

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 Agriculture, Food Security and Enterprise

Belize Agriculture Health Authority

Ministry of Health and Wellness

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.

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	127	Corozal, Orange Walk, Belize,



Cayo, Stann
Creek, Toledo

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	11	All lab confirmed cases (5 Czl, 2 Belize, 2 Tol, 1 Cyo, 1 OW) (8Males,3Females,),(Range 22 to 69 years),(Jan 1 case, Feb 7 cases, March 3 cases)
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



MINISTRY OF HEALTH AND WELLNESS

NATIONAL DRINKING WATER QUALITY LABORATORY

January – October 2023 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	16	19(approx.)
Orange Walk (Northern)	2	17	25	10(approx.)
Belize (Central)	5	5	27	20(approx.)
Cayo (Western)	4	21	21	28(approx.)
Stann Creek (Southern)	2	26	7	0
Toledo (Southern)	2	29	3	39(approx.)
Total	16	110	99	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 Jan.- Oct. 2023

District	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Total
Belize	84	102	58	118	121	116	122	90	100	123			1034
Corozal	22	19	61	14	51	33	37	46	31	34			348
Orange Walk	85	73	61	69	76	78	80	59	44	73			698
Cayo	49	92	83	79	80	80	66	86	71	69			755
Stann Creek	45	31	30	59	43	32	37	38	0	44			359
Toledo	8	0	20	23	18	0	11	33	0	35			148
Total	293	317	313	362	389	339	353	352	246	378			3342

Pie Chart 1: Total No. of Samples Collected by District Jan. – Oct. 2023

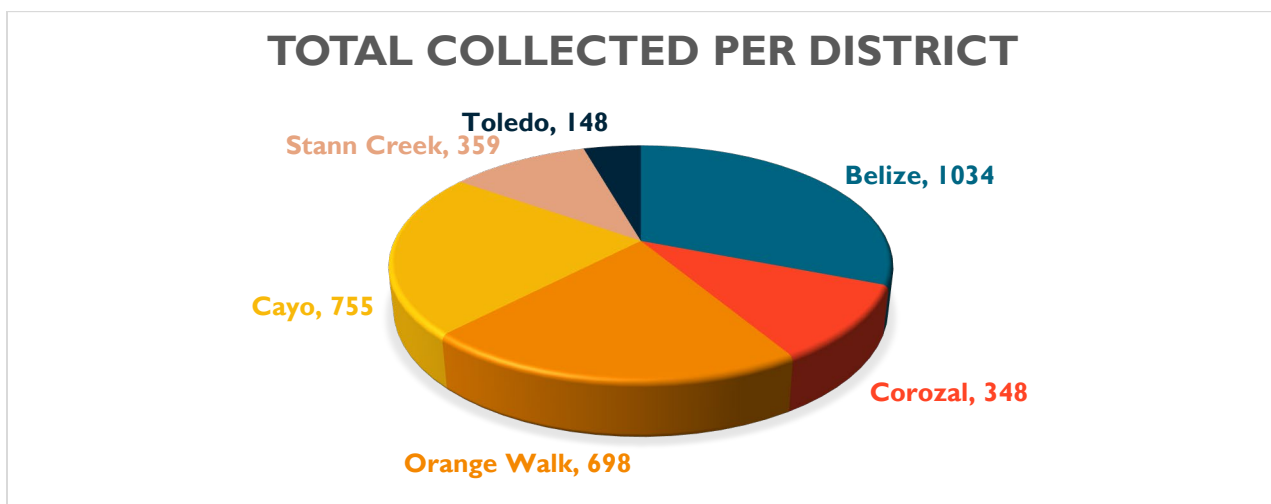


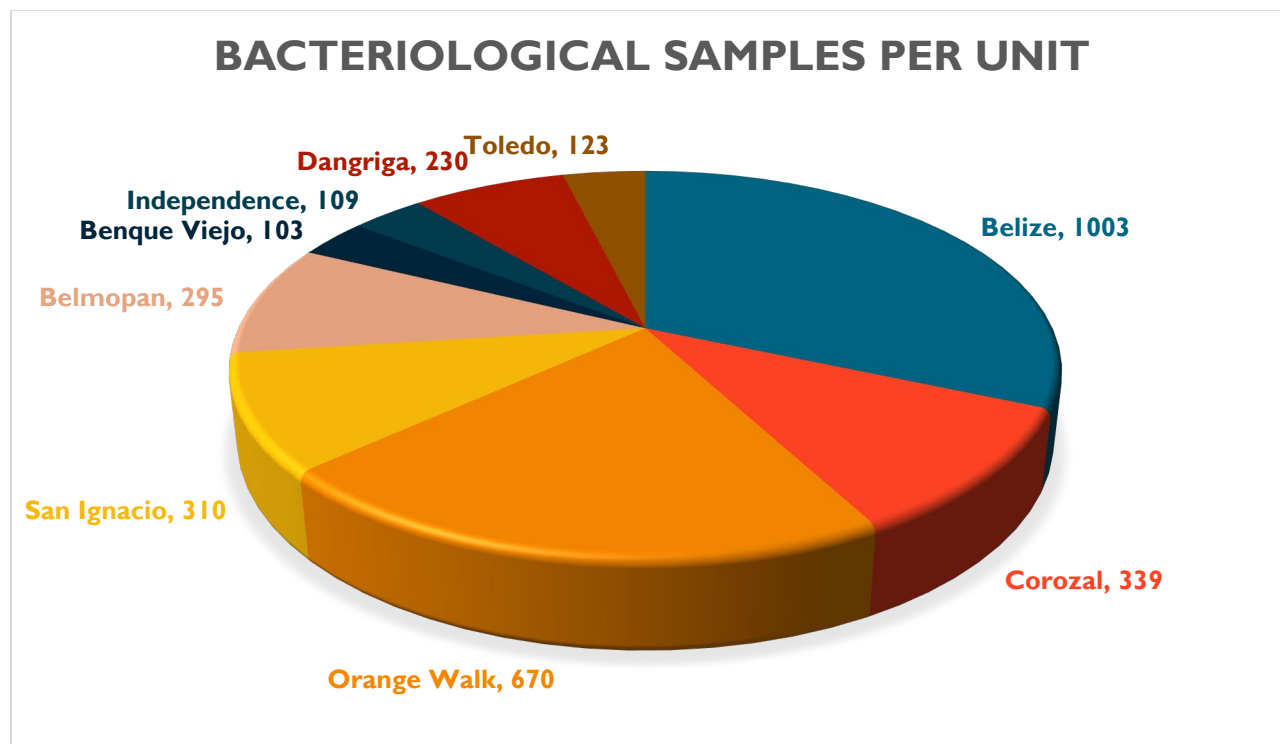


Table 4 - Total Number of samples collected (both bacteriological and chemical)

Total Samples collected Jan- Oct 2023 (bacteriological and chemical)

Unit	Bacteriological samples	Chemical samples	Total
Belize	1003	31	1034
Corozal	339	9	348
Orange Walk	670	28	698
San Ignacio	310	21	331
Belmopan	295	21	316
Benque Viejo	103	5	108
Independence	109	8	117
Dangriga	230	12	242
Toledo	123	25	148
TOTAL	3182	160	3342

Pie Chart 2: Bacteriological Samples per Unit Jan- Oct 2023





Pie Chart 3: Chemical Samples per Unit Jan. – Oct. 2023

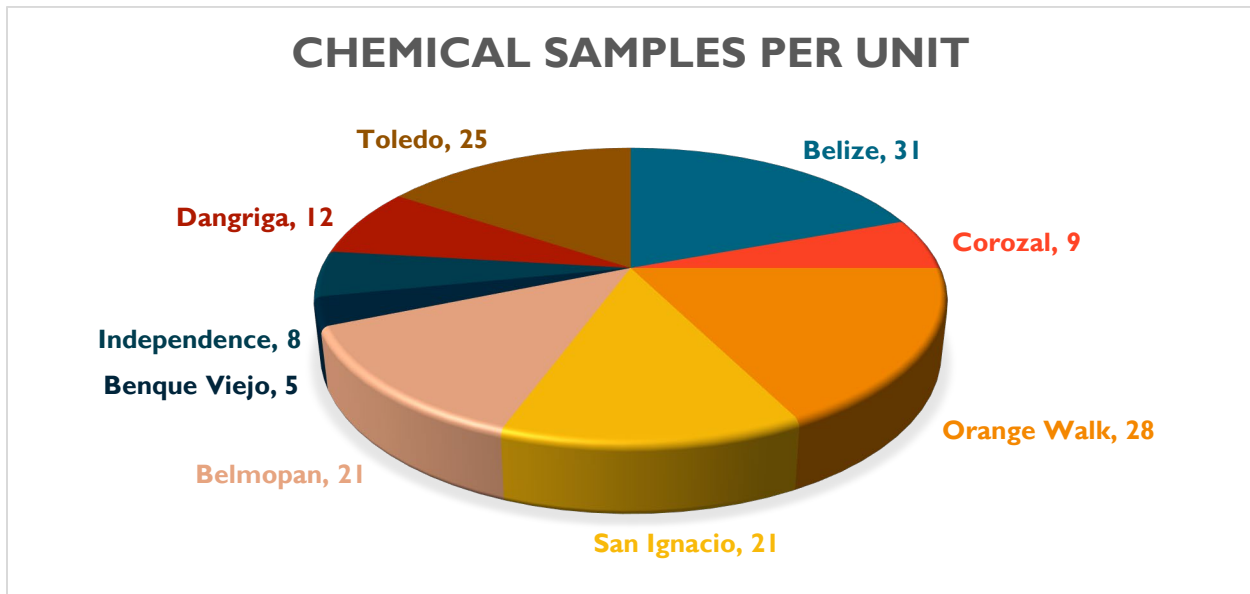


Table 5 – Total Number of Bacteriological samples collected from 4 Major Sources.

Districts	Belize Water Services	Rural Water Systems	Purified Water Operations	Hand Pump	Total
Belize District		101	96	1	198
Belize City/ S. Hill	363		163		526
San Pedro	23		23		46
Caye Caulker	40		8		48
River Valley	51				51
Hattieville	18				18
Corozal	18	70	152	1	241
Orange Walk		141	290	9	440
O. Walk Town	35				35
C. Pine Ridge	12				12
Cayo					
San Ignacio	80	115	79	5	279
Belmopan	55	54	103	12	224



Teakettle	13				13
Benque Viejo	36	30	30	2	98
Stann Creek					0
Dangriga	36	92	48		176
Placencia/S. Bight	8				8
Independence		62	28		90
Toledo		52	25	16	93
Forest Home	8				8
Punta Gorda	13				13
TOTAL	809	717	1045	46	2617

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		5	3	0	8
Belize City/ S. Hill	1				1
San Pedro					
Caye Caulker	2				2
River Valley	1				1
Hattieville	1				1
Corozal	0	0	0	1	1
Orange Walk	0	12	5	2	19
O. Walk Town					
C. Pine Ridge					
Cayo					
San Ignacio	1	9	6	2	18
Belmopan	2	3	0	10	15
Teakettle	2				2
Benque Viejo	1	2	2		5
Stann Creek					
Dangriga	1	5	0		6
Placencia/S. Bight	2				2
Independence		4	0		4
Toledo		19	0	0	19
Forest Home	0				0
Punta Gorda	2				2
TOTAL	16	59	16	15	106



Bacteriological Quality of Systems tested Jan. - Oct. 2023

Table 7 – Belize Water Services Systems

District	Total samples	Positive T. Coliforms	Positive F. Coliforms & E.coli	Negatives	Percentage Positives
Bze. City/ Double Run	363	34	1	328	10%
San Pedro	23	4	0	19	17%
Caye Caulker	40	6	0	34	15%
Hattieville	18	3	0	15	17%
River Valley	51	6	0	45	12%
Corozal	18	3	0	15	17%
Orange Walk	35	2	0	33	6%
C. Pine Ridge	12	1	0	11	8%
S. Ignacio/Sta. Elena	80	16	0	64	20%
Belmopan	55	2	0	53	4%
Teakettle	13	2	0	11	15%
Benque Viejo	36	6	0	30	17%
Placencia/Seine Bight	8	1	0	7	13%
Dangriga	36	4	3	29	19%
Forest Home	12	1	0	11	8%
Punta Gorda	9	2	0	7	22%
TOTAL	809	93	4	712	

N.B.:

12% of all BWS samples country wide were Positive with Total Coliform presence.

0.5 % of all BWS samples country were Positive either with Fecal Coliform or E. coli presence but these were from Dangriga system source (river).



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	101	33	0	68	5	5	5	32%
Corozal	70	32	0	38	10	12	12	46%
Orange Walk	141	46	1	94	17	17	17	33%
S. Ignacio/ Sta. Elena	115	63	1	51	13	13	13	57%
Belmopan	54	30	1	23	4	5	4	57%
Benque Viejo	30	13	1	16	3	3	3	46%
Independence	62	9	0	53	6	12	10	15%
Dangriga	92	23	0	69	8	14	12	25%
Toledo	52	19	0	33	11	29	19	37%
TOTAL	717	268	4	445	77	110	95	

N.B.:

86% of ALL RWS have been monitored up to October 2023

70% of ALL RWS monitored have at least once showed presence of Fecal Coliform Indicator Organisms (Contamination).

40% 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	290	26	3		261	10%
Corozal	152	24	10		118	22%
Orange Walk	290	44	1		245	16%
S. Ignacio/Sta. Elena	79	14	2		63	20%
Belmopan	103	11	6		86	17%
Benque Viejo	30	6	0		24	20%



Independence	28	0	1		27	4%
Dangriga	48	2	3		43	10%
Toledo	25	2	1		22	12%
TOTAL	1045	129	27	0	889	

N.B.:

A Total of 29 Purified Water Operations are in Belize District. 12 were contaminated at least once.

A Total of 14 Purified Water Operations are in Corozal District. 12 were contaminated at least once

A Total of 25 Purified Water Operations are in Orange Walk District. 18 were contaminated at least once.

A Total of 16 Purified Water Operations are in Cayo District. 14 were contaminated at least once.

A Total of 6 Purified Water Operations are in Stann Creek District. 4 were contaminated at least once.

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

A Total of 95 Purified Water companies are being actively monitored however many of these have multiple refill outlets. The number 95 is just the ‘Brand’ names.

Out of the total 1,045 collected so far a total of 156 samples showed contamination marking a 15% of contamination.

Table 10 – Hand Pumps

District	Samples collected	Fecal Coliform Positive	E. coli	Negative Samples
Belize	1	0		1
Corozal	1	0		1
Orange Walk	9	2		7
S. Ignacio/Sta. Elena	5	3		2
Belmopan	12	3		9
Benque Viejo	2	2		0
Independence	0			0



Dangriga	0			0
Toledo	16	6		10
TOTAL	46	16		30

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

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	9	1	2
Corozal	78	13	3
Orange Walk	170	17	2
Cayo	27	8	1
Stann Creek	15	3	0
Toledo	4	2	0
Total	303	44	8

N.B.:

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

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

N.B.:

Rain Water 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	23	1	4
Corozal	12	2	0
Orange Walk	6	1	0
Cayo	28	10	5
Stann Creek	41	0	3
Toledo	2	0	0
Total	112	14	12

District	Total Collected	Positive Fecal Coliforms	Positive E. coli
Belize	39	3	0
Corozal	7	0	0
Orange Walk	7	0	0
Cayo	36	6	0
Stann Creek	NOT	DONE	
Toledo	NOT	DONE	
Total	89	9	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
 as well in 2024.

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	31	17	14
Corozal	9	2	7
Orange Walk	28	18	10
San Ignacio	21	19	2
Belmopan	21	17	4
Benque Viejo	5	5	0
Independence	8	6	2
Dangriga	12	7	5



Toledo	25	24	1
TOTAL	160	115	45

N.B.:

28% 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	329	229	260	117
Corozal	3	1	15	3
Orange Walk	176	171	80	76
Cayo				
San Ignacio	70	44	128	12
Belmopan	57	35	65	18
Benque Viejo	25	18	26	5
Stann Creek				
Independence			66	9
Dangriga	28	28	28	6
Toledo	4	2	15	12
TOTAL	692	528	683	258

N.B.:

In Urban areas there is 76% 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 38% 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	340	239	85	16	70%
San Pedro	23	23	0	0	100%
Caye Caulker	40	25	15	0	63%
Hattieville	17	9	8	0	53%
River Valley	51	46	0	5	90%
Corozal	18	4	14	0	22%
Orange Walk Town	218	211	7	0	93%
Chan Pine Ridge	40	38	2	0	95%
San Ignacio/ Sta. Elena	80	48	31	1	60%
Belmopan	53	43	3	7	81%
Teakettle	18	10	0	2	56%
Benque Viejo	34	23	11	0	68%
Dangriga	26	26	0	0	100%
Placencia/ Seine Bight	8	6	2	0	75%
Forest Home	10	7	3	0	70%
Punta Gorda	9	7	2	0	78%
TOTAL	985	765	183	31	

N.B.:

78% 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.

22% 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	95	1	1%
Corozal	0	0	0%
Orange Walk	0	0	0%
Cayo	147	1	0.7 %
S. Creek	63	8	13%
Toledo	0	0	0%
TOTAL	305	10	

N.B.: Majority of RWS systems **DO NOT** have a consistent and continuous disinfecting system therefore the very poor national percentage of compliance of 3%. This therefore shows a clear trend in regards to the Microbiological quality of Rural Water Systems.



Table 13 Confirmed cases of reportable diseases surveillance by month

Reportable diseases	Number of monthly cases for 2023												Total for 2023	Rate	
	Jan	Feb	March	April	May	June	July	Au	Sept	Oct.	Nov	Dec	Jan		
AIDS															
Amebiasis															
Carbapenemase-Producing Enterobacteriaceae (CP)															
Chlamydia infections															
Cholera															
Encephalitis															
Food poisoning															
Gonorrhea															
Hepatitis A															
Hepatitis B															
Malaria	0	0	0	0											
Meningitis	0	0	0	0											
Rabies															
Rubella															
Siphilis															
List of vector-borne diseases	Number of monthly cases for 2023												Total for 2023	Rate	
	Jan	Feb	March	April	May	June	July	Au	Sept	Oct.	Nov	Dec	Jan		
Chikungunya		0													
Dengue		127													
Lymphatic filariasis															



Rift Valley fever	0													
Yellow Fever	0													
Zika	0													
Malaria	0													
Japanese encephalitis	0													
Lymphatic filariasis	0													
West Nile fever	0													
Schistosomiasis (bilharziasis)	0													
Onchocerciasis (river blindness)	0													
Plague (transmitted from rats to humans)	0													
Tungiasis	0													
Typhus	0													
Louse-borne relapsing fever	0													



List of vector-borne diseases	Number of monthly cases for 2023													Total for 2023	Rate
	Jan	Feb	March	April	May	June	July	Au	Sept	Oct.	Nov	Dec	Jan		
Anthrax		0													
Animal influenza		0													
Avian influenza		0													
Bovine tuberculosis		0													
Campylobacteriosis		0													
Cat scratch fever		0													
Cowpox		0													
Cryptosporidiosis		0													
Cysticercosis / Taeniasis		0													
Erysipeloid		0													
Fish tank / swimming pool granuloma		0													
Haemorrhagic colitis and haemolytic uraemic syndrome (HUS)			0												
Hantavirus syndromes		0													
Hepatitis E		0													
Hydatid disease		0													
Leptospirosis		0													
Listeriosis		0													
Louping ill		0													
Lyme disease		0													
Lymphocytic choriomeningitis		0													
Orf		0													



Ovine chlamydiosis	0																			
Pasteurellosis	0																			
Psittacosis	0																			
Q fever	0																			
Rabies	0																			
Rat bite fever	0																			
Ringworm	0																			
Salmonellosis	0																			
Streptococcal sepsis	0																			
Toxocariasis	0																			
Toxoplasmosis	0																			
Zoonotic diphtheria	0																			
Disease	0																			
Alveolar echinococcosis	0																			
Brucellosis	0																			
Crimean-Congo haemorrhagic fever (CCHF)	0																			
Ebola virus disease	0																			
Glanders	0																			
Hendra virus infection	0																			
Kyasanur Forest disease	0																			
Lassa fever	0																			
Marburg virus disease	0																			
Mers	0																			
Monkeypox	0																			
Nipah virus infection	0																			
Plaque	0																			



Rift Valley fever	0													
Tickborne encephalitis	0													
Trichinellosis	0													
Tularemia	0													
West Nile virus infection	0													
Yellow fever	0													



Prevent . Protect . Participate

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List of Zoonotic Diseases (Time frame of reporting February 2023)

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	0			



			(usually with cats)	
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 burgdorfer	ticks, rodents, deer, sheep, small mammals	tick bite	0	
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	2 bovines 2 bovines 2 bovines 1 bovine	OW Jan OW Mar OW Apr TOL Apr



				2 bovines	OW May
				1 bovine	OW Aug
				1 bovine	BZ Oct
Rat bite fever	Streptococcus 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
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



NATIONAL METEOROLOGICAL SERVICE OF BELIZE

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The National Meteorological Service of Belize under the Ministry of Sustainable Development, Climate Change and Disaster Risk Management surveillance reporting.

The National Meteorological Service of Belize maintains a network of manual and automatic weather stations across the country, measuring rainfall and temperature, among other variables. This data contributes to the monthly weather summary produced by the agro-climatic section.

The month of October is generally categorized as the second peak of the wet season; however, this was not observed. During the first two weeks of the month, new record-breaking maximum temperatures were recorded across the country. Additionally, the month experienced the first cold front of the season.

During the first week (1st - 7th), mostly isolated showers and thunderstorms occurred, mainly in the southern regions. From the 1st to the 3rd, the southern districts, coastal areas, and Maya Mountains were affected by isolated showers and thunderstorms. These weather patterns were influenced by a cold front over Florida/Gulf of Mexico, a surface trough over the Bay of Campeche, and a stationary front over southern Florida. A slack pressure gradient supported light Northeasterly airflow, maintaining relatively moist lower atmospheric levels. In the upper atmosphere, ridging created a north-westerly airflow with varying moisture levels, predominantly dry to relatively moist. From the 4th to the 7th, isolated showers and thunderstorms were observed across the north, south, and Maya Mountains. A surface trough was noted north of Belize and Yucatan, accompanied by an eastern Pacific monsoon trough moving southward toward Belize. Additionally, a cold front northwest of the Gulf of Mexico and a tropical wave near 70F contributed to a light easterly to northeasterly airflow, maintaining relatively dry moisture conditions in the lower atmosphere. The upper levels exhibited a TTT low and a trough extending East/Southeast of Belize, with predominantly northeasterly airflow and very dry to mostly dry moisture conditions.

The second week (8th - 14th) was characterized by fair and dry conditions, with sporadic isolated showers and thunderstorms, primarily over the Maya Mountains, Corozal, coastal, and southern areas. On the 11th, isolated showers occurred countrywide during the night due to a broad low-pressure system over the Gulf of Mexico near 92W, fostering moist atmospheric conditions in the lower levels. At the beginning of the week, a high-pressure ridge was noted, along with a stationary front spanning the southern Gulf of Mexico, Bay of Campeche, and eastern Mexico. This front later shifted north-westward toward Cuba. Additionally, a tropical wave was observed along the 86W. The week concluded with an elongated prefrontal trough stretching from the southern tip of Florida to the west of Tabasco. Throughout the week, a light easterly to southeasterly airflow persisted, driven by a slack pressure gradient and an observed low-pressure system aloft. The lower atmosphere maintained a mix of relatively moist, dry, and relatively dry conditions. In the upper atmosphere, a northeasterly to southeasterly airflow prevailed, supported by broad ridging between 300mb and 200mb, exhibiting very dry to dry moisture conditions,



except on the 11th when a blend of moist and dry air was evident. During this week, new record high temperatures were observed across the country, with a few stations achieving new monthly and daily high records. Punta Gorda had five consecutive new record daily maximum temperatures ranging from 34.0°C (93.2°F) to 36.7°C (98.1°F), with 36.7°C (98.1°F) being a new monthly high record. Savannah recorded three consecutive new record daily maximum temperatures ranging from 34.8°C (94.7°F) to 35.5°C (95.9°F). Central Farm recorded fourteen new record daily maximum temperatures, most of which occurred from the 4th to the 15th, ranging from 34.0°C (93.2°F) to 40.0°C (104°F), with 40.0°C (104°F) recorded on two consecutive days (the 11th and 12th); additionally, the latter was a new monthly record for this station. Belmopan recorded a total of ten new daily maximum temperatures within the first two weeks, ranging from 34.0°C (93.2°F) to 37.5°C (99.5°F), with 37.5°C (99.5°F) being a new monthly maximum record for this station. PGIA recorded eight new daily maximum temperatures, with five of them being consecutive, ranging from 32.9°C (91.3°F) to 35.4°C (95.8°F), the latter being a new monthly maximum record for this station. Melinda recorded three new daily maximum temperatures ranging from 34.0°C (93.2°F) to 36.5°C (97.7°F).

The third week (15th - 21st) commenced with isolated showers along the coast and in Toledo, followed by shower and thunderstorm activity in Cayo and Toledo Districts, eventually affecting the entire country. This was due to a cold front initially observed over the southern Gulf of Mexico, with a pre-frontal trough near Yucatan, later moving across the country. Cool and dry weather with isolated showers prevailed on the 17th in the coastal and northern regions, followed by dry and fair conditions. The week concluded with moderate rainfall along the coast, isolated thunderstorms in the Toledo district, and rain affecting the northern part, including Ambergris Caye and Corozal. In the lower atmosphere, a stationary front persisted across Bahamas, Cuba, Gulf of Honduras, southern Belize, and Guatemala until the 19th, after which a trough emerged over the western Caribbean. Moisture levels were predominantly dry to relatively dry in the lower atmosphere, except on the 16th and 17th, where relatively moist conditions were observed between 750-858mb. The prevailing airflow was mostly north-westerly, supported by ridging and a slack pressure gradient. In the upper atmosphere, a pattern of ridging and troughs created a south-westerly airflow initially, transitioning to a westerly airflow. A high centre over Belize on the 18th, along with ridging in the western Caribbean, sustained a north-westerly airflow, while dry to relatively dry moisture levels persisted.

The final week (22nd - 31st) began with light shower and thunderstorm activity in Belize District and the southern coast, progressing to isolated showers along the coast, then to isolated thunderstorms inland and over the Maya Mountains, culminating in moderate showers, thunderstorms, and rain across the country. In the lower atmosphere, trough activity was observed in the western Caribbean, followed by a weak trough east of Yucatan and Belize, with remnants of tropical depression 21 over southern Honduras. The month concluded with a cold front stretching from the Bay of Campeche to Northern Florida. A combination of ridging, trough patterns, and a slack pressure gradient maintained a northeasterly, then an easterly airflow. Moisture levels remained predominantly dry to relatively dry, except on the 24th and 25th, when moisture was observed in the lower atmosphere. The upper atmosphere exhibited varied airflow from westerly to northeasterly and easterly, supported by an upper-level low east of the Yucatan Peninsula, followed by ridging and a TUTT low over the northern Caribbean Sea. Dry moisture conditions mostly prevailed in the upper levels of the atmosphere.



Overall, based on the sample station, Savannah experienced the most rain days, with 15 days. The station that experienced the highest rainfall for the month was Melinda Station which recorded 318.5 millimeters. This station also recorded the highest one-day rainfall total of 114.1 millimeters on 31st October 2023. Overall, the southern parts of the country experienced the most rainfall while the central inland areas (esp. Spanish Lookout), experienced the least rainfall. Despite the passage of several tropical waves and the first cold front, most stations recorded below normal rainfall except for the Melinda Station in the Stann Creek district whose rainfall total was 6 percent above normal. Maximum and minimum temperatures for the month were above normal over most areas, except for slightly below normal minimum temperatures over Melinda Station.

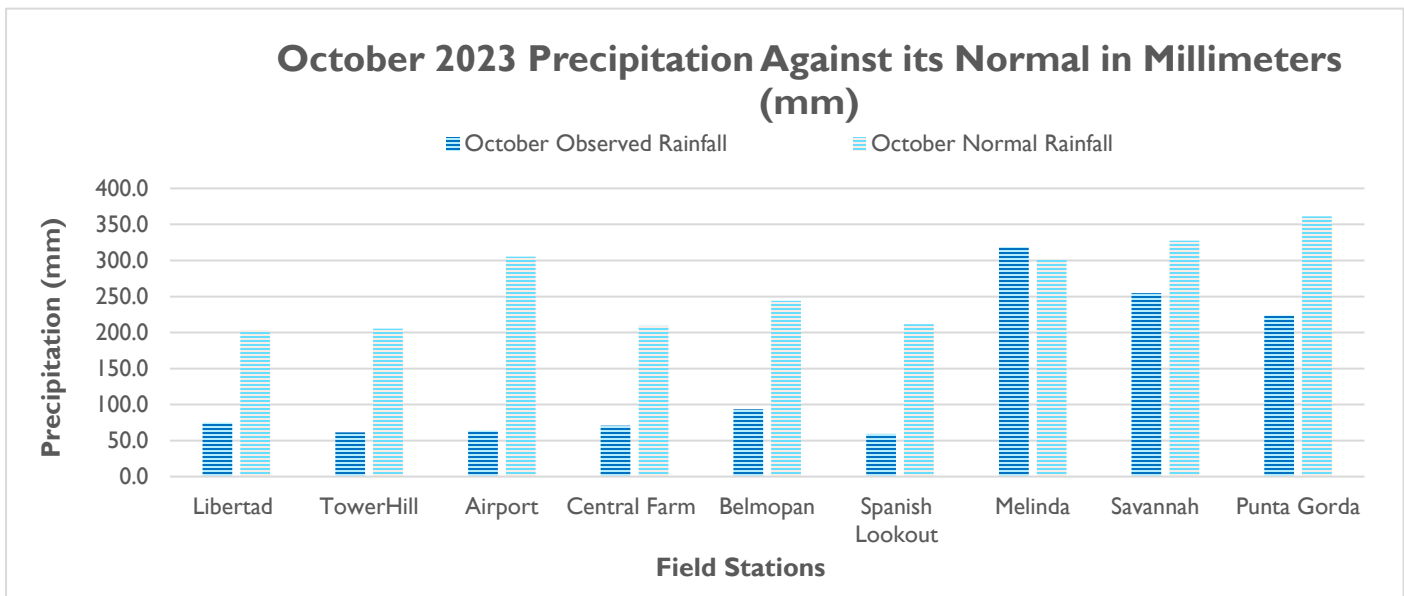


Figure I: Comparison of accumulated precipitation and Climate Normal (1991-2020), for some of the field stations across the country in October 2023.

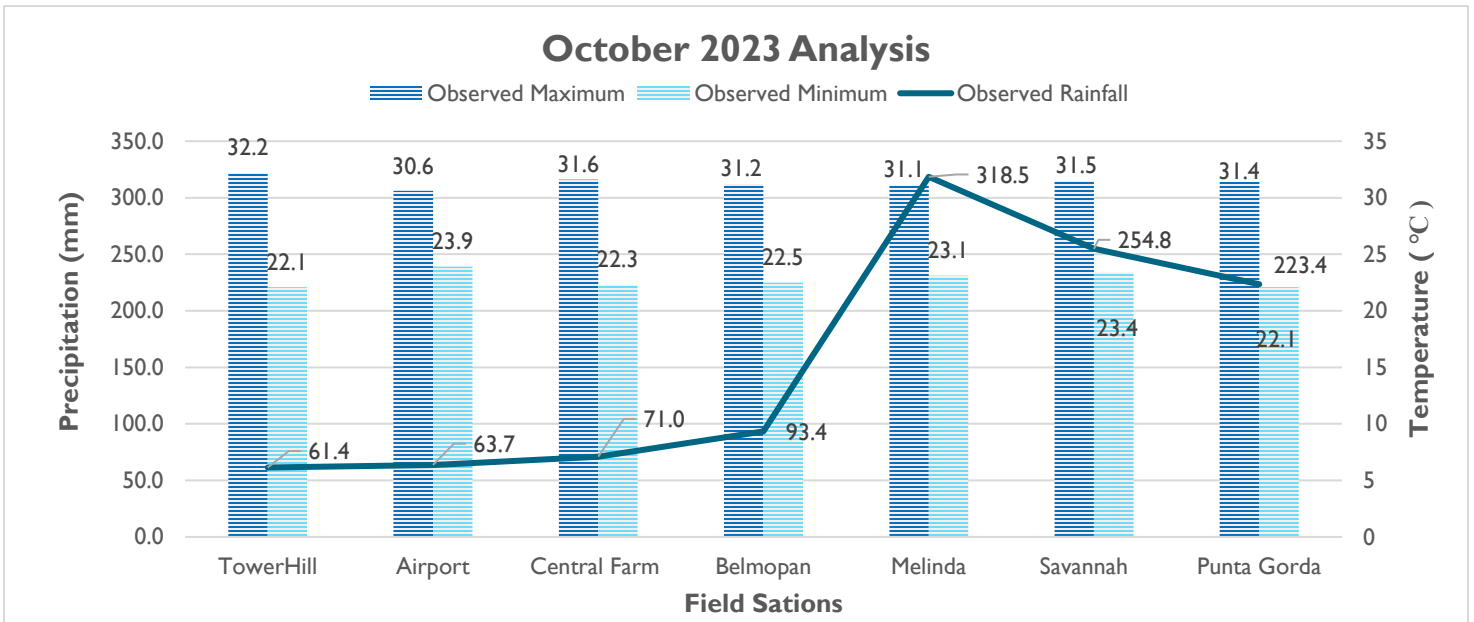


Figure 2: Analysis of October 2023

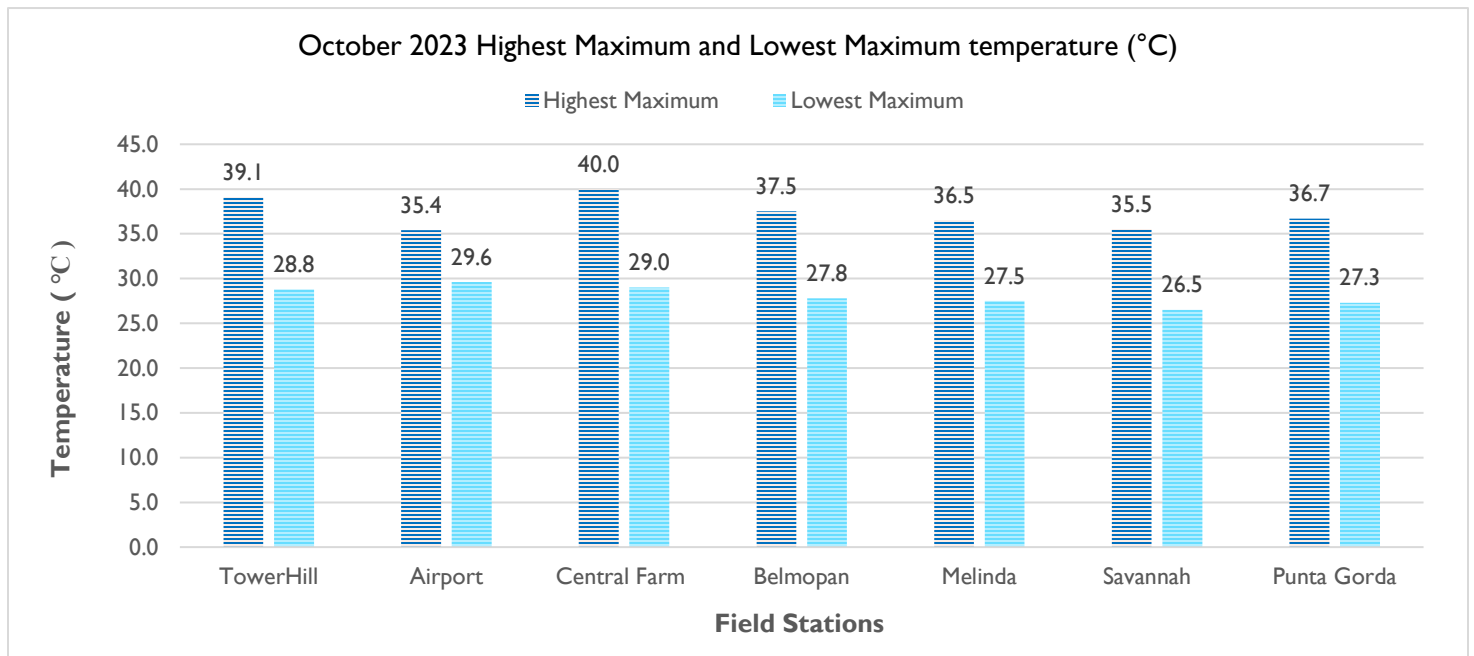


Figure 3: Comparison of the Highest and Lowest Maximum Temperatures in (°C) in Recorded in October 2023



Highest Minimum and Lowest Minimum Temperature (°C) October 2023

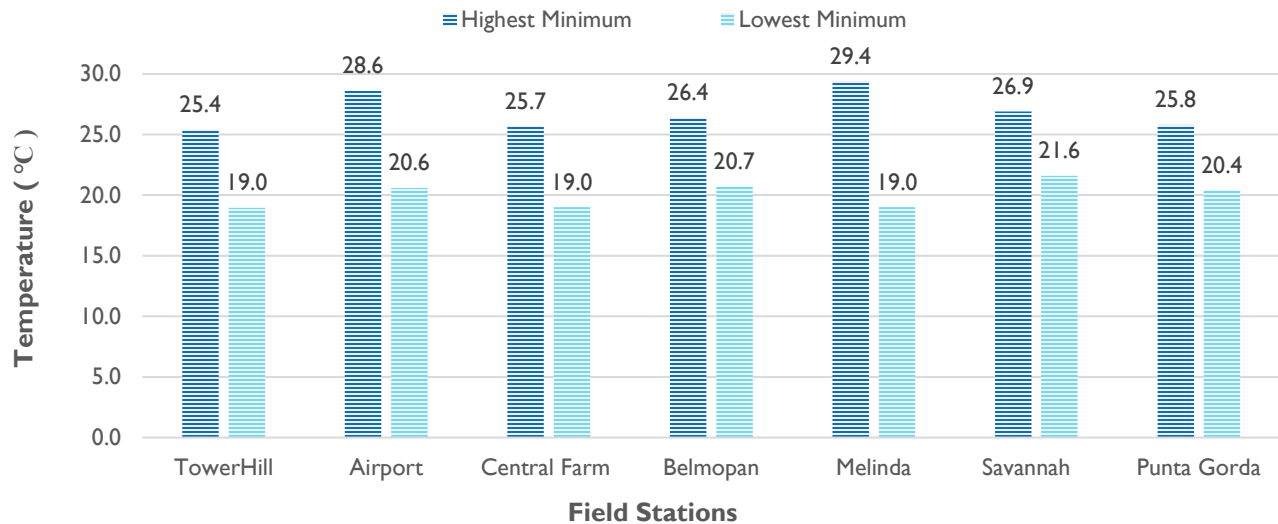


Figure 4: Comparison of the Highest and Lowest Minimum Temperatures in (°C) in Recorded in October 2023

STATION	Maximum Temperature 2023	Historical Maximum Extreme	Day	Previous Record Year
Towerhill	35.3	35.0	1	2020/2015
	35.2	35.0	2	2020/2017
	36.8	36.5	3	1995
	36.4	35.3	4	2020
	37.8	35.0	5	2020
	35.6	35.0	6	2020/2016
	35.3	35.0	7	2016/2014
	36.1	35.0	8	2017/2004
	36.8	36.0	11	2018
	39.1	36.0	12	2018/2003
	38.0	35.8	13	2020
PGIA	36.1	34.8	15	2015
	33.9	33.2	5	1996
	34.0	33.7	7	2015
	33.7	32.4	11	2009
	35.4	32.9	12	2005
	34.8	33.3	13	1995
	33.4	32.7	14	2021



	33.5	33.2	15	2004
Belmopan	34.0	33.9	1	2012
	34.5	33.9	2	1994/1991
	34.5	34.3	4	2016
	35.6	34.4	5	1976
	35.5	34.4	6	1976
	35.9	34.3	7	2016
	37.1	34.0	11	2021
	37.5	34.0	12	2020/2021
	36.9	34.0	13	2021
	35.5	34.6	14	2001
Central Farm	34.8	34.4	1	2019
	35.5	34.2	4	2019
	36.1	35.2	5	1996
	35.9	34.7	6	2019
	36.7	34.5	7	2009
	36.2	34.6	8	2017
	35.2	35.2	9	2018
	40.0	35.2	11	2021
	40.0	37.9	12	2015
	38.0	35.0	13	2003
	35.0	34.6	14	2021
36.6	34.5	15	2021	
Savannah	34.8	34.6	11	2018
	35.5	34.4	12	1969
	35.0	34.0	13	2019
Punta Gorda	34.9	33.3	11	2020
	34.4	33.5	12	2004
	31.4	33.3	13	2022/1979
	36.7	33.9	14	1979
	34.0	33.8	15	2021/2009
Melinda	35.0	34.9	14	2021

Table 1: Daily Maximum Extremes where records were broken in October 2023