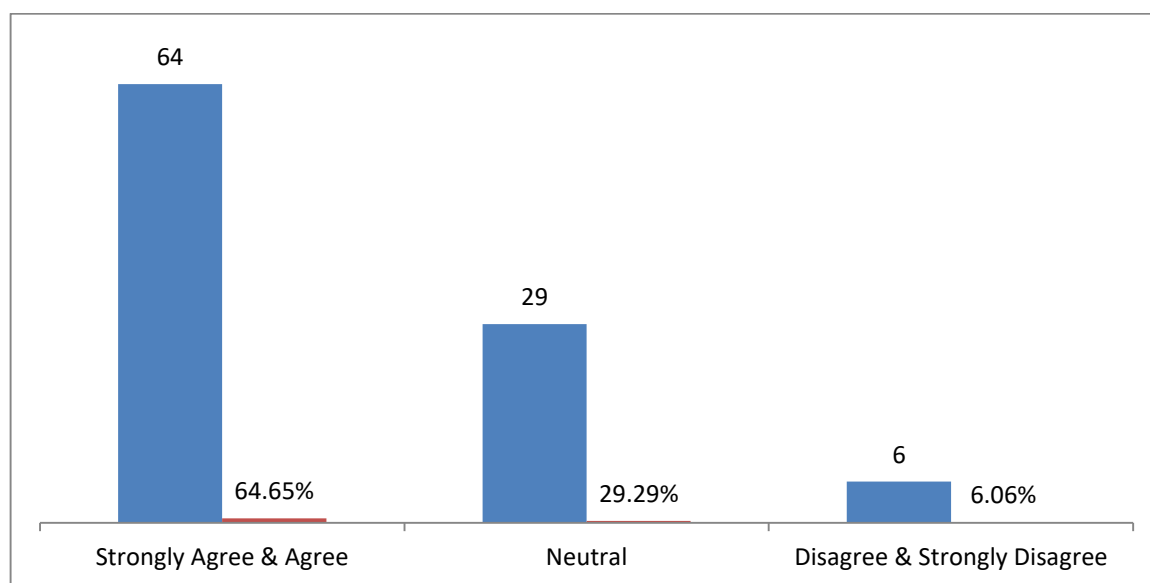


Figure 4.46: Participant's responses regarding the statement that chikungunya infection is responsible for immense sleep disturbances.

Q47: Changes in dietary patterns are observed after being affected by Chikungunya.

Nearly equal majorities of the participants either agreed or opted to stay neutral regarding a statement claiming that changes in dietary patterns are observed after being affected by Chikungunya with the opinions constituting 49.49% and 42.42% of the total responses respectively. 8.08% of the participants disagreed.

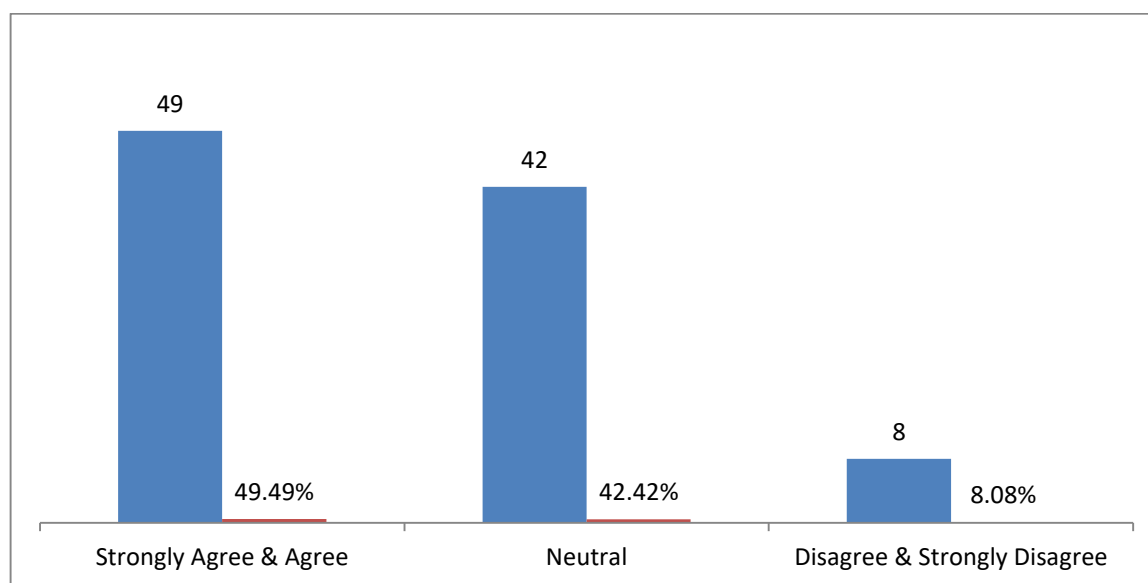


Figure 4.47: Participant's responses regarding the statement that changes in dietary patterns are observed after being affected by chikungunya.

Q48: People can get chikungunya twice or more.

The largest majority of participants agreed to the false statement claiming that people can get chikungunya twice or more with the opinion constituting 37.37% of the total responses while 40.40% were neutral with the statement, 22.22% disagreed with the statement.

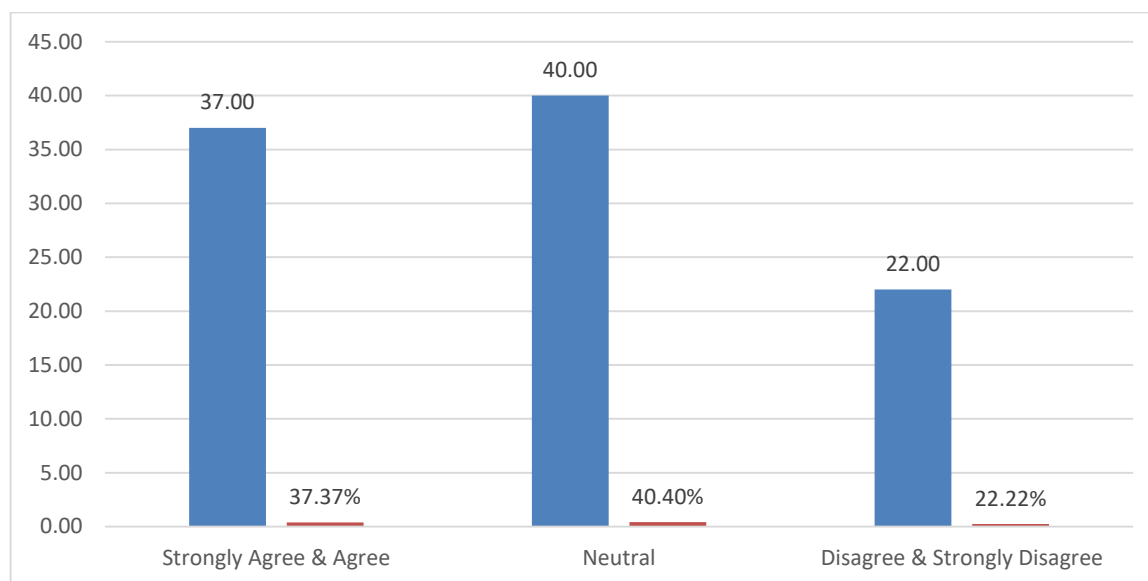


Figure 4.48: Participant's responses regarding the statement that people can get chikungunya twice or more.

58.19% of the people surveyed were in concordance with the correct opinions regarding the statements presented to them. Statements 46 and 47 were not taken into account for this calculation as the statements presented there were neither correct nor false but were subjective, varying from patient to patient.

Table 4.7: Participant's responses to the correct answers on the statements.

Statements	Number of Participants Answering Correctly
Fever with severe joint pain is the most common symptom of chikungunya.	95%
Chikungunya usually results in permanent joint destruction and subsequent abnormalities.	32%
Chikungunya can be identified by some tests.	49%
Chikungunya patients are advised to take painkillers.	58%
Symptoms of chikungunya last for around 7-10 days or even longer.	88%
Symptoms of chikungunya usually begin 3-7 days after being bitten by an infected mosquito.	49%
Chikungunya infection is most common in monsoon & spring season.	45%
Water storage containers/stagnant water is the most common breeding site of chikungunya mosquito.	85%
People can get chikungunya twice or more.	22%
Average Percentage of Correct Answers	58.19%

5 Discussion

After analyzing the responses to the questions, a conclusion can be drawn for certain is that people from Mirpur, Mohakhali, Ramna and Dhanmondi area are suffering severely from chikungunya infection, with a male to female ratio of 55.56% to 44.44% proving there is no pattern for the mosquitoes at biting any particular gender of people. While most of the affected individual were student (44.44%), there were also participants from different backgrounds and professions. Comparative analysis of different question showed that people in the household of participants inflicted by chikungunya are also more prone to be affected by chikungunya. Another response presented that people have mostly heard about chikungunya from either social network, their family, television, newspaper or their friends with a ratio of around 55%, equating each of their value in case of promoting any kind of chikungunya awareness activities. When asked about the type of infection chikungunya is, the name of the mosquito responsible and the timing of infecting the host, a slight more than half of the participants were able to correctly answer the questions even though they belong to non-healthcare backgrounds. However, around 85% of the patients were able to correctly answer that chikungunya infection does not transfer through human to human contact but almost 68% participants knew that this is a preventable disease. When again asked about the treatment plans of the disease such as the vaccine and drugs for chikungunya, approximately 67% and 59% of the participants were capable to answer them properly respectively. In addition to that participant responded fever, joint pain and rashes as the most common indication of the chikungunya infection with a response of around 97% for fever and joint pain, and around 75% for rashes. Slightly more than half of the patient preferred home treatment while the remaining participants preferred medical care even though physician recommended only paracetamol and home remedy to them anyway. Probable cause for this practice could be the lack of knowledge among people of non-healthcare professions about the chikungunya infection and the fear of how to confront it. The most alarming response were the rise of skin problems such as erythema nodosum/multiforme, urticarial etc. necessitating physician to prescribe an anti-allergic drugs to their chikungunya affected patients as a prophylactic treatment to ease their lifestyle. Furthermore, another responses revealed that a vast portion of the participants from non-healthcare backgrounds are willing to spend for chikungunya identification tests even though it adds no value to the treatment. When asked about their

expectation from the healthcare providers, observation showed that they would also be very delighted to be prescribed an anti-allergic drugs for their rashes as well as a good replacement for paracetamol due to developing immunity to it rapidly. Surprisingly, 58.19% of the people surveyed were in concordance with the correct opinions regarding the statements presented to them and the reason of being capable to be accurately answering them would be the knowledge and awareness among them that was nation-wide created due to the recent outbreaks in the country. To be aware of the chikungunya infection is of pressing importance, which in our dataset was found very positively from the participant's responses. Although the mortality rate is too low for chikungunya infection, the immense suffering is unbearable for the affected individual and more than half of the participants in our study seemed to have disturbed sleep schedules and dietary patterns. Therefore, chikungunya infected should be cautious about the disease to ease their distresses and improve their lifestyles.

6 Conclusion

Our climate has a foremost effect on the occurrence of the dengue and chikungunya infection in Dhaka as well as Bangladesh. The reason why people from Mirpur, Mohakhali, Ramna and Dhanmondi area are mostly suffering from chikungunya infection could be the presence of stagnant areas, poor environmental management and polluted lake and pond in the surroundings (Karim, Munshi, Anwar, & Alam, 2012). If a person in a family is infected with chikungunya, it is more likely that other members in the family will get infected as well which we represented in case of Mirpur, Dhanmondi and Ramna areas. Responses to the symptoms were mostly fever, joint pain and rashes which necessitates that physician must prescribe an anti-allergic drugs for chikungunya beside a painkiller which could drastically ease the lifestyle of a patient. In this project, we have incorporated some questions which will help us to guide through the longitudinal study of this disease, at least for the next 10 years ahead. Furthermore, to perform a longitudinal study we may require some responses from people who are not affected by the chikungunya but possess knowledge and awareness on it. We, fortunately, were able to gather another hundreds of data from people of healthcare backgrounds. We plan to extend this project and design it in a way that involves repeated observations over a long periods of time by collecting more responses from two different backgrounds of participants and preparing a comparative analysis of the samples.

7 References

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