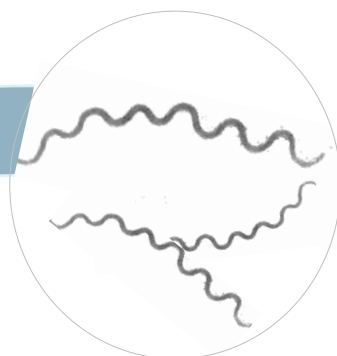


EXTERNAL QUALITY ASSURANCE (EQA) PROGRAM FOR THE ELIMINATION OF MOTHER-TO-CHILD TRANSMISSION (EMTCT) OF SYPHILIS:

A TECHNICAL REPORT (2018-2022)



EQA Provider:
Bacteriology Section
Disease Division
National Public Health Laboratory (NPHL)

MINISTRY OF HEALTH MALAYSIA
2023



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A. INTRODUCTION

On October 2018, Malaysia was officially presented with the validation certification for the elimination of mother-to-child transmission (EMTCT) of HIV and Syphilis, becoming the first country in the World Health Organization (WHO) Western Pacific Region certified for elimination.

After series of meeting and discussions with *Bahagian Pembangunan Kesihatan Keluarga* (BPKK), *Cawangan HIV AIDs & STD* (Bahagian Kawalan Penyakit), *Pusat Darah Negara* (PDN), Hospital Kuala Lumpur (HKL) and the National Public Health Laboratory (NPHL) was given a mandate to provide the External Quality Assurance (EQA) Program [Proficiency Test (PT) / Interlaboratory Comparison (ILC)] to primary health program for health clinic which offers this Syphilis screening test in order to monitor laboratory test performance for Antenatal mothers, whereas PDN will support the NPHL in supplying plasma samples.

In addition to the NPHL, the Public Health Laboratories of Ipoh (PHL Ipoh), Johor Bahru (PHL JB), Kota Bharu (PHL KB) and Kota Kinabalu (PHL KK) were also providers for the EQA program to provide better coverage for the 725 primary health clinics throughout Malaysia.

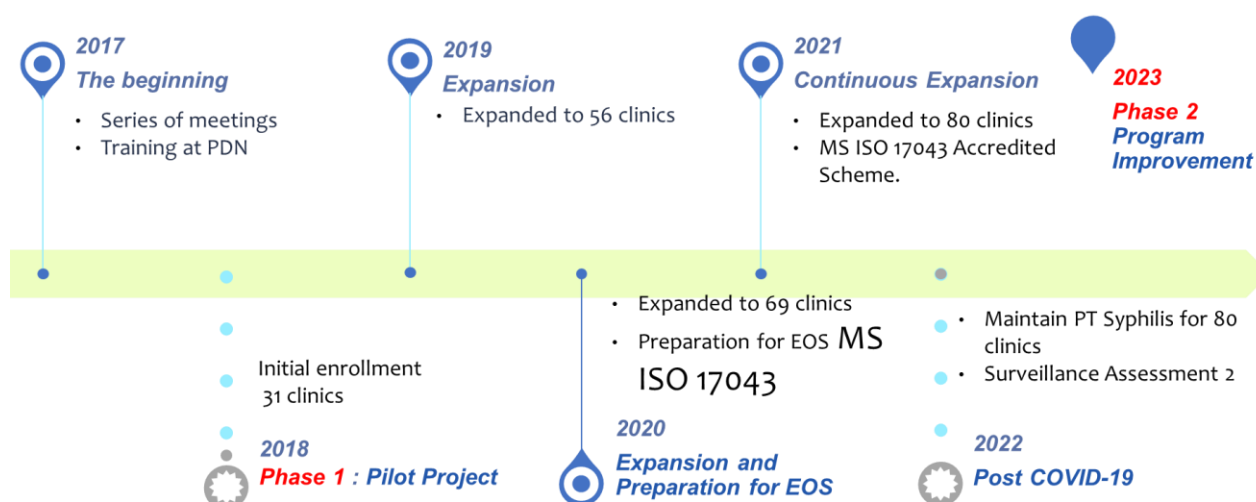
B. OBJECTIVES

The objectives of this EQA program are:

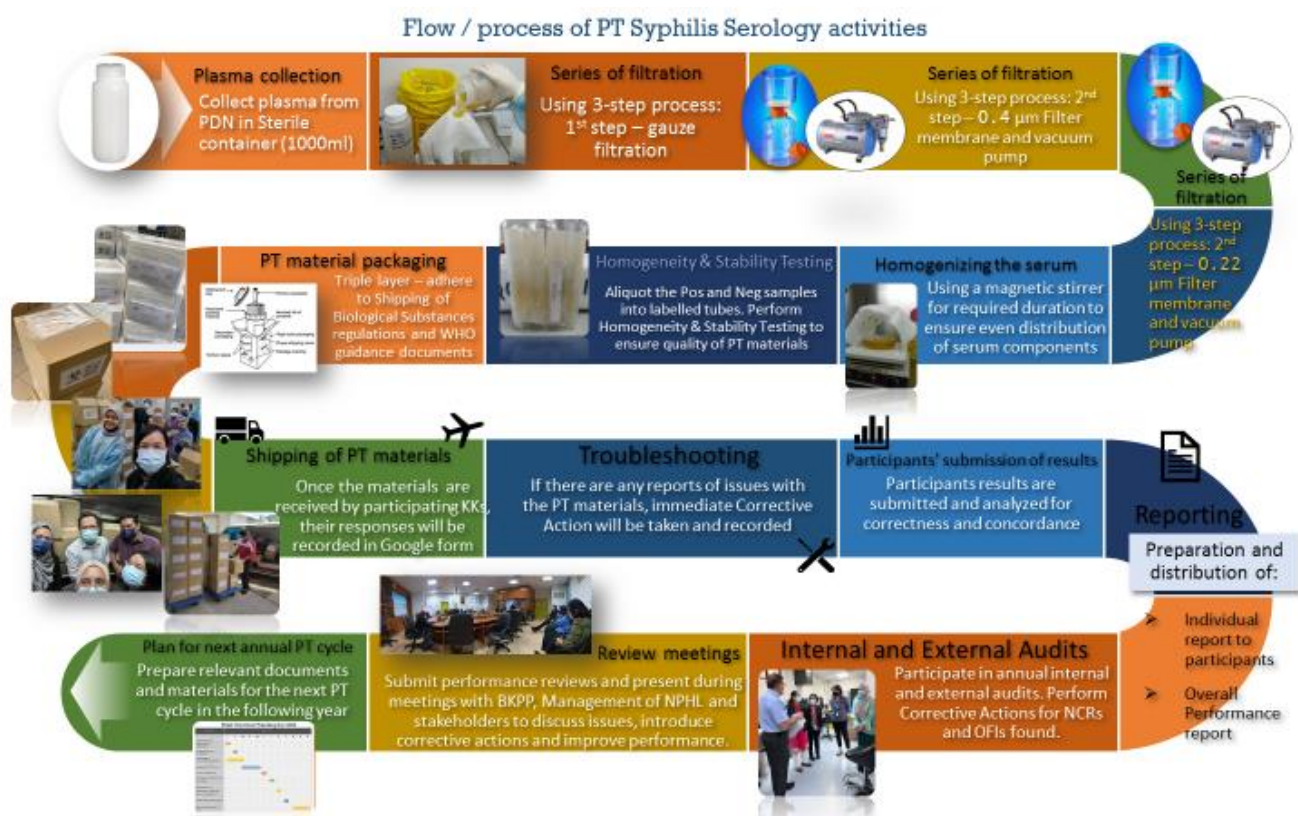
- a) to determine the laboratory performance of health clinics in Syphilis testing
- b) to assess the personnel competency in performing Syphilis Screening Test using Rapid Plasma Reagin (RPR) or Rapid Diagnostic Tests (RDT).

C. PROGRAM MILESTONES

The program milestone started in 2017 with a series of meetings to have the best design of the EQA program using currently available resources and training provided by PDN.



D. FLOW / PROCESS OF PT SYPHILIS SEROLOGY ACTIVITIES



E. PT SYPHILIS SEROLOGY PERSONNEL

	Personnel	Updates
a	Pn Wan Noraini Wan Yussof	Head of Section Bacteriology Section Signatory for MS ISO 17043:2010 PT Syphilis
b	Pn Rozliana Hanim Mat Hasan	Technical Manager MS ISO 17043:2010 PT Syphilis Signatory for MS ISO 17043:2010 PT Syphilis (June 2017 – June 2022)
c	Cik Che Nur Azni Nazira Che Md Rozi	Deputy Technical Manager MS ISO 17043:2010 PT Syphilis (June 2020 – April 2022)
d	Pn R.Pusparani Ramasamy	Head of Unit Bacteriology Section Signatory for MS ISO 17043:2010 PT Syphilis
e	Pn Hannah Phoon Yik Phing	Technical Manager Bacteriology Section Signatory for MS ISO 17043:2010 PT Syphilis
f	Pn Zety Erlina Muhammad Padzil	Deputy Technical Manager Bacteriology Section Signatory for MS ISO 17043:2010 PT Syphilis

F. REPORTING OF PERFORMANCE

i) PT PILOT STUDY IN 2018

In the 2018 pilot project, the NPHL distributed two rounds of Proficiency Testing (PT) material (4 samples consist of positive and negative Syphilis plasma for each round) to 31 clinics. Results from both cycles/rounds showed good performance; 96.4% (1st round) and 92.9% (2nd round), and the overall performance was 94.65% for 2018.

Table 1: Overall performance of PT (EQA Syphilis Serology) in 2018.

Year	Details	Organizer					Coverage (%)	Performance (%)	Note	
		NPHL	PHL IPOH	PHL JB	PHL KK	PHL KB				
2018	Round 1	31	NA	NA	NA	NA	4.3	96.4	4/4 Performance 27/28, 1 clinic score ¾, 3 clinics sample leaking.	
	Round 2	31	NA	NA	NA	NA	4.3	92.9	4/4 Performance 26/28, 2 clinic score 2/4, 3 clinics sample leaking.	
		Overall performance							94.7	

Two (2) issues were identified in the 2018 PT, which were leaking of specimens and incorrect results interpretation. Three clinics received leaked samples. Two clinics reported positive and negative results instead of reactive and non-reactive, which was not in compliance with the standard results interpretation.

ii) FOUR-YEAR PLAN FOR PT & ILC PROGRAM

Based on this pilot study, this EQA program was then proposed to cover 60% of the total 725 health clinics which handling the Syphilis Screening Test, in 4 years.

This EQA by NPHL was divided into two approaches; Proficiency Testing (PT) and Inter Laboratory Comparison (ILC);

- i) **Proficiency Testing (PT):** health clinics received a number of unknown specimens to be tested and report back the finding to NPHL. Clinics with high workload of test will be selected by BPKK to enrol in this program.

- ii) **Inter Laboratory Comparison (ILC):** health clinics send their routine samples to NPHL to be retested/rechecking. Clinics with lower workload, transportation problem will be selected by BPKK to enrol in this program.

Other Public Health Laboratories (PHL) such as PHL Ipoh, PHL Johor Bahru, PHL Kota Bharu and PHL Kota Kinabalu will be involved in the ILC, since they have limited resources, capacity and capability to run EQA program. The four years PT & ILC plan is as in Table 2.

Table 2: Four-Year Plan for PT EQA and ILC Syphilis

Year	Activities		Numbers of participating clinics	Number of panel/s	Health clinics with laboratories	Coverage (%)	Total Coverage (%)
2018	Pilot Study	EQA	31 (2 round)	4	725	4.3	4.3
2019	1 st Phase	EQA	56 (1 round)	4	725	7.7	19.4
		ILC	85 (1 rounds)	10		11.7	
2020	2 nd Phase	EQA	65 (1 round)	3	725	9.0	40.0
		ILC	225 (1 rounds)	10		31.0	
2021	3 rd Phase	EQA	75 (1 round)	3	725	10.3	60.0
		ILC	360 (1 round)	10		49.7	

Four-year planning and projection of participating clinics in EQA program (PT and ILC) from year 2018 to 2021. NPHL target to achieve 60% of the clinics to participate in EQA program by year 2021 through both approaches; PT and ILC.

iii) PT & ILC PERFORMANCE IN 2019

In 2019, there were 56 clinics enrolled in EQA Syphilis Serology PT program by the NPHL. In the same year, NPHL also received samples for re-testing from about 85 selected health clinics all over Malaysia for ILC pilot project program. All of the results are satisfactory with 100% concordance as shown below;

Table 3: Overall performance of PT (EQA Syphilis Serology and ILC) in 2019.

Year	Details	Organizer					Coverage (%)	Performance (%)	Note
		NPHL	PHL IPOH	PHL JB	PHL KK	PHL KB			
2019	EQA Round 1	56	NA	NA	NA	NA	7.7	100	All concordant
	EQA Round 2	56	NA	NA	NA	NA	7.7	100	All concordant
	ILC Round 1	85	NA	NA	NA	NA	11.7	100	All concordant

Year	Details	Organizer					Coverage (%)	Performance (%)	Note
		NPHL	PHL IPOH	PHL JB	PHL KK	PHL KB			
	ILC Round 2	85	NA	NA	NA	NA	11.7	100	All concordant
		141	Overall performance				19.4	100	

iv) PT & ILC PERFORMANCE IN 2020

Based on earlier proposal, besides PT & ILC by the NPHL, other PHLs were required to monitor Syphilis serology test in their zone/region by monitoring ILC performance. Each clinic was required to send 10 samples ie. combinations of reactive and non-reactive to the nearest PHL for re-testing.

However, NPHL only managed to organize 1 round of PT program with 69 participating laboratories due to pandemic of COVID-19 in Malaysia. A total of 1272 samples for ILC were received from 106 clinics by PHL Ipoh, PHL Johor Bahru and PHL Kota Bharu. However, PHL Kota Kinabalu was unable to proceed with ILC samples due to high workload of COVID-19 in Sabah. The overall performance is as below;

Table 4: Overall performance of PT (EQA Syphilis Serology and ILC) in 2020.

Year	Details	Organizer					Coverage (%)	Performance (%)	Note
		NPHL	PHL IPOH	PHL JB	PHL KK	PHL KB			
2020	EQA Round 1	69	NA	NA	NA	NA	9.5	95.5	64/67, 100% concordance. 2/67 have 1 & 2 discordant. 2 labs received leaking samples.
	ILC Round 1	47	20	15	NA	24	14.6	100	All concordant
	ILC Round 2	47	20	15*	NA	24	14.6	99.3	* 1 sample discordant false negative from PHL JB)
Overall performance		116	20	15	NA	24	24.1	98.3	

The overall performance was Good where all ILC showed concordance results except 1 sample from PHL JB which showed false negative results. Further investigation was conducted with the clinic involved.

Overall, 116 clinics were involved with this program which account for 24.1% (based on 725 Syphilis primary health clinics).

v) *PT & ILC PERFORMANCE IN 2021*

For year 2021, we have proposed to have 1 round of PT program, targeting enrolment of 80 clinics and 360 clinics enrolled in ILC program. With the support and involvement of three other regional PHL, we are expecting to increase a number of clinics enrol in EQA and ILC program in the future years. However, all the PT program was suspended due to COVID-19 Pandemic in Malaysia and all PHLs were actively involved as main screening centre for COVID-19 in Public Health. However, PHL Ipoh manage to run the ILC for 5 health clinics in 2021.

Table 5: Overall performance of PT (EQA Syphilis Serology and ILC) in 2021.

Year	Details	Organizer					Coverage (%)	Performance (%)	Note
		NPHL	PHL IPOH	PHL JB	PHL KK	PHL KB			
2021	EQA	NA	NA	NA	NA	NA	NA	NA	Suspended due to COVID-19 Pandemic
	ILC	NA	5	NA	NA	NA	0.7	100	All concordant
Overall performance		NA	5	NA	NA	NA	0.7	100	All other PHLs EQA and ILC programs were suspended due to COVID-19 Pandemic

vi) *PT & ILC PERFORMANCE IN 2022*

The NPHL resumed the PT program in June 2022, post COVID-19 pandemic and managed to send out 1 round of PT panel for the 80 participating clinics. The analysed results showed:

- a. There were two types of Syphilis test kit used in this survey; 77 participants using Rapid Plasma Reagin (RPR) and 3 participants using Rapid Diagnostic Test (RDT).
- b. Eighty (80) participants were enrolled in Survey 1/2022 and all (100%) returned results for assessment. Overall performance for all participants showed a very good performance 100% (3/3).
- c. Test kit brands used are: BD Macro-Vue™ RPR, Lorne Laboratories Ltd, Plasmatec RPR, Xiamen Boson Biotech, and ABON™ Syphilis Ultra Rapid Tests.

During the 2022 Bacteriology TWG Meeting, PHL Kota Bharu presented their initiative to offer EQA PT Syphilis Serology Program to health clinics and hospitals in Kelantan. At the same time, issues or problems faced by all PHLs during planning and execution of their respective programs were also discussed. All PHLs ILC program was withheld for 2022 as mapping of all clinic's participation was reviewed to better improve the national EQA coverage and avoid any duplication.

Table 6: Overall performance of PT (EQA Syphilis Serology and ILC) in 2022.

Year	Details	Organizer					Coverage (%)	Performance (%)		Note
		NPHL	PHL IPOH	PHL JB	PHL KK	PHL KB		NPHL	PHL KB	
2022	EQA	80	NA	NA	NA	58	19.0	100	84.5	
	ILC	NA	NA	NA	NA	NA	NA	NA	NA	Under review in 2022
Overall performance		NA	5	NA	NA	NA	19.0	100	84.5	

Table 7: Performance of EQA Syphilis Serology PT in 2022 by PHL KB.

Year	Details	Organizer	Institution	Numbers	Performance (100% Achievement)	Performance (<100% Achievement)	Remarks
2022	PT	PHL KB	Clinics	58	49	9 (8 Clinic 1 discordant, 1 Clinic 2 discordant)	All clinics gave correct answers for Non-Reactive samples, however 9 clinics and 3 hospitals failed to detect 1 and/or 2 Reactive of the PT samples supplied.
			Hospital	6	3	3 (1 discordant)	

* Note: Kits used in the ILC – Abon Diagnostic, BD Macrovue, Boson Biotech, Cyprus Diagnostic, Dialab Diagnostic, Lorne Diagnostic, Plasmatec RPR Carbon.

In November and December 2022, hybrid meetings with all PHLs and BPKK was conducted to further enhanced and expand the EQA PT & ILC program implemented by PHLs. Furthermore, changes in the numbers of participating clinics were necessary due to the patient management and Syphilis testing algorithm change adopted by clinics in Melaka were the Rapid Diagnostic Test (RDT) Kits were utilized instead of RPR. The way forward in planning and program improvements was also discussed in detail during the meetings and will be implemented beginning from 2023.

G. CORRECTIVE ACTIONS

During the implementation of the program, the PHLs faced several issues and problems which are identified, investigated, and corrected in order to provide a better service quality and delivery system to the participating clinics.

Table 8: List of corrective actions taken to address EQA technical issues and problems.

No	Issues	Identified factor	Corrective action
1	High temperature (>25°C) during transportation via land and air can cause deterioration of the samples.	Distance of the clinics and length of time needed for the courier to deliver to distant	Verification of temperature stability in transport the PHL KK, Sabah and PHL IPOH using actual samples was conducted in July 2022 and the results showed that the sample temperature

No	Issues	Identified factor	Corrective action
		clinics such as in Sarawak and Sabah.	maintained below 25°C within the delivery window period.
2	Sample 1C that was sent to Klinik Kesihatan Miri was broken and leaked	Most probably due to failure in handling of the sample during the transportation by PosLaju	A set of new samples were sent to Klinik Kesihatan on 27 June 2022 and notified verbally to PosLaju regarding the handling of the sample. To label with additional "URGENT" sticker on the outer box and to notify PosLaju regarding the handling of the sample.
3	Sample 1C that was sent to Klinik Kesihatan Bandar Sg Petani was empty. No leakage detected and the tube was intact.	Most probably due to mistake during aliquoting of the serum where there was no sample added to that particular tube.	The affected sample tube was replaced and sent to Klinik Kesihatan BSP on 12 July 2022 and notified to the receiver at KKBSPP via WhatsApp. To ensure that all tubes are filled before packing and sending out to the clinics.

H. SUGGESTIONS FOR FUTURE IMPROVEMENTS

- a) Expand EQA PT and ILC program coverage by 21.6% for PT and 138.9% for ILC, according to the agreed upon zones and number of clinics based on each PHLs capacity in 2023:

Table 9: Mapping of the clinic coverage from 2018 to 2022 and projection for expansion in 2023.

YEAR	2018		2019		2020		2021		2022		2023	
	PT	ILC	PT	ILC	PT	ILC	PT	ILC	PT	ILC	PT	ILC
SUMMARY OF COVERAGE BY PHLs:												
NPHL	31	0	56	90	69	22	80	12	80	0	105	50
PHL Ipoh	0	0	0	0	0	21	0	5	0	0	0	45
PHL KB	0	0	0	0	0	27	0	0	58	0	21	51
PHL JB	0	0	0	0	0	14	0	0	0	0	0	33
PHL KK	0	0	0	0	0	0	0	0	0	0	0	28
TOTAL	31	0	56	90	69	84	80	17	139	0	126	207

- b) Implementation of EQA PT and ILC programs will be continued following letter from BPKK to all states and PHLs in Mac 2023. The respective PHLs will send out the instructions and planned schedule for sample delivery, submission due date and reporting timelines to the respective clinics according to their zones.
- c) Reminder will be given to all PT participants before sending out parcel to the PIC's of the clinics in the EQA RPR Syphilis WhatsApp group.

- d) As part of the overall improvement for the EQA PT program, the NPHL will develop and launch an online website and dashboard for the online enrolment, certificate of participation, and submission of results from clinics for EQA Serology Syphilis.
- e) Improvement of the current packaging method to prevent the leakage or breakage of sample tubes by:
 - i. removing the outer cardboard box packaging and only use polystyrene box to prevent delayed delivery due to delivery of the parcel to the wrong receiver and to add on the name of KK's PIC on the address label
 - ii. placing the sample tubes in a hard, secondary container such as recycled tips box to prevent breakage of plastic tubes.

I. WAY FORWARD

It is important for Malaysia to maintain the WHO certification for EMTCT for Syphilis. The PHLs have to continue to pave the way for better EQA PT & ILC program from 2023 and beyond. Challenges such as personnel, expertise, testing method, type of reagent/kits, budget, transportation will continue to change and evolve but the standards and quality in Syphilis testing at the primary healthcare clinics must be maintained or improved for the better care of antenatal mothers.

~ END ~