

## Philippines Diagnostic Pathology Laboratory Benchmarking

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### ABSTRACT

**Introduction.** To ensure continuous quality improvement, laboratories need to obtain data about best practice from peers. Data about analytical EQA is available but far less is available about other important aspects of laboratory performance. There is a Roche Diagnostics Survey of laboratories which provides benchmarking in key areas of laboratory performance.

**Methodology.** The Roche Diagnostics Survey included 1058 laboratories from 14 countries in the Asia Pacific Region with both developing and developed nations. The data were collected in 2017 but the survey has been collecting data each second year since 2011. Data was collected in the areas of quality, speed and cost.

**Results.** The results for the Philippines was compared with other countries in the Asia Pacific Region. Broadly it was found that 42% of all laboratories in the Region were accredited to ISO 15189 or ISO 9001 and that 50% of laboratories were in an External Quality Assurance (EQA) program. Compared to other countries in the survey, the Philippines laboratories had fewer sites with ISO 15189 and with Lean Six Sigma improvement deployment. There are six laboratories in the Philippines that are accredited to ISO 15189. There was a greater emphasis on customer satisfaction related Key Performance Indicators (KPIs) such as turnaround time monitoring, cost reduction and employee productivity.

**Conclusions.** Benchmarking can highlight the differences in the apparent quality of laboratory services compared to their peers and may lead to improvement. The benchmarking comparison has identified opportunities for Philippine laboratories to improve including obtaining ISO 15189 accreditation, implementing laboratory information systems and concentrating on Lean practices to improve productivity. The Roche scheme provides an ongoing (growing) large sample of benchmarks that can be used by participants to improve their performance and the performance of individual countries.

*Key words: benchmarking, quality, cost of service, customer satisfaction, turnaround time*

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### INTRODUCTION

Benchmarking is the process of measuring products, services, and practices against leaders in a field, allowing the identification of best practices that will lead to sustained and improved performance. Performance may be compared either in a generic way, in which there is a comparison of a process regardless of the industry, or in a functional way, in which there are comparisons within the same industry. The aim of benchmarking is to identify variation in performance of key indicators so that improvement can be undertaken. In pathology practice we are more used to quality assurance activities where results from samples are sent from an EQA organisation and the performance of laboratories are compared. Omdahl<sup>1</sup> defines benchmarking as a continuous improvement process in which a company:

- Measures the most relevant specific attributes of its own products, services, and practices, often including operations, performance, procedures, project, processes, strategies



- Compares its own performance against:
  - Best-in-class company performance
  - Companies recognized as industry leaders
  - The company's toughest competitors
  - Any known process that is significantly superior to that of the company's processes
- Determines how those companies achieved their significantly superior performance level
- Uses that information to improve its own performance
- Ultimately reaches the level of performance achieved by the benchmarked process (or a level above that process)
- Continually repeats the process in an iterative fashion

An example of benchmarking system is Q-Probes, which are part of the College of American Pathologists' (CAP) programme of studies in quality assurance.<sup>2</sup> Q-Probes aims to provide short-term, external peer-comparison studies that provide a one-time comprehensive assessment of key processes including pre- and post- analytical activities such as turnaround time (TAT) and customer satisfaction.

Benchmarking can lead to improvement in the quality of patient care, support for administrative accountability, assistance in making judgements about testing quality, facilitation of inter-provider comparisons over time and assessment of improvement effectiveness.<sup>3</sup> Comparing broad organisational activities against peer laboratories, can be used to set priorities for quality improvement interventions. For example, when other similar laboratories have lower frequencies of process defects, e.g., shorter TAT, then the comparison suggests a focus for process improvement for laboratories with longer TATs.

Indicators of the extra-analytical phases of the Total Testing Process (TTP) have been developed in several countries, such as Australia and New Zealand,<sup>4</sup> the United States,<sup>5,6</sup> Brazil,<sup>7</sup> and Spain/Catalonia,<sup>8</sup> and other surveys and programs have been promoted in the UK,<sup>9,10</sup> and Croatia.<sup>11</sup> In 2008 the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) launched a Working Group named "Laboratory Errors and Patient Safety" (WG: LEPS) to identify QIs and related quality specifications which (i) produce Benchmarks from comparing laboratories, (ii) promote error reduction, and (iii) increase patient safety. The IFCC has developed Model Quality Indicators (MQIs) which laboratories in several countries have evaluated and the WG: LEPS has reported preliminary results.<sup>12,13</sup>

A Benchmarking program has been undertaken by Roche Diagnostics (Roche Diagnostics Asia Pacific) in the Asia Pacific Region with purpose to identify trends in laboratory management, to help laboratories identify areas for improvement and provide access to new ideas and procedures that drive further efficiency gains.

It was designed to collect information on three key areas of laboratory practice (quality, speed and cost) with a focus on, but not limited to, Clinical Chemistry and Immunoassay testing.<sup>14</sup>

The data collected is quite granular and provides information in each of the key areas (Table 1).

## METHODOLOGY

The questionnaires were formulated based on the common performance indicators that are used in laboratories.

The survey is delivered online with the survey questionnaires usually completed by laboratory manager or laboratory director.

The survey is carried every alternate year or so and when the country specific report is ready, it is provided to the countries and they will share with the participating laboratories. In this country specific report, the performance of the individual laboratory (myLab) will be compared against the APAC peer group data:

- by APAC (based on all survey submission)
- by country
- by country group (developed/developing, based on IMF advanced economies grouping)
- by lab type (government hospital/private hospital/commercial laboratory/others)
- by lab size (small <250 / medium 251-1000 / large >1000 samples per day)

The surveys are sent to a wide range of laboratories and is not restricted to Roche customers, who represent 70-80% of respondents.

## RESULTS

The survey started in 2011 with 181 laboratories in twelve countries and now includes 1058 participant laboratories in 14 countries (Figure 1). The laboratories are categorised by the following groups:

- Developed (18%) and developing (82%) countries based on International Monetary Fund advanced economies
- Government hospital laboratories (60%), private hospital laboratories (28%), private commercial laboratories (11%) and clinical research organisations laboratories (1%)

In general, it appeared that there were more (45%) medium laboratories (251-1000 samples per day) in the survey than large (29%) (>1000 samples per day) or small (<250 samples/day).

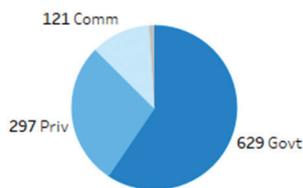
**Table 1. Structure of the questionnaire**

Quality	Cost	Speed
<ul style="list-style-type: none"> <li>• External Quality Assurance (EQA) Program</li> <li>• International accreditation</li> <li>• Continuous improvement</li> <li>• IT infrastructure</li> <li>• KPIs used</li> <li>• Point-of-care testing</li> </ul>	<ul style="list-style-type: none"> <li>• Instrument efficiency</li> <li>• Staff efficiency</li> <li>• Workspace efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Turnaround Time (TAT) Monitoring</li> <li>• TAT Target</li> <li>• Urgent specimen handling</li> </ul>

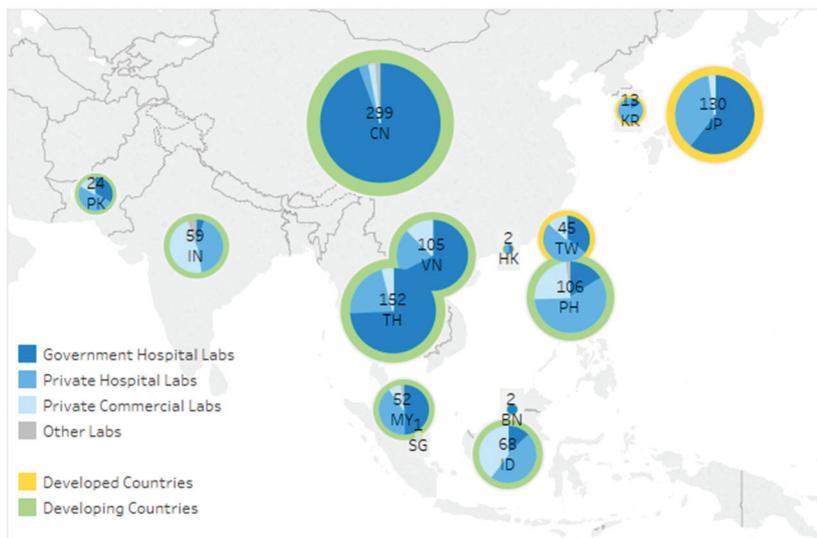
The Survey had a total of **1,058** participating labs from **14** countries

Survey data collected from 2015 to 2017

Labs per by Lab Type:



Labs per Country and by Lab Type:



Note: grouping of "developed" and "developing" countries based on IMF advanced economies

Figure 1. Participating laboratories by country, 2015-2017.

Overall in the 2017 APAC survey:

- 42% of laboratories were accredited to ISO 15189 or ISO 9001
- 50% of laboratories were in an EQA program
- 76% of laboratories had a TAT less than or equal to 60 minutes for stat chemistry
- 62% of laboratories had a TAT less than or equal to 60 minutes for stat immunoassay tests
- 33% of laboratories consolidate chemistry and immunoassay analysers
- 33% of laboratories utilise automation for pre-/post-analytic processes

There were 106 laboratories from the Philippines comprising the following types: private hospital 62 (58%); private commercial 25 (24%); government hospital 17 (16%); other 2 (2%). We will present the results under the broad headings of Quality, PoCT and TAT.

Quality

External Accreditation

The Philippines had fewer laboratories accredited to ISO 15189 than developed (41%) or developing (27%) countries. There is an intention for more laboratories to pursue this accreditation. Generally, across the APAC countries there were similar numbers of government and commercial laboratories accredited to this standard. Comparing with the number of laboratories with ISO 15189 accreditation in the developing countries of the APAC (27% have accreditation, 35% intend to achieve accreditation) the Philippines (3% and 25% respectively). The private hospital laboratories have the highest awareness of the need to implement ISO15189.

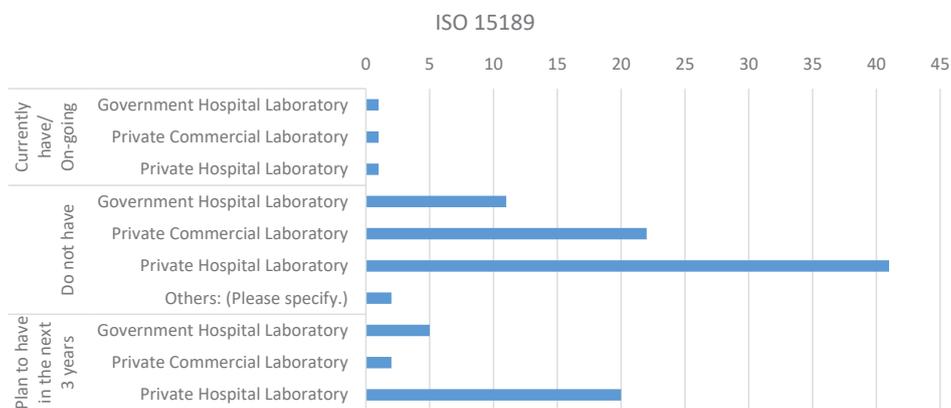


Figure 2. Philippine laboratories with ISO 15189 accreditation.



Figure 3. Laboratory KPIs comparing the Philippine laboratories to all developing countries in the APAC (Asia Pacific).

**Key Performance Indicators**

In Figure 3 we see that compared to other developing countries in APAC there are few differences between the Quality measures being used in the Philippines except for lean six sigma tools. In Figure 4 we see the deployment of lean six sigma by Philippine laboratory type. It can be seen that Laboratory Information Systems were more common in other developing countries. It also appears, that more Philippine laboratories implement customer satisfaction, TAT, employee satisfaction and training, and cost reduction as key measures compared to laboratories in developing countries.

The data in Figures 4 and 5 show the quality KPIs being used per Philippine laboratory type. It shows that with lean six sigma, the early adopters are the government hospitals with all sites planning to introduce this tool within three years. This is also the case with activity-based accounting. With the other quality KPIs perhaps the only apparent trend is that private commercial laboratories appear to be lagging compared to the other types of laboratory.

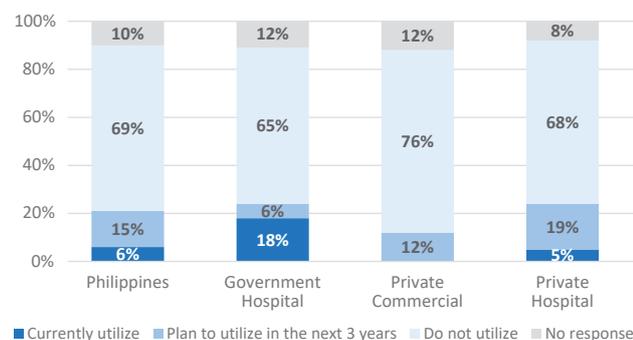


Figure 4. Deployment of lean six sigma in Philippine laboratories.

Government laboratories have the greatest lean six sigma utilization with private commercial the least, in fact nil at present. Private commercial laboratories have minimal implementation but there is an intention to utilize in the future.

In Figure 5 the deployment of ABC is shown indicating that this is greater in government hospitals.

**Point of Care Testing (PoCT)**

Laboratories were surveyed to determine where PoCT devices were deployed and what the role of the PoCT co-ordinator was. The results are given in Figures 6 and 7.

PoCT usage was high in the Philippine laboratories, higher than in other developing countries of the APAC at 55%. These devices are found throughout hospitals with the greatest numbers in the laboratories themselves. The role of the POCT co-ordinator is broad in the Philippines. In fact, it is broader than in other developing countries of the APAC countries where there is less emphasis on logistic management of these devices.

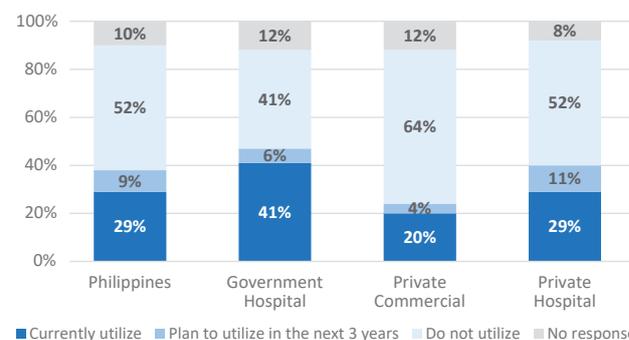


Figure 5. Deployment of activity based costing (ABC) in Philippine laboratories.

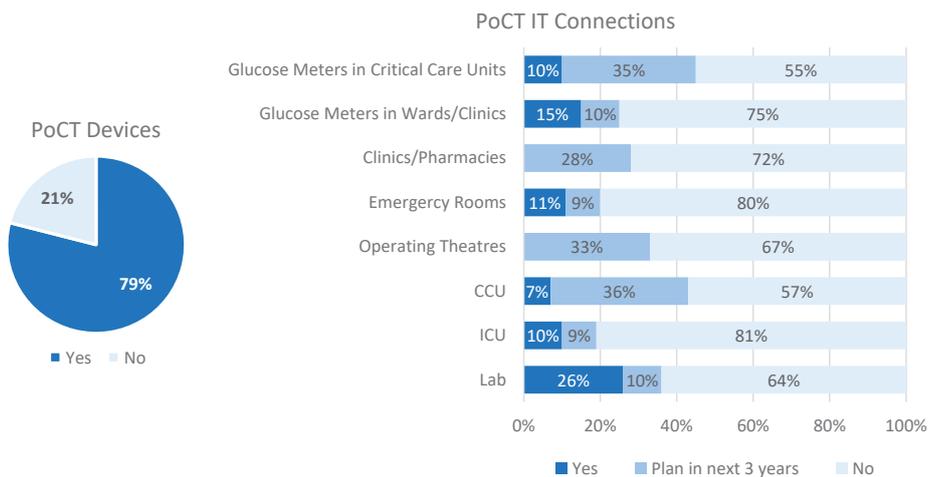


Figure 6. Deployment of point of care testing devices.

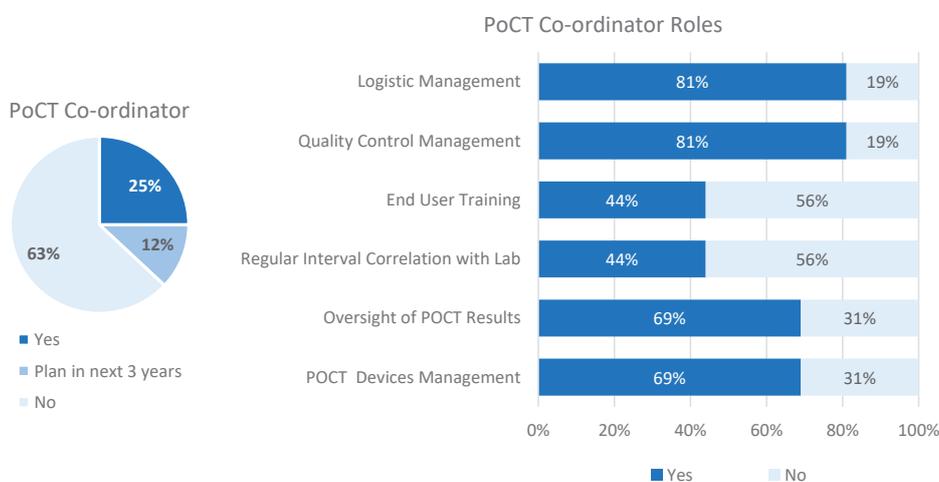


Figure 7. Role of the PoCT co-ordinator.

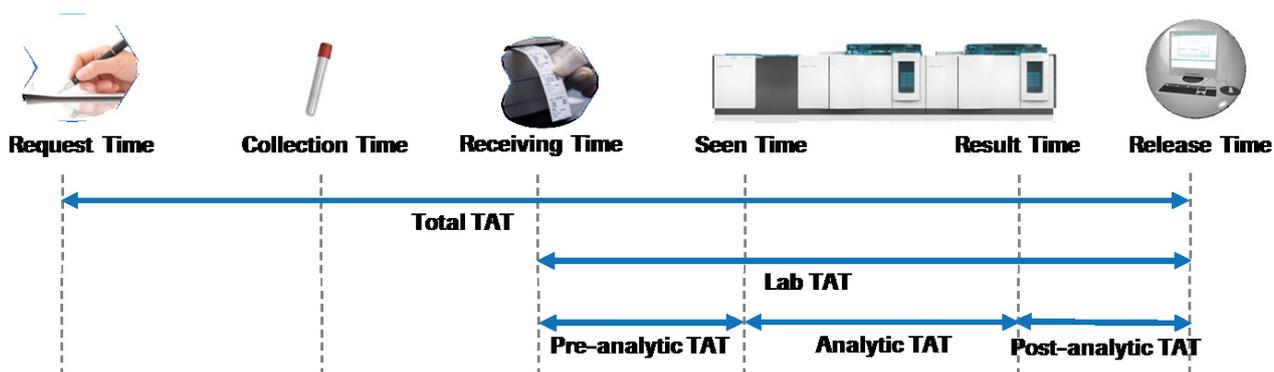


Figure 8. The definition of the various turnaround times.

**Turnaround Time**

The definition of TAT is varied so we have defined in Figure 8 the different TATs collected in the Survey.

In Figures 9 and 10, we present the Lab TAT for the stat and routine clinical chemistry and immunoassay samples.

The majority of laboratories have a TAT of 30-60 minutes for Stat specimens and 60-120 for routine specimens. There is a broad range of performance.

In Figure 11 is the total TAT for different categories of laboratories.

There are different ways a laboratory can deal with stat samples. There can be a dedicated stat laboratory, dedicated staff to deal with these samples and/or have instruments dedicated to these samples.

Figure 12 reveals that having dedicated stat laboratories is relatively common in private hospitals.

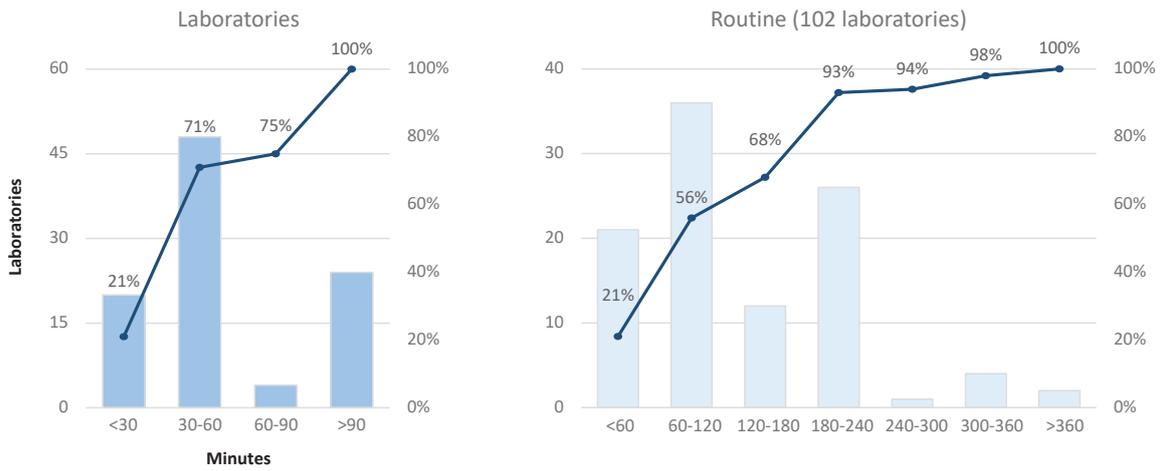


Figure 9. Laboratory TAT for Stat Samples for Clinical Chemistry samples.

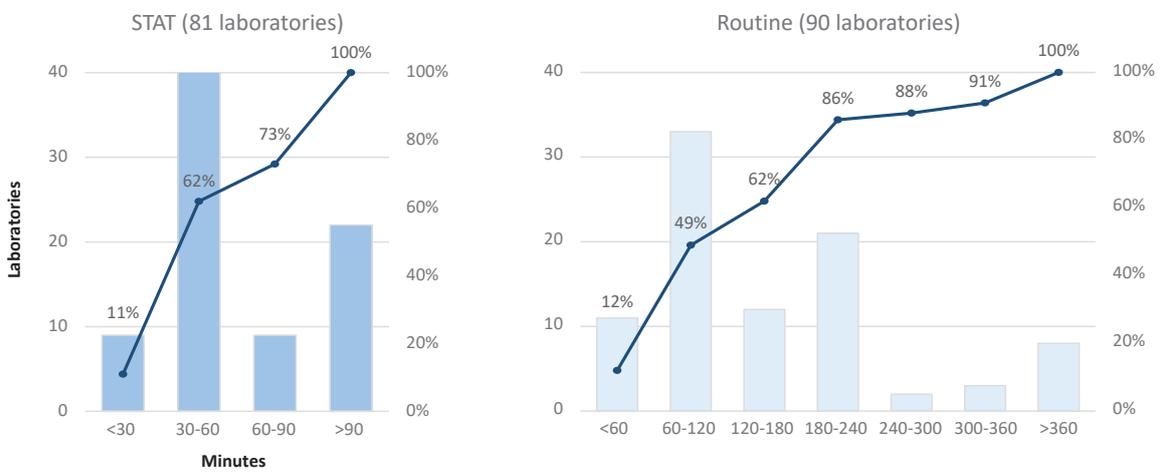


Figure 10. Laboratory TAT for stat samples for immunoassay samples.

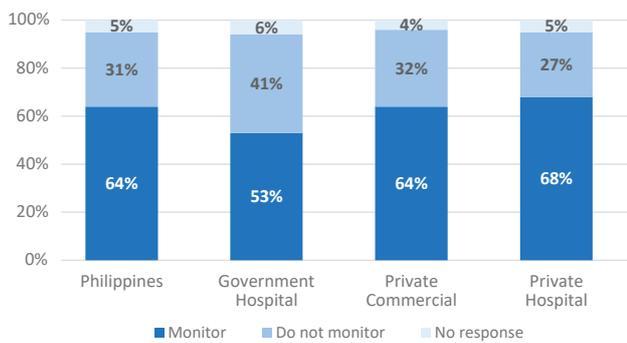


Figure 11. Laboratory total TAT for stat samples.

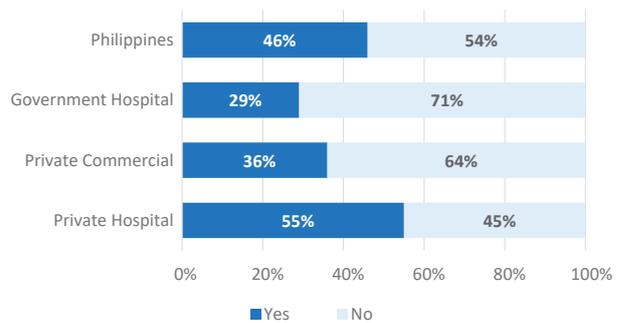


Figure 13. Laboratories with dedicated stat staff.

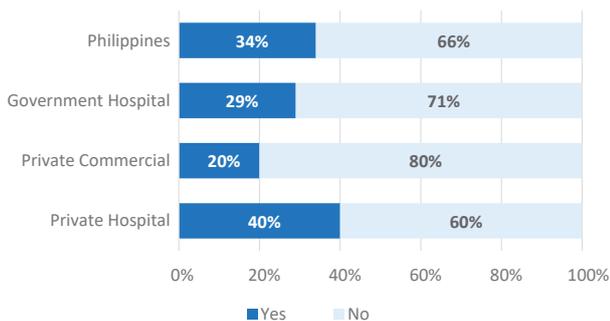


Figure 12. Laboratories with dedicated stat laboratories.

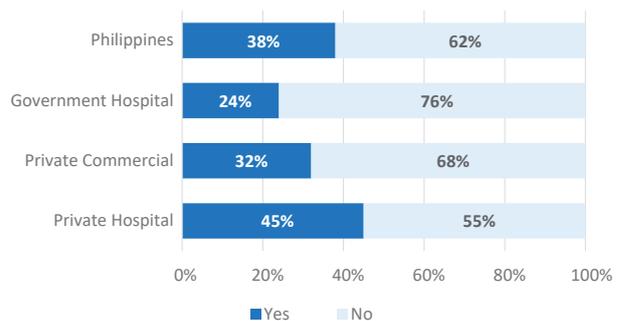


Figure 14. Laboratories with dedicated stat equipment.

## DISCUSSION

These data represent key benchmarks for laboratories to enable improvement. As expected the Survey has revealed varying degrees of compliance with the implementation of best practice, however there are common themes.

It is important to benchmark against the correct peer group to get the best possible comparison and insights for improvement. When comparing within survey laboratories in APAC versus the Philippines, there is a very different population by type and size of laboratory. In Philippine survey majority of laboratories are private hospital laboratories (58%), while in APAC survey, it is government laboratories. In addition, most laboratories in Philippines are small, while medium-sized laboratories predominate in the APAC. Productivity in the larger laboratories will be much higher than in the small laboratories for example. Also, when comparing private and government laboratories it is important to take note, that private laboratories will be measuring customer satisfaction as a priority. That could explain the difference for some data, for example, ISO 15189, which is less prevalent in Philippines due to budget constraints of small laboratories, and these small laboratories are not audited by government. There is a common focus on meeting customer demands, apparent through the monitoring of TAT and customer satisfaction on the one hand, and performance of the laboratory in EQA on the other.

On continuous improvement program, it seems that the Philippines is ahead of Asia. However, we need to keep in mind that this is happening mainly in private hospital laboratories and their driver is to improve efficiency, speed and hence customer satisfaction. One interesting finding is that few laboratories in the Philippines are accredited to ISO 15189, despite the evidence that accreditation leads to improvement. The benefits of adopting ISO 15189 accreditation for laboratories are the reduction in patient and business risk, the encouragement of sharing of best practices and the stimulation of innovation. For payers and healthcare providers, accreditation is a tool that provides assurance that clinical lab services are safe, reliable and good value for patients. It also provides a mechanism for measuring quality improvements and supporting consistency.<sup>15,16</sup>

Pursuant to a 2007 Executive Order<sup>17</sup> mandating the institutionalization of Total Quality Management programs in all government agencies, there was an initiative from the Department of Health to implement ISO 15189 in government laboratories.<sup>18</sup> Under Executive Order No. 605 the National Unit of Health Laboratories of the Department of Health - Health Facilities Development Bureau (DOH HFDB) targeted 50% of tertiary laboratories be accredited for ISO 15189 in five years. The Department of Trade and Industry (DTI) is mandated to conduct assessments for ISO 15189 accreditation however they have been constrained due to a lack of resources. These efforts are difficult to sustain due to a dearth of leadership in government to regulate the laboratory industry and a lack of resources and funds to implement Accreditation.

We note that CAP accreditation is in its initial phases in the country and that laboratories that participate in selective CAP proficiency such as Q-probes and performance improvement for pathologists are the larger commercial laboratories or private hospitals which can afford CAP fees. The perceived purpose of this is to distinguish themselves in the market and set themselves above the rest in terms of quality and standardized service to patients.

Government laboratories seem to be leading the sector with the use of improvement tools including activity based accounting, though the application of lean six sigma is low. Lean is not yet widespread, most likely due to space limitations and the fact that this technique has not yet been widely adopted in the market. It is likely that an increased awareness of Lean and attention to this area will lead to more efficient utilization of space. This is an opportunity for improvement for all laboratories.<sup>19,20</sup>

It seems that Philippine laboratories measure employee satisfaction more, and the reason might be the scarcity of medical technologists in the Philippines. Employee satisfaction and the design of new career tracks in molecular pathology, mass spectrometry and genomics, could be some of the retention strategies for private laboratories as there is huge competition for health manpower resources in the Philippines. Due to that challenge, there is also greater need for training and re-training for the employees due to rapid turnover, which is also seen in data.

There is a low income subsidy implementation in the Philippines than in other developing countries in spite of the benefits in accuracy, efficiency and cost. This is probably due to problems with Internet connectivity, IT personnel in hospitals and a lack of funds. It is worth noting that the same Administrative Order<sup>17</sup> that sought implementation of total quality management (TQM) and advocated ISO 15189 accreditation also promoted Laboratory Information Systems (LIS) to strengthen information management.

There is wide variation in the TAT of laboratories with both stat and routine samples. However, in general laboratories in the Philippines have similar TATs to their peers in the APAC Region. Perhaps Philippine laboratories seem to have a higher focus on TAT measurement which may reflect the business reality that customer satisfaction is key to their survival. TAT is a differentiating factor among the private laboratories and can lead to improved profitability.

This also could explain the STAT numbers observed among private Hospitals more focused on STATs. Analysis of the frequency and types of STAT requests may lead to development of guidelines for more rational utilization of laboratory services, influence ordering practices of physicians, and ultimately, reduce the costs of health care. There will be variation due to different capabilities of equipment and less optimized internal processes. However this is an area where laboratories impact directly on patient outcomes and hospital efficiency. This is one of the KPIs to deliver best service to Doctors and patients. Laboratories everywhere need to concentrate on this performance indicator.

Point of care testing in the Philippines is in varying stages of development and implementation. Although some forms of near-patient testing exist (e.g., glucose testing, blood gas, etc.), most hospitals that have this facility do not have a formal structure in place. Since a Department of Health directive<sup>18,19</sup> tasking the laboratory director/pathologist oversight and supervision over PoCT, regardless of its location in the hospital, the organizational chart of the clinical laboratory has included PoCT and a designated POCT coordinator. Still, there are not a lot of Point of Care Coordinators (PoCC) who are supposed to be overseeing and managing PoCT program in their respective institutions and in general, they are limited only to private and internationally-accredited hospitals in Metro Manila. Since the number of PoCC in the country is very limited, one of the biggest challenges facing them is not having a support group or a network of like-minded individuals with shared interests with whom they could exchange ideas and best practices. This is despite the many responsibilities expected from a PoCC that include instrument selection and validation, device and operator management, logistics management, quality control management, etc. Often, PoCC would rely on web-based resources (i.e., online forums that are based in the US) to keep abreast on the latest developments in the PoCT space. Unlike other allied health professionals such as nurses and medical technologists, among others, that have local organizations that foster continuous professional development and provide a sense of community to its members, PoCC are left to rely on themselves. This may well be the reason why the tasks a PoCC perform is unpopular among laboratory staff and as a result interest level in the role remains low.

Connectivity of PoCT devices in hospitals that use them is another consideration. Often these instruments still operate as standalone units and rarely as integrated solutions that are able to interface with LIS/HIS, mostly due to cost implications. Hence, the value of having a connected hospital PoCT system is not fully utilized and this is certainly true in the case of glucose meters wherein manual operation continues to be the norm. In terms of device operations, lab technicians are by far the typical users of PoCT devices in the Philippines. This practice is really the opposite because in most countries the nurses are the end-users whilst the lab technicians are only tasked to do device quality control management.

There are data in the survey which show that the productivity of laboratories in the Philippines is much lower in all aspects, consolidated, non-consolidated, automated and non-automated, compared to APAC laboratories (Supplementary S6). This additional data also demonstrates that on average, there are only 5 parameters measured by sample, versus Asia laboratories average of 6-7. This is difficult to comment upon. In the Philippines where ordering physicians are keenly aware of budgetary constraints on patients, it is not unusual for chemistry requests to have fewer than six parameters, rather than the full chemistry panel of 20 or more analytes. The more common practice is to order symptom-directed and diagnosis-related or focused tests.

### Limitations

Benchmarking processes suffer from the problem of ensuring participants measuring the same thing. Different units of measure or, if manual processes are used, the accuracy of any measure can impact on the value of the outcome. However, if a benchmarking scheme is used repeatedly then, over time, there seems to be agreement on the measures and the results do become useful. This survey has been in existence for nearly a decade and the results over that time have to be consistent, indicating some reproducibility and hence internal validity of the results. External validation i.e., extrapolation to other groups is another issue.

### CONCLUSION

Benchmarking can highlight the differences in the apparent quality of laboratory services compared to their peers.

Furthermore, Q-Probe studies have demonstrated that Benchmarking does indeed lead to improvement in laboratory performance over time.<sup>6</sup> When laboratories in the Philippines are compared against their APAC peers one of the major differences is the lack of ISO 15189 accreditation. ISO 15189 has been shown to lead to improvements in laboratory quality and this finding is an opportunity to improve patient outcomes in the Philippines. Other key differences between Philippine laboratories and their peers were the lack of LIS and lean six sigma implementations. Both of these will lead to fewer errors, better patient and business outcomes and better value for the health system.

In summary, as the value of benchmarking becomes better understood by laboratory professionals, its impact will grow. There are also local Benchmarking schemes<sup>20,21,22</sup> but few global schemes. The Roche scheme provides an ongoing (growing) large sample of benchmarks that can be used by participants to improve their performance and the performance of individual countries.

### STATEMENT OF AUTHORSHIP

All authors certified fulfillment of ICMJE authorship criteria.

### AUTHOR DISCLOSURE

Jozica Habijanac is the Country Manager of Roche Philippines. Sam Yew Mah is the Consulting Team Manager of Lab Workflow Solutions, Roche Asia Pacific. The authors did not receive any honoraria for this work. Roche Diagnostics provided the Survey data. The interpretation of the data and the decision to publish were made by Prof. Tony Badrick and Dr. Elizabeth Arcellana-Nuqui.

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