

THE NATIONAL ONE HEALTH

SURVEILLANCE REPORT

BELIZE

QUATERLY REPORTING



Overview:

The National One Health Initiative

The National One Health initiative focuses on issues related to zoonosis, antimicrobial resistance (AMR), food safety, Vector-Borne Diseases, Neglected Tropical Diseases, environmental health, and other health related threats that affect the human-animal, and the environment interface. It is the national platform where multiple sectors communicate and work together to achieve better public health outcomes.

Belize National One Health Collaborating Bodies:

Ministry of Health and Wellness

Ministry of Agriculture, Food Security and Enterprise

Belize Agriculture Health Authority

Ministry of Sustainable Development, Climate Change and Disaster Risk Management

The Department of the Environment (within the Ministry of Sustainable Development, Climate Change and Disaster Risk Management)

The National Meteorological Service of Belize (within the Ministry of Sustainable Development, Climate Change and Disaster Risk Management)

Selva Maya

Belize Vector Ecology Center

Abbreviations and Acronyms:

AMR	Antimicrobial Resistance
BCRC-Caribbean	Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean
CDC	Centers for Disease Control and Prevention
FAO	Food and Agriculture Organization
OH	One Health
OHHLEP	One Health High Level Expert Panel
PAHO/WHO	Pan American Health Organization/World Health Organization
WOAH (OIE)	World Organization for Animal Health
UNEP	United Nations Environment Program

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Introduction:

“ONE HEALTH IS AN INTEGRATED, UNIFYING APPROACH THAT AIMS TO SUSTAINABLY BALANCE AND OPTIMIZE THE HEALTH OF PEOPLE, ANIMALS AND ECOSYSTEMS.

It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent.

The approach mobilizes multiple sectors, disciplines, and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.”

-One Health High Level Expert Panel (OHHLEP, Dec 2021)

In line with the underlying ethic of ‘One Health’ (OH), the National OH Committee offers a unification of the medical, agricultural, veterinary, and environmental sectors with the establishment of collaborative ventures in clinical care, surveillance and control of cross-species disease, education, and research into disease pathogenesis, diagnosis, therapy and vaccination. The concept encompasses the human population, domestic animals and wildlife and the impact that environmental changes (‘environmental health’) such as climate change and variability will have on these populations.

Belize’s recent accomplishment to establishing an online National OH Platform on November 24th, 2022 (<https://onehealth.gov.bz/>) places it at the cutting edge of innovation and high-level adaptation of information exchange policy. The OH Committee involves stakeholders from the Ministry of Agriculture, Food Security, and Enterprises, Belize Agriculture Health Authority, Ministry of Health and Wellness, Ministry of Sustainable Development, Climate Change and Disaster Risk Management and the Department of the Environment, (DOE), National Meteorological Services, Selva Maya, Belize Vector and Ecology Center (BVEC) in partnership with the Pan American Health Organization/ World Health Organization (PAHO/WHO). The OH platform aims to “promote, improve, and defend the health and well-being of all species by enhancing cooperation and collaboration between physicians, veterinarians, agronomists, environmental scientists, and other relevant professionals by fostering strengths in leadership and management to achieve these goals.” It is currently being updated to serve as an alert platform for priority pathogens and major health threats in the country with support from international partners such as the Centers for Disease Control and Prevention (CDC), The Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean (BCRC-Caribbean) and the World Organization for Animal Health (OIE).

This proposed report aims to strengthen cross-sectorial collaboration and transdisciplinary knowledge exchange in surveillance data integration and analysis, along with the One Health (OH) objective of improving health and well-being. It provides a national joint framework for data sharing to promote health at human animal-environment interface to address the need for targeted investments to prevent, prepare,

detect, respond to, and recover from issues like diseases with pandemic potential, it facilitates efficient exchange of knowledge and sharing of resources, guidelines, tools and experiences promoting the adoption of the OH concept primarily in relation to surveillance data.

As a region, Latin America and the Caribbean has recorded overall increases in multidrug- and extensively drug-resistant organisms, which results in adverse outcomes in human health and increasing socioeconomic burden. The country has developed a National Action Plan on AMR (2018) and has received support from the Pan American Health Organization/ World Health Organization (PAHO/WHO) to detect and characterize resistance. It was one of the first countries in the Caribbean to contribute to the regional surveillance network, The Latin American and Caribbean Network for Antimicrobial Resistance Surveillance (RELAVRA+). As of 2022, there have been three additional CPE isolates of two other mechanisms (VIM and KPC) characterized using GeneXpert at CML. The country also continues to build capacity in infection prevention and control (IPC) and disease surveillance to bolster health services to detect and respond to significant outbreaks in the long-term.



The Ministry of Health Mission vision is to provide quality health care and wellbeing for all now and beyond. Its mission aims to provide quality, affordable, comprehensive health services: within a resilient environment that promotes equal health and wellbeing for all.

Vector-borne diseases.

Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors. The burden of these diseases is highest in tropical and subtropical areas, and they disproportionately affect the poorest populations. Therefore, major outbreaks of dengue, malaria, chikungunya, yellow fever and Zika have afflicted populations, claimed lives, and overwhelmed health systems in many countries. Distribution of vector-borne diseases is determined by a complex set of demographics, environmental and social factors.

List of vector-borne diseases, according to their vector

The following table is a non-exhaustive list of vector-borne disease, ordered according to the vector by which it is transmitted. The list also illustrates the type of pathogen that causes the disease in humans.

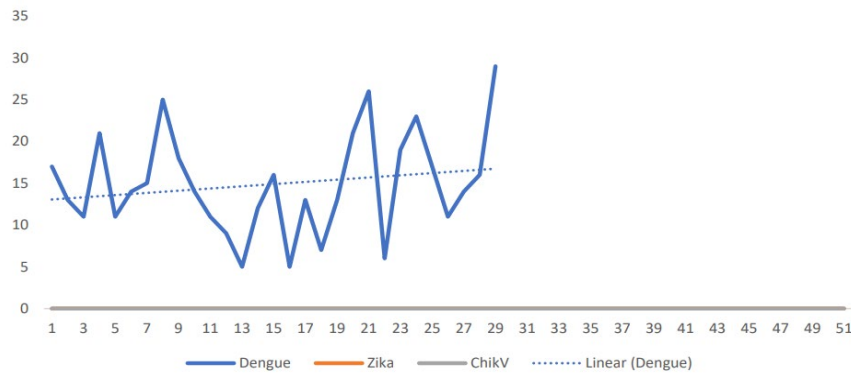
Reporting Period January 2024 to March 2024

Vector	Disease caused	Type of pathogen	Number of cases	Location of cases
mosquitoes	Chikungunya	Virus	0	0
<i>Aedes albopictus</i>				
<i>Aedes aegypti</i>	Dengue	Virus	468	Corozal 20, Orange Walk 45, Belize 31, Cayo 100, Stann Creek

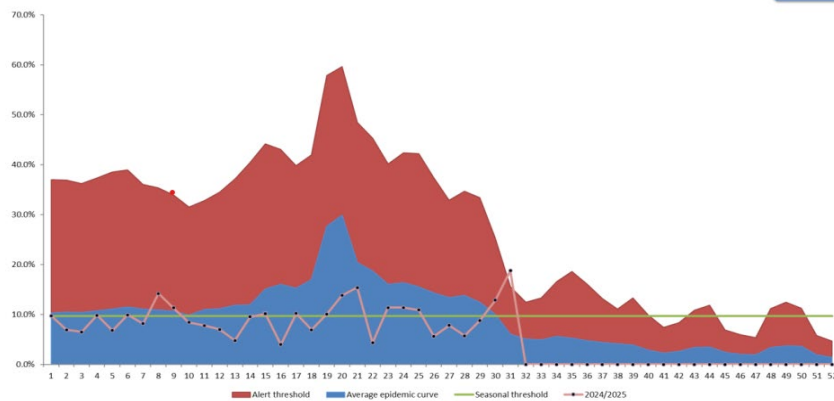
				82, Toledo 190
Culex quinquefasciatus in the (Americas), in Africa (Anopheles)	Lymphatic filariasis	Parasite	0	0
Aedes and Culex mosquitoes	Rift Valley fever	Virus	0	0
Aedes or Haemagogus species mosquitoes	Yellow Fever	Virus	0	0
Aedes species mosquito (Ae. aegypti and Ae. albopictus). These are the same mosquitoes that spread dengue and chikungunya viruses.	Zika	Virus	0	0
Anopheles mosquito species	Malaria Lymphatic filariasis	Parasite	0	0
Culex species mosquitoes, particularly Culex tritaeniorhynchus.	Japanese encephalitis	Virus	0	0
In the Americas, it is Culex quinquefasciatus	Lymphatic filariasis	Parasite	0	0
Culex mosquitoes	West Nile fever	Virus	0	0
Aquatic snails	Schistosomiasis (bilharziasis)	Parasite	0	0

Blackflies	Onchocerciasis (river blindness)	Parasite	0	0
Fleas	Plague (transmitted from rats to humans)	Bacteria	0	0
Hematophagous fleas	Tungiasis	Ectoparasite	0	0
Lice	Typhus	Bacteria	0	0
Lice	Louse-borne relapsing fever	Bacteria	0	
Sandflies	Leishmaniasis	Parasite	1	All lab confirmed cases (Cayo I)
Sandflies	Sandfly fever (phlebotomus fever)	Virus	0	0
Ticks	Crimean-Congo haemorrhagic fever	Virus	0	0
Ticks	Lyme disease	Bacteria	0	0
Ticks	Relapsing fever (borreliosis)	Bacteria	0	0
Ticks	Rickettsial diseases (eg: spotted fever and Q fever)	Bacteria	0	0
Ticks	Tick-borne encephalitis	Virus	0	0
Ticks	Tularaemia	Bacteria	0	0
Triatome bugs	Chagas disease (American trypanosomiasis)	Parasite	0	0
Tsetse flies	Sleeping sickness (African trypanosomiasis)	Parasite	0	0

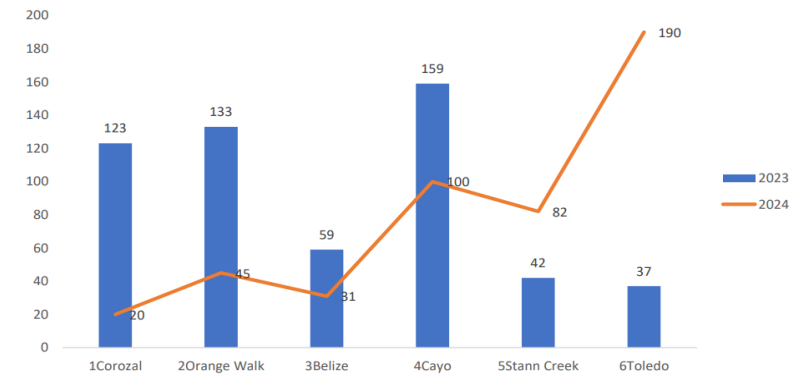
Graph 1: Country Lab Confirmed Arboviruses, EW 1-30, 2024 Belize



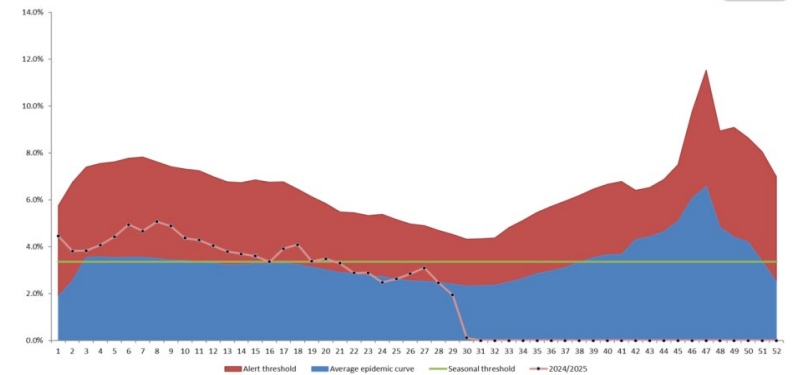
Country Epidemic Baseline Dengue, EW 1-30, 2024



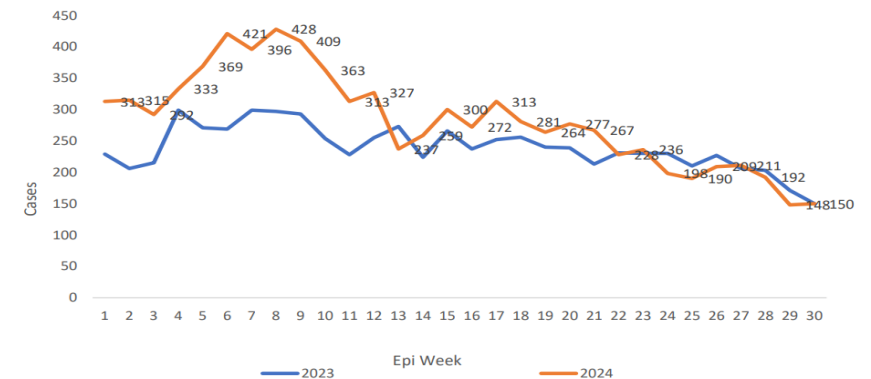
Graph 3a: Dengue Laboratory Confirmed Cases by District, EW 1-30, 2023-2024, Belize



Country Acute Respiratory Infections <5, EW 1-30, 2024, Belize



Graph 4a: Acute Respiratory Infections <5 by EW 1-30, 2023-2024, Belize



At the end of Epidemiological Week (EW)30 July 31, 2024, 468 confirmed cases of Dengue were reported by the Epidemiology Unit, an 8.3% cumulative increase compared to the end of EW 29 with 432 confirmed cases of Dengue. Epi week 29 and 30 recorded the highest number of cases reported (29 and 30 cases respectively) since the beginning of the year. Additionally, no laboratory confirmed cases for Chikungunya, and Zika have been reported since the beginning of the year (Graph 1). The Toledo District and Cayo districts reports the highest number of confirmed cases with 190 and 100 cases respectively (Graph 2 & 3). The <5 years acute respiratory infections (ARI) country epidemic baseline shows that we continue at ALERT threshold up to the end of Epi Week 30 8,511 ARI infections have been reported in the Under 5 age group up to the end of EW 30, a 1.8% cumulative weekly increase compared to end of EW 29 with 8,361 ARI infections. A weekly increase is observed between EW 29 and EW 30, 2024 (Graph 4). Information is provided by the Ministry of Health and Wellness (MOHW) and the National Meteorological Service under the Ministry of Sustainable Development Climate Change and Disaster Risk Management.

Graph 3c: Dengue Cases by Incidence Rate and District, EW 1-30, 2024, Belize

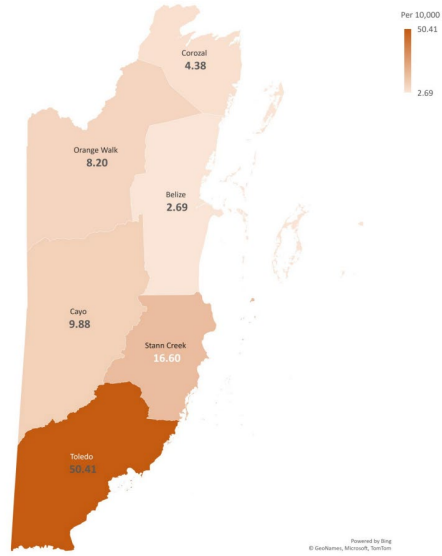
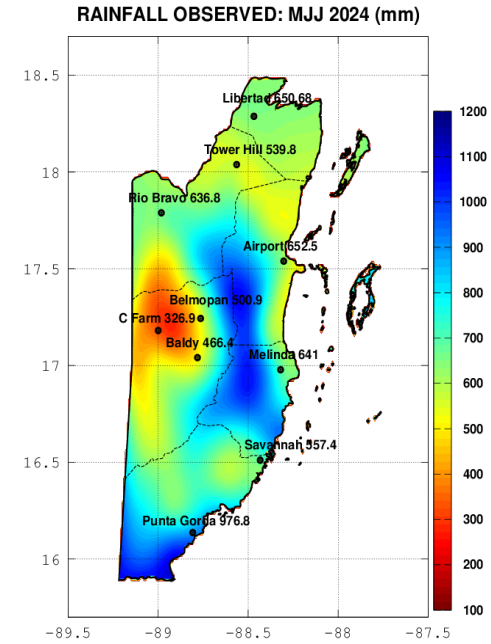


Figure 3 - Rainfall Observation - First Quarter

Figure 2 - Rainfall Average - second Quarter 2024



RAINFALL OBSERVED: MJJ 2024 (%ABOVE/BELOW AVERAGE)

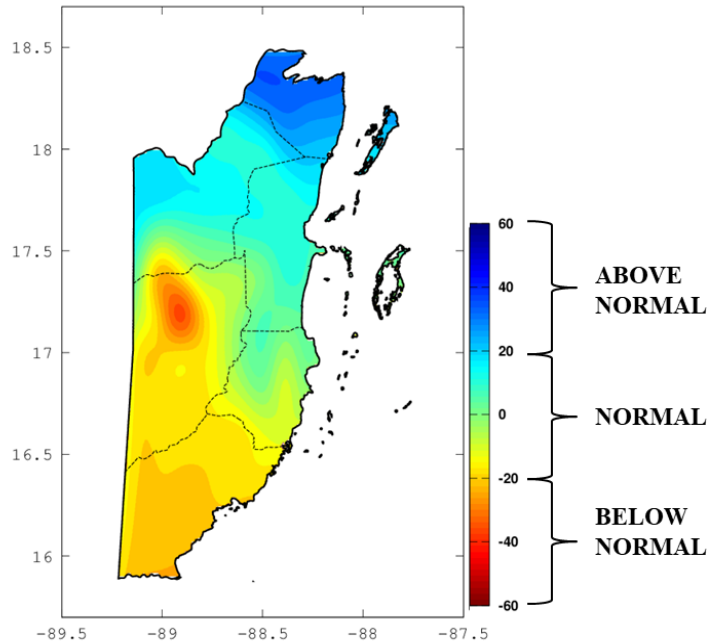


Figure 1 illustrates Dengue cases by incidence rate and District during the epidemiological week 1-30 (EW 1-30, 2024 Belize); Toledo District had the highest incidence followed by the Cayo District with 50.41, and 16.6 cases per 10,000 population respectively. The national Dengue data showed we were currently below the seasonal threshold at the end of EW 30. However, all districts are on Alert at the end of EW 30, except for the Orange Walk District.

Correlation with environmental factors: Figure 2 and 3 maps, indicate that rainfall was mostly below normal except for Central Farm, Belmopan, Savannah and Punta Gorda which saw above normal rainfall during the second quarter of the reporting period, suggesting that potential mosquito habitats (e.g. water holding containers such as drums and tires) are still present and conducive to the proliferation of mosquitoes.

Recommendations:

Given the observed data and the 2024 hurricane season, the following actions are recommended to mitigate the proliferation of Dengue cases.

1. Launch a public awareness campaign across all districts, emphasizing the importance of eliminating mosquito breeding sites. This includes:
 - Regularly cleaning yards.
 - Properly disposing of tires and unwanted containers that can collect water.
 - Ensuring that water storage containers are tightly covered.
 - Cleaning of drains and immediate periphery around home.
2. Organize community clean-up days, especially in the districts of Stann Creek, Cayo and Toledo, where the risk is highest. Encourage local participation to:
 - Clear stagnant water
 - Remove debris and other potential mosquito breeding grounds.
3. Increase vector surveillance and control efforts in the high-incidence areas. This includes:
 - Regular monitoring of mosquito populations.
 - Establishing a threshold for landing rate counts to justify ground spraying-e.g. >5 bites per minute.
 - Applying larvicides to water bodies that cannot be drained.
4. With the onset of the hurricane season, ensure that disaster preparedness plan include specific measures for Dengue prevention. This may involve:
 - Pre-positioning mosquito control resources.
 - Providing guidelines for post-hurricane clean-up to prevent mosquito breeding
5. Continuously monitor temperature trends and provide timely updates and advisories on expected changes in mosquito activity based on temperature variations and rainfall.

MINISTRY OF HEALTH AND WELLNESS
NATIONAL DRINKING WATER QUALITY LABORATORY

April 2024 – July 2024 Report

National Drinking Water Quality Monitoring Program

This national program involves the collection and analysis of water samples collected from 4 routine major areas, namely:

- *Belize Water Services systems*
- *Rudimentary water systems*
- *Handpumps (These are rapidly becoming obsolete)*
- *Purified water Operations/Bottled Water Producers*

Water samples are also collected on a needs basis from Other Sources dictated by requests or as a part of investigation from:

- *Private wells*
- *Rainwater tanks*
- *Private water systems*
- *Rivers, creeks, etc.*
- *Recreational areas*

Table 1 – National Water Supply Systems for monitoring

Region	No. of BWS	No. of RWS	No. of BWP	No. of HP
Corozal (Northern)	1	12	15	19(approx.)
Orange Walk (Northern)	2	17	25	10(approx.)

Belize (Central)	5	5	33	20(approx.)
Cayo (Western)	4	21	19	28(approx.)
Stann Creek (Southern)	2	26	8	0
Toledo (Southern)	2	29	5	39(approx.)
Total	16	110	105	116(approx.)

BWS – Belize Water Services systems, RWS – rural water systems, BWP – bottled (purified) water plants, HP – handpumps.

Table 2 – Monitoring Frequency Schedule

Monitoring Programme	Monthly	Quarterly	Yearly
Urban Water Systems	X		
Rudimentary Water Systems	X	X	
Bottled Water	X		
Handpumps			X
Ice	X		
Other sources	As requested, required		

Table 3 - Total No. of samples Collected by District January- July 2024

District	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Total
Belize	92	106	85	60	72	45	142						602
Corozal	61	48	12	44	50	15	28						258
Orange Walk	76	76	55	61	45	20	37						370
Cayo	76	89	74	67	55	25	108						494
Stann Creek	26	34	24	17	20	5	10						136
Toledo	12	9	11	32	42	13	30						149
Total	343	362	261	281	284	123	355						2009

Pie Chart 1: Total No. of Samples Collected by District January - July 2024

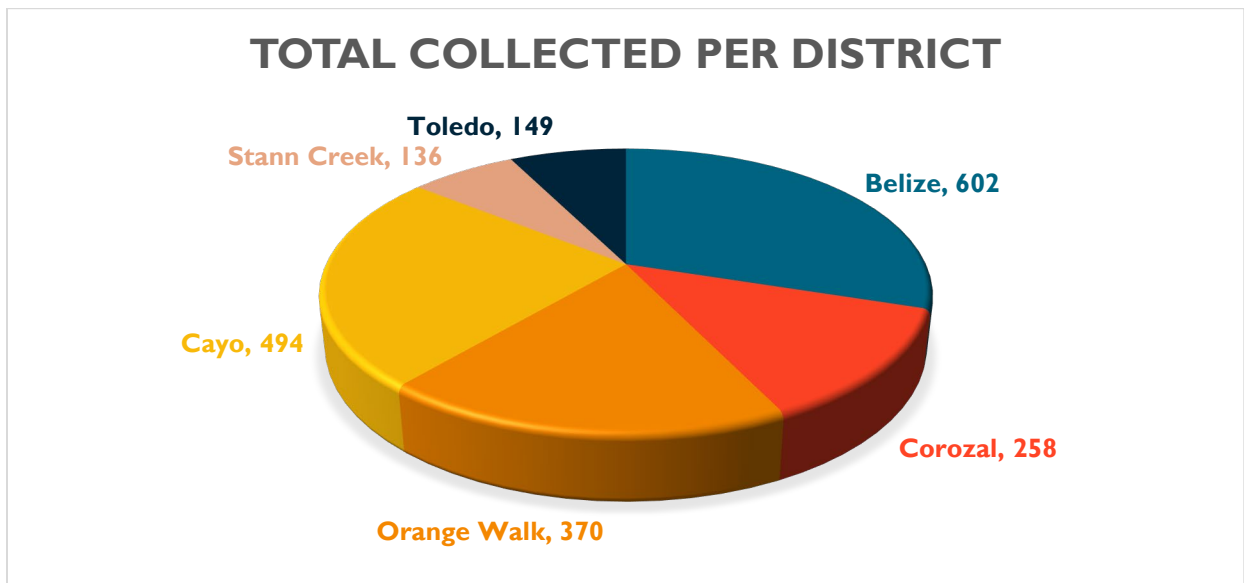
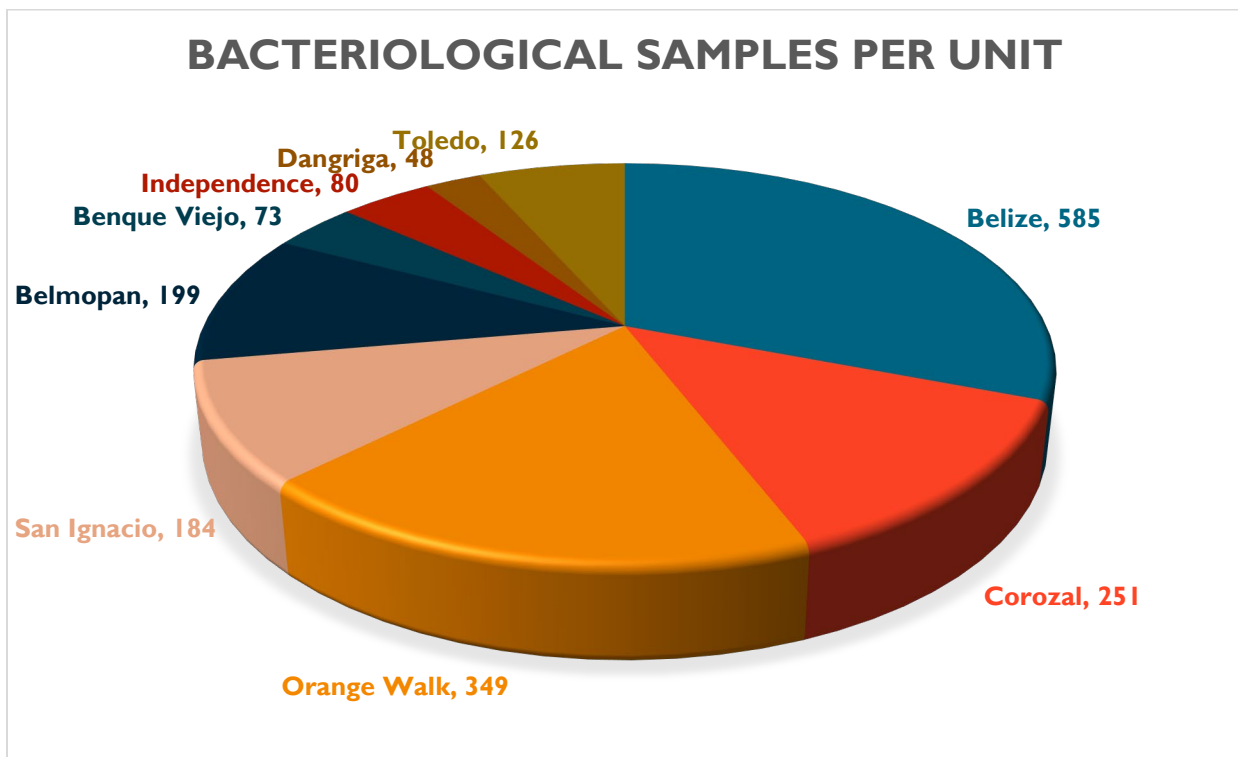


Table 4 - Total Number of samples collected Jan- July 2024 (bacteriological and chemical)

Unit	Bacteriological samples	Chemical samples	Total
Belize	585	17	602
Corozal	251	7	258
Orange Walk	349	21	370
San Ignacio	184	19	203
Belmopan	199	13	212
Benque Viejo	73	6	79
Independence	80	5	85
Dangriga	48	3	51
Toledo	126	23	149
TOTAL	1895	114	2009

Pie Chart 2: Bacteriological Samples per Unit Jan- July 2024



Pie Chart 3: Chemical Samples per Unit Jan. – July 2024

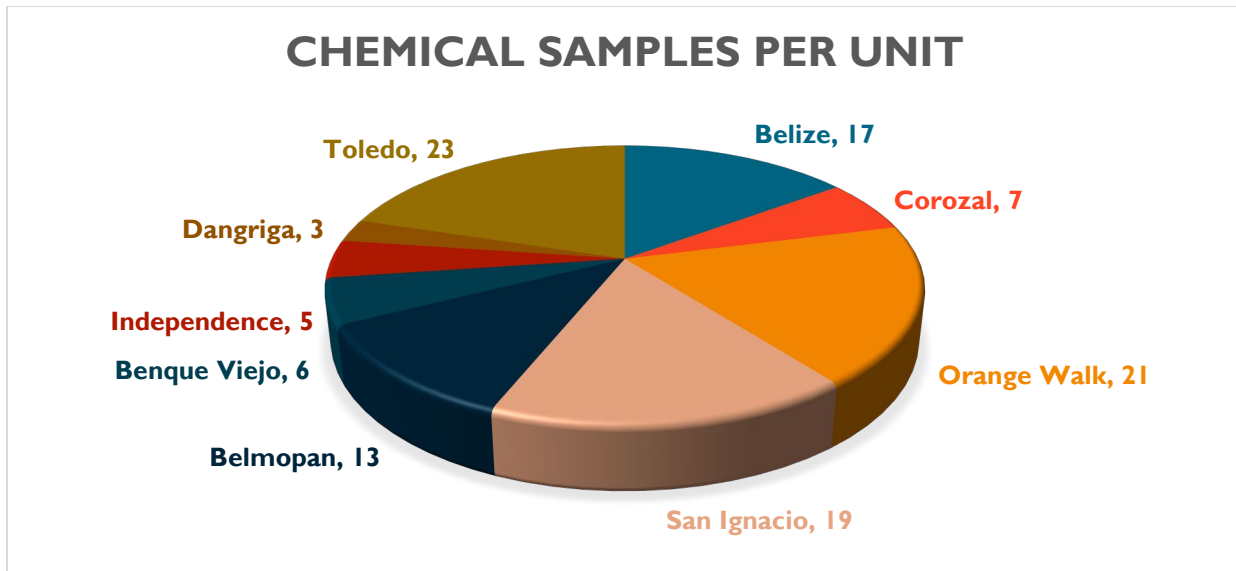


Table 5 – Total Number of Bacteriological samples collected from 4 Major Sources.

Districts	Belize Water Services	Rural Water Systems	Purified Water Operations	Hand Pump	Total
Belize District		92	135		227
Belize City/ S. Hill	170				170
San Pedro	14		16		30
Caye Caulker	18		1		19
River Valley	39				39
Hattieville	12				12
Corozal	9	101	101		211
Orange Walk		74	161	5	240
O. Walk Town	12				12
C. Pine Ridge	13				13
Cayo					
San Ignacio	38	74	49	4	165
Belmopan	33	40	73	5	151
Teakettle	3				3
Benque Viejo	18	19	26	2	65
Stann Creek					
Dangriga	12	8	18		38
Placencia/S. Bight	3				3
Independence		47	19		66

Toledo		53	14	15	82
Forest Home	8				8
Punta Gorda	16		0		16
TOTAL	418	508	613	31	1570

Table 6 – Total Number of Chemical samples collected from 4 Major Sources.

District	Belize Water Services	Rural Water Systems	Purified Water Operations	Hand Pump	Total
Belize		2	1		3
Belize City/ S. Hill					
San Pedro					
Caye Caulker					
River Valley					
Hattieville					
Corozal		5			5
Orange Walk		7	3	1	11
O. Walk Town					
C. Pine Ridge					
Cayo					
San Ignacio		8	10		18
Belmopan	1	3	1	4	9
Teakettle					
Benque Viejo	1	2	1	2	6
Stann Creek					
Dangriga	2				2
Placencia/S. Bight					
Independence		3			3
Toledo					
Forest Home					
Punta Gorda		13		5	18
TOTAL	4	43	16	12	75

Bacteriological Quality of Systems tested Jan. - July. 2024

Table 7 – Belize Water Services Systems

District	Total samples	Positive T. Coliforms	Positive F. Coliforms & E.coli	Negatives	Percentage Positives
Bze. City/ Double Run	170	22	0	148	13%
San Pedro	14	1	0	13	7%
Caye Caulker	18	5	0	13	28%
Hattieville	12	1	0	11	8%
River Valley	39	6	0	33	15%
Corozal	9	0	0	9	0%
Orange Walk	12	3	0	9	25%
C. Pine Ridge	13	2	0	11	15%
S. Ignacio/Sta. Elena	38	1	0	37	3%
Belmopan	33	4	0	29	12%
Teakettle	3	0	0	3	0%
Benque Viejo	18	2	0	16	11%
Placencia/Seine Bight	3	3	0	0	100%
Dangriga	12	1	0	11	8%
Forest Home	13	5	0	8	38%
Punta Gorda	11	6	0	5	55%
TOTAL	418	62	0	356	15%

N.B.:

15% of all BWS samples country wide were Positive with Total Coliform presence.

0 % of all BWS samples country were Positive either with Fecal Coliform or E. coli presence.

Table 8 – Rural Water Systems

District	Samples collected	Positives for Fecal coliform	Positive for E. coli	Negatives	RWS with Positives	Total RWS	# of RWS Monitored	% Positive
Belize	92	37	1	54	5	5	5	41%
Corozal	101	24	0	77	12	12	12	24%
Orange Walk	74	13	0	61	6	17	15	18%
S. Ignacio/ Sta. Elena	74	38	0	36	9	13	11	51%
Belmopan	40	19	1	20	4	5	6	50%
Benque Viejo	19	14	0	5	2	3	2	74%
Independence	47	13	0	34	7	12	10	28%
Dangriga	8	0	0	8	0	14	2	0%
Toledo	53	15	0	38	12	29	19	28%
TOTAL	508	173	2	333	57	110	82	34%

N.B.:

75% of ALL RWS have been monitored up to July 2024

57% of ALL RWS monitored have at least once showed presence of Fecal Coliform Indicator Organisms (Contamination).

34% of Total Samples collected have showed presence of Fecal Coliform indicator organisms (Contamination). This has been a consistent trend for the past decade.

Table 9 – Purified Water Operations

District	Samples collected	Total Coliforms Positive	Fecal Coliform Positive	E. coli	Negative Samples	% of Positives
Belize	152	22	2	1	127	16%
Corozal	101	19	2	0	80	21%
Orange Walk	161	41	3	1	116	28%
S. Ignacio/ Sta. Elena	49	16	0	0	33	33%
Belmopan	73	4	0	0	69	5%
Benque Viejo	26	8	0	0	18	31%
Independence	19	0	1	0	18	5%
Dangriga	18	1	1	0	16	11%
Toledo	14	3	0	0	11	21%

TOTAL	613	114	9	2	488	20%
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N.B.: January to July 2024

A Total of 23 Purified Water Operations are in Belize District. 14 were contaminated at least once with Total Coliforms or Fecal Coliforms.

A Total of 15 Purified Water Operations are in Corozal District. 10 were contaminated at least once with Total Coliforms or Fecal Coliforms.

A Total of 25 Purified Water Operations are in Orange Walk District. 20 were contaminated at least once with Total Coliforms or Fecal Coliforms.

A Total of 17 Purified Water Operations are in Cayo District. 12 were contaminated at least once with Total Coliforms or Fecal Coliforms.

A Total of 6 Purified Water Operations are in Stann Creek District. 1 was contaminated at least once with Total Coliforms or Fecal Coliforms.

A Total of 5 Purified Water Operations are in Toledo District. 3 were contaminated at least once with Total Coliforms or Fecal Coliforms.

A Total of 105 Purified Water companies are being actively monitored however many of these have multiple refill outlets. The number 105 is just the ‘Brand’ names.

Out of the total 613 collected so far, a total of 125 samples showed contamination marking a 20% of contamination.

Table 10 – Hand Pumps

District	Samples collected	Fecal Coliform Positive	E. coli	Negative Samples
Belize	0			
Corozal	0			
Orange Walk	5	2	0	3
S. Ignacio/Sta. Elena	4	4	0	0
Belmopan	5	2	0	3
Benque Viejo	2	0	0	2
Independence	0			
Dangriga	0			
Toledo	15	8	0	7
TOTAL	31	16	0	15

**Table
11 –**

Other drinking sources (Private Well & Rainwater Vat)

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	1	0	0
Corozal	36	9	0
Orange Walk	77	5	1
Cayo	20	7	0
Stann Creek	4	1	0
Toledo	9	1	0
Total	147	23	1

N.B.:

Orange Walk has the greatest collection of Wells in the country.

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	4	4	0
Corozal	0		
Orange Walk	1	0	0
Cayo	0		
Stann Creek	0		
Toledo	5	5	0
Total	10	9	0

N.B.:

Rainwater Tanks are only tested when requested.

Table 12 – Other drinking sources cont'd (Private water system & ice)

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	33	4	3
Corozal	3	1	0
Orange Walk	3	0	0
Cayo	18	9	0
Stann Creek	15	0	0
Toledo	6	1	1
Total	78	15	4

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	20	1	0
Corozal	1	0	0
Orange Walk	0		
Cayo	31	1	0
Stann Creek	0		
Toledo	0		
Total	52	2	0

N.B.:

Private systems are starting to become installed
 More and more in different companies and
 Communities with some being treated and others
 Don't.

Ice Collection is now being monitored
 more closely and actively and will be
 monitored in the southern districts
 in the later part of this year.

Table 13– Quality of Physical/Chemical water samples

Unit	Total Collected	Compliant to WHO Guidelines for Drinking Water	Non- Compliant to WHO Guidelines for Drinking Water
Belize	17	10	*4
Corozal	7	3	4
Orange Walk	21	12	9
San Ignacio	19	19	0
Belmopan	13	13	0
Benque Viejo	6	6	0
Independence	5	4	1
Dangriga	3	2	1
Toledo	23	22	1
TOTAL	114	91	2

N.B.:

17.5% of Total Chemical Samples collected are not in compliance with WHO guidelines for drinking water. 3 samples were from sources such as marine and creeks.

Table 14– Free Chlorine Monitoring

District	Free chlorine tests done in Urban areas	Total Acceptable Free chlorine results in Urban areas	Free chlorine tests done in Rural areas	Total Acceptable free chlorine results in Rural areas
Belize	218	124	199	97
Corozal	0	0	9	5
Orange Walk	11	11	13	10
Cayo				
San Ignacio	34	24	50	6
Belmopan	31	19	27	9
Benque Viejo	12	10	12	1
Stann Creek				
Independence	0	0	44	3
Dangriga	10	9	0	0
Toledo	1	0	3	0
TOTAL	317	197	357	131

N.B.:

In Urban areas there is 62% of compliance to WHO guidelines for drinking water for free chlorine readings which is 0.5- 2.0 mg/L.

In Rural areas there is 37% of compliance to WHO guidelines for drinking water for free chlorine readings which is 0.5 -2.0 mg/L.

Table 15– Free Chlorine Monitoring for BWS

District	Total Free Chlorine tests	Acceptable results 0.5 – 2.0 mg/L	Less than 0.5 ppm	more than 2.0 ppm	Percentage Compliant
Belize (5 systems)	317	229	81	7	63%
Corozal	9	5	4	0	56%
Orange Walk Town	10	9	1	0	90%
Chan Pine Ridge	11	10	1	0	91%
San Ignacio/ Sta. Elena	38	27	10	1	71%
Belmopan	33	26	4	3	79%
Teakettle	3	3	0	0	100%
Benque Viejo	14	12	2	0	86%
Dangriga	10	9	1	0	90%
Placencia/ Seine Bight	3	0	3	0	0%
Forest Home	2	0	2	0	70%
Punta Gorda	2	0	2	0	70%
TOTAL	452	330	111	11	73%

N.B.:

73% of ALL Free Chlorine readings in Belize Water Services systems country wide are compliant with WHO guidelines for drinking water which is 0.5 to 2.0 mg/L.

27% of ALL Free Chlorine readings in Belize Water Services systems country wide are non-compliant with WHO guidelines for drinking water which is 0.5 to 2.0 mg/L.

There are more free chlorine residuals for BWS than samples collected due to the fact that in the month of June due to a lack of reagents to do microbial analysis only Free chlorine were done.

Table 16– Free Chlorine Monitoring for RWS

District	Free chlorine tests done in RWS systems	Acceptable Free chlorine results in RWS 0.5- 2.0 mg/L	Percentage compliance of 0.5 – 2.0 mg/L
Belize	53	0	0%
Corozal	0	0	0%
Orange Walk	0	0	0%
Cayo	59	1	3%
S. Creek	29	0	0%
Toledo	0	0	0%
TOTAL	141	1	

N.B.: Majority of RWS systems DO NOT have a consistent and continuous disinfecting system therefore the very poor national percentage of compliance of 1%. This therefore shows a clear trend in regard to the Microbiological quality of Rural Water Systems.



List of Zoonotic Diseases (Time frame of reporting January 2024 – March 2024)

Disease	Organism	Main reservoirs	Usual mode of transmission to humans	Number of cases	Location of cases	Species	Month
Anthrax	Bacillus anthracis	livestock, wildlife, environment	direct contact, ingestion, inhalation	0			
Animal influenza	Influenza A viruses	Pigs, other livestock, humans	direct contact	0			
Avian influenza	Influenza A virus	Poultry	direct contact	0			
Bovine tuberculosis	Mycobacterium complex	cattle	unpasteurised milk, dairy products, meat or exposure to tuberculous animals	0			
Campylobacteriosis	Campylobacter spp	poultry, farm animals	direct animal contact, raw meat, milk, dairy products	0			
Cat scratch fever	Bartonella henselae	cats	bite, scratch	0			
Cowpox	Cowpox virus	rodents	direct contact (usually with cats)	0			

Cryptosporidiosis	Cryptosporidium spp	cattle, sheep, pets	contaminated water, direct contact	0
Cysticercosis / Taeniasis	Taenia spp.	cattle, pigs	raw/undercooked meat	0
Erysipeloid	Erysipelothrix rhusiopathiae	pigs, fish, environment	direct contact, fomites, environment	*
Fish tank / swimming pool granuloma	Mycobacterium marinum	fish	contact with fish or contaminated water	0
Haemorrhagic colitis and haemolytic uraemic syndrome (HUS)	Shiga toxin-producing E. coli	ruminants	direct contact, foodborne	0
Hantavirus syndromes	Hantaviruses	rodents	aerosolised excreta	0
Hepatitis E	Hepatitis E virus	pigs, wild boar, deer	undercooked animal meats	0
Hydatid disease	Echinococcus granulosus	dogs, sheep	ingestion of eggs excreted by dog	0
Leptospirosis	Leptospira spp	rodents, ruminants	urine-contaminated water or direct contact	0
Listeriosis	Listeria spp.	cattle, sheep, soil	dairy produce, meat products	0
Louping ill	Louping ill virus	sheep, grouse	direct contact, tick bite	0
Lyme disease	Borrelia burgdorferi	ticks, rodents, deer, sheep,	tick bite	0

		small mammals					
Lymphocytic choriomeningitis	Lymphocytic choriomeningitis virus (LCMV)	rodents	direct contact	0			
Orf	Orf virus	sheep, goats	direct contact	0			
Ovine chlamydiosis	Chlamydia abortus	sheep, farm animals	direct contact, aerosol	0			
Pasteurellosis	Pasteurella spp	dogs, cats, many mammals	bite/scratch, direct contact	0			
Psittacosis	Chlamydia psittaci	psittacine birds, poultry, ducks	aerosol, direct contact	0			
Q fever	Coxiella burnetii	cattle, sheep, goats, cats	aerosol, direct contact, products of conception, fomites	0			
Rabies	Rabies virus and other lyssaviruses	Bats and other wildlife	Bite, aerosol, saliva or scratch	1 case	Orange Walk, Guinea Greass	Bovine	04.04.2024
				1 case	Orange Walk, Blue Creek	Bovine	18.04.2024
				1 case	Orange Walk, Blue Creek	Bovine	23.04.2024
				1 case	Orange Walk, Blue Creek	Bovine	8.17.2024

				1 case	Orange Walk, San Carlos	Bovine	8.17.2024
Rat bite fever	Streptobacillus moniliformis	rats	bite/scratch, milk, water	0			
Ringworm	Dermatophyte fungi	many animal species	direct contact	0			
Salmonellosis	Salmonella spp.	poultry, farm animals	direct animal contact, raw meat, other raw foods	0			
Streptococcal sepsis	Streptococcus suis	pigs	direct contact, meat	0			
Streptococcal sepsis	Streptococcus zooepidemicus	horses	direct contact	0			
Toxocariasis	Toxocara canis/catis	dogs, cats	ingestion	0			
Toxoplasmosis	Toxoplasma gondii	cats, ruminants	ingestion of faecal oocysts, meat	0			
Zoonotic diphtheria	Corynebacterium ulcerans	cattle, farm animals, dogs	direct contact, milk	0			

Disease	Organism	Main reservoirs	Usual mode of transmission to humans	Number of cases	Location of cases	Species	Month
Alveolar echinococcosis	Echinococcus multilocularis	foxes	ingestion of eggs	0			

Brucellosis	Brucella spp.	cattle, goats, sheep, pigs	dairy products, milk	0
Crimean-Congo haemorrhagic fever (CCHF)	CCHF virus	Livestock, ticks	Tick bite, direct contact animal blood	0
Ebola virus disease	Ebola virus	Unknown, possibly bats	Wild animals	0
Glanders	Burkholderia mallei	Horse, donkey mule	Direct contact, contaminated fomites, food and water	0
Hendra virus infection	Hendra virus	Fruit bats, horses	exposure to body fluids	0
Kyasanur Forest disease	Kyasanur Forest virus	rodents, shrews, and monkeys	tick bite, direct animal contact	0
Lassa fever	Lassa virus	Multimammate rat	direct or indirect contact with infected rodent excreta	0
Marburg virus disease	Marburg virus	bats	bats	0
Mers	MERs Coronavirus	dromedary camels	direct and indirect contact	0
Monkeypox	Monkeypox virus	rodents	direct contact	0
Nipah virus infection	Nipah virus	fruit bats	Contaminated date palm sap, close contact with infected pigs	0
Plague	Yersinia pestis	Rats and their fleas	flea bite, scratches or	0

			bites from infected cats	
Rift Valley fever	Rift Valley fever virus	cattle, goats, sheep	direct contact, mosquito bite	0
Tickborne encephalitis	Tickborne encephalitis virus	rodents, small mammals, livestock	tick bite, unpasteurized milk products	0
Trichinellosis	Trichinella spiralis	pigs, wild game	undercooked or raw meat	0
Tularemia	Francisella tularensis	rabbits, wild animals, ticks	direct contact, aerosol, ticks, inoculation	0
West Nile virus infection	West Nile virus	wild birds, mosquitoes	mosquito bite	0
Yellow fever	Yellow fever virus	monkeys	mosquito bite	0



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Monthly Summary: May – June 2024

The month of May was relatively dry with little to no rainfall and fair weather for the entire month at most stations. Ridging was the main feature that persisted in the low levels and in the upper levels. In the low levels the wind flow over the area was easterly to southeasterly for most of the month. In the upper levels the wind flow was westerly the first and second week but transitioned to a north-westerly flow for the remainder of the month. Each of the stations experienced new extreme for some of their one day extreme.

For the month of May rainfall was below normal. Most stations recorded 0mm of rainfall except for PGIA which had the highest rainfall amount of 1.7mm for the month.

June is typically the start of the wet season. Riding was the dominant feature in the upper and lower levels. In the lower level the wind flow was easterly to southeasterly for the month. In the upper levels the wind flow was westerly the first week. The second week the wind flow was northeasterly for the remainder of the month. The maximum temperatures were above normal across the country based on the sampled stations. The Belmopan station recorded the warmed mean maximum temperature with a value of 35.1. The Punta Gorda station recorded the coolest mean minimum temperature of 24.2 while the PGIA station recorded the warmest minimum temperature of 26.3. The Highest one-day temperature was observed at the Central Farm station with a value of 39.4.

The rainfall was mostly below normal except for Central Farm, Belmopan, Savannah and Punta Gorda which saw above normal rainfall. The highest rainfall was observed in Libertad with a value of 491.6mm. Meanwhile, the lowest rainfall was observed in Savannah with a value of 120.5mm. The highest one-day rainfall was observed at the Libertad Station, this occurred on June 29, 2024, the Libertad Station also experienced the most rainfall day with 19 rain days. Savannah experienced the least rainy days, experiencing 11 rain days. The start of the rainy season occurred in Central Farm and Melinda on the 6th, Punta Gorda on the 7th; Libertad, Tower Hill and PGIA on the 8th and in Belmopan and Savannah on the 14th.

The first week of July was relatively moist except for the 2nd and 3rd where there were low moisture levels in the low levels. Ridging supported moist conditions and supported an easterly flow across the area except for the 5th where Tropical Storm Beryl supported a westerly flow across the country. In the upper levels, troughing supported moist conditions. These conditions prevailed except for a spell with low moisture levels on the 2nd and 3rd. The moisture levels in the low levels and upper levels were high due to ridging and a trough which supported showers and thunderstorms across the country for the month. The wind flow in the low levels was easterly the first two weeks and transitioned to northerly briefly the third week before transitioning to easterly for the remainder of the month. In the upper levels, the wind flow was southerly most of the month with a brief westerly flow in the last week.

Most of the stations recorded above normal maximum temperatures across the country except for Punta Gorda that was below normal with a temperature of 30.8°C. The minimum temperatures across the country were above normal except for the Savannah Station that recorded below normal with a temperature of 23.8°C. The highest one-day temperature was recorded at the Central Farm Station with a value of 38.0°C. The coolest one-day temperature was 18.8°C at the Savannah Station. The highest maximum temperature for the month was 33.6°C, recorded at the Tower Hill Station and the lowest maximum temperature was 30.8°C recorded at the Punta Gorda Station. The lowest minimum temperature was 22.9°C at Melinda Station and the highest minimum temperature was observed at the Airport Station.

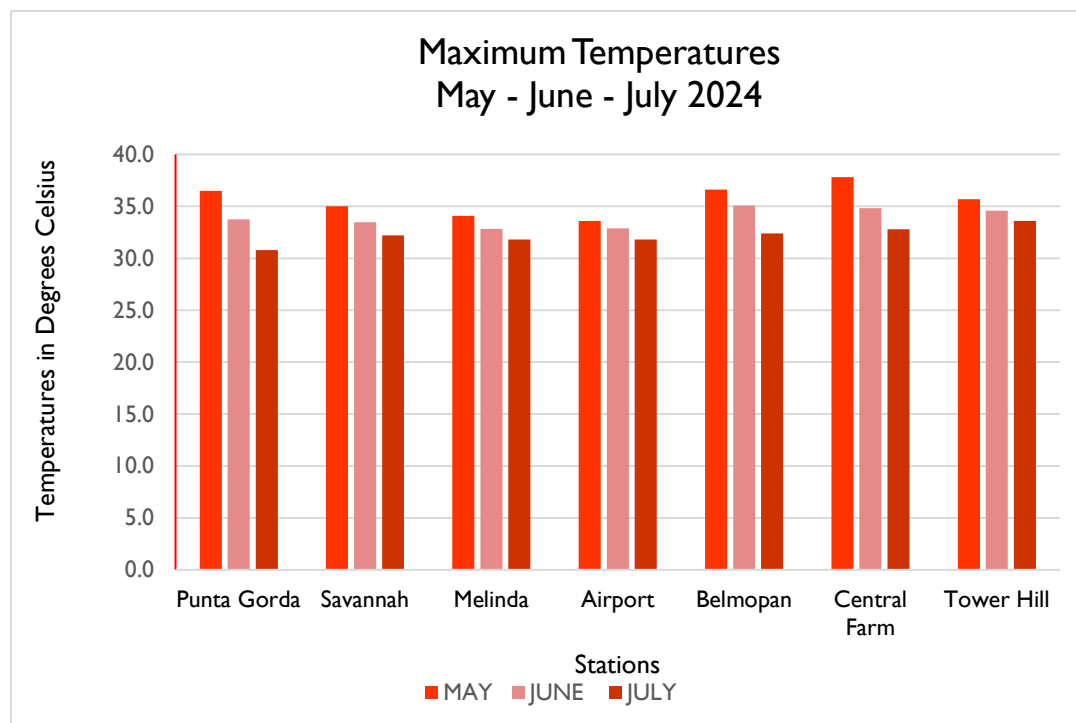


Figure 1: Maximum Temperatures for May, June and July 2024.

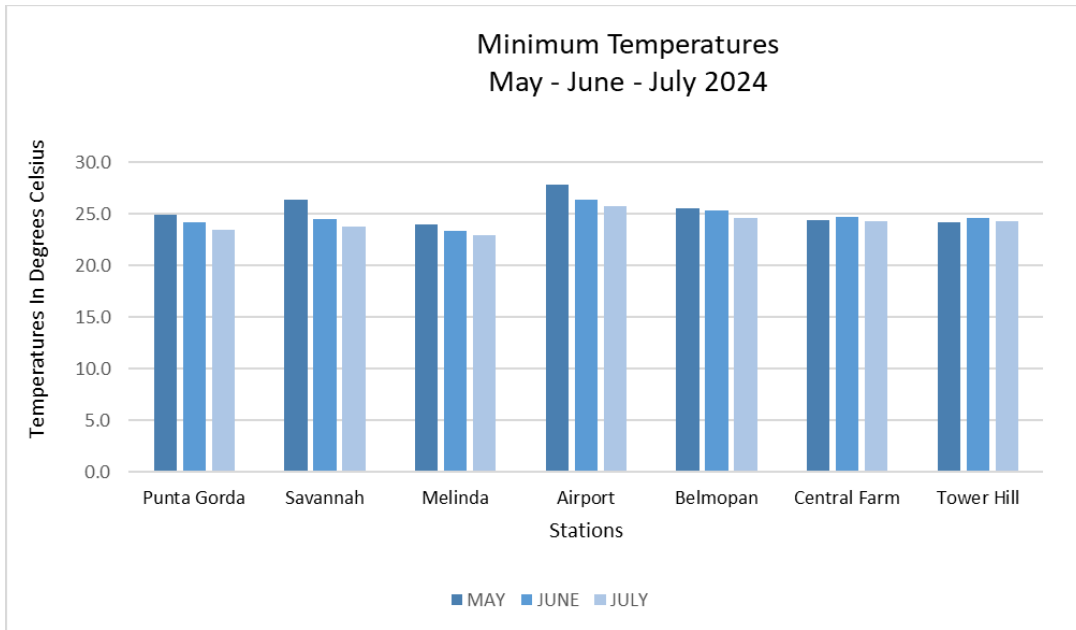


Figure 2: Minimum Temperatures for May, June and July 2024.

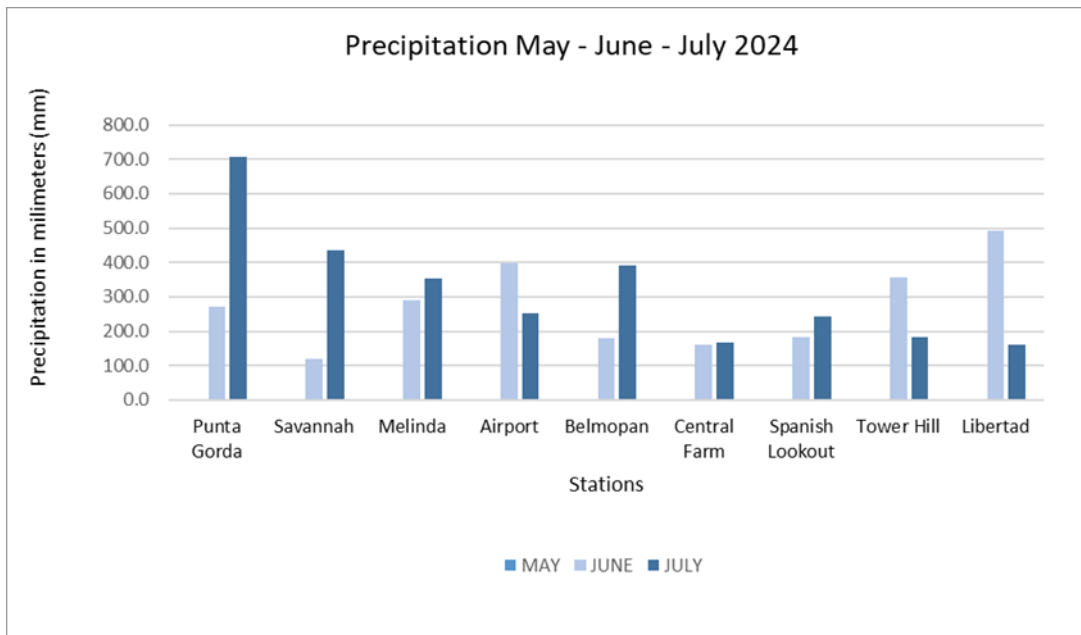


Figure 3: Total Precipitation for May, June and July 2024.