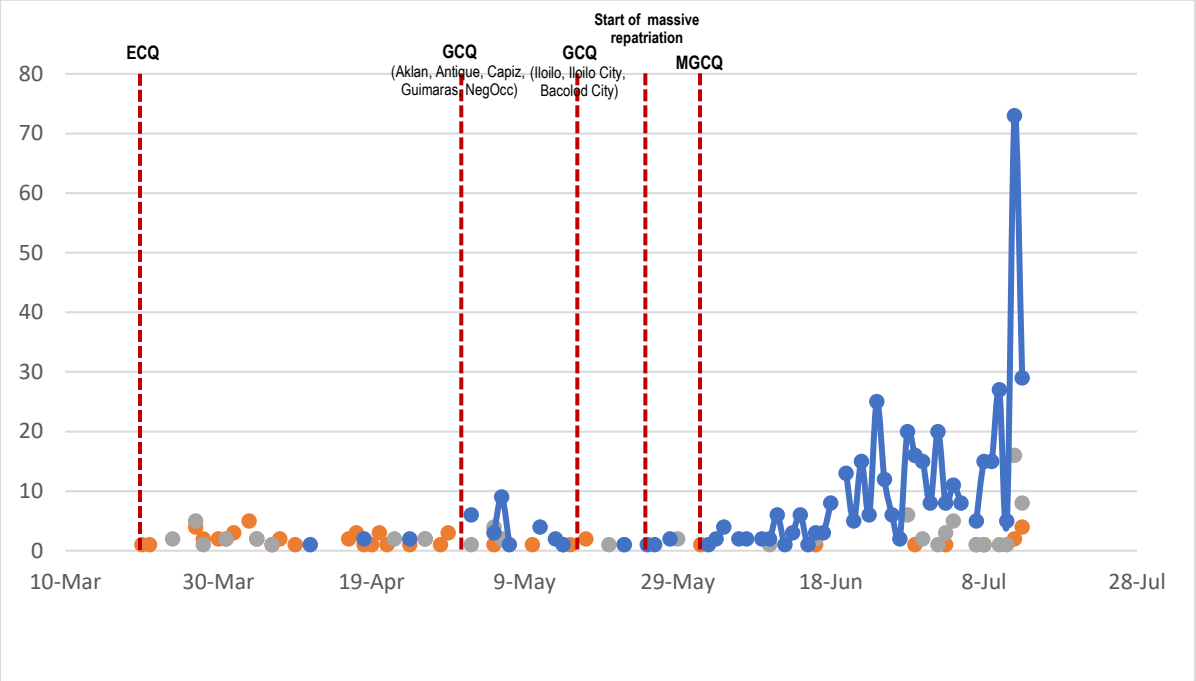
Policy Note No. 4

July 20, 2020

COVID-19 IN WESTERN VISAYAS: PUBLIC HEALTH DATA ANALYSIS AND RECOMMENDATIONS AS OF 13 JULY 2020*

Helena Marie Lagon Alvior, MD[1], Mary Camille Samson, RMT[1], Joseph Arbizo, RMT, MoS[2], Abigail Puno, RMT, MPHSM[2], and Philip Ian Padilla, MD, PhD[2]

[1] ThinkWell Philippines, Iloilo City
[2] University of the Philippines Visayas, Miagao, Iloilo
*Based on the data available on 13 July 2020.



ECQ – Enhanced Community Quarantine
GCQ – General Community Quarantine
MGCQ – Modified General Community Quarantine

Figure 1. Epidemiologic curve COVID-19 Cases in Western Visayas (Data Source: DOH-CHD VI)

The present epidemiologic curve shows that quarantine measures managed to flatten the curve from the start of the COVID-19 pandemic in the region, but a surge occurred with the mass repatriation policy of the national government. The timeline of the quarantine measures and the number of new cases (Figure 1) reflect that majority of the COVID-19 confirmed cases are locally stranded individuals (LSIs) and returning overseas Filipinos (ROFs). The total number of cases in Western Visayas is now 593, broken down as follows: 55% LSIs, 18% ROFs, 26% local transmission (Table 1). Notably, 7 of 10 new cases are coming from outside the region, with more of these coming in during the next few weeks.

The Western Visayas Regional Task Force put in place protocols for returning residents which was adopted by the provinces and cities. Upon arrival in the region, returning individuals need to submit themselves to the testing process of the home province/city and proceed to quarantine in their respective municipalities. If the municipality is not capacitated, the

province/city assists. This initiative allowed provinces to continue with economic activities while safeguarding the health of the community with standard interventions for LSIs and ROFs.

Low local transmission incidence proportion and daily transmission rate of COVID-19 in Western Visayas. After almost four months since the first confirmed COVID-19 case in Western Visayas, the DOH Center for Health Development Western Visayas has declared a low-level community transmission in the region through a press release. This is following the detection of confirmed cases in the region that could not be traced back to known cases. Excluding cases by repatriation, the incidence proportion of local transmission of COVID-19 in Western Visayas is relatively low with only 2.7 cases per 100,000 population and daily transmission rate of 0.024 during the past 4 months in Western Visayas (Table 1, Figure 2A). These low transmission rates mean that the epidemic has been tightly controlled by the Western Visayas local government units (LGUs). Although, the specific spikes in numbers of local infection might be alarming, data still indicates a constant low incidence rate and R_0 (Figure 2B).

Incidence proportion per 100,000 susceptible persons[1]	2.703
Daily incidence rate per 100,000 susceptible persons[2]	0.024

1 Incidence proportion during the period from day of first case to July 8, 2020
2 Daily incidence rate from day of first case

Table 1. Incidence proportion and daily incidence rate for COVID-19 in Western Visayas

The epidemic curve and reproductive number (R_0) are in decline overall in the region. The bulk of new cases in Western Visayas are from ROFs and LSIs (Figure 2A). Nonetheless, the reproductive number (R_0) for the whole Western Visayas is still below 1 at 0.414 (95% CrI: 0.294 to 0.553) as of July 13, 2020 considering the emergence of new imported cases from ROFs and LSIs (Figure 2B). This R_0 (0.414) translates to 1 COVID-19 infected patient transmitting the virus to less than 1 person during the period covered. (Note: In this particular model, the imported cases were not included as part of local transmission.)

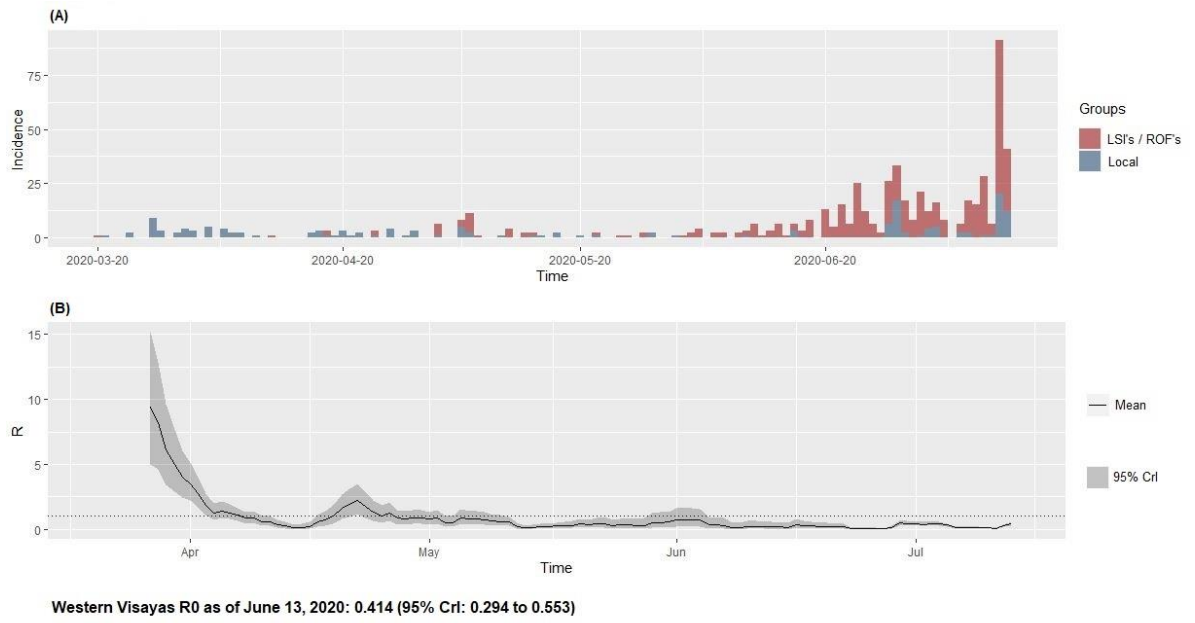


Figure 2. (A) Epidemic curve and (B) R0 trend in Western Visayas from March 20 to July 13, 2020

There are significant clusters of COVID-19 cases located in the provinces of Iloilo and Negros Occidental, and in Iloilo City. The hotspot analysis shows 2 spatial clusters of COVID-19 cases from June 10 to July 13, 2020. Based on data, three or more confirmed positive cases were identified in five municipalities in the province of Iloilo (Alimodian, Bingawan, Igbaras, New Lucena, and Oton), in Iloilo City, and in Talisay City, Negros Occidental. The surrounding municipalities within the 5-kilometer radius of the epicenter of these hotspots were also noted. Finding these hotspots and surrounding municipalities has practical importance for these areas to roll out a comprehensive strategy to suppress transmission of disease.

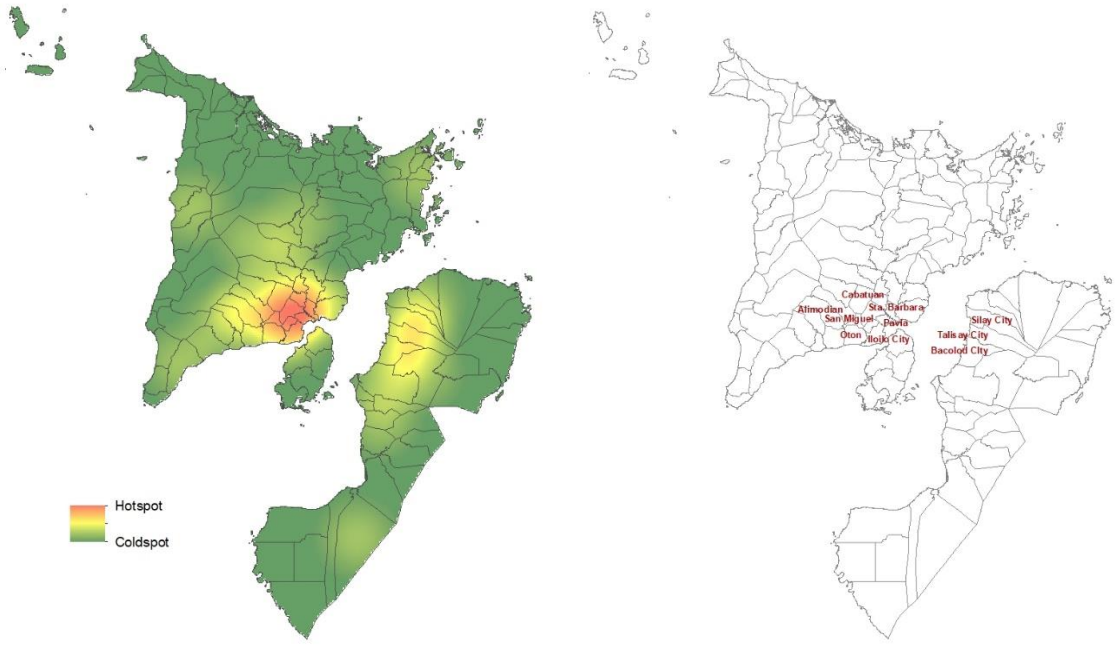


Figure 3. COVID-19 hotspots in Western Visayas from June 10 to July 13, 2020 (Data Source: DOH-CHD VI)

Case doubling time (CDT) observed to be progressively slowing but with the recent addition of cases the trend needs to be monitored. Doubling time is a measure used to estimate the speed of an outbreak. The steeper the lines, the higher the growth rate and the faster the total number of COVID-19-related deaths is doubling. As seen in Figure 4, the COVID-19 case doubling times for Western Visayas is almost at the 15-day doubling mark. It is continuously increasing (Table 2) until the 5th of July. However, from 15.8 days doubling time, it returned to 12.5 days by July 12. This reflects the sudden influx of positive LSIs and ROFs. The situation should be monitored closely to see whether this is just a momentary change or a continuing trend.

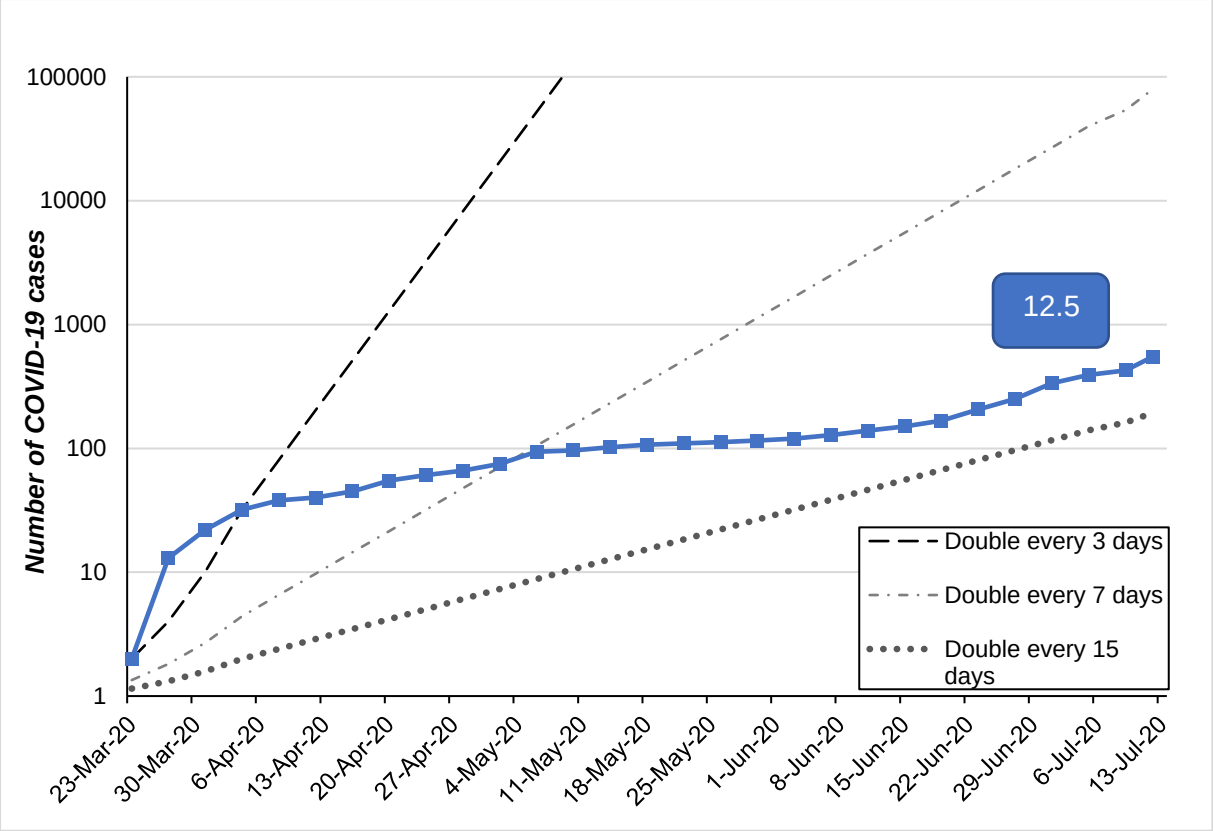


Figure 4. Number of COVID-19 cases and growth predictions based on Doubling Times (Western Visayas)*

**Doubling time calculated since the first reported confirmed case in WV (March 20, 2020). "Predicted" assumes no change in doubling time. Number of confirmed cases may not reflect actual number of cases due to limited testing*

Date	Cumulative Cases	Doubling time
23-Mar-20	2	3
31-Mar-20	22	2.2
08-Apr-20	38	3.6
16-Apr-20	45	4.9
24-Apr-20	61	5.9
02-May-20	75	6.9
10-May-20	96	7.7
18-May-20	107	8.8
26-May-20	112	9.8
03-Jun-20	120	10.9
11-Jun-20	139	11.7
19-Jun-20	167	12.3
27-Jun-20	251	12.4
01-Jul-20	335	12.3
05-Jul-20	392	15.8
09-Jul-20	426	12.7
12-Jul-20	551	12.5

Table 2. Doubling time of confirmed COVID-19 cases in Western Visayas

The case fatality rate (CFR) and mortality doubling time (MDT) has continuously decreased in the region. The CFR is a measure of disease severity – the proportion of people who died from a certain disease to the number of people diagnosed with it. Due to the limited number of testing capacity and contact tracing during the first months of the pandemic, the CFR reached the high of 18%. As the situation progressed, the CFR continuously decreased and is currently 2% (Figure 5). The MDT in Western Visayas has significantly slowed down since the start of the pandemic. There was a sharp increase in the number of deaths in early April and deaths were predicted to double within 5 days (Figure 6). This initial impact of the COVID-19 in the region is probably due to low testing capacity, contact tracing and the unfamiliarity of the people to the new health protocols and policies. With strengthened preventive measures and health protocols, the trendline eventually flattened. Currently, Western Visayas has 11 deaths and with a longer MDT of 33.5 days.

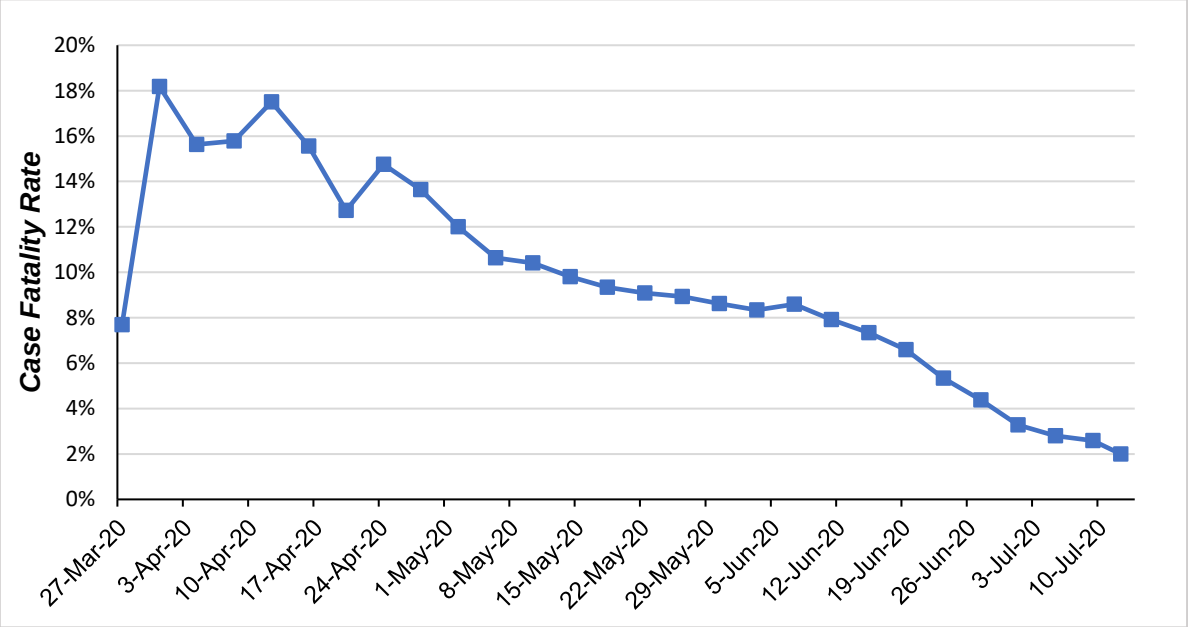


Figure 5. Case Fatality Rate of COVID-19 (Western Visayas)

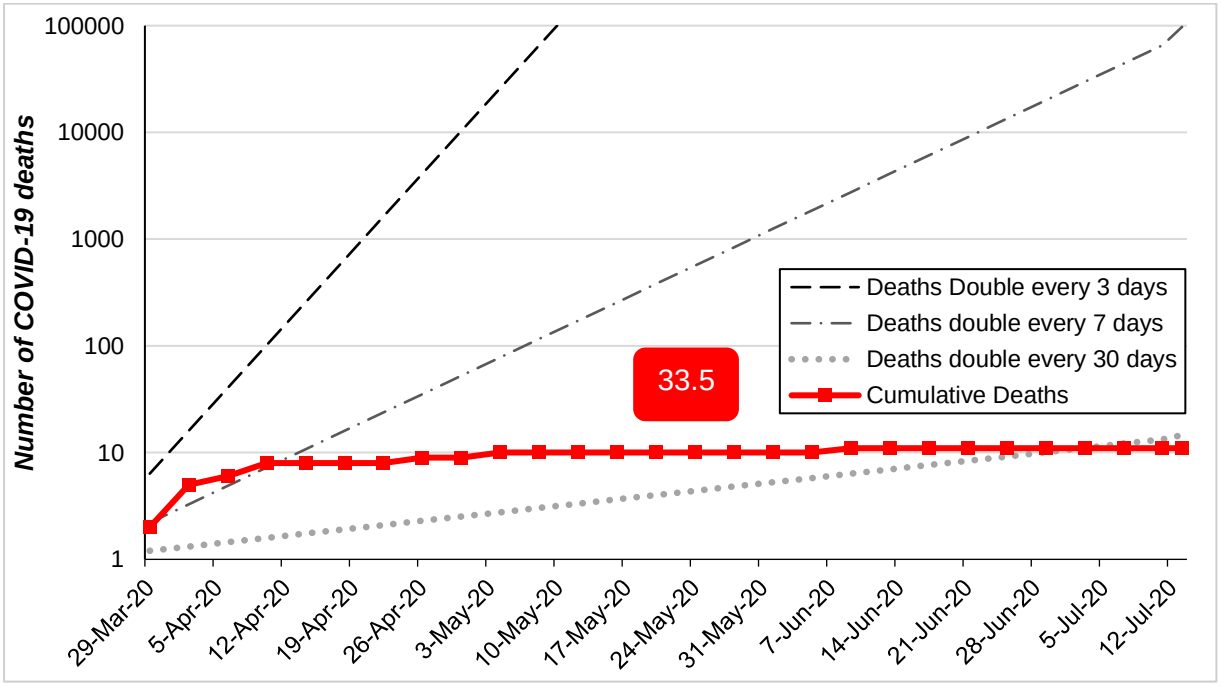


Figure 6. Number of COVID-19 deaths and growth predictions based on Doubling Times (Western Visayas)*

Demographic Profile of Confirmed Positive COVID-19 Cases in Western Visayas

The demographic profile shows majority are males, aged 21-50 years old, and are asymptomatic. Almost 3 in 4 Western Visayas cases are imported cases (74% are LSIs and ROFs). Across the different age groups in Table 3, almost 6 out of 10 are males and more than 80% of cases belong to the age group 21-50 years old. A third of cases are coming from the two biggest provinces in the region: Iloilo and Negros Occidental. A quarter is coming from the HUCs: Iloilo and Bacolod cities. Although case classification data disaggregated per case are only available until July 8, 2020, it already shows that most of the cases are asymptomatic (60%). This is further supported in the regional daily bulletin last July 13 showing that overall asymptomatic cases comprise 87%. Those who were identified under local transmission have experienced Severe Acute Respiratory Illness (SARI) and ten have died from the group.

Characteristics	Frequency N (%)	LSI N (%)	Repatriate N (%)	Local N (%)
Total	593 (100.0)	328 (55.5)	109 (18.4)	156 (26.4)
Sex				
Male	339 (57.2)	177 (54)	76 (69.7)	86 (55.1)
Female	254 (42.8)	151 (46)	33 (30.3)	70 (44.9)
Age Group				
<1	1 (0.2)	1 (0.3)	0	0
1-10	10 (1.7)	7 (2.1)	0	3 (1.9)
11-20	21 (3.5)	18 (5.4)	0	3 (1.9)
21-30	237 (40.0)	169 (51.5)	38 (34.9)	30 (19.2)
31-40	160 (27.0)	72 (22.0)	39 (35.8)	49 (25.6)
41-50	82 (13.8)	29 (8.8)	24 (22.0)	29 (18.6)
51-60	29 (4.9)	17 (5.2)	6 (5.5)	29 (18.6)
61-70	8 (1.3)	13 (4.0)	2 (1.8)	14 (9.0)
71-80	1 (0.2)	2 (0.6)	0	6 (3.8)
81-90	1 (0.2)	0	0	1 (0.6)
>90		0	0	1 (0.6)
Province/HUC				
Aklan	11 (1.9)	1 (0.3)	4 (3.7)	6 (3.8)
Antique	20 (3.4)	1 (0.3)	4 (3.7)	15 (9.6)
Capiz	19 (3.2)	8 (2.4)	5 (4.6)	6 (3.8)
Guimaras	10 (1.7)	5 (1.5)	5 (4.6)	0
Iloilo	191 (32.2)	107 (32.6)	24 (22.0)	60 (38.5)
Negros Occidental	196 (33.1)	156 (47.6)	26 (23.9)	14 (9.0)
Iloilo City	84 (14.2)	23 (7.0)	20 (18.3)	41 (26.3)
Bacolod City	62 (10.5)	27 (8.2)	21 (19.3)	14 (9.0)
Case Classification+				
Asymptomatic	352 (59.4)	178 (54.3)	97 (89.0)	77 (49.4)
ILI*	33 (5.6)	10 (3.0)	4 (3.7)	19 (12.2)
SARI**	30 (5.1)	0	1 (0.9)	29 (18.6)
Missing Data	178 (30.0)	140 (42.7)	7 (6.4)	31 (19.9)
Status				
Admitted	40 (6.7)	8 (2.4)	8 (7.3)	24 (15.4)
Died	11 (1.9)	0	1 (0.9)	10 (6.4)
Facility Quarantined	366 (61.7)	295 (89.9)	35 (32.1)	36 (23.1)
Home Quarantined	23 (3.9)	9 (2.7)	1 (0.9)	13 (8.3)
Recovered	153 (25.8)	16 (4.9)	64 (58.7)	73 (4.4)

Table 3. COVID-19 positive patients in Western Visayas (March 20 - July 13, 2020)

+Case classification data is until July 8, 2020
*ILI – Influenza-like Illness
*SARI – Severe Acute Respiratory Illness

Repatriates testing positive mostly come from Negros Occidental and Iloilo province and are facility quarantined. Forty-four percent (44%) of LSIs and ROFs are from the Negros Occidental, 20% from Iloilo province, and both Bacolod City and Iloilo City contribute 14% each. Almost all the LSIs (89.9%) and ROFs (32.1%) are isolated in quarantine facilities designated by their respective LGUs.

Mortality related to COVID-19 comprise 2% of cases in Western Visayas. There are 11 deaths out of 593 cases (Table 3 and Figure 5). Majority of them are male (72.7%), 9 out of 11 are older than 50 years old, either index cases or close contacts (90.9%), and from the Iloilo Province (45.5%). All deaths were of Severe Acute Respiratory Illness.

Characteristics	Frequency N (%)	Male N (%)	Female N (%)
Total	11 (100.0)	8 (72.7)	3 (27.2)
Age			
<1	0	0	0
1-10	0	0	0
11-20	0	0	0
21-30	0	0	0
31-40	2 (18.2)	2 (18.2)	0
51-60	3 (27.3)	1 (9.1)	2 (18.2)
61-70	4 (36.4)	3 (27.3)	1 (9.1)
71-80	1 (9.1)	1 (9.1)	0
>90	1 (9.1)	1 (9.1)	0
Remarks			
LSI	0	0	0
Repatriate	1 (9.1)	1 (9.1)	0
Others	10 (90.9)	7 (63.6)	3 (27.3)
Province/ HUC			
Aklan	0	0	0
Antique	0	0	0
Capiz	2 (18.2)	1 (9.1)	1 (9.1)
Guimaras	0	0	0
Iloilo	5 (45.5)	4 (36.4)	1 (9.1)
Negros Occidental	0	0	0
Iloilo City	1 (9.1)	1 (9.1)	0
Bacolod City	3 (27.3)	2 (18.2)	1 (9.1)
Case Classification			
Asymptomatic	0	0	0
ILI	0	0	0
SARI	11 (100.0)	8 (72.7)	3 (27.3)

Table 4. Demographic Characteristics and Case Classification of COVID-19-related deaths in Western Visayas (March 20 - July 13, 2020)

Asymptomatic cases in the region mostly belong to the working age group. Those in the working age group, 21-60 years old, can return to work under the MGCQ making them potential spreaders of the disease. Moreover, 83% of these working group asymptomatic cases are LSIs and ROFs (Figure 7). With greater mobility comes the increased likelihood of transmitting the virus if minimum public health standards are not observed.

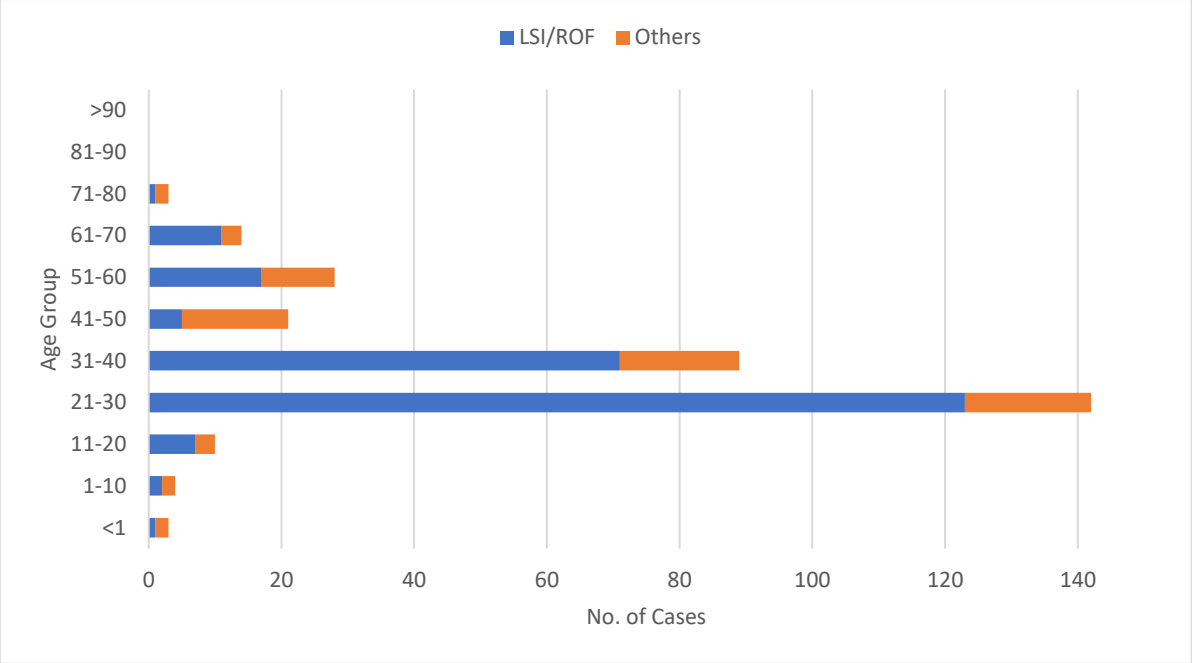


Figure 7. Asymptomatic COVID-19 Cases in Western Visayas according to Age Group (Data Source: DOH-CHD VI, as of July 8, 2020)

Migration patterns to Western Visayas indicate a third of confirmed cases lack data as to the point of origin of travel. Around 32% of cases have no data as to where they came from originally going into the 2 biggest provinces in the region: Iloilo and Negros Occidental. Interestingly, but not surprisingly, Manila and Cebu comprise 38% of the point of origins of LSIs and ROFs. International travel origins include Kingdom of Saudi Arabia, Italy, and USA.

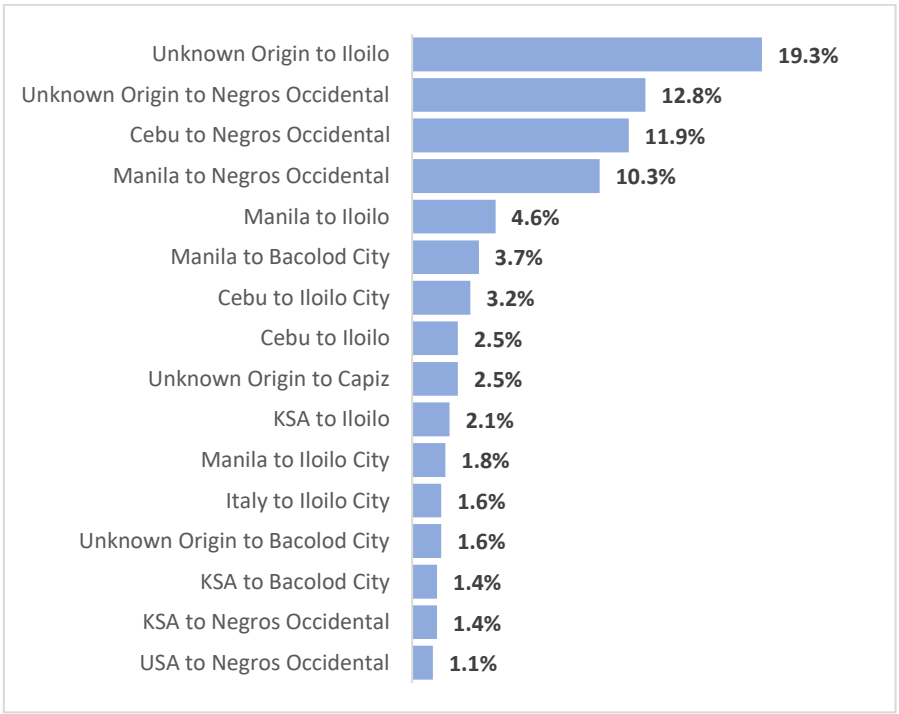


*Figure 8. Migration pattern of COVID-19 positive LSIs and ROFs in Western Visayas**

*Migration patterns with frequency of <5 positive cases (52 data points or 18.1% of overall patterns) were not included in the graph

Detect - Isolate – Treat Capacity Updates in Western Visayas

Currently, there are four laboratory facilities licensed to conduct RT-PCR testing for COVID-19 in Western Visayas. In the past months, only Western Visayas Medical Center sub-national laboratory (WVMC-SNL) caters to the whole region. There are three new licensed laboratories - Qualimed Hospital molecular laboratory (QH-ML), Iloilo City, Teresita L. Jalandoni Provincial Hospital molecular laboratory (TLJPH-ML), Silay City, and Corazon Locsin Montelibano Memorial Regional Hospital molecular laboratory (CLMMRH-ML), Bacolod City. The last two now process specimen for Negros island, specifically the province of Negros Occidental and Bacolod City.

The average testing turnaround time (TAT) of 6 days is longer compared to previous TAT of 5 days (from Policy Note 3, May 22, 2020). TAT starting June 4, 2020, after the operationalization of the second laboratory (TLJPH-ML), is shown in Figure 9. Recent data indicates that test results for Bacolod City, Antique, and Negros Occidental have the longest TAT in the region (Figure 9). However, available data does not specify to which laboratory the samples were sent. From the data, it can be gleaned that swab samples are usually brought to the laboratories for processing on the same day it was collected but there are some that take days before receipt by the laboratory. In the case of Antique, swab samples collected were received in the laboratory on the same day, but it took 7 days for the tests to be processed and results released. In the case of Negros Occidental and Bacolod City, some samples were received by the labs 3 days after collection, but the actual sample processing takes an average of 6 days. The inauguration and operationalization of CLMMRH-ML in Bacolod City is expected to address the lag in testing and translate to shorter TAT for the LGUs in Negros island.

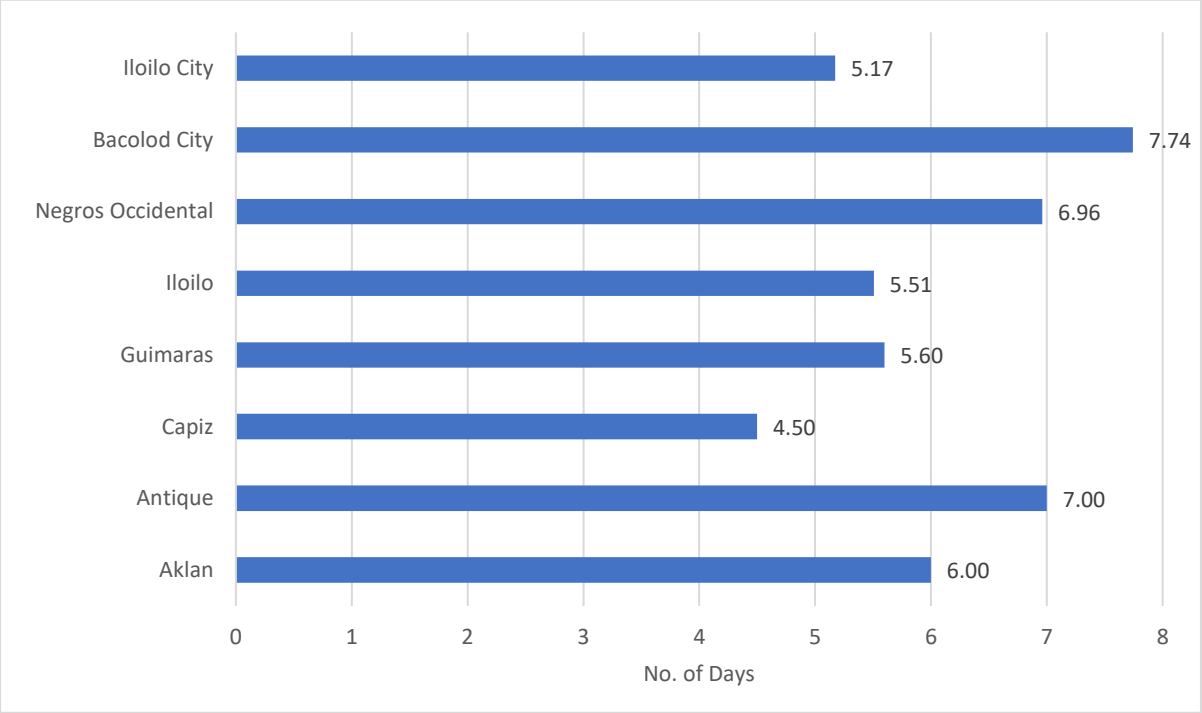


Figure 9. Average Turn-Around Time (in days) by Province/HUC (Data Source: DOH-CHD VI, as of July 8, 2020)

COVID-19 laboratories in the region reported backlogs on testing due to the surge of samples received but have yet to reach their daily testing capacity. WVMC-SNL has reported that backlogs where due to the influx of swab samples received following the lockdown of two hospitals in Panay Island. As of July 8, the COVID-19 laboratories in the region reported backlogs (Table 5) which are swab samples pending to be processed and lab results pending release. It is important that factors contributing to these backlogs and TAT delays are investigated and addressed. Knowing the test results the soonest time possible is crucial to initiate early contract tracing efforts and immediately implement apt disease control measures within a locality.

Facility	Date of First Lab Result Release	Daily Testing Capacity*	Average Samples Tested Daily	Total Samples Tested	Backlogs as of July 8*
Western Visayas Medical Center SNL	April 3	500-800	344	35,070	3,200
Teresita L. Jalandoni Provincial Hospital ML	June 4	250-300	296	11,241	3,000
Qualimed Hospital ML	July 9	96	21	107	-

**DOH-CHD VI Presscon, July 8, 2020*

Table 5. Testing Capacity of Operational COVID-19 Laboratories in Region 6
(Data Source: DOH COVID-19 Tracker – Data Drop, DOH-CHD VI)

The positivity rate in WV is half that of the national average. As the COVID-19 situation in the country progresses, it is important to determine whether testing capacities are improved. One measure that can predict how widespread the testing is the *positivity rate* which shows the ratio of positive COVID-19 individuals relative to the number of tests performed. The national testing capacity has been improving since the start of April but spiked recently reaching a little less than 10%. However, in Western Visayas, positivity rate is half of the national average at slightly less than 5% (Figure 10). The number of tests has visibly increased since April and decreased in June (thus the peak of 8% positivity rate) coinciding also with the surge of repatriates coming in WV.

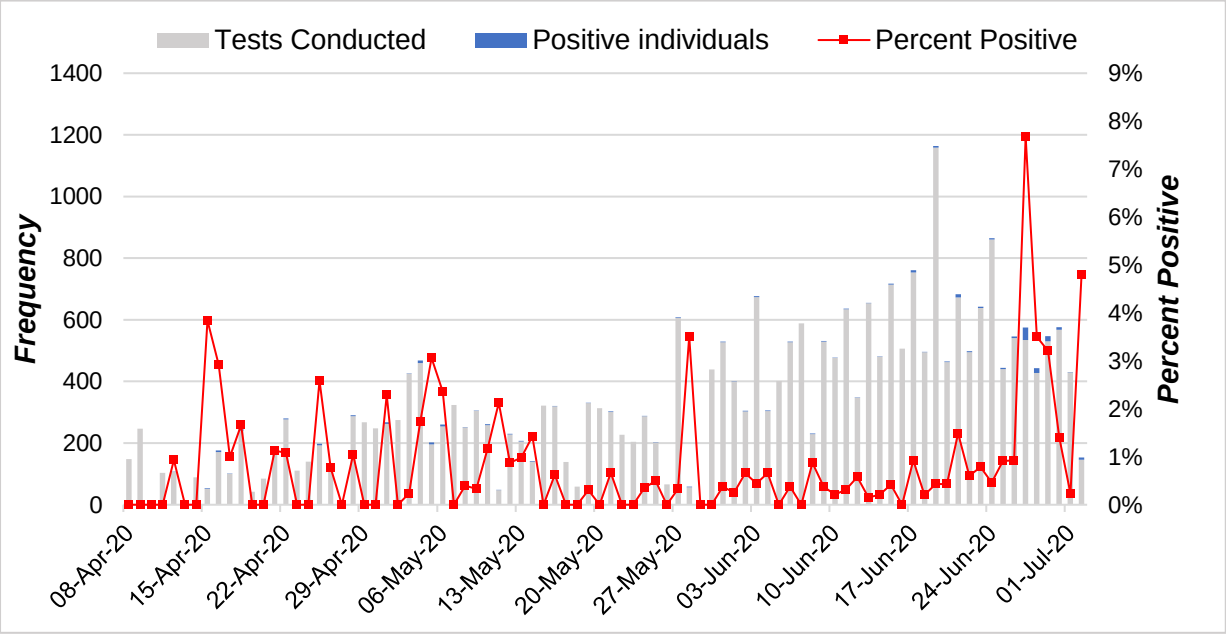


Figure 10. Number of positive COVID-19 results per total tests conducted daily and the percent positive (Western Visayas)

Overall isolation capacity (quarantine) in Western Visayas is at the warning zone, which is mostly contributed to by the province of Negros Occidental and Iloilo City. There is a total of 223 designated quarantine facilities for suspect, probable and confirmed COVID-19 cases in the region. The greatest number of facility beds has been allocated by Iloilo province (1,249). With the expected influx of more repatriates coming into the region, there is a need for the provinces and cities to invest in upgrading the capacity of the quarantine facilities.

	Quarantine facility beds		Quarantine facility beds
AKLAN	1 / 49 (2.04%)	NEGROS OCC	844 / 885 (95.37%)
ANTIQUE	29 / 480 (6.04%)	GUIMARAS	0 / 30 (0.00%)
CAPIZ	0 / 151 (00.00%)	ILOILO CITY	223 / 226 (98.67%)
ILOILO	356 / 1,249 (28.50%)	BACOLOD CITY	0 / 25 (0.00%)
	WESTERN VISAYAS	1,453 / 3,095 (46.95%)	
Safe Zone (0%-30%)	**Warning Zone (30%-70%)**	**Danger Zone (70%-100%)**	

Table 6. Occupancy rate in quarantine facilities by Province in Western Visayas (Data Source: DOH-CHD VI Weekly Situationer, July 3, 2020)

Health care capacity in hospital facilities catering to COVID-19 related cases across the region are considered mostly in the safe zone. There are 99 hospitals with designated COVID-19 beds in the whole Western Visayas. Occupancy rate are 30% and below in most of the areas. In the warning zone are some hospitals in Iloilo City, Bacolod City, and the provinces of Capiz and Iloilo. Notably, most of the isolation beds are in hospitals located in the province of Iloilo (135) and Negros Occidental (117), and those for the ICU beds are in Bacolod City (27) and Aklan (17). However, there are no allocations for ICU beds in Iloilo province and Guimaras, and there are only 9 in Iloilo City. This might have implications if most of the new cases will need critical care.

	Bed Wards	Isolation Beds	ICU Beds	Mechanical Ventilators
AKLAN	0 / 16 (0.00%)	0 / 28 (0.00%)	0 / 17 (0.00%)	0 / 8 (0.00%)
ANTIQUE	1 / 14 (7.14%)	6 / 33 (18.18%)	0 / 1 (0.00%)	0 / 3 (0.00%)
CAPIZ	2 / 12 (16.67%)	16 / 44 (36.36%)	1 / 8 (12.50%)	0 / 10 (0.00%)
ILOILO	5 / 8 (62.50%)	36 / 135 (26.67%)	0 / 0 (N/A)	0 / 1 (0.00%)
NEGROS OCC	0 / 17 (0.00%)	9 / 117 (7.69%)	0 / 4 (0.00%)	0 / 5 (0.00%)
GUIMARAS	0 / 1 (0.00%)	0 / 3 (0.00%)	0 / 0 (N/A)	0 / 0 (N/A)
ILOILO CITY	8 / 15 (53.33%)	50 / 87 (57.47%)	2 / 9 (22.22%)	8 / 37 (21.62%)
BACOLOD CITY	0 / 12 (0.00%)	12 / 52 (23.08%)	10 / 27 (37.04%)	1 / 33 (3.03%)
WESTERN VISAYAS	16 / 95 (16.84%)	129 / 499 (25.85%)	13 / 66 (19.70%)	9 / 97 (9.28%)
Safe Zone (0%-30%)	**Warning Zone (30%-70%)**	**Danger Zone (70%-100%)**		

Table 7. Occupancy rate in hospital facilities by Province in Western Visayas (Data Source: FASSSTER COVID-19, July 13, 2020)

Conclusions and Recommendations

1. The very low local transmission data (R0=0.4 and incidence rate=2.7), long CDT (12 days) and MDT (33 days) coupled with low positivity rate (less than 5%), and hospital capacity in the safe zone indicate, despite the surge of LSIs and ROFs, a well-managed Western Visayas health system. There needs to be a reinforcement of the good governance practices of the Western Visayas LGUs in coordination with DOH-CHD VI, and other partners in the RTF to at least maintain, at best, improve further the numbers.

2. On the flip side, the surge of imported cases during the past week is concerning. This led to testing backlogs and quarantine facilities being stretched to almost full capacity. Backlogs on testing has implications in the spread of COVID-19 in the region. Although the number of testing centers has increased and with it an increased testing capacity, the TAT has not improved. DOH-CHD VI might need to help more in the capacity building of these SNLs to improved TATs. Local and health leaders should remain vigilant and be prepared should a surge in cases occur after backlog catch up.

3. There are very few and less accessible local hotspots data, especially where local transmissions occurred. So there needs to be more preparations for local transmission outbreaks in the LGUs and stricter monitoring on the maintenance of minimum public health standards set by DOH and DTI, as well for workplace arrangements. Maintain low-level community transmission by pursuing localized lockdowns (sitio/barangay/ municipality or workplace) as needed, with aggressive contact tracing (finding index cases and communicating the case linkages), targeted confirmatory testing, and isolation of cases and contacts. For faster data consolidation and analyses, there is a great need to invest in the health information system with consideration for applicability in networks of care and maximizing technology.

4. In the overall regional health system, there needs to be a review of the repatriation protocols in coordination with the National IATF (3 out 4 cases are either LSIs or ROFs). For instance, what is the manageable number of total repatriates for the region or for the province or the municipality to accommodate in terms of testing, tracing, treatment? These have implications in number of facility quarantines, manpower, and personal protective equipment complements. As also emphasized in the previous 3 policy notes, LGU capacity strengthening including monitoring is key in managing COVID-19 in Western Visayas.

5. Prioritize generation of evidence-based analyses for learning and decision-making at the provincial/city or regional level, and as needed collaborate with other stakeholders for support or assistance for the following key topics among others:
    a. Repatriation: Exposure and testing history of LSIs and ROFs
    b. Primary health care in the time of COVID-19: challenges and learnings, adjustments made, supply and demand side comparisons prior to and during COVID-19 time, needs/support needed from provincial, regional, or national level
    c. Pandemic resilience: harvesting of learnings and how to translate them to a better prepared region for the continuing COVID-19 pandemic or future pandemics

References

Department of Health. 2020. DOH COVID-19 Tracker Philippines. *Tableau.* https://ncovtracker.doh.gov.ph/. Accessed July 14, 2020.

Department of Health CHDWV. 2020. Department of Health CHDWV COVID-19 Case Bulletin. http://ro6.doh.gov.ph/. Accessed July 13, 2020.

Gomez, C. 2020. Western Visayas' testing backlog impedes fight vs COVID-19. https://newsinfo.inquirer.net/1303647/western-visayas-testing-backlog-impedes-fight-vs-covid-19. Accessed July 16, 2020.

Guadalquiver, N. 2020. NegOcc gets green light to operate Covid-19 testing lab. https://www.pna.gov.ph/articles/1104677. Accessed July 16, 2020.

Lena, P. 2 new laboratories to boost testing capacity of Western Visayas. https://www.pna.gov.ph/articles/1108383. Accessed July 16, 2020

Philippine Information Agency – Iloilo. 2020. DOH6: WV has 'low-level COVID-19 community transmission'. https://pia.gov.ph/news/articles/1047007. Accessed July 13, 2020.

S.C. Department of Health and Environmental Control. 2020. SC Testing Data & Projections (COVID-19). 2020. https://www.scdhec.gov/infectious-diseases/viruses/coronavirus-disease-2019-covid-19/sc-testing-data-projections-covid-19. Accessed May 12, 2020.

Sornito, I. 2020. WVMC lab has 3,200 backlogs in COVID testing. https://www.panaynews.net/wvmc-lab-has-3200-backlogs-in-covid-testing/. Accessed July 16, 2020.

World Health Organization. 2020. Transmission of SARS-CoV-2: implications for infection prevention precautions: scientific brief, 09 July 2020. World Health Organization. https://apps.who.int/iris/handle/10665/333114. License: CC BY-NC-SA 3.0 IGO