

THE NATIONAL ONE HEALTH

SURVEILLANCE REPORT

BELIZE



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.

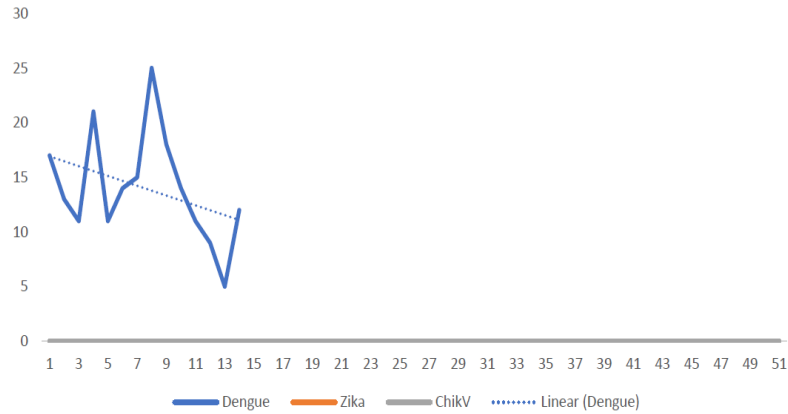
Reporting Period January 2024 to March 2024

Vector	Disease caused	Type of pathogen	Number of cases	Location of cases
mosquitoes Aedes albopictus	Chikungunya	Virus	0	0
Aedes aegypti	Dengue	Virus	196	Corozal 12, Orange Walk 24, Belize 11, Cayo 55, Stann Creek 56, Toledo 38

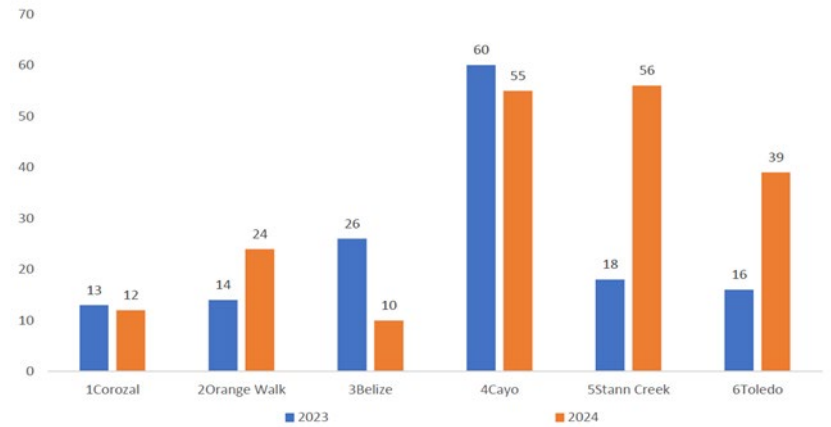
Culex quinquefasciatus in the (Americas), in Africa (Anopheles)	Lymphatic filariasis	Parasite	0	0
Aedes and Culex mosquitoes	Rift Valley fever	Virus	0	0
Aedes or Haemagogus species mosquitoes	Yellow Fever	Virus	0	0
Aedes species mosquito (Ae. aegypti and Ae. albopictus). These are the same mosquitoes 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

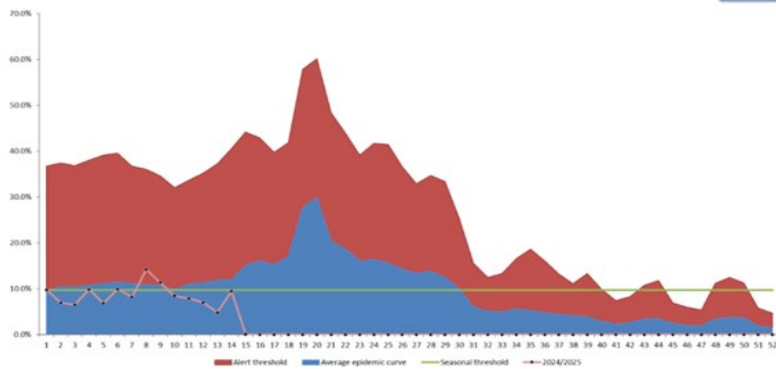
Graph 1: Country Lab Confirmed Arboviruses, EW 1-14, 2024 Belize



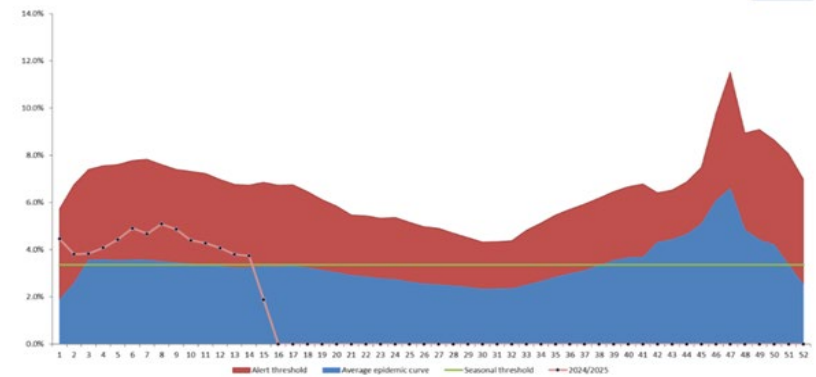
Graph 2: Dengue Laboratory Confirmed Cases by District, EW 1-14, 2023-2024, Belize



Country Epidemic Baseline Dengue, EW 1-14, 2024, Belize

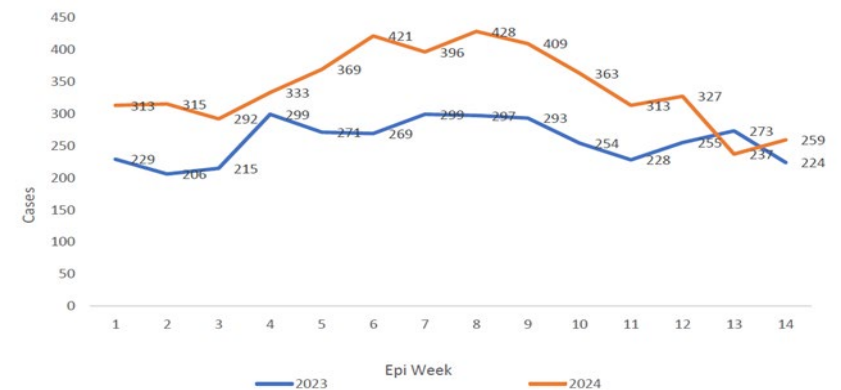


Country Acute Respiratory Infections <5, EW 1-14, 2024, Belize



At the end of Epidemiological Week (EW) 14 April 6, 2024, 196 confirmed cases of Dengue were reported by the Epidemiology Unit, a 6.5% weekly cumulative increase compared to the end of EW 13 with 184 confirmed cases of Dengue. Epi week 8 recorded the highest number of cases reported (25) 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). Stann Creek District and Cayo districts reports the highest number of confirmed cases with 56 and 55 cases respectively (Graph 2). The <5 years acute respiratory infections (ARI) country epidemic baseline shows that we continue at ALERT threshold up to the end of Epi Week 14. 4,775 ARI infections have been reported in the Under 5 age group up to the end of EW 14, a 5.7% cumulative weekly increase compared to end of EW 13 with 4,516 ARI infections. A weekly increase is observed between EW 13 and EW 14, 2024 (Graph 3). 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 3: Acute Respiratory Infections <5 by EW 1-14, 2023-2024, Belize



Dengue Cases by Incidence Rate and District, EW 1-14, 2024, Belize

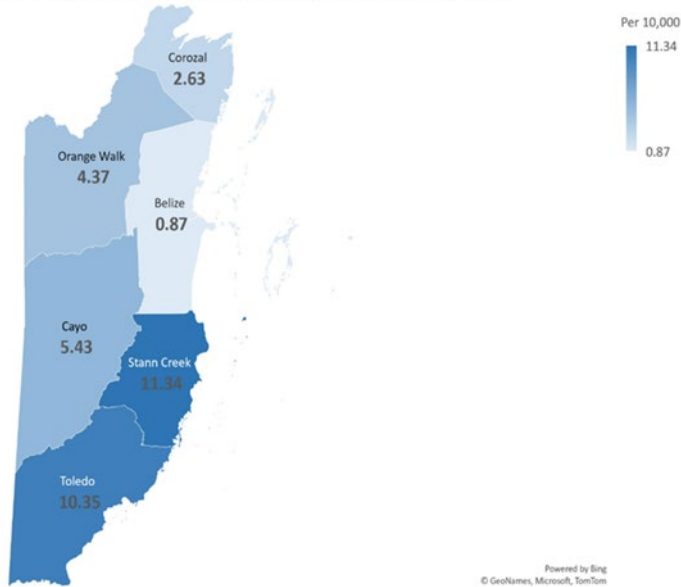


Figure 3 - Rainfall Observation - First Quarter

Figure 2 - Rainfall Average - First Quarter 2024

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

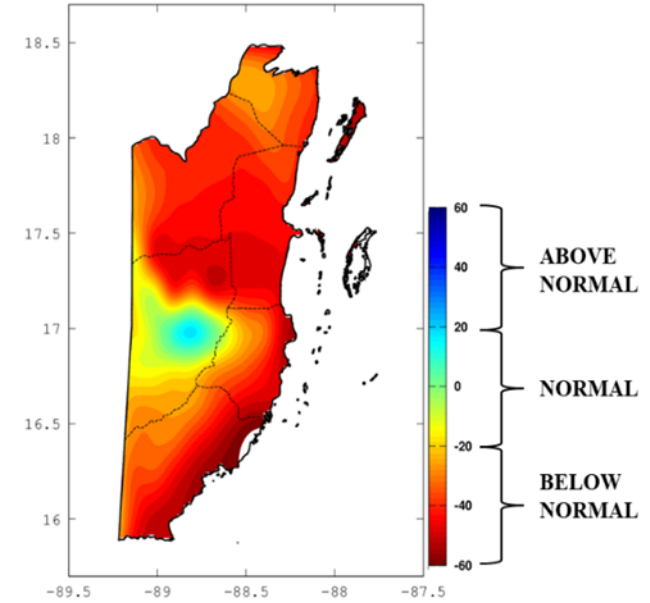


Figure 4 - Average Temperature - First Quarter 2024

MEAN TEMPERATURE OBSERVED: JFM 2024 (°C)

RAINFALL OBSERVED: JFM 2024 (mm)

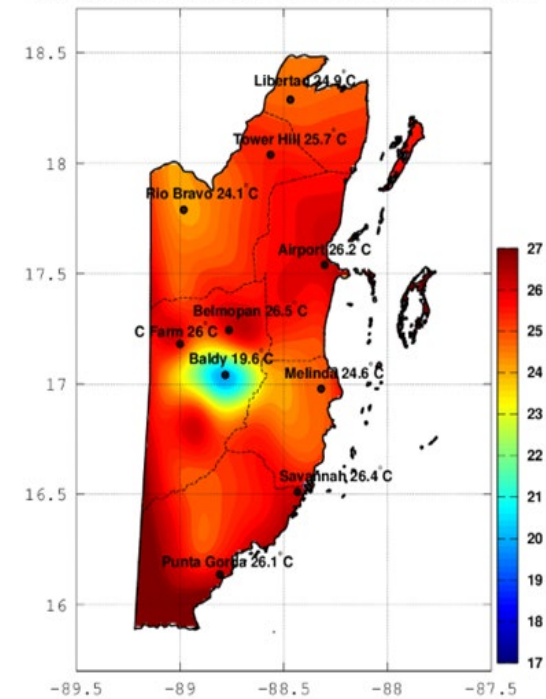
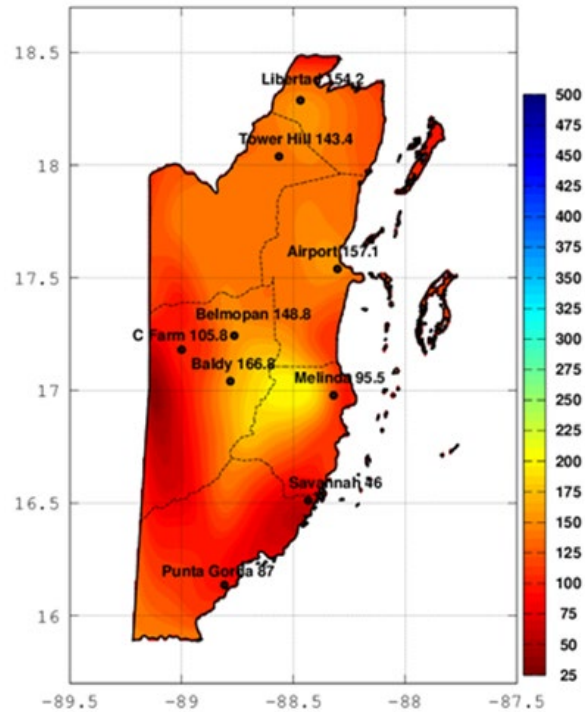


Figure 1 Illustrates Dengue cases by incidence rate and District during the epidemiological week 1-14 (EW 1-14, 2024 Belize); Stann Creek had the highest incidence, followed by Toledo District with 11.34 and 10.35 cases per 10,000 population respectively. The national Dengue data showed we were currently below the seasonal threshold at the end of EW 14. However, the Cayo and Stann Creek districts were ABOVE the expected threshold while Toledo district is on ALERT.

Correlation with environmental factors: Figure 2 and 3 maps, indicate a below average rainfall observed during the epidemiological week of 1-14, 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.

Figure 4 shows that the average temperatures during this period are suitable for the proliferation of *Aedes* spp. mosquitoes (*Ae. aegypti* and *Ae. albopictus*), which are the primary vectors for Dengue in Belize.

Recommendations:

Given the observed data and the start of the 2024 hurricane season, the following actions are recommended to mitigate the risk of Dengue outbreaks:

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 – eg. > 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 plans 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
January 2024 – March 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- March 2024

District	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Total
Belize	92	106	81										279
Corozal	61	48	12										121
Orange Walk	76	76	55										207
Cayo	76	89	78										243
Stann Creek	26	34	24										84
Toledo	12	9	11										32
Total	343	362	261	0	0	0	0	0	0	0	0	0	966

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

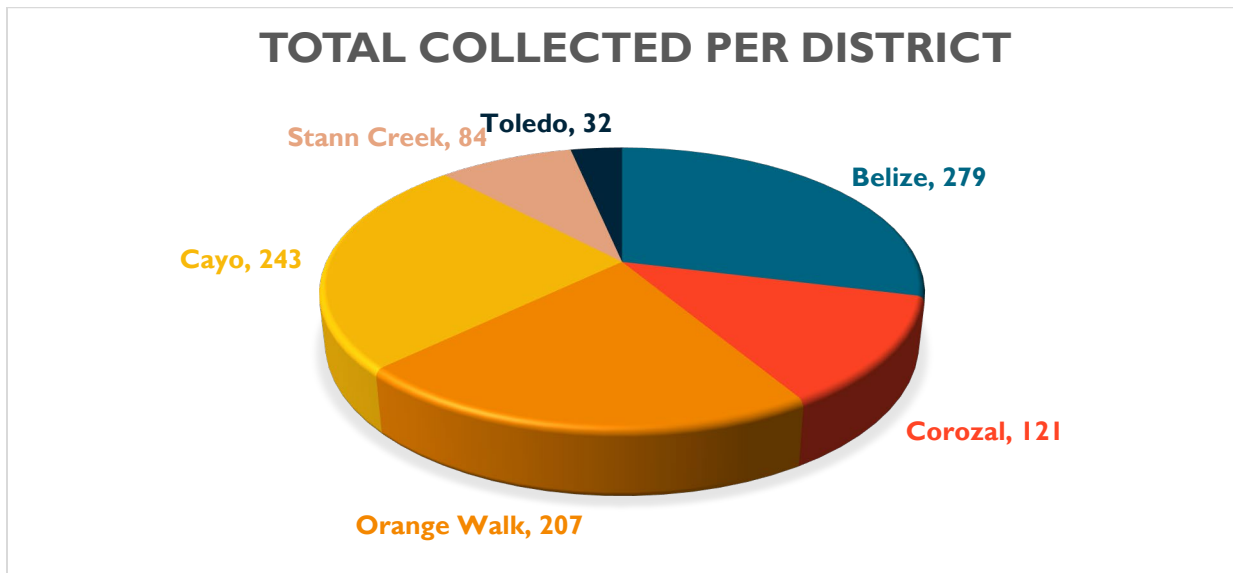
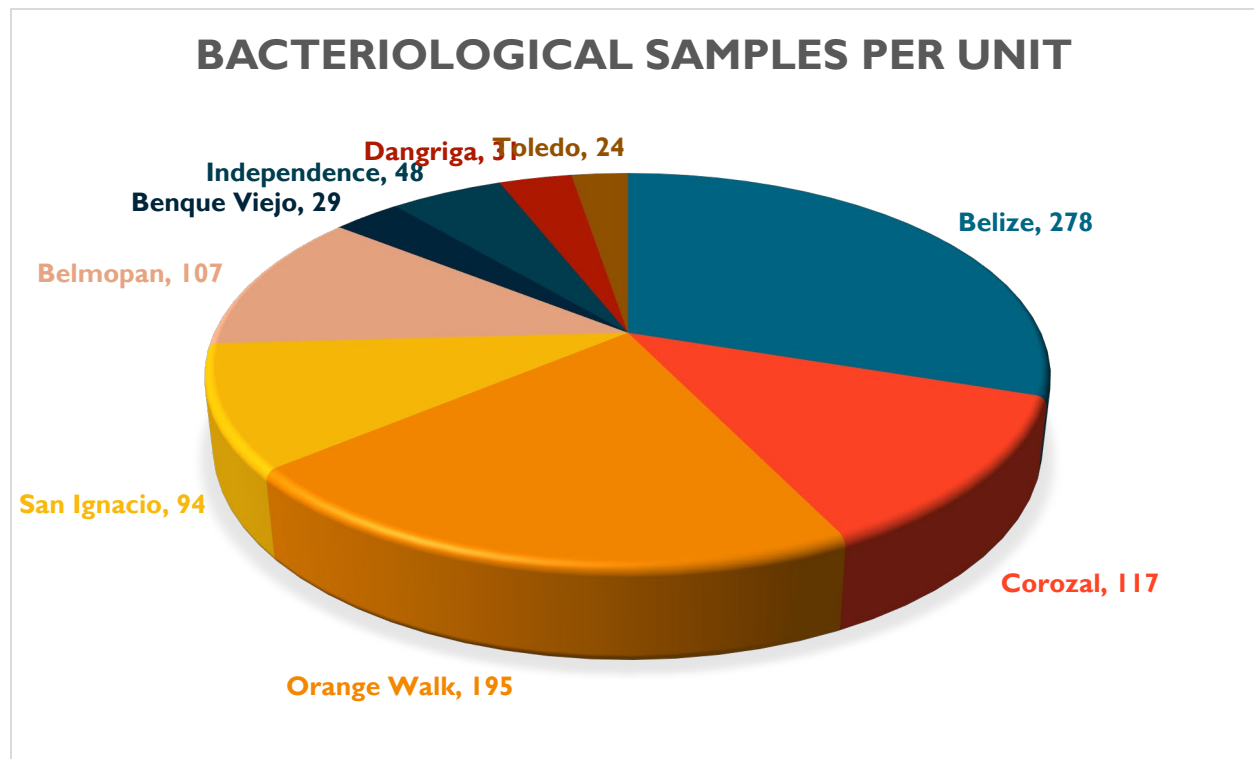


Table 4 - Total Number of samples collected (both bacteriological and chemical)

Total Samples collected Jan- Mar 2024 (bacteriological and chemical)

Unit	Bacteriological samples	Chemical samples	Total
Belize	278	1	279
Corozal	117	4	121
Orange Walk	195	12	207
San Ignacio	94	7	101
Belmopan	107	3	110
Benque Viejo	29	3	32
Independence	48	2	50
Dangriga	31	3	34
Toledo	24	8	32
TOTAL	923	43	966

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



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

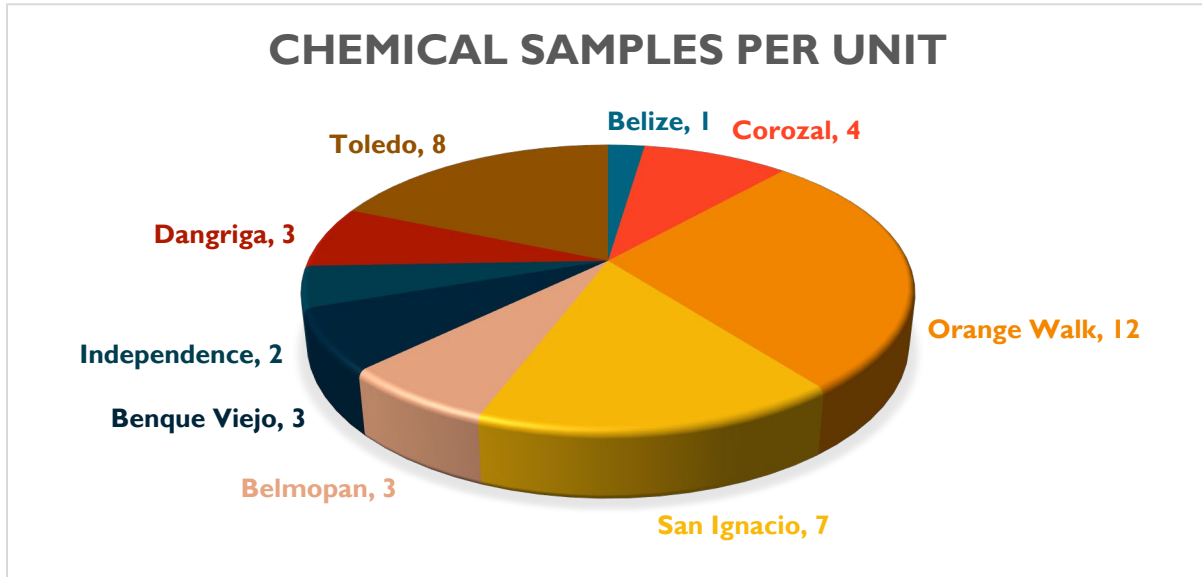


Table 5 – Total Number of Bacteriological samples collected from 4 Major Sources.

Districts	Belize Water Services	Rural Water Systems	Purified Water Operations	Hand Pump	Total
Belize District		32	59		91
Belize City/ S. Hill	100				100
San Pedro	7		8		15
Caye Caulker	14		0		14
River Valley	18				18
Hattieville	4				4
Corozal	3	50	39		92
Orange Walk		30	88	5	123
O. Walk Town	11				11
C. Pine Ridge	10				10
Cayo					
San Ignacio	22	34	30	2	88
Belmopan	15	21	34	2	72
Teakettle	3				3
Benque Viejo	12	7	10	2	31
Stann Creek					0
Dangriga	11	4	10		25
Placencia/S. Bight	0				0

Independence		26	12		38
Toledo		6		6	12
Forest Home	0				0
Punta Gorda	0		0		0
TOTAL	230	210	290	17	747

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					0
Belize City/ S. Hill					0
San Pedro					
Caye Caulker					0
River Valley					0
Hattieville					0
Corozal		2			2
Orange Walk		3	3	1	7
O. Walk Town					
C. Pine Ridge					
Cayo					
San Ignacio		3	4		7
Belmopan		1		1	2
Teakettle					0
Benque Viejo	1		1	1	3
Stann Creek					
Dangriga	2				2
Placencia/S. Bight					0
Independence		1			1
Toledo		2		2	4
Forest Home					0
Punta Gorda					0
TOTAL	3	12	8	5	28

Bacteriological Quality of Systems tested Jan. - Mar. 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	100	9	0	91	9%
San Pedro	7	0	0	7	0%
Caye Caulker	14	5	0	9	35%
Hattieville	4	1	0	3	25%
River Valley	18	0	0	18	0%
Corozal	3	0	0	3	0%
Orange Walk	10	1	0	9	10%
C. Pine Ridge	11	2	0	9	18%
S. Ignacio/Sta. Elena	22	0	0	22	0%
Belmopan	15	0	0	15	0%
Teakettle	3	0	0	3	0%
Benque Viejo	12	0	0	12	0%
Placencia/Seine Bight	0				
Dangriga	11	1	0	10	9%
Forest Home	0				
Punta Gorda	0				
TOTAL	230	19	0	211	8%

N.B.:

8% 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	32	8	0	24	3	5	5	25%
Corozal	50	10	0	40	7	12	10	20%
Orange Walk	30	5	0	25	3	17	10	17%
S. Ignacio/ Sta. Elena	34	19	0	15	7	13	9	56%
Belmopan	21	13	0	8	3	5	6	62%
Benque Viejo	7	5	0	2	2	3	2	71%
Independence	26	7	0	19	2	12	7	30%
Dangriga	4	0	0	4	0	14	1	0%
Toledo	6	0	0	0	0	29	0	0%
TOTAL	210	67	0	137	27	110	50	33%

N.B.:

45% of ALL RWS have been monitored up to March 2024

75% of ALL RWS monitored have at least once showed presence of Fecal Coliform Indicator Organisms (Contamination).

33% 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	67	7	1	0	59	12%
Corozal	39	4	0	0	35	10%
Orange Walk	88	21	3	1	63	28%

S. Ignacio/Sta. Elena	25	6	0	0	19	24%
Belmopan	34	2	0	0	32	6%
Benque Viejo	15	3	0	0	12	20%
Independence	12	0	1	0	11	8%
Dangriga	10	1	0	0	9	10%
Toledo	0					
TOTAL	290	44	5	1	240	17%

N.B.: January to March 2024

A Total of 29 Purified Water Operations are in Belize District. 7 were contaminated at least once.

A Total of 14 Purified Water Operations are in Corozal District. 3 were contaminated at least once

A Total of 25 Purified Water Operations are in Orange Walk District. 15 were contaminated at least once.

A Total of 16 Purified Water Operations are in Cayo District. 8 were contaminated at least once.

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

A Total of 5 Purified Water Operations are in Toledo District. Non have been monitored.

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 290 collected so far a total of 50 samples showed contamination marking a 17% 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	2	2	0	0

Belmopan	2	0	0	2
Benque Viejo	2	0	0	2
Independence	0			
Dangriga	0			
Toledo	6	3	0	3
TOTAL	17	7	0	10

Table 11 – Other drinking sources (Private Well & Rainwater Vat)

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	1	0	0
Corozal	23	4	0
Orange Walk	47	2	1
Cayo	12	4	0
Stann Creek	3	1	0
Toledo	7	1	0
Total	93	12	1

N.B.:

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

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	3	3	0
Corozal	0		
Orange Walk	1	0	0
Cayo	0		
Stann Creek	0		
Toledo	5	5	0
Total	9	8	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	9	0	0
Corozal	1	0	0
Orange Walk	2	0	0
Cayo	6	2	0
Stann Creek	11	0	0
Toledo	0	0	0
Total	29	2	0

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	11	1	0
Corozal	1	0	0
Orange Walk	0		
Cayo	11	0	0
Stann Creek	0		
Toledo	0		
Total	23	1	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	1	1	0
Corozal	4	1	3
Orange Walk	12	9	3

San Ignacio	7	0	0
Belmopan	3	0	0
Benque Viejo	3	0	0
Independence	2	1	1
Dangriga	3	2	1
Toledo	8	7	1
TOTAL	43	21	9

N.B.:

21% of Total Chemical Samples collected are not in compliance with WHO guidelines for drinking water.

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	105	61	76	34
Corozal	0	0	3	0
Orange Walk	11	0	13	11
Cayo				
San Ignacio	19	18	25	5
Belmopan	13	9	17	6
Benque Viejo	10	10	9	2
Stann Creek				
Independence	0	0	29	3
Dangriga	9	8	0	0
Toledo	0		0	
TOTAL	167	106	172	61

N.B.:

In Urban areas there is 63% 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 35.4% 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/S. Hill	96	54	37	5	56%
San Pedro	7	6	1	0	86%
Caye Caulker	14	7	7	0	50%
Hattieville	4	4	0	0	100%
River Valley	18	18	0	0	100%
Corozal	3	0	3	0	0%
Orange Walk Town	10	9	1	0	90%
Chan Pine Ridge	11	10	1	0	91%
San Ignacio/ Sta. Elena	22	20	2	0	91%
Belmopan	14	12	0	2	86%
Teakettle	3	3	0	0	100%
Benque Viejo	12	12	0	0	100%
Dangriga	9	8	1	0	88%
Placencia/ Seine Bight	0				55%
Forest Home	0				70%
Punta Gorda	0				70%
TOTAL	223	163	53	7	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.

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	27	0	0%
Corozal	0	0	0%
Orange Walk	0	0	0%
Cayo	32	1	3%
S. Creek	17	0	0%
Toledo	0	0	0%
TOTAL	76	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
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	Locations of cases	Species	Months
Alveolar echinococcosis	Echinococcus multilocularis	foxes	ingestion of eggs	0			
Brucellosis	Brucella spp.	cattle, goats, sheep, pigs	dairy products, milk	0			
Crimean-Congo haemorrhagi	CCHF virus	Livestock, ticks	Tick bite, direct contact animal blood	0			

c fever (CCHF)				
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
Plaque	Yersinia pestis	Rats and their fleas	flea bite, scratches or bites from infected cats	0
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: JANUARY – MARCH 2024

January 2024 brought a diverse mix of weather patterns to Belize, characterized by alternating periods of fair, dry weather, and showers, with occasional isolated showers all influenced by the movement of cold fronts and airflow dynamics. In the first two weeks of January, the country experienced mainly fair and dry conditions, with occasional isolated showers along the coast and in central, inland, and southern regions. Three cold fronts were observed during this period, one originating from the Gulf of Mexico and the other two from the northwest Caribbean and another in the Gulf of Mexico. The third week saw widespread showers and rain, driven by a weak cold front over the northwest Caribbean, followed by another passing through the Gulf of Mexico. Despite this, dry conditions persisted, resulting in a mix of dry and moist atmospheric conditions across the lower and upper levels of the atmosphere. By the final week of January, moderate showers, rain, and isolated thunderstorms became more prominent, initially affecting central and northern areas before gradually moving southward. A diurnal pattern emerged, with nighttime showers impacting various regions, influenced by a weak stationary front in the northwestern Caribbean.

February marked the transition from the cool season to the dry season in Belize. Throughout the month, a combination of fair, dry weather and occasional showers occurred, driven by cold fronts and shifts in wind patterns. At the beginning of February, mostly fair and dry conditions prevailed, with light rain and isolated showers in the southern coastal areas, influenced by a cold front moving from the Gulf of Mexico towards Colombia. The third week of February initially saw isolated showers intensify into moderate rain affecting the entire country, gradually decreasing towards the week's end. This was influenced by a stationary front observed over eastern Cuba, followed by a cold front emerging over the Gulf of Mexico. Variable wind flows with southeasterly and northwesterly patterns, supported by ridging, were observed, while moisture conditions fluctuated with mostly dry conditions prevailing. February ended with generally dry and fair weather, characterized by an easterly to southeasterly wind flow supported by ridging.

Throughout March, Belize experienced predominantly fair, warm, and dry weather with occasional isolated showers and thunderstorms, influenced by frontal systems and shifts in wind patterns. The first week commenced with fair, dry, and warm conditions, with isolated light rain in central and southern inland regions. Throughout the week, dry conditions prevailed across different atmospheric levels. The second week maintained the trend of fair, warm, and dry weather, with isolated showers attributed to a stationary cold front. During the third week, fair, warm, and dry conditions persisted, though isolated thunderstorms and showers were influenced by troughs and

a cold front. The fourth week concluded with fair, hot, and hazy conditions, accompanied by isolated showers, thunderstorms, and moderate shower activity.

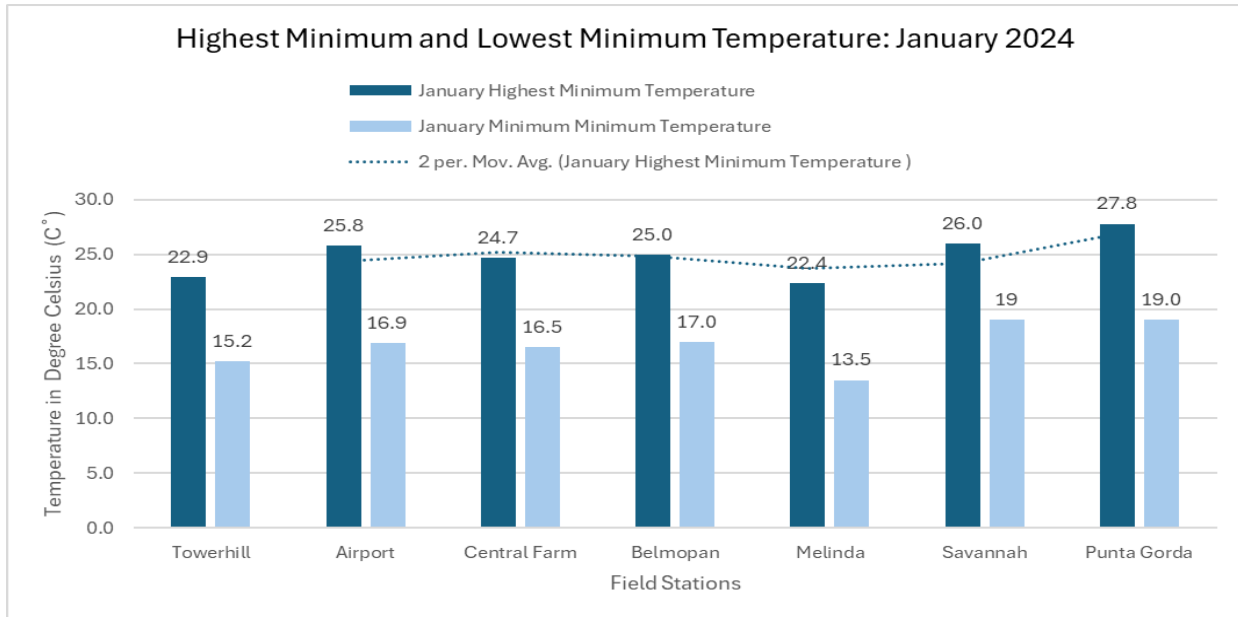


Figure 1: Comparison of Highest Minimum and Lowest Minimum Temperature: January 2024.

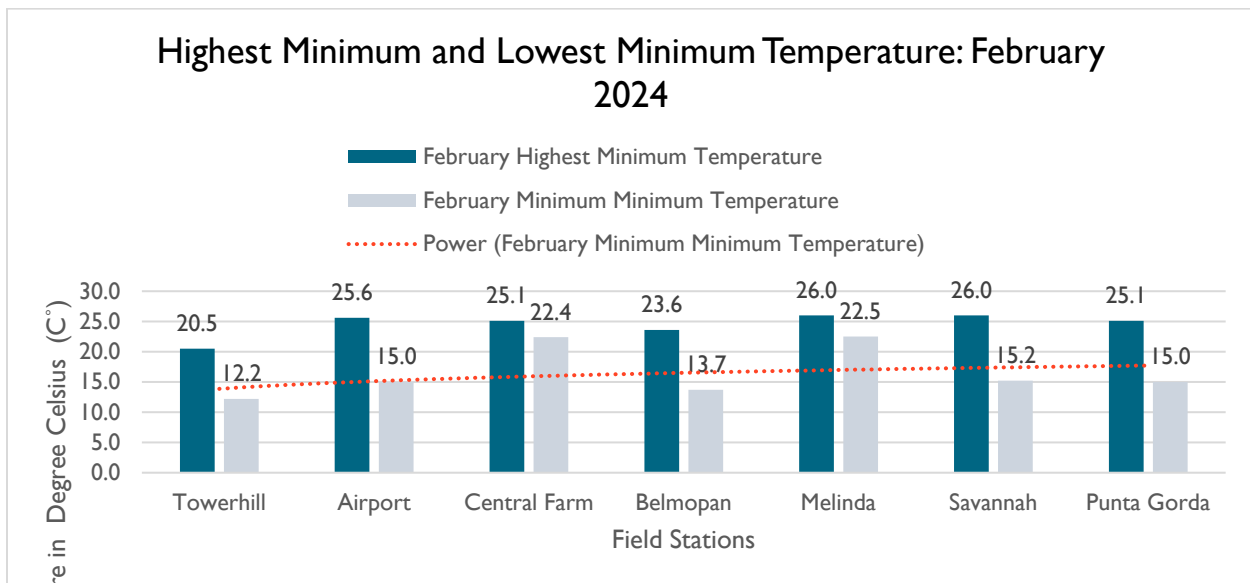


Figure 2: Comparison of Highest Minimum and Lowest Minimum Temperature: February.

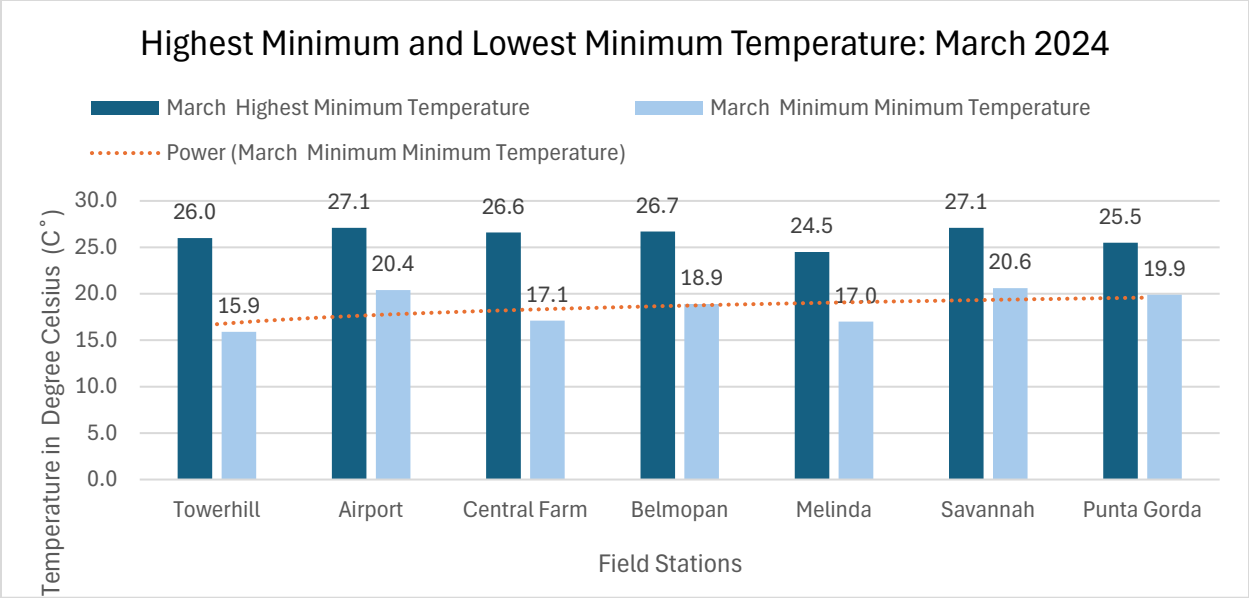


Figure 3: Comparison of the Highest Minimum and Lowest Minimum Temperature: March 2024.

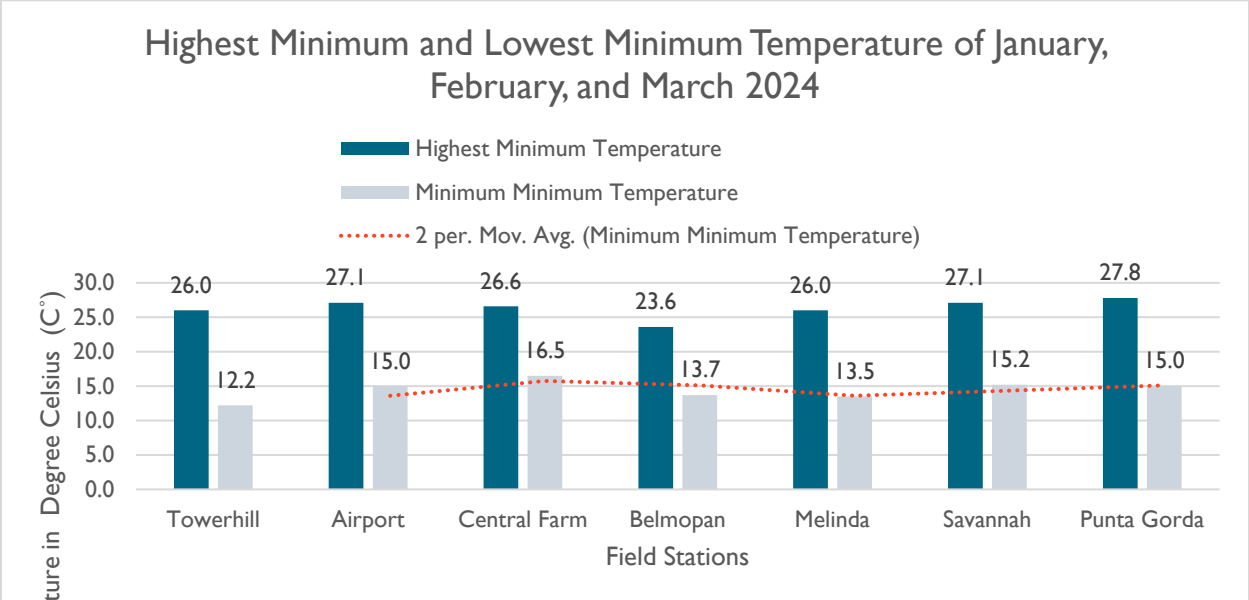


Figure 4: Comparison of the Highest Minimum and Lowest Minimum Temperature of January, February, and March 2024.

