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INDONESIA CLINICAL LABORATORY MARKET OUTLOOK TO 2022 - BY TYPE (PUBLIC CLINICAL LAB, PRIVATE HOSPITAL LABS AND PRIVATE INDEPENDENT LABS), BY TYPE OF TEST (ROUTINE, NON LABORATORY AND ESOTERIC)

February 2018

PRODUCTS MENTIONED

Public Clinical Lab, Private Hospital Labs and Private Independent Labs, Single Independent Labs, Laboratories Chains, Customer (Doctor Referrals, Walk-Ins, Corporate Clients and External Referrals), Payer (Private Health Insurance, Corporates, Out of Pocket and BPJS), Test (Routine, Non Laboratory and Esoteric)

COMPANIES MENTIONED

Prodia, Kimia Farma Diagnostika, Pramita, Cito, BioMedika and Parahita

Key Topics Covered

- Indonesia Healthcare Market Size, 2012-2017
- Indonesia Clinical Laboratory Market Size, 2012-2017
- Indonesia Clinical Laboratory Market Segmentation (By Type Of Clinical Laboratory, By Type Of Private Independent Laboratory, By Type Of Customer, By Payer, By Type Of Test And By Region)
- Trends and Developments in Indonesia Clinical Laboratory Market
- Issues and Challenges in Indonesia Clinical Laboratory Market
- Government Initiatives, Rules and Regulations in Indonesia Clinical Laboratory Market
- Indonesia Clinical Laboratory Market Competitive Landscape
- Indonesia Clinical Laboratory Future Outlook and Projections, 2018-2022
- Macro-economic Factors Impacting Indonesia Healthcare Market
- Analyst Recommendations

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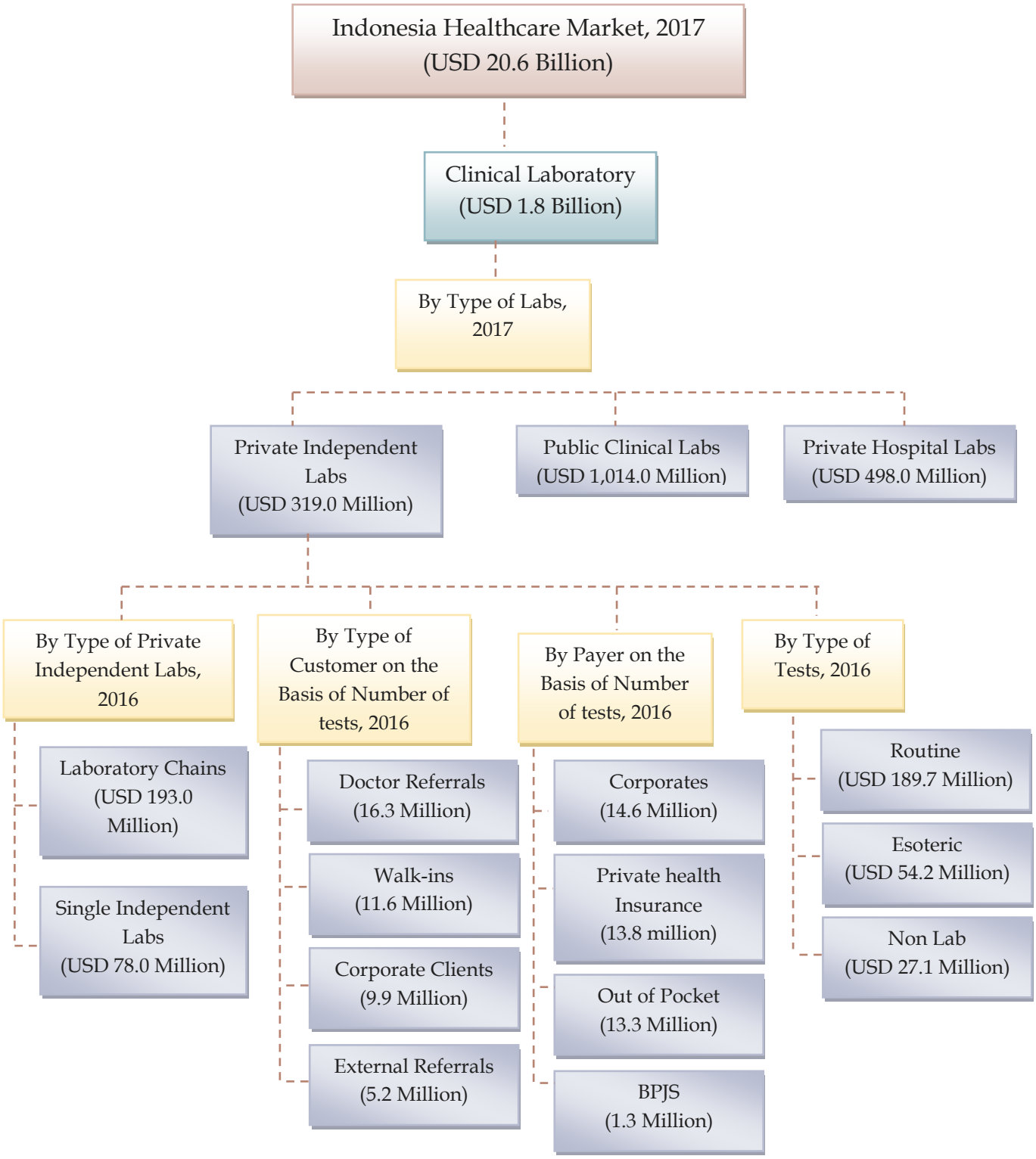
Figure 1-1: Indonesia Clinical Laboratory Market Flowchart



Source: Ken Research Analysis

INDONESIA CLINICAL LABORATORY MARKET OVERVIEW

Indonesia clinical laboratory market increased from USD 1,067.0 million in 2012 to USD 1,831.0 million in 2017 at a CAGR of 11.4%. The industry has witnessed expansion of private laboratory chains and use of advanced technology in order to provide high quality laboratory services. The largest private laboratory chain, Prodia established 9 new labs during 2012 to 2017. Prodia's number of clinical laboratory increased from 120 in 2012 to 129 in 2017. During this period, the self-caring attitude among the people has led to more number of diagnostic tests, hence generating revenue for the market. Due to growing awareness amongst people about healthy living, private and public laboratories have witnessed an increase in walk-in patients asking for routine checkups which is funded out of the patient's pocket.

INDONESIA CLINICAL LABORATORY SEGMENTATION

By Type of Laboratory: The public clinical labs have accounted for 55.4% of the revenue share in Indonesia clinical laboratory market in 2017. Private hospital labs have accounted for 27.2% in 2017 and private independent labs with 17.4% of the overall market**.**

By Type of Private Independent Laboratory: The laboratory chains such as Prodia, Kimia Farma Diagnostik, Pramita, Cito, BioMedika and Parahita have together accounted for 71.2% of revenue the overall private independent laboratory market in 2016. Single independent labs have contributed to their lower revenue share of 34.0% due to their restricted geographic presence.

By Type of Customer in Private Independent Laboratory: Doctor Referrals have accounted for the largest share of 38.0% of the tests in Indonesia Private independent laboratory market in 2016. With growing awareness about chronic diseases and their treatment procedure increasing number of Indonesians have taken charge of their own health. This has led to an increase in number of walk-ins at medical laboratories which has registered 27.0% of the tests. This is followed by corporate clients with 23.0% of the tests and external referrals with 12.0% of the total tests in 2016.

By Payer in Private Independent Laboratory: Corporates have accounted for the largest share of 34.0% of the number of tests in Indonesia Private Independent Laboratory Market in 2016. This is followed by private health insurance companies with 32.0% of the number of tests, out of pocket with 31.0% and BPJS with 3.0% of the number of tests in 2016.

By Type of Tests in Private Independent Laboratory: Routine tests have accounted for 70.0% of the revenue in Indonesia Private independent laboratory market in 2016. This is followed by esoteric tests with 20.0% and non laboratory tests with 10.0% of the overall private independent laboratory market.

By Region: Java, Sumatra, Bali, Jakarta and Palembang have together accounted for 90.3% of the revenue in the overall private laboratory market in 2016. This is driven by high rate of urbanization and more affluent population, which has created greater demand for private clinical laboratory testing services. Underdeveloped cities such as Sulawesi, Maluku and Kalimantan have together accounted for 9.7% of the revenue in 2016.

INDONESIA CLINICAL LABORATORY COMPETITIVE LANDSCAPE

Indonesia clinical laboratories market can be segmented into public clinical labs and private clinical labs. The public clinical labs capabilities are restricted to routine tests such as glucose, lipid profile and urine tests. Private and public hospital labs find it more cost-effective to outsource low demand, specialized tests, such as microbiology, anatomical pathology and esoteric tests due to the high cost of the laboratory equipment. The private independent clinical laboratory market is organized and is composed of both chain laboratories and stand-alone laboratories. The chain laboratories are the leading market players in Indonesia. The 6 major players in the industry are Prodia, Kimia Farma, Pramita, Cito, BioMedika and Parahita. They have together accounted for 71.2% of the revenue share in private independent laboratory market in 2017. The major players compete on distribution network, product portfolio, advertising, technology, Prices and services.

INDONESIA CLINICAL LABORATORY FUTURE OUTLOOK

The clinical laboratory market is expected to reach USD 3.2 billion by 2022 growing at a CAGR of 11.5%. The major private independent laboratories chains are expected to undergo geographic expansion beyond key cities into underdeveloped areas. It is also expected that the implementation of JKN will increase the demand for laboratory services. This will lead the public hospitals to refer samples to private independent laboratories for clinical testing, resulting in the growth of external referrals for private independent laboratories. Further, the industry will witness a rising trend towards precision medicine also known as personalized medicine. Further, the market for rapid tests will grow at a CAGR of 13% between 2016 and 2021 in Indonesia. The growth will be driven by factors such as increasing rate of infectious diseases such as dengue, malaria, hepatitis, and HIV, the government's healthcare initiatives, and product advancements and innovations by rapid test manufacturers.

2. RESEARCH METHODOLOGY

2.1. MARKET DEFINITIONS

Indonesia Healthcare Market: This includes total revenue generated from sales of medical devices and pharmaceuticals, and services provided by hospitals and clinical laboratories in Indonesia.

Clinical Laboratory Market: This includes the revenue generated from services provided by public clinical labs, private independent labs and public and private hospital labs for routine, non laboratory and esoteric tests in Indonesia.

Routine Tests: This can be defined as tests performed on most patients to detect relatively common disorders or to establish a base for further evaluation of a patient. Key types of routine tests include lipid profile, hematology kidney function, liver function, thyroid panel, glucose, HbA1c, urinalysis, coagulation testing, and endocrinology panel.

Esoteric Tests: tests that involve analysis of rare substances or molecules that are not performed in a routine clinical lab. Major types of esoteric tests include nutrition panel, trace element testing, vitamin D testing, autoimmune panel, molecular-genetic testing, and osteoporosis panel.

Non-laboratory tests: tests are non pathological tests involving the use of medical equipments such as X-ray machine, MRI machines, ECG devices, ultrasound devices and others.

Table 2-1: Type of Radiology Tests in Indonesia Non Laboratory Tests Market

Particulars	Radiology tests
Non Laboratory Tests	• Computed tomography (CT), Fluoroscopy, Magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA), Mammography, Nuclear medicine, which includes such tests as a bone scan, thyroid scan, and thallium cardiac stress test, Plain X-rays, which includes chest X-ray, Positron emission tomography, also called PET imaging or a PET scan, ultrasound • Interventional radiology: Angiography or angioplasty and stent placement, Embolization, cancer treatments including tumor embolization using chemoembolization or Y-90 radioembolization, Tumor ablation with radiofrequency ablation, cryoablation, or

	microwave ablation, Vertebroplasty and kyphoplasty, Needle biopsies of different organs, such as the lungs and thyroid gland, Breast biopsy, guided either by stereotactic or ultrasound techniques, Uterine artery embolization, Feeding tube placement, Venous access catheter placement, such as ports and PICCs

Source: Ken Research Analysis

Public Clinical Labs: Clinical laboratories which are managed and regulated by any government healthcare organizations or are located within public hospitals and clinics.

Private Independent Laboratories: Clinical laboratories which are managed and run by private players

Private Hospital Labs: Clinical laboratories which are managed and run by private hospitals

2.1. ABBREVIATIONS

USD: US Dollars
IDR: Indonesian Rupiah
JKN: Jaminan Kesehatan Nasional (Universal Health Scheme)
OTC: Over-The-Counter
TB: Tuberculosis
WHO: World Health Organization
BPJS: Badan Penyelenggara Jaminan Sosial (Social Insurance Administration Organization)
CAGR: Compound Annual Growth Rate
MOH: Ministry of Health, Indonesia
BPOM/NADFC: Indonesia National Agency of Drug and Food Control
ASEAN: Association of Southeast Asian Nations

2.2. MARKET SIZE AND MODELING

CONSOLIDATED RESEARCH APPROACH

Hypothesis Creation: The research team has first framed a hypothesis about the market through analysis of existing industry factors obtained from magazines, journals, broker reports, investor presentations and annual reports of major

companies and several articles. The team has used both public and proprietary databases to define and collect each market data point such as overall market size, segmentations and estimated future growth.

Hypothesis Testing: The research team conducted computer assisted telephonic interview (CATI) with several industry professionals including decision makers in all segments of healthcare market which included medical devices, pharmaceuticals, hospitals, and clinical laboratories. The industry professionals included several retailers, wholesalers, importers and distributors of medical devices and pharmaceutical products and doctors, management executives, financial analysts and other higher level authorities. The analyst at Ken Research collated their insights on the market onboard and to seek justification to the hypothesis framed by the team. Additionally several B2B clients from different sectors including government offices, clinics, diagnostic centers, and hospitals in the ecosystem have been interviewed to understand their perspectives, needs, requirements and the prices they are willing to pay for procuring medical devices and pharmaceutical drugs.

Sanity Checking: General consensus on data collected from primary research and public and proprietary databases has been reached by conducting in-house decision tree analysis of the data points available and by comparing it with macro-economic factors. Data has been collected and verified through cross-sanity checking between primary and secondary sources. Secondary data sources include the analysis of existing industry factors, obtained from company reports and from magazines, journals and online articles. The secondary data sources are used to form the initial perception and contention on several forces playing their role in determining the future growth in the industry.

Future Forecasting via Poll Opinions and Statistical Tools: Multi-Factor regression and scenario analysis was conducted on the lag variables i.e. on the historical market size of the industry by identifying the independent and quantifiable variables directly affecting the market. The forecasting was done by using SPSS statistical tools. The variables were checked for multi-co-linearity and other bias that could be present in the model. The conclusion from the regression was then double-checked by conducting poll opinions. Structured interviews were conducted through telecom with several industry veterans including major decision makers from Prodia, Pramita, Cito, Parahita, Biomedika and other companies. These interviews helped the research team to authenticate the data collected from secondary data sources and to reject or accept the hypothesis regarding the future projections.

Interpretation and Proofreading: The final analysis was then interpreted in the research report by our expert team well versed with the Healthcare Sector.

MARKET SIZING – CLINICAL LABORATORIES MARKET

- We have followed bottom to top approach under which we were able to get the market share, financials and number of tests with their average prices for leading labs in Indonesia. This led us to estimate the total market for clinical labs in Indonesia
- The market derived from last step is duly verified from annual report and investor presentation of the market players.
- CATIs were conducted to confirm the overall market size and market share of respective segments

Limitation: There might be a case that the chief executives / representatives might be bullish with the numbers. We have cross checked and revalidated the data, collected with our hypothesis and question them on the numbers. But in the end, justification provided by a primary might / might not be satisfactory on the numbers as there is no right mechanism to revalidate their numbers. However, to ascertain this, we have increased our samples by approaching more number of lab collection centers to validate our model

VARIABLES (DEPENDENT AND INDEPENDENT)

Reasons for the selection of the independent variables:

- **Population**: an increase in population will result in increase in demand for healthcare services as proportion of aged population increases and number of visitors at clinical labs, pharmacies, hospitals and other healthcare center will increase
- **Number of healthcare centers**: an increase in number of healthcare centers will lead to increase accessibility o various healthcare services which positively affect the revenue of Indonesia healthcare market
- **Budget Allocation on Healthcare**: Increase in budget allocation on healthcare will lead to advanced healthcare infrastructure in the country which will result in direct procurement of devices and will also attract more number of medical tourists and both inbound and outbound patients.
- **Obese population**: increase in obese population will lead to an increase in demand for nutritional products and healthcare related to treatment of obesity. This will positively affect the overall market revenue

The report applies Correlation and Regression analysis methods to forecast the future of the Indonesia Healthcare Market. The capabilities of SPSS and predictive analytics software have been leveraged to determine the relevant indicators used for forecasting this industry.

In the present case, healthcare market revenue has been taken as the dependent variable and other variables such as population, number of healthcare centers, budget allocation on healthcare and obese population have been taken as independent variables

MULTI FACTOR BASED SENSITIVITY MODEL

The model first identifies the correlation (whether linear or non-linear) between the dependent and independent variables. After calculating the degree and strength of relationship between the variables, the regression model is used to calculate the sensitivity of each factor on the dependent variable. Finally, the expected value and sensitivity of the independent variable is used to determine the future value of dependent variable. However, we have not considered the SPSS value as our forecast values. For future value, we conducted several telephonic interviews with industry participants and have calculated value on the basis of responses

Table 2-2: Correlation Matrix for Indonesia Healthcare Market

		Revenues in USD Million	Population in Million	Number of Health Centers	Government Expenditure in IDR Trillion	Obese Population In Thousand
Revenues in USD Million	Pearson Correlation	1	.988	.950	.992	.984
	Sig. (2-tailed)		.000	.004	.000	.000
	N	6	6	6	6	6
Population in Million	Pearson Correlation	.988	1	.972	.993	.999
	Sig. (2-tailed)	.000		.001	.000	.000
	N	6	6	6	6	6
Number of Health Centers	Pearson Correlation	.950	.972	1	.964	.980
	Sig. (2-tailed)	.004	.001		.002	.001
	N	6	6	6	6	6

Government Expenditure in IDR Trillion	Pearson Correlation	.992	.993	.964	1	.990
	Sig. (2-tailed)	.000	.000	.002		.000
	N	6	6	6	6	6
Obese Population In Thousand	Pearson Correlation	.984	.999	.980	.990	1
	Sig. (2-tailed)	.000	.000	.001	.000	
	N	6	6	6	6	6

Source: Ken Research Analysis
Notes: Correlations are significant at the 0.05 level (2-tailed).

From the correlation table, we can conclude that:

- Government expenditure on healthcare in Indonesia has been the strongest factor with a correlation value of 0.992
- Population of Indonesia has influenced the healthcare market of Indonesia positively with a positive correlation value of 0.988
- Obesity Prevalence is also a strong factor impacting the Indonesia healthcare market with a correlation value of 0.984
- Number of healthcare centers also has a strong positive correlation with the Indonesia healthcare market with a correlation value of 0.950

Regression Matrix

A multiple regression model has been used through SPSS statistical tool that analyzes the multiple correlation coefficients, R, its square, and an adjusted version of this coefficient as summary measures of model fit. Further, R-Square is used to explain the validity of the independent variables. R Square, also known as the coefficient of determination, represents the proportion of total variation in the dependent variable explained by the variation in the independent factors.
Applying multiple regression analysis to a set of data leads to regression coefficients, one for each explanatory variable. These coefficients give an estimated change in the response variable associated with a unit change in the corresponding explanatory variable, conditional on the other explanatory variables remaining constant.

Table 2-3: Regression Coefficients Output

Model	Un Standardized Coefficients	Standardized Coefficients

	B	Std. Error	Beta
(Constant)	179886.870	987471.846	
Population in Million	-504.291	3687.856	-1.081
Number of Health Centers	-8.390	28.867	-.387
Government Expenditure in IDR Trillion	195.389	314.546	1.031
Obese Population In Thousand	3.237	17.583	1.422

Sauce: Ken Research Analysis
Dependent Variable: Indonesia Healthcare Market.

FINAL CONCLUSION

With regard to clinical laboratory market, the conclusion regarding the expected value of dependent variable is determined by using weighted average of time series analysis, the output of subjective judgment, primary research and opinions polls since the regression model has been rendered inaccurate with high standard deviation. The weighted average method enables us to filter out the possible noise in each computation method and help us to derive the best possible future projections. However, the study of survey did not support the SPSS results and the final values were decided on the basis of interviews with industry professionals.

3. INDONESIA HEALTHCARE MARKET SIZE, 2012-2017

Table 3-1: Key Developments in Indonesia Healthcare Market, 2012-2017

Period	Key Developments
2012-2014	• Indonesia Healthcare market revenue has increased from USD 12.8 billion in 2012 to USD 15.2 billion in 2014. In 2014, universal healthcare was launched, aiming to make healthcare services affordable and available to the population in Indonesia. This increased demand for healthcare services across the country and created an urgent need for improvements in healthcare infrastructure. • Healthcare market in the country has surged owing to the growth of the healthcare facilities. The number of public hospitals increased from 1,540 in 2012 to 1,599 in 2014 and the private hospitals increased from 543 in 2012 to 807 in 2014. • The market surged owing to expansion of various foreign pharmaceutical companies in Indonesia. For instance, Mitsubishi Tanabe Pharma announced in 2013 that its Indonesian subsidiary would build a new production facility to expand capability and meet new GMP standards. Merck, Germany based multinational pharmaceutical company, opened an Indonesian packaging plant in 2012. Further, Fresenius Kabi bought 51.0% share of Indonesian pharmaceutical manufacturer PT Ethica Industri Farmasi (EIP) for a reported USD 200.0 million in August 2013. Fresenius Kabi and the other stakeholder of EIP, PT Soho Global Healthcare (SGH), constructed a USD 60.0 million generic drug and infusion solutions plant in Indonesia.
2015-2017	• Indonesia healthcare sector reached USD 20.6 billion in 2017 growing at a CAGR of 12.0% during 2015 to 2017 • The number of private hospitals has been increasing at 50.0% a year, reaching more than 900 in 2016. The rise in private hospitals made a positive impact on the healthcare sector of Indonesia. • Increasing investment by pharmaceutical companies has made a positive impact on the healthcare market. Fresenius Kabi and SGH also planned to invest about USD 40.0 million in two new antibiotic plants. • Siloam Hospitals set aside a capital expenditure of USD 80.0 million in 2015 to build ten hospitals and increase the bed capacity in their existing facilities, with future plans to grow their total portfolio of hospitals to 50 by 2017. Other hospital groups that have actively increased their investments in 2015 include Mitra Keluarga Karyasehat Tbk (Mika). • Jaminan Kesehatan Nasional or JKN became one of the world's largest universal healthcare coverage schemes by member size, with total enrollment reaching over 170 million individuals by 2016. This has created demand for primary health care services and generic drugs. • In addition to this, the government allocated USD 37.1 million for generic medicines under JKN program which has been distributed to over 196

million users through Health Care and Social Security Agency.
- This review period saw investment in nutritional health segment and biopharmaceuticals. International companies benefitted from rising demand in medication for chronic diseases such as Tuberculosis, HIV and others.

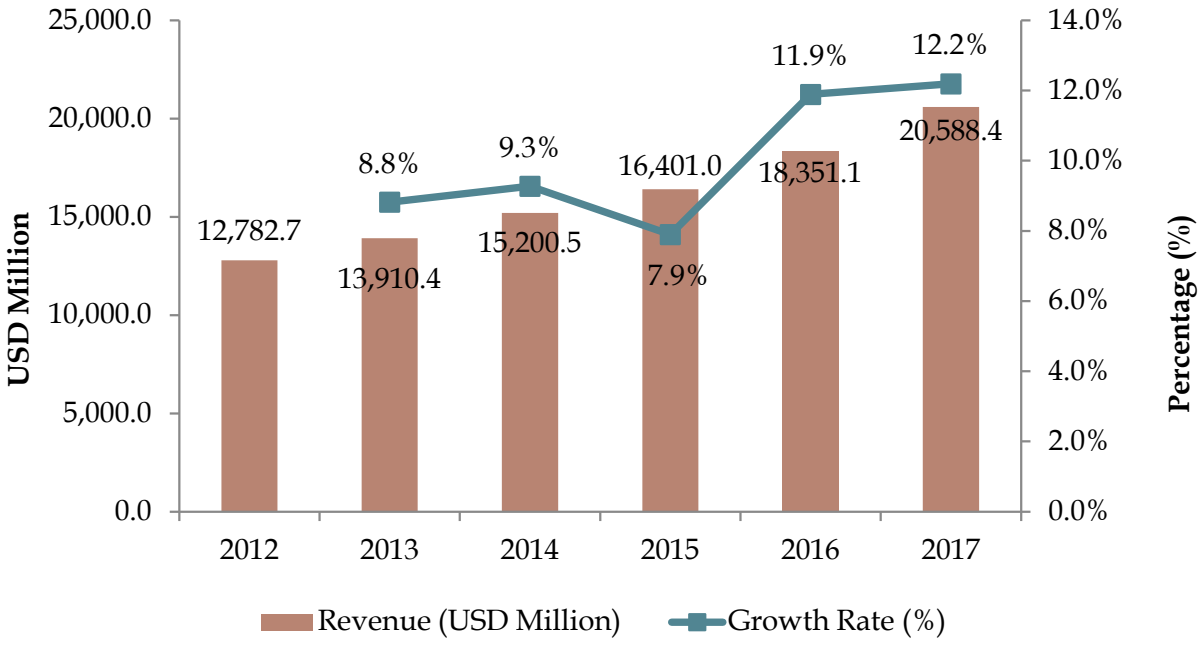
Source: Interviews with experts in Indonesia Healthcare Market, Industry articles and Ken Research Analysis

Table 3-2: Change in Foreign Investment Regulation in Different Healthcare Verticals in Indonesia

Segment	Old Regulation	New Regulation
Pharmaceutical Raw Material	85%	100%
Business and management consulting services or hospital management services	67%	100%
Healthcare support services (medical equipment rental)	49%	100%
Healthcare support services (Laboratory Clinic)	67%	100%
Healthcare Support Services (Medical checkup clinic)	67%	100%

Source: Interviews with experts in Indonesia Healthcare Market, Industry articles and Ken Research Analysis

Figure 3-1: Indonesia Healthcare Market Size on the Basis of Revenue in USD Million and Growth Rate in Percentage (%), 2012-2017



Source: Interviews with experts in Indonesia Healthcare Market, Industry articles and Ken Research Analysis
Indonesia Healthcare Market: This includes total revenue generated from sales of medical devices and pharmaceuticals, and services provided by hospitals and clinical laboratories in Indonesia

4. Indonesia Clinical Laboratory Market Introduction

Table 4-1: Introduction for Indonesia Clinical Laboratory Industry

Parameters	Description
Genesis and Inception	• During early 2000s, the clinical laboratory market revenue augmented due to growing incidence of various diseases. Cardiovascular diseases, infections and parasites, respiratory problems, tuberculosis, digestive systems diseases and cancer were the primary causes of death in Indonesia. • All these diseases along with population growth and aging created further demand in the market for quality laboratory services. This led healthcare providers to invest in quality clinical laboratory equipment to diagnose and prevent diseases. • In the public sector, decentralization increased the decision-making role of regional governments in the healthcare space thus creating a larger market for public clinical laboratory services. The disasters caused by the Tsunami in 2004, earthquakes and floods also increased demand for laboratory services • The government pushed for the national healthcare plan of 2004-2009 to provide quality healthcare by strengthening laboratory services and other healthcare facilities. • Further, Indonesia is the country worst hit by avian influenza. As of February 2008, the WHO has recorded a total of 129 confirmed human H5N1 cases and 105 deaths. This also pressured the government to invest in healthcare infrastructure and research. While non-communicable diseases in Indonesia increase and communicable diseases still pose a threat.
Present Scenario	• Presently Indonesia Clinical Laboratory Market is in the growing stage. The market has grown at a CAGR of 1.4% during 2012 to 2017 with revenue estimated at USD 1.8 billion in 2017. The industry has witnessed expansion of private laboratory chains and use of advanced technology in order to provide high quality laboratory services. The largest private laboratory chain, Prodia established 9 new labs during 2012 to 2017. Prodia's number of clinical laboratory increased from 120 in 2012 to 129 in 2017 • With the implementation of JKN, the demand for laboratory services has further increased. The public hospitals mostly perform routine test while the esoteric tests are outsourced to the private clinical laboratories. • Service delivery from health settings such as mobile clinics, rapid retail clinics demand the use of new-age clinic laboratory diagnostic which can cater to the needs of all age groups and can perform all type of tests (routine, esoteric and non laboratory tests).

	• There has been a growing focus amongst industry participants on acquiring effective and fast clinical testing capabilities
Major Players	• The six major private laboratories have accounted for 71.2% of the revenue share of Indonesia Private independent labs in 2016 are Prodia, Kimia Farma, Pramita, Cito, Parahita and BioMedika

Source: Interviews with veterans from Indonesia Medical Devices Industry, Ken Research Analysis

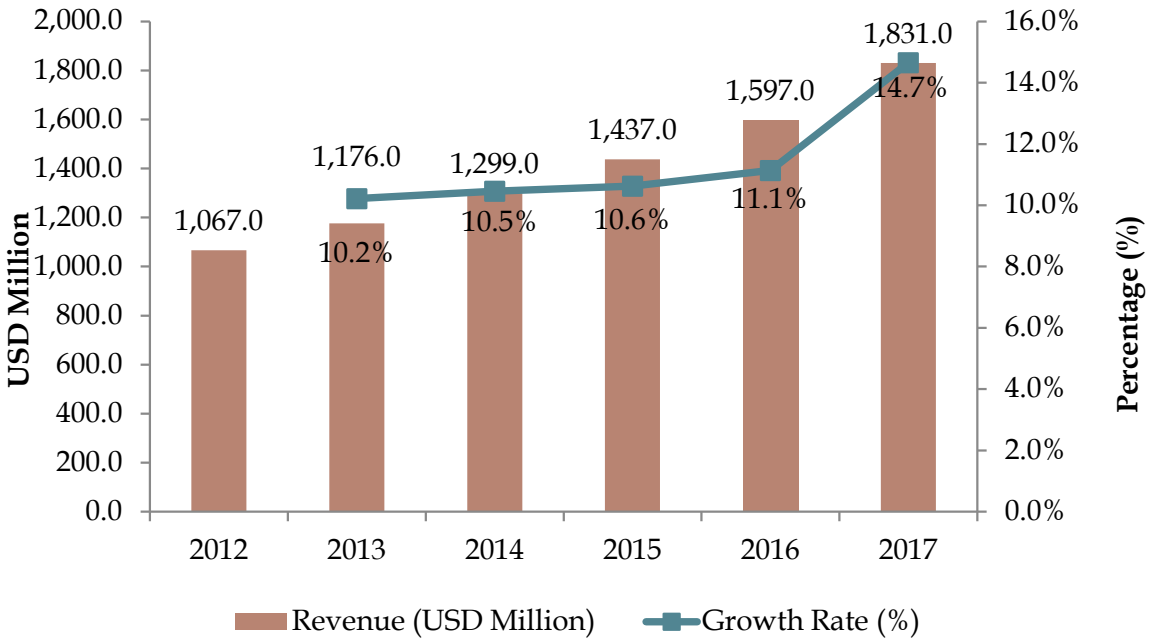
4.1. INDONESIA CLINICAL LABORATORY MARKET SIZE, 2012-2017

Table 4-2: Key Developments in Indonesia Clinical Laboratory Market, 2012-2017

Period	Developments
2012-2017	• Indonesia clinical laboratory market increased from USD 1,067.0 million in 2012 to USD 1,831.0 million in 2017 at a CAGR of 11.4%. The growth in income levels and accessibility of healthcare services supported by an increase in contagious illnesses and non-contagious illnesses including heart disease, cancer, and diabetes have driven the market for laboratory examinations. • Diabetes awareness increased at a high rate during this period in the Indonesia, which resulted in increase in the precautionary tests for diabetes in the region in the Indonesia. There were over 10 million cases of diabetes in Indonesia of which 95.0% of the cases were Type 2 diabetes. The prevalence of diabetes in adults is 6.7% in 2015. • During this period, the self-caring attitude among the people has led to more number of diagnostic tests, hence generating revenue for the market. Due to growing awareness amongst people about healthy living, private and public laboratories have witnessed an increase in walk in patients asking for routine checkups which is funded out of the patient's pocket. • Further, the major private laboratory chains have expanded their operations in terms of capacity and geographic presence. The largest private laboratory chain, Prodia established 9 new labs during 2012 to 2017. Prodia's number of clinical laboratory increased from 120 in 2012 to 129 in 2017. • The number of hospitals increased from 2,083 in 2012 to 2,601 in 2016. This has facilitated the growth of referrals and tie ups between hospitals and clinical laboratories. • The expenditure per capita for examinations from clinical laboratories in Indonesia was USD 5.1 per capita in 2016 which is relatively lower as compared to other Asian countries

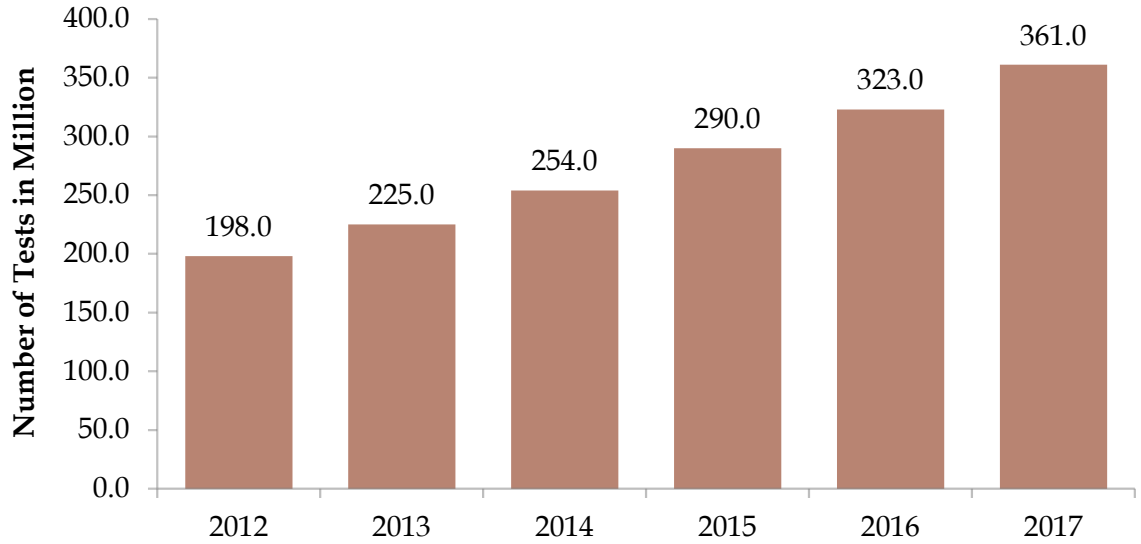
Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis

Figure 4-1: Indonesia Clinical Laboratory Market Size on the Basis of Revenue in USD Million and Growth Rate in Percentage (%), 2012-2017



Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
Clinical Laboratory Market: This includes the revenue generated from services provided by public clinical labs, private independent labs and private hospital labs for routine, non laboratory and esoteric tests in Indonesia

Figure 4-2: Indonesia Clinical Laboratory Market Size on the Basis of Number of Tests in Million, 2012-2017



Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis

5. Indonesia Clinical Laboratory Market Segmentation

5.1. By Type of Laboratory (Public Clinical Lab, Private Hospital Labs and Private Independent Labs), 2012-2017

Table 5-1: Indonesia Clinical Laboratory Market Segmentation by Type of Laboratory (Public Clinical Lab, Private Hospital Labs and Private Independent Labs) on the Basis of Revenue in USD Million, 2012-2017

Particulars	2012	2013	2014	2015	2016	2017
Public Clinical Labs	632.0	684.0	749.0	822.0	891.0	1,014.0
Private Hospital labs	269.0	301.0	338.0	380.0	435.0	498.0
Private Independent Labs	166.0	191.0	212.0	235.0	271.0	319.0
Total	1,067.0	1,176.0	1,299.0	1,437.0	1,597.0	1,831.0

Key Takeaways:

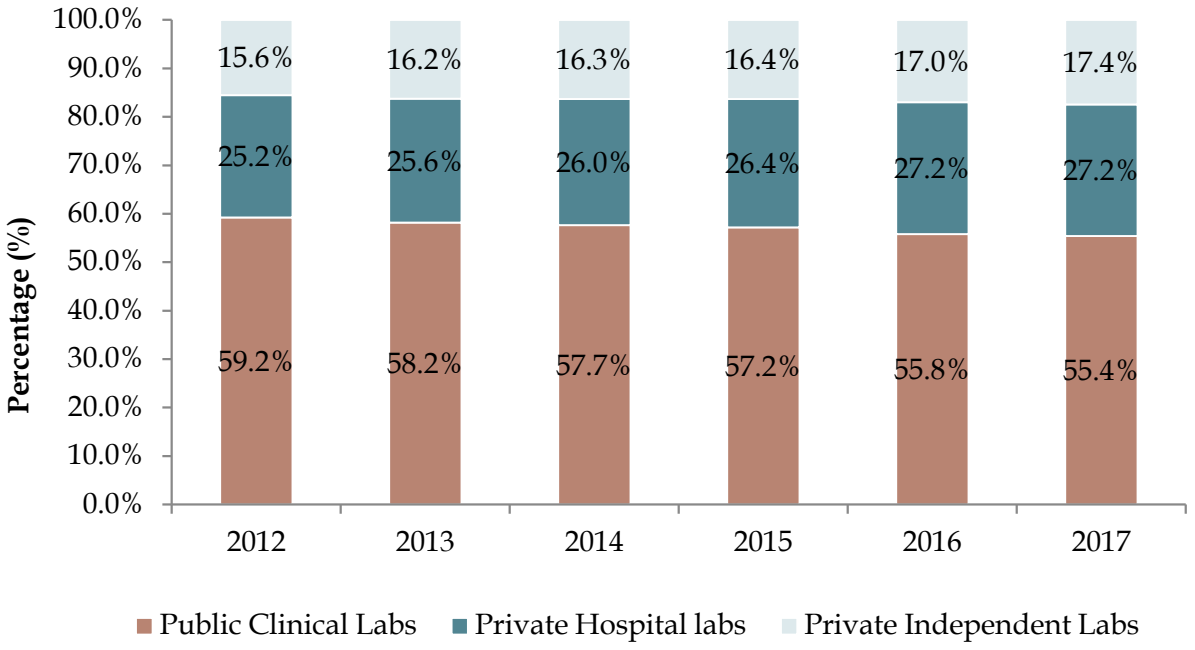
- The public clinical labs have accounted for 55.4% of the revenue share in Indonesia clinical laboratory market in 2017. The public sector includes public hospital laboratories, public independent laboratories and laboratory services at Puskesmas clinics.
- In 2015, there were a total of 3,428 registered clinical laboratories, of which 1,594 were owned by public hospitals, 917 were private independent laboratories and 917 were owned by private hospitals.
- In 2017, the number increased to 3,877 clinical laboratories, of which 1,637 were public clinical labs, 986 were private independent labs and 1,254 were private hospital labs
- The laboratory infrastructure model has gained prominence in Indonesia amongst large class A and B hospitals as more hospitals have upgraded their laboratory capabilities and their hospital class due to JKN.
- The private sector comprises of private hospital labs and private independent labs. Although private hospital labs have accounted for the larger share of 27.2% in the overall clinical laboratory market in 2017 as compared to private independent labs with 17.4% of the overall market but private independent lab segment have grown at a CAGR of 14.0% from 2012 to 2017 as compared to private hospital labs which have grown at a CAGR of 13.1% during 2012 to 2017.
- Private independent laboratories has been supported through an increase in the number of clinical laboratories country-wide and by offering test packages capturing demand from different customer segments.
- There were 45 million clinical tests performed in 2017 as compared to 39 million in 2015 representing a CAGR of 8.0%.
- Majority of the private independent labs are located in Java and Sumatra. This has

been facilitated by increase in expenditure on health services as people have become more health conscious. Further, due to growing prevalence of lifestyle diseases such as diabetes, hypertension and others, the number of walk-in customers in these areas has increased. Furthermore, with majority of the public and private hospitals located in Java and Sumatra, these regions have become the highest source for doctor and external referrals

- Furthermore, the public hospital laboratories have limited capabilities and can only perform basic routine tests therefore; they outsource the specialized tests to private independent laboratories. The private laboratories are equipped with modern equipments and technology to perform specialized tests such as microbiology, anatomical pathology and esoteric tests
- Private clinics usually perform Point of Care Testing (POCT) which includes routine tests such as glucose, lipid profile and urine tests conducted using POCT devices. In most cases, samples are withdrawn from the patients and referred out to hospitals or independent labs for clinical testing
- The hospital based labs tie up with the hospitals and pay certain agreed upon proportion of their revenue as a commission to the hospitals. The commission charged by the private hospitals can be as high as up to 40-60% of the fees charged for each test whereas the commission charged by the public hospitals is around 20-40%.

Source: Prodia Broker Report, Ken Research Analysis

Figure 5-1: Indonesia Clinical Laboratory Market Segmentation by Type of Laboratory (Public Clinical Lab, Private Hospital Labs and Private Independent Labs) on the Basis of Revenue in Percentage (%), 2012-2017

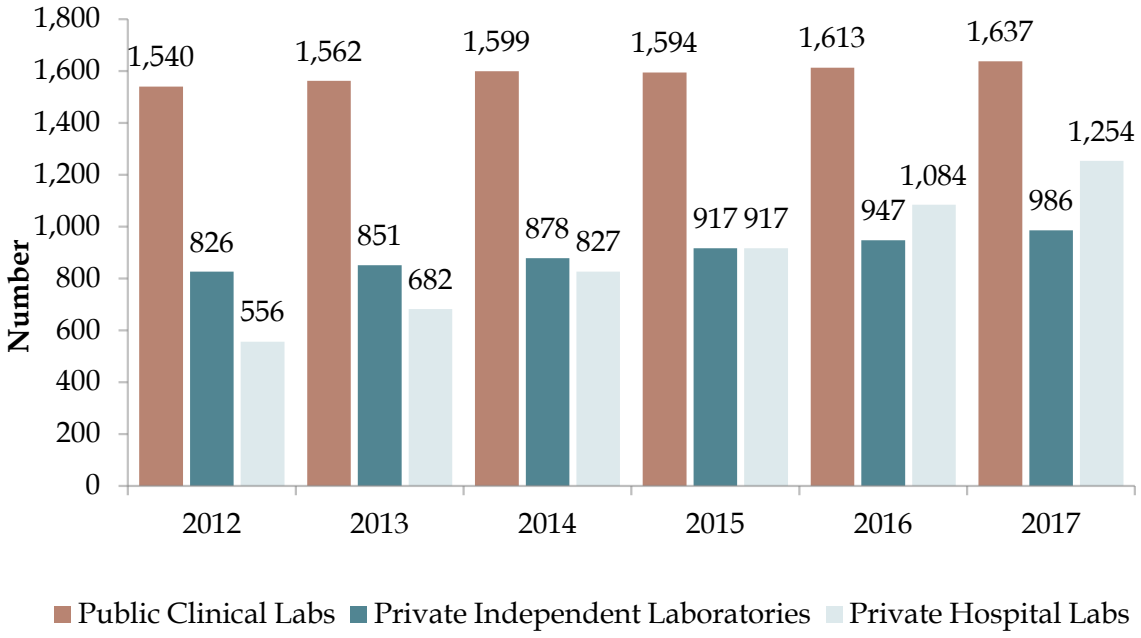


Source: Prodia Broker Report, Ken Research Analysis

Public Clinical Labs: Clinical laboratories which are managed and regulated by any government healthcare organizations or are located within public hospitals and clinics.

Private Independent Laboratories: Clinical laboratories which are managed and run by private players
Private Hospital Labs: Clinical laboratories which are managed and run by private hospitals

Figure 5-2: Number of Public Clinical Labs, Private Independent Labs and Private Hospital Labs in Indonesia, 2012-2017



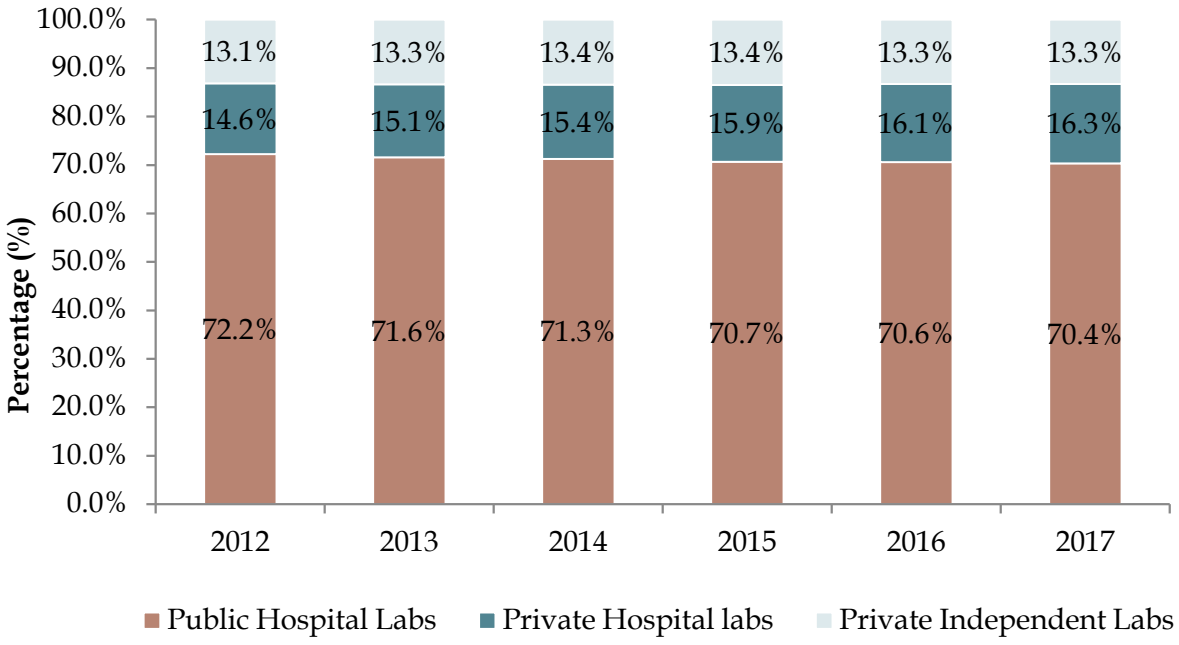
Source: Prodia Broker Report, Ken Research Analysis

Table 5-2: Indonesia Clinical Laboratory Market Segmentation by Type of Laboratory (Public Hospital Labs, Private Hospital Labs, Private Independent Labs) on the Basis of Number of Tests in Million, 2012-2017

Type of Lab	2012	2013	2014	2015	2016	2017
Public Hospital Labs	143	161	181	205	228	254
Private Hospital labs	29	34	39	46	52	59
Private Independent Labs	26	30	34	39	43	48
Total	198	225	254	290	323	361

Source: Ken Research Analysis

Figure 5-3: Indonesia Clinical Laboratory Market Segmentation by Type of Laboratory (Public Hospital Labs, Private Hospital Labs, Private Independent Labs) on the Basis of Number of Tests in Percentage (%), 2012-2017



Source: Ken Research Analysis

5.2. Indonesia Private Independent Laboratory Market Segmentation

BY TYPE OF PRIVATE INDEPENDENT LABORATORY (LABORATORY CHAINS AND SINGLE INDEPENDENT LABORATORY), 2015 & 2016

Table 5-3: Indonesia Private Independent Laboratory Market Segmentation by Type (Laboratory Chains and Single Independent Laboratory) on the Basis of Revenue in USD Million, 2015 and 2016

Particulars	Revenue (USD Million), 2015	Revenue (USD Million), 2016
Laboratories Chains	159.8	193.0
Single Independent Labs	75.2	78.0
Total	235.0	271.0

Key Takeaways:

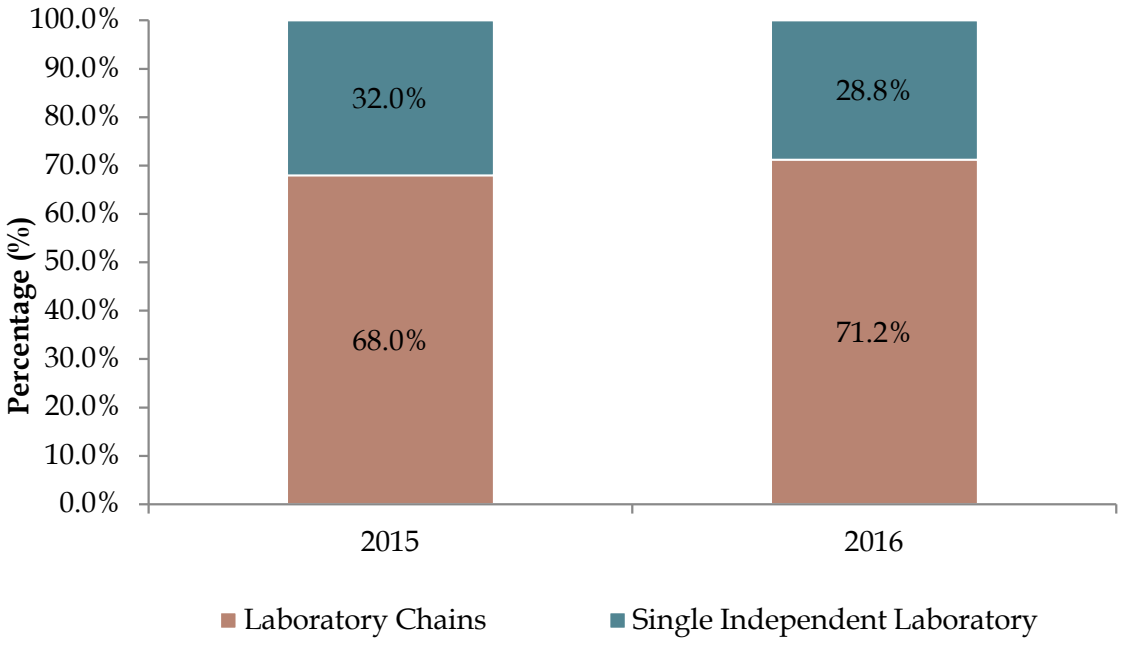
- The chain laboratories have been the leading market players in Indonesia in 2016. There are six leading players namely Prodia, Kimia Farma Diagnostik, Pramita, Cito,

BioMedika and Parahita which have together accounted for 71.2% of revenue the overall private independent laboratory market in 2016.

- These major chain laboratories have undergone geographic expansion beyond key cities such as Java and Sumatra and have presence in underdeveloped areas such as Sulawesi, Kalimantan which has facilitated their growth.
- The laboratory chains are equipped with skilled labour, modern equipment and are able to perform specialized tests such as microbiology, anatomical pathology and esoteric tests.
- The laboratory chains tie up with insurance companies, corporates and hospitals to gain customers through referrals. Due to greater accessibility, the laboratory chains also benefit from larger number of walk-in customers.
- The single independent laboratories are concentrated majorly in well developed areas such as Java, Sumatra and Bali.
- They have a limited customer base due to their restricted geographic presence. They are generally located nearer to hospitals and medical institutions in order to gain referrals. Further, they have a limited brand value. All these factors have contributed to their lower revenue share of 28.8% in Indonesia private independent laboratory market in 2016.
- Some of the major single independent laboratories include PT Rohto Laboratories, Gleneagles Diagnostic Center, PT. Smart Lab Indonesia and Laboratorium Klinik PathLab Indonesia.

Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Prodia Broker Report, Ken Research Analysis

Figure 5-4: Indonesia Private Independent Laboratory Market Segmentation by Type (Laboratory Chains and Single Independent Laboratory) on the Basis of Revenue in Percentage (%), 2015 & 2016



Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Prodia Broker Report, Ken Research Analysis

BY TYPE OF CUSTOMER (DOCTOR REFERRALS, WALK-INS, CORPORATE CLIENTS AND EXTERNAL REFERRALS), 2016

Table 5-4: Indonesia Private Independent Laboratory Market Segmentation by Type of Customer (Doctor Referrals, Walk-Ins, Corporate Clients and External Referrals) on the Basis of Number of Tests, 2016

Particulars	Number of Tests (in Million)
Doctor Referrals	16.3
Walk-Ins	11.6
Corporate Clients	9.9
External Referrals	5.2
Total	43.0

Source: Citi bank analysis, Prodia broker report, Ken Research Analysis
Notes: Walk-ins also include corporate employees (approx. 11% of the total tests) visiting the diagnostic lab for test without booking an appointment on the behalf of the company while corporate clients includes the number of test scheduled and booked by the companies on behalf of employees

Table 5-5: Indonesia Private Independent Laboratory Market Segmentation by Type of Customer (Doctor Referrals, Walk-Ins, Corporate Clients and External Referrals) on the Basis of Number of Tests, 2016

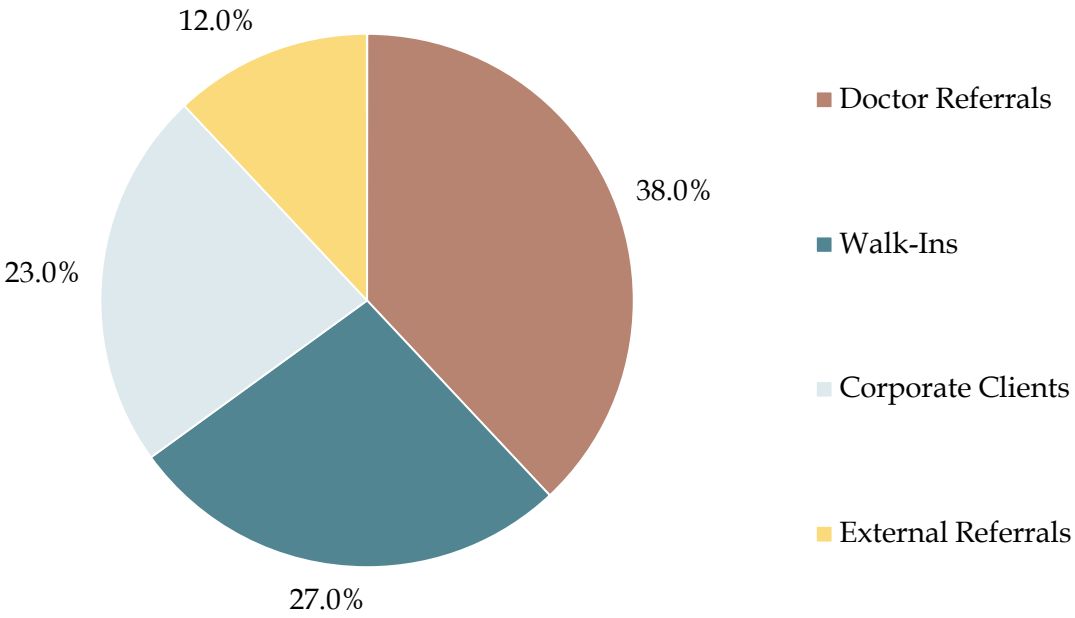
Particulars	Description
Doctor Referrals	• The private independent laboratories have accounted for the largest share of 38.0% of the 43 million tests conducted in Indonesia Private independent laboratory market in 2016. • Indonesia has witnessed an increase in prevalence of chronic diseases such as tuberculosis, diabetes, cardiovascular diseases and HIV. The treatment of such diseases requires a series of tests which are recommended by specialized doctors. For instance, there are two kinds of tests that are used to detect TB bacteria in the body namely, the TB skin test (TST) and TB blood tests. Diagnosis of diabetes involves Fasting plasma glucose (FPG), Oral glucose tolerance test (OGTT), Hemoglobin A1c test, Random plasma (blood) glucose. • Indonesia is one of the 27 Multi-drug-resistant tuberculosis (MDR-TB) high burden countries worldwide, with estimated 6,800 new cases every year. Further, Indonesia is also a member of International Diabetes Federation and there were 10 million cases of diabetes in Indonesia in 2015 with 6.6% prevalence in Males and 7.3% prevalence in females. • With 70% of public and private hospitals in Indonesia located in Java and Sumatra, these regions have the highest number of total general

	practitioners and specialists, thereby representing the biggest source of referrals for clinical laboratory testing • Type of tests include Hematology, Viral testing, Coagulation, Autoimmune detection • Doctors usually tie up with private and public laboratories to gain certain percentage commission. They earn a commission of 20-60% of the fees per test referred by them to the clinical lab.
Walk-Ins	• With growing awareness about different types of chronic diseases and the treatment procedure increasing number of Indonesians have taken charge of their own health. This has led to an increase in number of walk ins at medical laboratories which has registered 27.0% of the tests in Private independent labs market in 2016 • Further, walk-ins offer other benefits such as convenience, affordability and confidentiality. Ordering lab tests online cuts the expense of the doctor visit altogether and the price of the direct-ordered lab tests are usually less expensive than lab tests ordered by the doctor • People suffering from lifestyle diseases such as diabetes, thyroid, and hypertension opt for walk in medical tests. Further, the medical laboratories also assist the patients about the relevant tests and provide online payment options which has made the procedure more convenient • Type of tests include Lipid panel, Glucose and Uric Acid • The margin earned through walk-ins is usually higher as compared to doctor and external referrals as the laboratory doesn't have to pay any commission in case of walk-in customers
Corporate Clients	• Pre-employment check-ups are required to cover occupational and safety hazards at workplace and ensure that the selected candidate is medically fit for the job. Corporate clients have accounted for 23.0% of the tests in Indonesia private independent laboratory market in 2016. • This consists of lab tests such as complete Blood Count, Blood Sugar Fasting, Urine Routine & Microscopy, Erythrocyte Sedimentation Rate (ESR), blood group & Rh factor. • In this scenario, the corporates tie up with the laboratories which conduct the required medical tests as and when required. This includes annual and pre-employment checkups. • In this scenario, the clinical laboratories usually charge less as compared to the labs' standard test rates as the corporates require clinical services in bulk. • Type of tests include X-ray, Spirometry and Audiometry test
External Referrals	• External referrals have accounted for 12.0% of the number of tests in Indonesia private independent laboratory market in 2016. • This includes the patients and test samples referred from healthcare providers such as hospitals and other clinical laboratories. • JKN contributed to the increase of patient volume and greater utilization of public sector facilities, which has resulted in greater demand for laboratory testing in the public sector. This has led public hospitals to refer samples to private independent laboratories for

clinical testing, resulting in the growth of external referrals for private independent laboratories
- Type of tests include Molecular test, Microbiology test, Viral marker, Tumor marker
- These tests are funded by referring institutions on credit

Source: Citi bank analysis, Prodia broker report, Ken Research Analysis

Figure 5-5: Indonesia Private Independent Laboratory Market Segmentation by Type of Customer (Doctor Referrals, Walk-Ins, Corporate Clients and External Referrals) on the Basis of Number of Tests in Percentage (%), 2016



Source: Citi bank analysis, Prodia broker report, Ken Research Analysis, Ken Research Analysis
Notes: Walk-ins also include corporate employees (approx. 11% of the total tests) visiting the diagnostic lab for test without booking an appointment on the behalf of the company while corporate clients includes the number of test scheduled and booked by the companies on behalf of employees

BY PAYER (PRIVATE HEALTH INSURANCE, CORPORATES, OUT OF POCKET AND BPJS), 2016

Table 5-6: Indonesia Private Independent Laboratory Market Segmentation by Payer (Private Health Insurance, Corporates, Out of Pocket and BPJS) on the Basis of Number of Tests in Million, 2016

Particulars	Number of tests
Corporates	14.6
Private Health Insurance	13.8
Out of Pocket	13.3

BPJS	1.3
Total	43.0

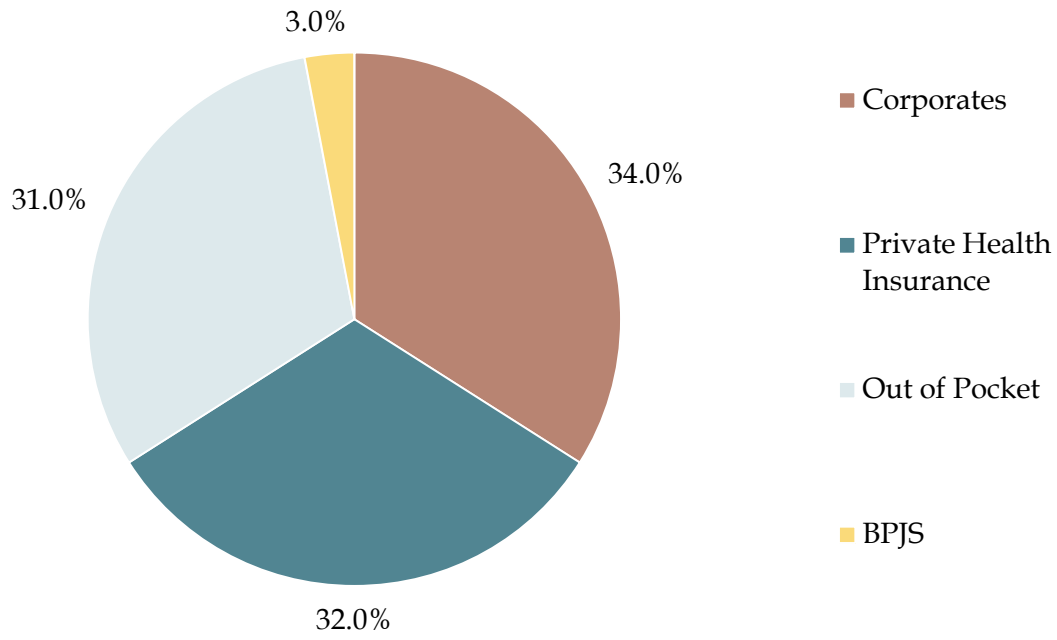
Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
BPJS stands for Badan Penyelenggara Jaminan Sosial (Social Insurance Administration Organization) of Indonesia
Notes: Corporate includes the total number of test finally paid by the corporate entity

Table 5-7: Rationale for Indonesia Private Independent Laboratory Market Segmentation by Payer (Private Health Insurance, Corporates, Out of Pocket and BPJS), 2016

Particulars	Description
Corporates	• Corporates have accounted for the largest share of 34.0% of the number of tests in Indonesia Private Independent Laboratory Market in 2016. About 7% of overall test in 2016 conducted for walk-ins as companys' employees are finally paid by the corporate entity. • This is supported by the growing Indonesian workforce who has led to growth of corporate clients for pre-employment checkups and annual checkups. More number of corporates has tied up with private medical laboratories. There were approximately 58.1 million people employed in the service sector in 2016 as compared to 54.9 million in 2015 • The customers majorly opt for basic check up of the employee which includes Complete Medical & Physical Examination, Laboratory Investigations, Complete Blood Count, Blood Sugar Test (usually fasting), Urine Routine & Microscopy, Blood Group & Rh Factor
Private Health Insurance	• The private health insurance companies have accounted for 32.0% of the tests in Indonesia Private Independent Laboratory Market in 2016. • This consists of patients who are diagnosed with chronic diseases such as cancer, HIV, Tuberculosis, diabetes and others and require advanced medical tests which cost more. • Major proportion of these patients comes through doctor referral and external referrals which includes healthcare providers. • The private health insurance sector has increased inspite of the JKN scheme launched by the government. The major reason behind this is the extent and quality of treatment and the freedom of choice offered by private health insurance companies.
Out of Pocket	• 31.0% of the total number of tests in Indonesia has been financed from the patient's pocket in 2016. • Majority of such patients directly walk in to the medical lab for tests. These customers majorly suffer from lifestyle diseases such as diabetes, hypertension and others.
BPJS	• Only 3% of test volumes are contributed by BPJS patients as there are limited partnerships between JKN and independent laboratories. • JKN has collaborated with independent laboratories mainly for preventative diagnosis such as stage IVA tests and Pap smear tests for cervical cancer.

Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
BPJS stands for Badan Penyelenggara Jaminan Sosial (Social Insurance Administration Organization) of Indonesia

Figure 5-6: Indonesia Private Independent Laboratory Market Segmentation by Payer (Private Health Insurance, Corporates, Out of Pocket and BPJS) on the Basis of Number of Tests in Percentage (%), 2016



Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
BPJS stands for Badan Penyelenggara Jaminan Sosial (Social Insurance Administration Organization) of Indonesia
Notes: Corporate includes the total number of test finally paid by the corporate entity

BY TYPE OF TEST (ROUTINE, NON LABORATORY AND ESOTERIC), 2016

Table 5-8: Indonesia Private Independent Laboratory Market Segmentation by Type of Test (Routine, Non Laboratory and Esoteric) on the Basis of Revenue in USD Million, 2016

Particulars	Revenue (in USD Million)
Routine	189.7
Esoteric	54.2
Non Laboratory	27.1
Total	271.0

Key Takeaways

- Routine tests have accounted for 70.0% of the revenue in Indonesia Private

independent laboratory market. Key types of routine tests include lipid profile, hematology kidney function, liver function, thyroid panel, glucose, HbA1c, urinalysis, coagulation testing, and endocrinology panel.

- The major chain and private clinics with basic clinical laboratory equipment conduct routine clinical laboratory tests such as glucose tests, urine tests and lipid profile
- Private clinics usually perform Point of Care Testing (POCT) which includes routine tests such as glucose, lipid profile and urine tests conducted using POCT devices. In most cases, samples are withdrawn from the patients and referred out to hospitals or independent labs for clinical testing
- Esoteric tests have accounted for 20.0% of the revenue share in private independent laboratory market. Major types of esoteric tests include nutrition panel, trace element testing, vitamin D testing, autoimmune panel, molecular-genetic testing, and osteoporosis panel.
- Esoteric tests require a professional approach from highly-skilled technical personnel, often utilize more sophisticated technology, equipment or materials and are generally ordered less frequently than routine tests
- Many smaller labs, including some hospital labs do not see enough volume for specific tests within this category and outsource genomic and esoteric tests to larger private labs or niche specialty labs
- Generally, margins for esoteric tests are higher as compared to routine tests. Furthermore, esoteric tests are generally priced higher than routine tests
- Non Laboratory tests have accounted for 10.0% of the tests. The most common non lab tests include X-rays, mammography, Colonoscopy and biopsy. Non lab tests have witnessed an increase due to the prevalence of cardiovascular diseases.

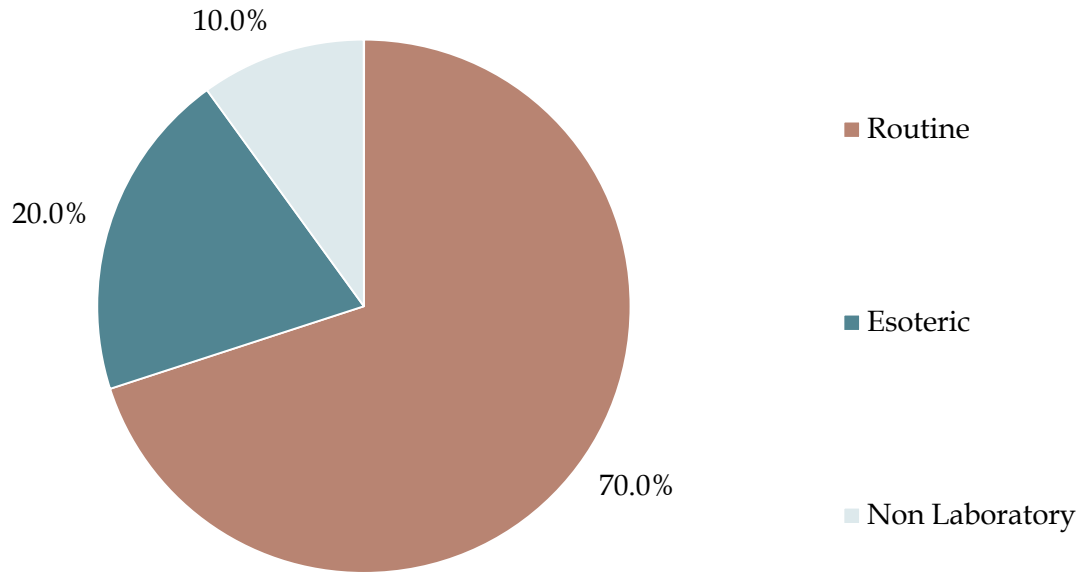
Source: Prodia Broker Report, Citi Research and Ken Research Analysis

Table 5-9: Indonesia Clinical Laboratory Market Segmentation by Type of Test (Routine, Non Laboratory and Esoteric) on the Basis of Best Selling Medicines, Major Labs and Price

Particulars	Best Selling	Major Labs	Price as of Jan 2018
Routine	CBC (Complete Blood Count), haemoglobin, HbA1c, urinalysis	Prodia, PT SmartLab, PT Rohto Labs, Pramita	CBC: IDR 95,000 Haemoglobin: IDR 61,000 HbA1c: IDR 158,000 Urinalysis: IDR 56,000
Non Laboratory	X-Ray, Spirometry, Radiology	Kimia Farma Diagnostic, Prodia	X-Ray: IDR 550,000

Source: Ken Research Analysis

Figure 5-7: Indonesia Private Independent Laboratory Market Segmentation by Type of Test (Routine, Non Laboratory and Esoteric) on the Basis of Revenue in Percentage (%), 2016



Source: Prodia Broker Report, Citi Research and Ken Research Analysis
Routine Tests: This can be defined as tests performed on most patients to detect relatively common disorders or to establish a base for further evaluation of a patient. Key types of routine tests include lipid profile, hematology kidney function, liver function, thyroid panel, glucose, HbA1c, urinalysis, coagulation testing, and endocrinology panel.
Esoteric Tests: tests that involve analysis of rare substances or molecules that are not performed in a routine clinical lab. Major types of esoteric tests include nutrition panel, trace element testing, vitamin D testing, autoimmune panel, molecular-genetic testing, and osteoporosis panel.
Non-laboratory tests: tests are non pathological tests involving the use of medical equipments such as X-ray machine, MRI machines, ECG devices, ultrasound devices and others

BY REGION, 2016

Table 5-10: Indonesia Private Laboratory Market Segmentation by Type of Labs (Private Hospital Labs and Private Independent Labs) in Different Regions on the Basis of Revenue in USD Million, 2016

Particulars	Private Laboratory	Private Hospital Labs	Private Independent Labs
Greater Jakarta, Palembang and Lampung	210.1	122.5	87.6
West Java	134.3	91.6	42.7
East Java, Bali and Nusa	112.5	69.8	42.7
Central Java	70.0	34.3	35.7

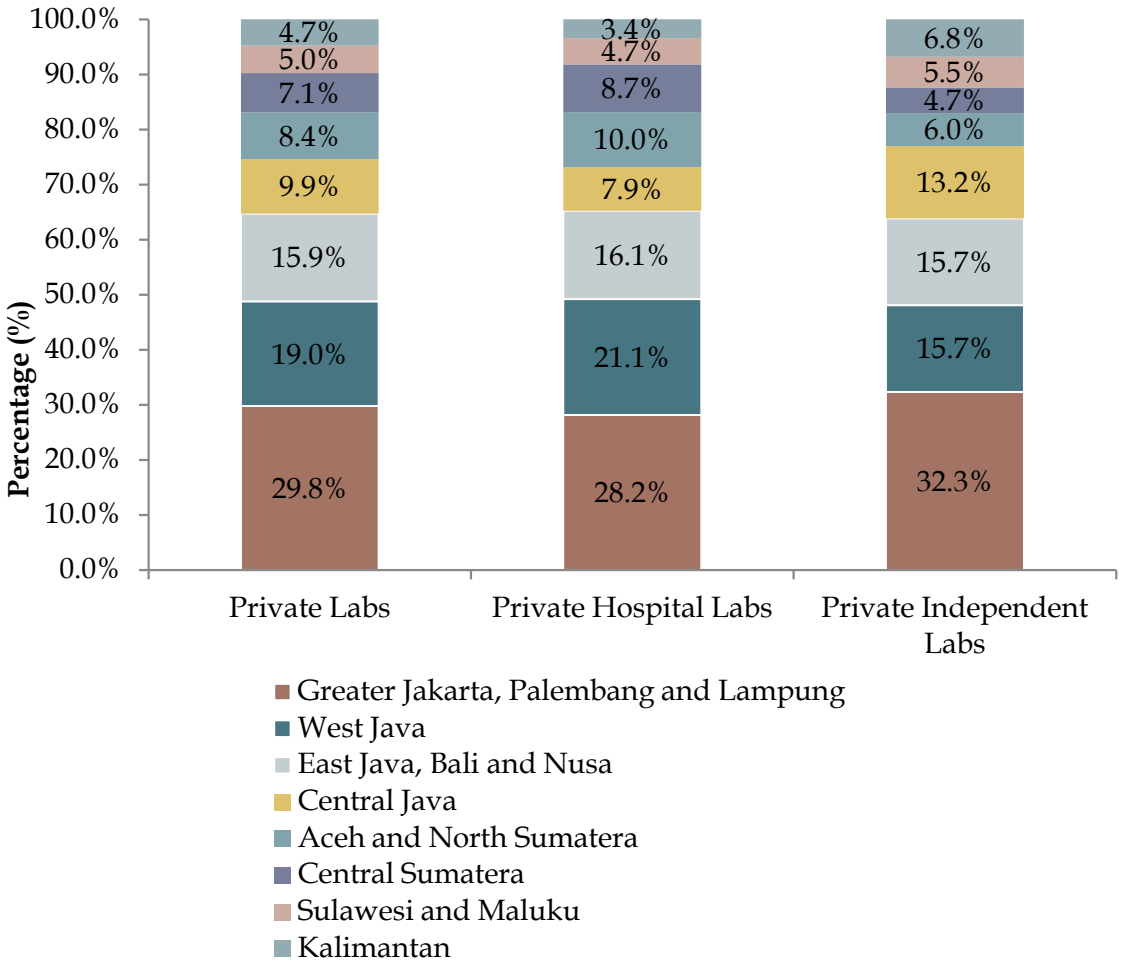
Aceh and North Sumatera	59.7	43.5	16.1
Central Sumatera	50.5	37.8	12.7
Sulawesi and Maluku	35.6	20.6	14.9
Kalimantan	33.3	14.9	18.5
Total	706.0	435.0	271.0

Key Takeaways:

- 70% of public and private hospitals in Indonesia located in Java and Sumatra, these regions have the highest number of total general practitioners and specialists. These regions represent the largest source of referrals for clinical laboratory testing.
- Java, Sumatra, Bali, Jakarta and Palembang have accounted for 90.3% of the revenue in the overall private laboratory market in 2016. Furthermore, About 80% of the total labs in Indonesia are located in the Sumatra and Java regions in 2015.
- These regions also have high rate of urbanization and more affluent population, which has created greater access and demand for private clinical laboratory testing services**.** Key private laboratories are clustered in these areas offering a wider range of clinical laboratory testing services and modern equipment
- In the major cities such as Java, Sumatra, Jakarta and others, private laboratories form partnerships with corporate and insurance firms in order to provide test services for their employees and policy applicants.
- All major clinical laboratory chains are present in Jakarta, Java and Sumatra. Some major clinical labs in Jakarta include Hi lab Diagnostic Center, Adamas Geomological Laboratory, Parahita Diagnostic center.
- Furthermore, prevalence of lifestyle diseases such as diabetes has further created demand for routine clinical lab tests. For instance, the prevalence of diabetes in Jakarta is 1.63% in 2016.
- Underdeveloped cities such as Sulawesi, Maluku and Kalimantan have accounted for 9.7% of the revenue in overall private laboratory market in 2016.
- In smaller underdeveloped cities, majority of the customers come from doctor and external referrals as there are limited clinical laboratory facilities in such areas.

Source: Prodia Broker Report, Ken Research Analysis

Figure 5-8: Indonesia Private Laboratory Market Segmentation by Type of Labs (Private Hospital Labs and Private Independent Labs) in Different Regions on the Basis of Revenue in Percenatge (%), 2016



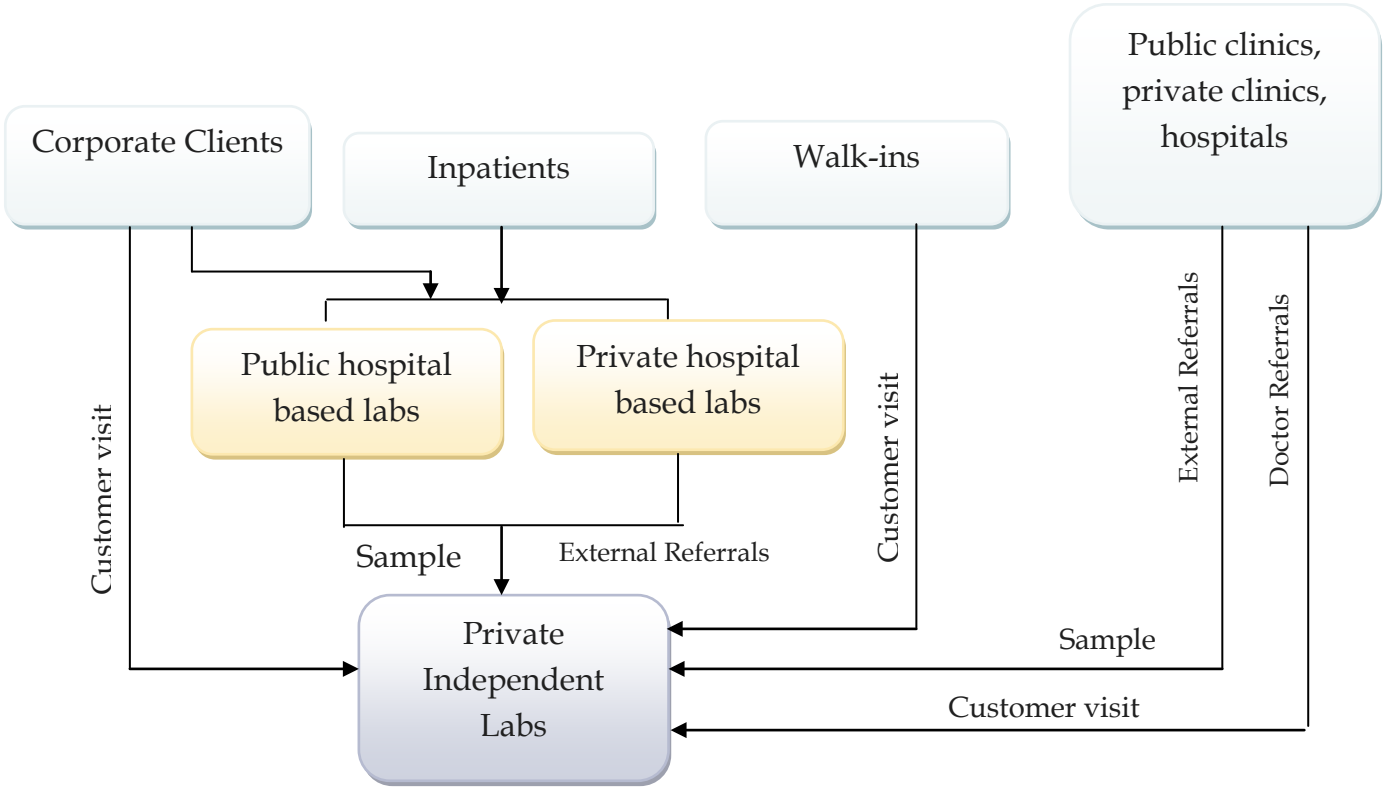
Source: Prodia Broker Report, Ken Research Analysis

6. Value Chain of Clinical Labs Market

Clinical laboratory plays an important role in the decision making of both individuals and medical practitioners, and serving both the public and private healthcare segments which make up the overall healthcare system. The labs primary revenue is generated by charging fees for performing routine, esoteric and non lab tests. Further, they also tie up with healthcare institutions, insurance companies and large corporates to increase their customer base. Sometimes, smaller labs with restricted equipments and capabilities outsource the samples to other private labs. The labs target multiple customer segments including walk-ins, doctor referrals, corporate clients and external referrals.

The equipments required for the set up of a clinical laboratory is either obtained from manufacturers or local distributors and importers. Around 93% of the medical devices are imported. Further, the pharmaceutical products and test samples need to be stored at the specific temperature and moisture.

Figure 6-1: Value Chain for Indonesia Clinical Laboratory Market



Source: Prodia Broker Report, Ken Research Analysis

7. TRENDS, DEVELOPMENTS, ISSUES AND CHALLENGES IN INDONESIA CLINICAL LABORATORY MARKET

UNIVERSAL HEALTH COVERAGE (UHC) INCREASES THE DEMAND FOR CLINICAL LABORATORY TESTING

Greater Universal Health Coverage has increased accessibility to healthcare services, leading to a rising number of the population seeking treatment and thereby increasing laboratory testing. The UHC scheme has increased the demand for basic and specialized testing. Since public clinical labs are not equipped with the technology for specialized testing, such tests have been outsourced to private independent laboratories.

Introduction of JKN has caused certain patient segments to utilise certain government health services instead of hospitals where it provides clinical laboratory services which has led to a decline in patient volumes at private independent labs.

Table 7-1: Indonesia Private Independent Lab Collaboration with BPJS

Particulars	Description
Direct Collaboration	• BPJS has collaborated with private independent labs mainly for preventative measures such as IVA test and Pap smear for cervical cancer (that is a part of government health programmes). • BPJS evaluates the capability of the labs to cope with high test volumes. • If the total cost of the test is less than 100 million IDR, BPJS directly appoints the lab clinic. • If the total cost of the test is more than 750 million IDR, BPJS has a tender process where all labs need to submit their documents and costing information to the agency
Indirect Collaboration	• For a private independent lab to be part of the BPJS scheme, it must affiliate itself with hospitals that accept BPJS patients, as the aim of BPJS is to provide one-stop services for healthcare in Indonesia.

Source: BPJS, Indonesia

RISING PREVALENCE OF NON-COMMUNICABLE DISEASES (NCDS) AND COMMUNICABLE DISEASES (CDS)

According to the World Health Organization, in 2014, cardiovascular, cancer and diabetes accounted for 56% of disease mortality in Indonesia. Further, Indonesia accounted for the largest numbers of TB cases globally at 10%. Rising major illness of NCDs and CDs has driven the demand for cardiovascular tests, tumor markers, metabolic tests, malaria and TB tests.

INCREASING DEMAND FOR HEALTH CHECK-UPS

Rising personal disposable income has led to higher spending on healthcare services including clinical testing. Further there has been an increase in middle to high income earners seeking preventive health check-ups. Health check-ups are driven by walk-in patients and corporate clients who have together contributed up to 50% of the total test volume of a private independent laboratory. In addition to this, it is expected that the number of people taking health check-ups to grow by 2.2% on a yearly basis as more emphasis is given to the promotion of preventive health checkups. Major laboratory chains such as Cito, Pramita and Prodia have hence introduced health check up packages for male, female, children, adolscenets, and old age people. Further, there are packages for different diseases such as cancer, diabetes, cardiac, fertility and others.

INTRODUCTION OF NEW SPECIALIZED TESTS

The market has witnessed introduction of wide range of tests from routine tests to more specialized tests, including genomic platform with multiplexing capabilities able to support different classes of patients with precise diagnosis and speed up treatment consultation. This is supported by growing focus amongst

industry participants on acquiring effective and fast clinical testing capabilities

SHORTAGE OF SKILLED HUMAN RESOURCE LIMITS GROWTH

Increase in demand for healthcare services has not been met with an increase in the number of trained medical personnel. Moreover, there is high disparity between urban and rural areas. Most pathologists are located in the urban regions in Java given the better salary structures. Human resource shortage is much higher in rural areas. Furthermore, there is higher shortage of anatomical pathology specialists than clinical pathology specialists, where the shortage is more evident in class C and D hospitals. Lack of in-house and external training has resulted in low-quality human resource in this field which can potentially hinder growth.

LIMITATIONS IN REIMBURSEMENT PER CASE LOAD BY BPJS MAY LIMIT THE EXTENT OF TESTS PERFORMED

BPJS reimbursement, that is a case-based INA-CBG tariff, has no clear allocation to pathology testing. This may limit the number of tests performed by hospitals to accommodate costs. INA-CBG tariffs are considered to be too low by private hospitals. Hence, many are not willing to partner with BPJS currently.

FAILURE OF HUB-AND-SPOKE MODEL

The specimen collection process is highly distributed, fragmented, and labour-intensive, and dependent on the skill and focus of front-end employees and transportation providers, such as independent couriers, which is exacerbated by the fact that Indonesia is a large group of islands. Any mix-ups, losses or errors in the sample collection process can result in erroneous or non-results and adversely affect the business.

A key challenge in the operation of a laboratory network is the maintenance of sample integrity and turnaround time when tests are conducted by laboratories far away from the specimen collection point or POC outlet. The timely pick-up, transportation and delivery of specimens depend on numerous factors beyond the company's control, including weather, road conditions and transportation schedule delays. Disruptions of transportation services because of weather-related problems, strikes, lock-outs, terrorism, inadequacies in road infrastructure and port facilities, or other events could impair the company's ability to receive test samples or any other supplies and generate test results to its customers in a timely manner

8. Government Regulations for Indonesia Clinical Laboratories Market

The National Accreditation Committee (KAN) is the accreditation agency in Indonesia. The Center for Health Laboratory develops national standards for health laboratories on Microbiology, Clinical Chemistry, Pathology and Immunology, and imparts technical training for laboratory staff of hospitals and public health units. Foreign companies can set up clinical laboratories in Indonesia by way of joint venture between foreign capital and domestic capital.

Two regulations pertain to the clinical labs and clinics industry in Indonesia, Health Minister Regulation No.411/2010 on clinical laboratories (Reg. 411), and Health Minister Regulation No.9/2014 on clinics (Reg. 9)

CLASSIFICATION AND LICENSES OF CLINICAL LABORATORIES

Regulation 411 stipulates that a clinical lab established by a private party must be created as a legal entity. To commence its operational activities, a clinical lab must have an operational license, valid for a period of five years and extendable as long as the license holder continues to meet the requirements. A clinical lab needs to submit reports every three months to the issuer of the license and is required to be accredited every five years by Medical Laboratories Accreditation Committee.

Under the regulation, clinical labs are classified into two main categories, general and specialized clinical labs. General clinical labs provide examination of simpler clinical services in hematology, pharmacy, microbiology, parasitology and immunology, while specialized clinical labs offer examination of clinical samples for a specific type of examination with special capability.

Table 8-1: Clinical Laboratories Classification and Minimum Requirement for Medical Personnel in Indonesia Clinical Laboratory Market

Type	Doctor		Technical And administration			License Issuer
	Min.	Certification/ Specialization	Health analysts	Nurse	Admin	
General clinic laboratories						
Basic	1	Medical lab technical management training and certification	2	NA	1	Head of relevant local city or regency health office
Intermediate	1	Pathology	4	NA	2	Head of local provincial health office, based on recommendation from head of health office of relevant city or regency
Main	2	Pathology	6 (2 must have microbiology training certification)	1	3	Director General of Healthcare Services Development, based on recommendation from the head of the provincial health office
Specialized Clinic Laboratories						
Microbiology	2	Microbiology	2 (microbiology training certification	1	1	Director General of Healthcare Services Development, based on recommendation from the head of the provincial health office
Parasitology	2	Parasitology	2 (parasitology training certification)	1	1	
Anatomy pathology	1	Anatomy Pathology	1 anatomy pathologist/ analyst/ Bachelor's degree in biology		1	

Source: Indonesia Government Regulation

Regulation 9 stipulates that clinics must have establishment and operational license. Both licenses can be issued by the relevant local regency or city

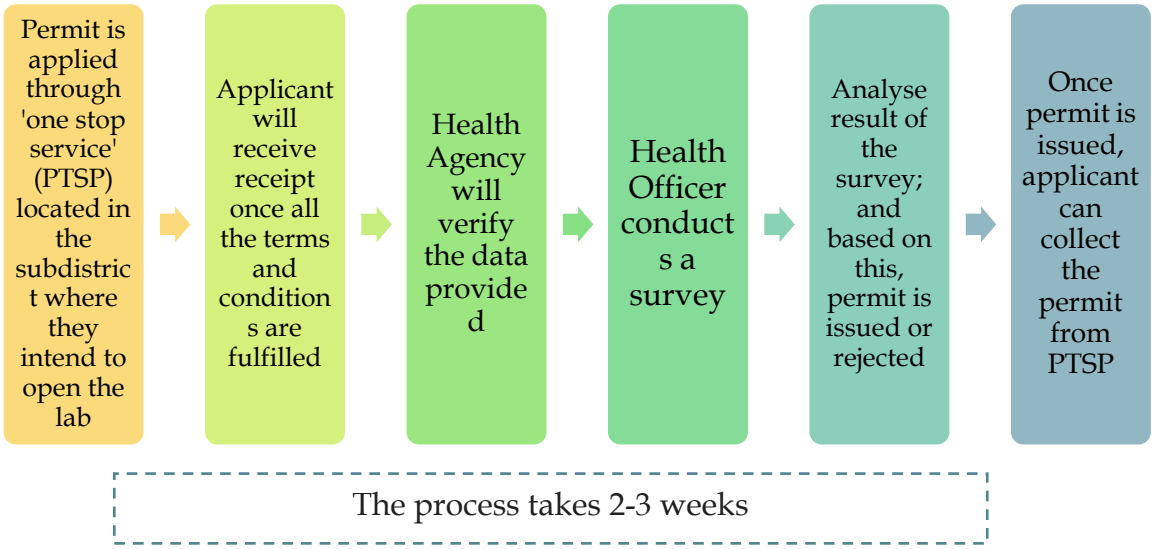
government. In addition operational licenses can also be issued by Head of relevant regency or city health office and shall be valid for five years and can be extended accordingly. The license of a clinic is integrated with its clinical laboratory license, unless the clinical laboratory has more advanced healthcare services that those required for basic and intermediate clinical laboratories. This means clinics do not require additional clinical laboratory licenses for the laboratory services they may offer. Furthermore, clinics are required to renew their accreditation every three years as well as audited annually by professional organization.

LICENSE APPLICATION PROCESS

Documents required:

- Provide a list of all equipment that will be used in the lab, including safety equipment
- Data for personnel who work in the laboratory
- Surat izin Praktek (SIP) of pathologist
- Letter of intention for technical manager attaching a certificate of work experience as a technical lab attendant and a copy of the diploma certificate
- Letter of intention for technical personnel (enclosing a copy of the diploma certificate)
- Letter of intention to participate in External Quality Improvement (PME)
- Reagent data

Figure 8-1: Process of Applying for License for Clinical Laboratory in Indonesia



Source: Industry Articles, Ken Research Analysis

REGULATION FOR SETTING UP CLINICAL LABORATORY IN INDONESIA

Table 8-2: Regulations for Setting up a Clinical Laboratory in Indonesia

Parameters	Description
Accreditation	• Labs must be accredited every five years by Komite Akreditasi Laboratorium Kesehatan (KALK)
Referral	• Lab clinics can examine specimens only if there is a written letter from: Government or private healthcare facilities, Doctor, Dentist, Midwife, Government agencies for law enforcement • For anatomy pathology, referral can only be written by doctors specializing in anatomy pathology
Requirement	• Each type of labs must meet their specific requirements in terms of human resources, infrastructure, and equipment • Doctor responsible for the lab clinic Pratama can only manage one clinic • Specialist doctor for any lab clinic can manage up to three labs
Permit	• For the permit, they can apply through the 'one stop service' (PTSP) located in the sub-district where they intend to open the lab; there is a form that must be filled and requirements that must be met before submitting all the documents in PTSP. • Permit for opening Pratama will be granted by the Health Office

	Regency/City. • Permit for opening Madya will be granted by the Provincial Head of the Health Department. • Permit for opening Utama will be granted by the Director General of Medical Services.

Source: MOH, Indonesia

REGULATIONS ON TRANSPORT OF TESTS AND QUALITY CONTROL MANAGEMENT

Table 8-3: Regulations on Transport of Tests and Quality Control Management, Indonesia

Parameters	Description
Specifications of Transport of Specimen based on PMK No 43/2013 on Good Clinical Laboratory Practice	• Samples that need to be referred are to be sent out in relatively stable form. • Requirements of transporting specimens include: ➢ The delivery time should not exceed the period of stability of the specimen ➢ It should not be exposed to direct sunlight ➢ Packaging must meet the safety requirements of the lab including labeling that reads "Material Inspection Infectious" or "Hazardous Material Inspection" ➢ Shipping temperature should be eligible ➢ The use of transport media for microbiological examination • Infectious materials and specimens must be packed in three layers from inside-out: ➢ Waterproof container containing the specimen ➢ Watertight containers containing absorbent pads were quite a lot to suck all the leaking fluid specimens ➢ Container to protect container from outside influences such as physical damage and water during the trip • The first and second packaging must be able to withstand differences pressures up to 95 kPa and to the difference in temperature between -40 and +50 degrees Celsius
Specifications on Quality Control Management based on PMK No 43/2013 on Good Clinical Laboratory Practice	• Internal Quality Control ➢ Preparation of the patient ➢ Retrieval and processing of specimens ➢ Calibration equipment ➢ Water quality testing ➢ Quality of reagents testing ➢ Quality of media testing

	➢ Maintenance strains of germs ➢ Antigen quality test ➢ Test precision/accuracy test • External Quality Control ➢ Can be done by the government, private sector. or an international body ➢ Every health laboratory is obliged to follow EQC regulations imposed by the government on a regular basis, covering all areas of laboratory testing ➢ Evaluation results obtained show performance
Transport medium	• Motorcycle is the most preferred medium to transport specimens to referral labs within the city due to its low cost and offering the most efficient and quickest way to transport samples • The samples are usually kept inside an ice box

Source: Ministry of Human Resources and Culture Coordinating Ministry

REGULATION FOR TRANSPORTING SAMPLES ABROAD

Table 8-4: Regulation for Transporting Samples Abroad, Indonesia

Parameters	Description
Category	• Samples sent abroad must submit all the relevant documents to the MTA (Material Transfer Agreement) team for evaluation. There are three types of MTA: ➢ Sederhana(basic) This is for diagnostic purposes based on ICD 10 ➢ Antara (intermediate) This is for educational purposes ➢ Lengkap (complete) This is for research and development
Procedure	• The sender must submit a request form that must also be signed by the receiver • The form must address the Head of Litbang (Research and Development), who is the representing the Health Minister • The MTA team will then evaluate the request and accordingly make recommendations to the Head of Litbang If the request is accepted, the MTA is given to the requestor
Terms	• Samples can only be sent abroad if they cannot be examined locally to achieve the purpose of the examination due to reasons such as: ➢ lack of competent workforce ➢ no available equipment • Hence, local labs must try their best to examine the samples locally by increasing their capacity, ability, and management before sending their samples abroad.

Source: MTA (Material transfer Agreement)

SPECIMEN COLLECTION POINT / HOSPITAL LABORATORY

Under the Indonesia regulation, the operation of a specimen collection point or a hospital laboratory falls under the licensing of the respective doctor's clinic or hospital. Hence, standalone specimen collection points are not allowed

RELEVANT REGULATIONS ON THE MEDICAL PERSONNEL LAW

Table 8-5: Minimum Human Resource Requirement on the Basis of Type of Clinical Laboratory, Indonesia

Type of lab	Description
Pratama General Clinical Laboratory	• Technical management must consist of at least one doctor certified with technical training and three months of health lab management, conducted by a professional clinical pathology organization and healthcare education institute in collaboration with the Ministry of Health • Technical and administrative personnel must consist of at least two health analysts and one administration officer
Madya General Clinical Laboratory	• Technical management must consist of at least one clinical pathology specialist doctor • Technical and administrative personnel must consist of at least four health analysts, one nurse, and two administration officer
Utama General Clinical Laboratory	• Technical management must consist of at least one clinical pathology specialist doctor • Technical and administrative personnel must consist of at least one clinical pathology specialist doctor, six health analysts (two of them holding microbiology specialist training certificates), one nurse, and 3 administration officer
Microbiology Specialist Clinical Laboratory	• Technical management must consists of at least one clinical microbiology specialist doctor • Technical and administrative personnel must consist of at least one clinical microbiology specialist doctor, two health analysts who have undergone certified training in clinical microbiology, one nurse, and one administration officer
Parasitology Specialist Clinical Laboratory	• Technical management must consist of at least one clinical parasitology specialist doctor • Technical and administrative personnel must consist of at least one clinical parasitology specialist doctor, two health analysts

	who have undergone certified training in clinical parasitology, one nurse, and one administration officer
Anatomical Pathology Specialist Clinical Laboratory	• Technical management must consist of at least one anatomical pathology specialist doctor • Technical and administrative personnel must consist of at least one technician with a Bachelor's degree in anatomical pathology/analysis/biology, and one administration officer

Source: Ministry of Health, Industry Articles

FOREIGN INVESTMENT RESTRICTIONS

Based on 2014 Negative List under Law No. 39/2014, foreign investors are restricted from operating clinics but are allowed to own a maximum of 67% of specialist and medical clinics. Moreover, ASEAN investors are allowed to invest in specialist clinics for a maximum of 70% in all provincial capitals of Eastern Indonesia, except Makassar and Manado. Changes to the maximum foreign ownership in the 2016 Negative List will not be applicable to the investments that have been granted prior to the issuance of the 2016 Negative List, unless the new investment limitation is higher than the previous amount, in which case a foreign investment company may apply the new limitation

Table 8-6: List of Foreign Investment Restrictions in Indonesia Clinical Laboratory Market

	100% Local Capital	Foreign capital ownership	Foreign capital ownership from ASEAN countries
		2014 Negative List	
Clinics	Allowed	Not Allowed	Not Allowed
Specialized Clinics	Allowed	Up to 67%	Maximum 70% in all provincial capitals of Eastern Indonesia, except Manado and Makassar
Medical supporting services, such as clinical laboratories and medical check-up clinic	Allowed	Up to 67%	Up to 67%
		2016 Negative List	
Basic clinics	Allowed	Not Allowed	Not Allowed

Main clinics	Allowed	Up to 67%	Maximum 70% in all provincial capitals of Eastern Indonesia, except Manado and Makassa
Cells and tissues laboratories & banks	Allowed	Special license from the Ministry of Health	Maximum 67%

Source: Investment Coordinating Board (BKPM)

9. Competition Scenario for Indonesia Clinical Laboratories Market

Indonesia clinical laboratories market can be segmented into public clinical labs and private clinical labs. The public clinical labs capabilities are restricted to routine tests such as glucose, lipid profile and urine tests. Private and public hospital labs find it more cost-effective to outsource low demand, specialized tests, such as microbiology, anatomical pathology and esoteric tests due to the high cost of the laboratory equipment.

The private independent clinical laboratory market is organized and is composed of both chain laboratories and stand-alone laboratories. The chain laboratories are the leading market players in Indonesia. The 6 major players in the industry are Prodia, Kimia Farma, Pramita, Cito, BioMedika and Parahita. They have together accounted for 71.2% of the revenue share in private independent laboratory market in 2017. About 25% of total independent labs are owned by top 8 lab operators including Prodia, Pramita, Parahita, Kimia Farma, Lab Cito, Bio Medika, and Tirta Medical Centre. About 80% of the labs in Indonesia are located in the Sumatra and Java regions. The major players compete on distribution network, product portfolio, advertising, technology, Prices and services

Table 9-1: Major Competition Parameters in Indonesia Clinical Laboratory market

Parameters	Description
Distribution Network	• With majority of the hospitals located in Java and Sumatra, large number of clinical laboratories are located in their vicinity so as to gain patients through referrals • Further the clinical laboratories tie up with private and public hospitals, insurance companies and large corporates in order to increase their customer base. • Moreover, the private laboratories are now expanding to less developed geographies in Indonesia where there exists potential.
Product	• With technological advancements, private players compete to

Portfolio	offer advanced medical tests and services such as clinical, anatomic pathology, genetic, and genomic tests. • They compete on number and type of tests performed. With the prevalence of complex diseases in Indonesia, the clinical laboratories have come up with specialized tests focused on the treatment of the particular disease such as cancer, HIV, TB and others. • Further, the clinical laboratories offer medical checkup packages catering to different age groups. • The companies have widened their portfolios to cater to major medical fields such as oncology, preventive care, urology, dermatology, immunology, molecular diagnostics, autoimmune, and neuroscience.
Prices	• The routine tests are priced competitively whereas the private labs offering specialized tests unique to their lab are priced higher. • The private companies also go for price discrimination in different geographies. They charge higher in developed cities such as Java and Sumatra while the prices are lower in less developed cities such as Kalimantan, Sulawesi and Maluku • Other factors affecting the pricing include severity of the condition, type of disease, technology used and skills required
Technology	• Major players focus on technological Upgradation in order to achieve economies of scale. They use new generation diagnostic technological equipment and invest in improving laboratory procedures to improve sensitivity, specifications, time and cost of examinations • For instance, PT Prodia Widyahusada Tbk has participated in scientific studies of illnesses of miscarriage, hepatitis, cardiovascular, diabetic, obesity, hypertension, autism and Down syndrome. Further, the company has a number of new examinations in the pipeline of research and validation, including the examination of leukemia, various allergies and auto-immune abnormality
Services offered	• The clinical laboratories also promote themselves on parameters such as convenience, affordability, accuracy and timeliness of services offered. • Convenience includes online payment system, collection of samples at the patient's doorstep and ease of accessing the test reports.
Advertisement	• In order to attract walk in customers, clinical laboratories make significant investments in advertisements. The companies offer discounts and offers. • Further, the companies invest in scientific marketing activities which include educating the public and healthcare industry regarding the new laboratory examinations, technology, and clinical laboratory equipment that are available for them. • Some major activities include seminars, round table discussions

	and other promotional activities including the provision of journals, bulletins and scientific publications as well as supplying informational brochures for healthcare service providers, professional medical workers, doctors and the public

Source: Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis

9.1. Market Share of Major Organized Clinical Laboratories in Indonesia, 2016

Table 9-2: Market Share of Major Organized Diagnostic Laboratories (Prodia, Kimia Farma Diagnostika, Pramita, Cito, Parahita, Biomedika and Others) in Indonesia Private Independent Laboratory Market on the Basis of Revenue in USD Million, 2016

Company	Revenue (USD Million), 2016
Prodia	101
Kimia Farma Diagnostika	30
Pramita	24
Cito	16
Parahita	14
Biomedika	8
Others	78
Total	271

Source: Company articles, annual reports, Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
Others include private independent labs

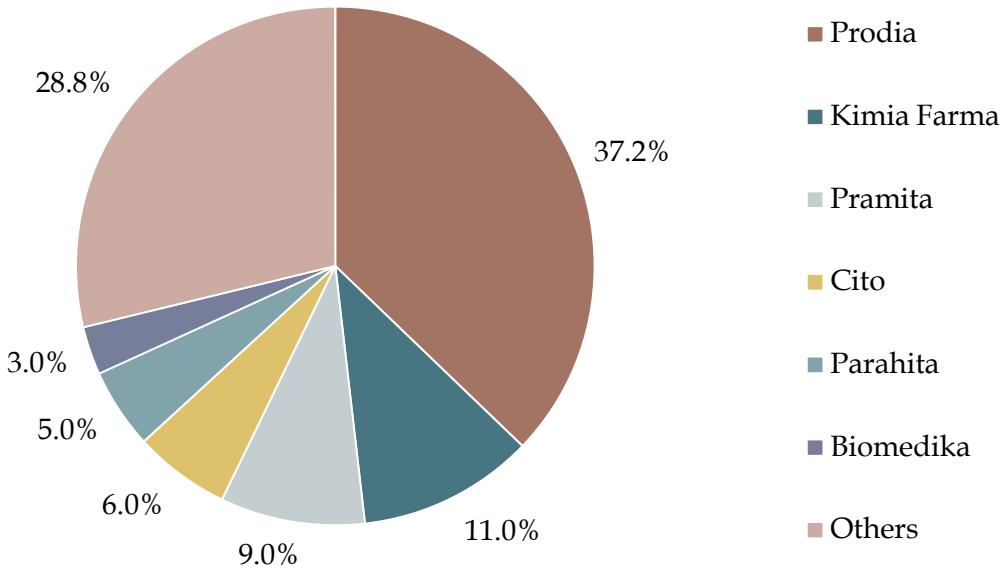
Table 9-3: Strengths and Weakness for Major Organized Clinical Laboratories (Prodia, Kimia Farma Diagnostika, Pramita and Cito) in Indonesia

Company	Strengths	Weakness
Prodia	• Prodia is the market leader in Indonesia Clinical Laboratory Market supported by the largest labs network and experienced management team • Further the company is able to provide comprehensive test offerings through its hub and spoke model improving top line driven by volume growth and pricing power • Further, the company has	• Delays in expansion projects and execution has hampered the growth of the company • With growing competition, the company is facing the risk of deteriorating brand recognition

	witnessed a strong financial performance backed by double-digit EBITDA growth along with margin expansion and operating leverage	
Kimia Farma Diagnostika	• The company is a backed by one of the leading pharmaceutical companies in Indonesia namely, Kimia Farma. This has enhanced the brand value of the lab leading to more number of walk ins per day • The company has second largest hold in the market in terms of number of laboratories leading to high customer base	• It is relatively new player in the market as compared to other major players due to which customer prefer Prodia over Kimia Farma
Pramita	• Amongst all the companies, Pramita is well recognized for its customer services	• Pramita has a lower brand value in the clinical laboratory market as compared to its competitors
Cito	• Its service portfolio consists of tailored tests catering to the health needs of different individuals such as mother, father, child, grandparents, couples and others	• Even though the company has more than 50 years of experience in this industry, it has relatively restricted geographic presence in terms of number of labs and lower brand value compared to the other players

Source: Company articles, annual reports, Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis

Figure 9-1: Market Share of Major Organized Diagnostic Laboratories (Prodia, Kimia Farma Diagnostika, Pramita, Cito, Parahita, Biomedika and Others) in Indonesia Private Independent Laboratory Market on the Basis of Revenue in Percentage(%), 2016



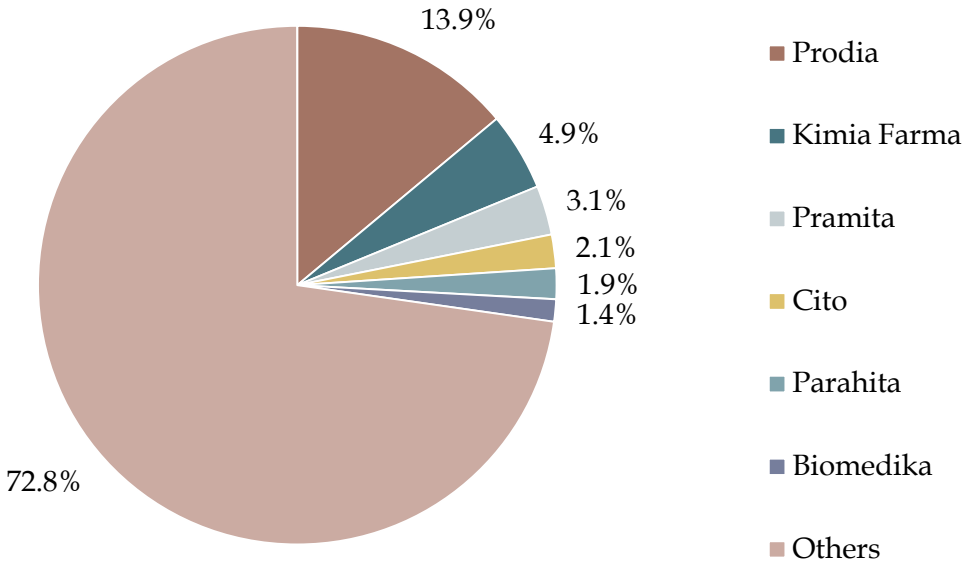
Source: Company articles, annual reports, Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
Others include private independent labs operating in Indonesia

Table 9-4: Market Share of Major Organized Clinical Laboratories (Prodia, Kimia Farma Diagnostika, Pramita, Cito, Parahita, Biomedika and Others) in Indonesia Private Independent Laboratory Market on the Basis of Number of Private Independent Labs, 2016

Company	Number of Private Independent Labs
Prodia	132
Kimia Farma	46
Pramita	29
Cito	20
Parahita	18
Biomedika	13
Others	689
Total	947

Source: Company articles, annual reports, Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
Others include private independent labs operating in Indonesia

Figure 9-2: Market Share of Major Organized Diagnostic Laboratories (Prodia, Kimia Farma Diagnostika, Pramita, Cito, Parahita, Biomedika and Others) in Indonesia Private Independent Laboratory Market on the Basis of Number of Private independent Labs in Percentage (%), 2016



Source: Company articles, annual reports, Interviews with veterans from Indonesia Clinical Laboratory Devices Industry, Ken Research Analysis
Others include private independent labs operating in Indonesia

10. Competitive Landscape of Major Organized Diagnostics Labs in Indonesia

10.1. Prodia

Table 10-1: Competitive Landscape of Prodia including Company Overview, Key Developments, Number of Branches, Strengths, Key Stats, Products and Services, Research and Developments and Business Strategy

Parameters	Description
Company Overview	• The company was established in 1973 with its headquarters in Central Java. Further, it has established itself in Jakarta and Bandung • The company is the leading clinical laboratory and national referral lab in Indonesia. • Prodia employed 3,648 employees as of first quarter of 2016 • Prodia offers 214 routine tests, 130 esoteric tests and radiology services such as X-Rays. It also offers general medical check-up, prevention and well-being treatment as well as special testing for children/women
Products and Services	• The company provides laboratory tests, panel tests, other diagnostics support such as EKG, Treadmill, Rontgen, Audiometry, Spirometry, and USG. • The Prodia Customer Club (PCC) is a membership given to Prodia's loyal customers. There are various privileged facilities customers may benefit from such as laboratory test fee waiver, information on health provided routinely through educational series brochures and Smart living magazine, fee waiver voucher that can be used by relatives
Key Developments	• In 2010, Prodia expanded its business by forming ProSTEM, which specifically deals with stem cell laboratory. ProSTEM became the first umbilical cord blood bank with the official permits from the Ministry of Health of the Republic of Indonesia • Further in the same year, Prodia opened its new business unit, namely ProLine, a local producer of in vitro diagnostic (IVD) medical instruments in collaboration with Diasys • Prodia ChildLab was established in Jakarta in 2011 in order to cater to the specific needs for children • The Central Prodia Library Jakarta was founded in 2009. Until 2014, the Prodia Library owns a collection of 1,230 titles of books categorized by the subject (such as: hematology, immunology, clinical chemistry and so forth) and subscribes around 34 international journals (among others, Nature and Science journal). • In 2015, Prodia launched the first clinical laboratory

	implementing green building concept, namely Grha Prodia Surabaya. • Prodia introduced Prodia Health Care with the concept of wellness clinic • Prodia established Prodia Women's Health Center in Jakarta to fulfill the special need for clinical laboratory for women. • PT Prodia Widyahusada Tbk expanded its service network to include Jayapura city, Papua in 2017. Furthermore, it launched a new test named ProSafe. ProSafe is one of the superior screening tests to detect chromosomal abnormalities in the fetus by using maternal blood samples. • Prodia opened new Grha Prodia building in Medan in 2017. The facility provides Prodia Health Care (PHC) service, the first wellness-based service in Medan and the Regional Referral Lab, namely a Referral Lab for Sumatra region.
Number of Branches	• It has 132 clinical labs, 1 PHC, 3 specialty clinics, 126 POC outlets and 12 hospital labs as of 2016
Strengths	• Prodia is the market leader in Indonesia private independent Laboratory market in 2017. It has the largest nation-wide lab network, with the largest national reference lab, and a scalable Hub-and-Spoke Model • Most-recognized clinical lab brand in the country supported by consistent focus on quality • Comprehensive service offering that targets multiple customer segments supported by strong relationships with healthcare practitioners and institutions
Key Risks	• Macroeconomic risk: dependence on disposable income and general awareness. Its key sources of income are walk-in customers and customers who are referred to it by doctors. Such customers generally pay for medical diagnostics out-of-pocket. • Regulatory risk: Implementation of JKN might lead the patients to public clinical labs hampering Prodia's patient volume. • Dependence clinic and hospitals for the operation of its POC outlets. • Failure to comply with laws and regulations, including those relating to licensing, facility inspections and waste disposal can hamper the lab's performance • Prodia's laboratories are concentrated in Java, making it sensitive to regulatory, economic, environmental and competitive conditions and changes in that region • Ability to maintain its brand image which is dependent upon customer confidence, quality of laboratory testing, relationship with other healthcare institutions. • Dependence on third-party manufacturers for the testing equipment and reagents.
Key Challenges	• Rising competition: As a result of the clinical lab services industry receiving large investments in recent years, other clinical lab chains have increased cost efficiencies afforded by automated

	testing, which allows them to charge more aggressive prices. • Disruption in operations, errors, failure in renewing certifications and accreditations, and not abiding by the relevant regulations would harm Prodia's reputation and could attract lawsuits • Technology advancements such as rising use of point-of-care testing can negatively impact the number of tests • Indonesian Medical Code of Ethics prohibits the payment of fees to doctors for referrals, which may cause the loss of such doctors' freedom and independence of their profession. • Furthermore, Prodia rents space from physicians and clinics for use of space for its operations in their offices and clinics for Prodia's POC outlets, and it has revenue sharing arrangements with hospitals for its hospital laboratories. In addition, Prodia sponsors events and conferences targeted at doctors and their scientific research. A significant part of Prodia's marketing efforts are focused on educating physicians and healthcare professionals on the latest developments in clinical laboratory and in healthcare, generally. Failure to maintain these existing relationships, develop new relationships and/or sustain a high-quality, professional reputation would result in a decrease in the number of customers referred to it and, therefore, a decrease in its revenue
Key Stats	• Revenue Split, YTD September 2017: ➢ Doctor Referrals: 34.1% ➢ Walk-ins: 33.6% ➢ External Referral: 18.6% ➢ Corporate Clients: 13.7% • Number of tests, YTD September 2017 on the basis type of test: ➢ Routine tests: 90.8% ➢ Non-laboratory: 5.9% ➢ Esoteric: 3.4% • Major routine tests include: lipid profile, hematology kidney function, liver function, thyroid panel, glucose, HbA1c, urinalysis, coagulation testing, and endocrinology panel. • Major types of esoteric tests include: nutrition panel, trace element testing, vitamin D testing, autoimmune panel, molecular-genetic testing, and osteoporosis panel.
Research and Development	• Research services which have been available since 1991 are managed by the Research Support Department and also supported by Prodia's Research & Esoteric Laboratory, Molecular Laboratory, and National Reference Center Laboratory. • From 1991 to 2016, Prodia Clinical Laboratory has contributed to over 2,822 pieces of research for academic purposes, epidemiological studies, and scientific publications. These studies include more than 375 types of test comprising Research Use Only (RUO) tests, Laboratory Developing Tests (LDT), and molecular tests and over 100 types of routine tests.
Lab Equipment	• Roche, Abbott, Siemens, Biomerieuex Biorad and Sysmex

Suppliers	
Third party Tie-ups	• Prodia has agreements with the NUH Laboratories and Quest, which together give it access to up to 3,000 tests that it does not perform • Outsourced tests represented 2.1% of its total revenues in 2015
Business Strategy	• PT Prodia Widyahusada Tbk intends to open new clinical laboratories in regions that have not been previously served such as West Papua, Papua, North Kalimantan and Bengkulu • Further it plans to upgrade its existing facilities to increase volume and provide wider range of tests such as molecular, immunology and others. • Network expansion plan by 2021: ➢ New Regional referral labs: 4 (3 already opened in 2016 and 2017) ➢ Clinical labs: up to 33 new labs ➢ New POC Collection centers: 20 per year ➢ New Hospital labs: 5 per year ➢ New specialty clinics: 13 (2 already added in 2016 and 2017) ➢ Upgrade up to 39 additional clinical labs to PHC Clinics (11 PHC Clinics already added at clinical labs in 2017) ➢ 24 clinical lab improvements • It plans to continue implementing a vendor-managed inventory system and improve productivity by upgrading its lab information systems. • Further, the company plans to invest in precision medicine segment

Source: Company website, annual reports

Table 10-2: Description of various facility and Services offered by Prodia

Facility	Description	Location	Services	Opening hours	Contract terms
PNRL	Equipped with most scientifically advanced testing equipment Center for esoteric testing segment	Jakarta	Able to perform 330 of 500 tests by prodia	Mon-Sat: 24 Hours Sun: 12 hours	Leased from relate party
Clinical Labs	Equipped to process and conduct certain routine tests. Some labs offer	104 cities across Indonesia	Conduct and process routine tests Refer the routine and	6.30AM-9PM 24 hours for some labs in Surabaya and	Mixed of leased and owned Leased property with

	non laboratory tests		esoteric tests which cannot be performed to PNRL	Makassar	3-5 Year term
PHC Clinic	Fully functional clinical laboratories Also offer wellness services on preventive care	Central Sumatra	Clinical lab testing and wellness services	6.30AM-9PM	Leased property with 3-5 Year term
Specialty Clinic	Specialized facilities focusing on particular fields of medicine or specific patient types	Central Jakarta	Collect specimen samples from specific types of customers Offers specialized testing services	6.30AM-9PM	Leased property with 3-5 Year term
POC Outlets	Consists of both POC centers and PPOC collection centers Can take specimen to doctor's clinic.	Within doctor's clinics across Indonesia	POC collection centers collect and send specimen to nearby labs POC Centers perform some limited tests	Same as the clinic located in	1-2 Year rental agreement with doctors/clinics Reserve rights to terminate the relationship if revenue threshold not met
Hospital Labs	Operate hospital labs for private hospitals that lack the resources, know-how for clinical laboratories	Located in 6 private hospitals	Conduct and process certain routine tests Send other routine and esoteric tests to PNRL	24Hours	1-5 year agreement with hospitals Revenue sharing agreement: Prodia gets 80-90% of the revenue from performing tests

Source: Company website, annual reports and industry articles

Table 10-3: Prodia Merger, Acquisition, and Partnership Assessment, Indonesia, 2012–2015

Company	Deal Type	Description	Impact
Prodia	IPO	Prodia, the largest private laboratory chain operator, opted for an IPO	The IPO will help raise funds for its expansion plans and increase value to the company
Prodia Diagnostic Line (Proline)	Partnership	Proline is working with a German partner, DiaSys for the technology and planning to start assembly of medical equipment for primary care in Indonesia at its facility in Cikarang	The partnership will strengthen Prodia's portfolio, enabling the company to become leading IVD manufacturer in Indonesia

Source: industry Articles on Indonesia Clinical Laboratory market

Table 10-4: Comprehensive Service Portfolio for Prodia

Segment	Description
Routine Testing	• Generally performed on whole blood, serum, plasma and other body fluids and specimens such as microbiology samples • All of Prodia's labs perform routine tests, which typically takes 2-4 hours to complete • Prodia currently performs c.214 routine tests such as lipid profiles, renal and liver function profiles
Esoteric Testing	• Specialized clinical lab tests that are not routine are generally performed by skilled personnel and require more sophisticated technology, equipment and materials as compared to the normal routine tests. • Prodia currently performs c.130 esoteric tests such as hormone profiles and molecular clinical lab testing for infectious diseases or cancer
Reference Lab Services	• Include both routine and esoteric testing with the capability to perform 330 tests • Employs advanced testing equipment including machines for advanced molecular diagnostics, chromatography-mass spectrometry, anatomical pathology and immunology and flow cytometry
Non-Laboratory Testing	• Offered in several of Prodia's clinical labs • Includes electrocardiogram, X-Rays, audiometry, spirometry, ultrasonography and treadmill testing
General medical check-up services	• Basic medical checkup services are available in every branch of Prodia • Consists of pre- and post-test doctor consultation services, as well as home collection services
Specialty clinics	• Developing specialized clinical facilities focusing on particular

	fields of medicine or specific customer types, with general medical services and advice tailored to the specific needs of customer segments • Specialty clinic includes: Prodia Children's Health Center (initially opened as Prodia Child Lab 2011), Prodia's women's Health Center (intends to open in 4Q16), and Prodia Senior Health Center (intends to open in 2017)

Source: Company Articles, Broker Report

Table 10-5: Key Statistics for Prodia, 2013-2017

Parameters	2013	2014	2015	2016	2017
Number of Tests in Million	13.7	13.7	14.0	14.6	15.6
Number of Samples in Million	5.4	5.6	5.7	NA	NA
Number of Tests in Million	2.2	2.3	2.4	2.4	2.5
Test Per Visit	6.1	5.9	5.9	5.9	6.1
Number of Visits in Million	2.2	2.3	2.4	2.5	2.5
Revenue Per Visit in IDR Thousand	440.8	468.8	502.7	548.0	597.3
Revenue Per Test in IDR Thousand	72.1	78.7	85.7	92.6	100.9
Revenues in IDR Billion	986	1,081	1,198	1,358	1,389.1

Source: Company website, annual reports

Note: the figures for the year 2017 have been reported as of September 2017

Table 10-6: Region Wise Lab Distribution of Prodia, YTD September 2017

Region	Clinical Labs	POC Outlets	Hospital Labs	Specialty Clinic
Aceh and North Sumatera	15	5	1	0
Central Sumatera	7	6	1	0
Greater Jakarta, Palembang and Lampung	33	33	5	2
West Java	20	23	1	0
Central Java	22	23	1	0
East Java, Bali and Nusa	16	16	2	1
Kalimantan	7	2	0	0
Sulawesi and Maluku	12	18	1	0
Total	132	103	12	3

Source: Company website, annual reports

Table 10-7: Prodia Revenue Split by Region in IDR Billion, 2013-2016

Region	2013	2014	2015	2016
Aceh and North Sumatera	51	60	66	74
Central Sumatera	47	51	56	62
Greater Jakarta, Palembang and Lampung	364	408	462	515

West Java	87	96	102	123
Central Java	120	131	145	172
East Java, Bali and Nusa	167	177	192	214
Kalimantan	47	51	55	61
Sulawesi and Maluku	101	106	119	132
Total	986	1,081	1,198	1,358

Source: Company website, annual reports, broker reports

Table 10-8: Number of Clinical Laboratory, PHC Clinic, Specialty Clinic, POC Services and Hospital laboratory for Prodia, 2012-YTD September 2017

	2012	2013	2014	2015	2016	YTD September 2017
Clinical Laboratory	120	122	125	128	129	132
PHC Clinic	0	0	0	0	1	1
Specialty Clinic	0	0	0	0	2	3
POC Services	112	117	112	127	118	126
Hospital laboratory	14	14	12	11	9	12
Total	246	253	249	266	259	274

Source: Company website, annual reports

Table 10-9: Number of Patient Visit Segmentation by Customer Type (Walk-in, Doctor Referral, External Referral, Corporate Clients and Prodia Specialty Labs), 2013-2016

Type of Customer	2013	2014	2015	2016
Walk in Customer	799	765	816	836
Doctor Referral	738	775	742	760
External Referral	451	454	509	522
Corporate Clients	246	307	313	321
Prodia Specialty labs	2	4	3	5
Total	2,236	2,305	2,383	2,445

Source: Company website, annual reports

Table 10-10: Prodia Revenue Split by Type of Customer (Walk-in, Doctor Referral, External Referral, Corporate Clients and Prodia Specialty Labs) in IDR Billion, 2013-2016

Type of Customer	2013	2014	2015	2016
Walk in Customer	342	359	410	457
Doctor Referral	324	373	398	444
External Referral	167	179	197	229
Corporate Clients	152	168	192	224
Prodia Specialty labs	1	2	1	5

Total	986	1081	1198	1358

Source: Company website, annual reports

10.2. KIMIA FARMA DIAGNOSTIKA

Table 10-11: Competitive Landscape of Kimia Farma Diagnostika including Company Overview, Services, number of Branches and Business Strategy

Parameters	Description
Company Overview	• The Company's business activities in pharmaceutical retail, health clinic and clinic laboratory are focused on managed by Subsidiaries, PT Kimia Farma Apotek (KFA) • The clinical laboratory business unit was opened in 2003 to complement PT's business portfolio. Kimia Farma (Persero) Tbk. As a Healthcare company. Its head office is located in Central Jakarta, Indonesia. • The Business Unit of Kimia Farma Clinical Laboratory turned into an independent entity which was then called PT. Kimia Farma Diagnostika (PT KFD) as a subsidiary of PT. Kimia Farma Apotik. • Number of employees: 269 in 2016
Services	• Laboratory tests: ➢ Routine ➢ Laboratory ➢ Inspection - Referral Laboratory ➢ Inspection - Special Laboratory Inspection - Investigation examination research Non Laboratory Examination: ➢ Complete Physical Examination ➢ Spirometry ➢ Inspection ➢ Audiometric Inspection ➢ Rontgent Inspection ➢ EKG Inspection – Treadmill • Medical Check Up: this includes Employee Health Checkup / Prospective Employee, Pre-Marriage Health Inspection, Child Health Check • Other testes include hematology, hematosis, tests of kidney function, diabetes militus, fat profile, cardio marker, pankreas, electroly and others
Number of Branches	• By 2016 KFD already has a total of 45 branches spread across several cities in Indonesia • Jakarta: 5 • Banten: 2 • Java: 13 • Jawa Tengah: 3 • Jawa Timur: 3

	• Kalimantan: 5 • Sumatera: 8 • Bali: 1 • Sulawesi: 5
Business Strategy	• The company aims to strengthen the presence of Kimia Farma in the market through strengthening of the product and business. Some of the projects include the development of medicinal raw materials through a Joint Venture with Sungwun Pharmacopia Co. Ltd., the completion of the plant Rapid Test which is the first factory in Indonesia that will facilitate diagnostic tools

Source: Company Website, Annual Reports

10.3. PRAMITA

Table 10-12: Competitive Landscape of Pramita including Company Overview, Services, number of Branches and Business Strategy

Parameters	Description
Company Overview	• The company was established in 1987 with its head office at Surabaya. • It offers wide range of clinical laboratory services across Indonesia. • In 2010, the company has a workforce of 800 employees
Number of branches	• It has 28 outlets located across Indonesia ➢ Surabaya: 6 ➢ Jakarta: 3 ➢ Bandung: 3 ➢ Cirebon: 1 ➢ Medan: 2 ➢ Padang: 1 ➢ Palembang: 3 ➢ Semarang: 1 ➢ Yogyakarta: 2 ➢ Madiun: 1 ➢ Balikpapan: 1 ➢ Cimahi: 1 ➢ Pekanbaru: 1 ➢ Magelang: 1 ➢ Makassar: 1
Technology	• Equipment with state-of-the-art technology can be witnessed in laboratory and electro-medical process rooms. The instruments are made in America, Germany and Japan used for examination of blood and immunology • The Radiology Unit is supported by a Japanese-made x-ray airplane with a capacity of 650 mA that has the ability to photograph rongent plain, contrast and fluoroscopy, in addition to mammography x-rays, and panoramic dental rays / cephalometry

	• For examination of the heart, ultrasound aircraft, Treadmill, Holter Monitoring, and EKG with the latest technology are available. • Equipment for brain neurological examination include Digital EEG plane equipped with video capture.
Services	• Laboratory tests with focus on anatomy pathology, clinical chemistry, immunology, urology, haematology, and microbiology • Pramita offers more than 300 different tests • Radiology services, electrocardiography, and ultrasonography • Mobile services • General Medical Consultation, Laboratory, Consultation, Blood Test, The Koletsterol test, Health Check Medical examination, Heart Scans, CT Scan

Source: Company Website, Annual Reports

10.4. CITO

Clinical Laboratory CITO was established in 1967. Its head office is located in Semarang City, Indonesia

The company has 20 branches located across Indonesia as of 2017 including Semarang, Yogyakarta, Pekalongan, Tegal, Solo, Jakarta, Surabaya, Merauke, Holy, Magelang, Bogor, Demak, Travelers, Purwokerto and Jayapura. It has more than 75 tests for haematology, clinical chemistry, immunology, microbiology, anatomy pathology, and molecular diagnostics.

Lab Cito is the first to allow online shopping of medical check-up services. Lab Cito is also the only one to have set up a branch in Papua. The lab plans to allocate their services for BPJS patients by affiliating themselves to BPJS.

Table 10-13: Service Portfolio for Cito, Indonesia

Service	Description	Price
Executive Check Up for Men	Blood Complete Automatic 2x Blood Sugar Total cholesterol HDL Cholesterol LDL Cholesterol Trigliserid Cholesterol / HDL Ratio	IDR 2,591,000

	Uric acid SGOT SGPT Ureum Creatinin HBsAg PSA Free PSA Urine Analysis EKG Ultrasound Thorax photo Physical examination	
Executive Check Up for Women	Blood Complete Automatic 2x Blood Sugar Total cholesterol HDL Cholesterol LDL Cholesterol Trigliserid Cholesterol / HDL Ratio Uric acid SGOT SGPT Ureum Creatinin HBsAg Ca 125 Ca 153 Urine Analysis EKG Ultrasound Thorax photo Physical examination	IDR 2,541,000
Elderly Check Up	Blood Complete Automatic 2x Blood Sugar Total cholesterol Trigliserid Uric acid SGPT Urine Analysis EKG (Electrocardiography / Heart Record) Physical examination	IDR 511,000
Medical Check Up (MCU) for children	Blood Complete Automatic	IDR 550,000

	Hbs Ag Ultrasensitive Anti Hbs Thorax photo Physical examination	
MCU for grandfather	Blood Complete 2x Blood Sugar LDL Cholesterol SGPT Uric acid PSA Free PSA Urine Analysis EKG (Electrocardiography / Heart Record) Ultrasound (Ultrasound) Physical examination	IDR 1,696,000
MCU for grandmother	Blood Complete 2x Blood Sugar LDL Cholesterol SGPT Uric acid Ca - 125 Urine Analysis EKG (Electrocardiography / Heart Record) Ultrasound (Ultrasound) Physical examination	IDR 1,381,000
MCU for Mother	Blood Complete Automatic 2x Blood Sugar LDL Cholesterol SGPT Uric acid Urine Analysis Ultrasound (Abdominal & Gynecology) EKG (Electrocardiography / Heart Record) Physical examination	IDR 846,000
MCU for Father	Blood Complete Automatic 2x Blood Sugar LDL Cholesterol SGPT Uric acid	IDR 846,000

	Urine Analysis Ultrasound EKG (Electrocardiography / Heart Record) Physical examination	
Jasmine Package (Pre Marital Package)	Blood Complete Analyzer (with LED) Fasting Glucose Glucose 2 hours pp VDRL HbsAg Blood Type + Rhesus Urine Analysis Physical examination	IDR 513,000
Weekend Check Up	Blood Complete Automatic Fasting Sugar & 2 Hours after meal Cholesterol Uric acid SGPT Creatinine Urine Analysis EKG / Heart Record Photo Rontgen Dada Physical examination	IDR 626,000
Panel CITO Healthy Friends	Cholesterol Glucose Uric acid Creatinine SGPT	IDR 150,000
Screening Check Up	Blood Complete Automatic Sugar Time Cholesterol Uric acid SGPT Creatinine Urine Analysis Physical examination	IDR 403,000
TORCH Panel	IgG Toxoplasma IgM Toxoplasma IgG Rubella IgM Rubella IgG CMV IgM CMV IgG HSV II	IDR 2,000,000

	IgM HSV II	
Hypertension Panel	Glucose Cholesterol Trigliserid Ureum Creatinine Urine Analysis Physical examination	IDR 318,000
Predictors of Coronary Heart Disease (type 2)	Total cholesterol HDL Cholesterol LDL Cholesterol Trigliserid Cholesterol / HDL Ratio Small Dense Lippo Protein (A) Hs CRP EKG Physical examination	IDR 1,095,000
Predictors of Coronary Heart Disease (type 1)	Total cholesterol HDL Cholesterol LDL Cholesterol Trigliserid Cholesterol / HDL Ratio EKG Physical examination	IDR 380,000
Panel Haji Mabrur	Blood Complete Glucose Cholesterol HDL LDL Trigriserid Cholesterol / HDL Ratio SGOT SGPT Ureum Creatinine Urine Analysis EKG (Electrocardiography / Heart Record)	IDR 723,000
Candidate Panel for Jemaah Haji	Blood Complete Glucose Cholesterol HDL LDL Trigliserid Cholesterol / HDL Ratio SGOT	IDR 843,000

	SGPT Ureum Creatinin Urine Analysis Thorax photo EKG	
DM1 Annual Monitoring	2x Sugar Total cholesterol HDL Cholesterol LDL Cholesterol Trigliserid Cholesterol / HDL Ratio HbA1c Ureum Creatinine Uric acid Microalbuminuria Electrocardiography (EKG / Heart Record) Body Mass Index (IMT) Blood pressure	IDR 911,000
Monitoring of DM 6 Monthly	2x Blood Sugar Cholesterol HDL Cholesterol LDL Cholesterol Trigliserid Cholesterol / HDL Ratio HbA1c Microalbuminuria Body Mass Index (IMT) Blood pressure	IDR 706,000
Monitoring of DM 3 Monthly	2x Sugar HbA1C	IDR 241,000
Dengue Fever Day 3 – 7	Blood Complete Automatic Rumple Leed (for age> 12 years) IgG anti Dengue IgM anti Dengue	IDR 390,000
Dengue Fever Panel 1 – 3	Blood Complete Automatic (no LED) Rumple Leed (for age> 12 years) NS-1	IDR 370,000
Screening Of Blood Fever	Blood Complete Automatic (no LED) Rumple Leed (for age> 12 years)	IDR 200,000

FEM Panel	Blood Complete Analyzer (without LED) Urine Analysis Malaria Dengue Duo (IgG - IgM anti dengue) IgM anti Salmonella SGOT SGPT	IDR 845,000

Source: Company Website, ken Research analysis

10.5. BioMedika

Table 10-14: Competitive Landscape of BioMedika including Company Overview, Products and Service and Key Developments

Parameters	Description
Company Overview	• The Main Clinic Laboratory of Bio Medika was established in Jakarta since February 22, 1983. • It has 14 clinical labs as of 2015
Products and services	• It offers both laboratory and non laboratory services • Laboratory services include tests such as Hematologic examination, Coagulation Examination, Urine examination, Feces Inspection, Clinical Chemistry Examination, Serological Examination, rematological examination and others • Non laboratory services include Radiology, Ultrasound and Elektrokardiografi & Treadmill • The company provides various service packages specific to treatments such as pregnancy package, DM Diagnostic package, Coronary Heart Disease Packages, fat profile package and others.
Key Developments	• The company expanded its geographic presence by opening new branches in Sunter, Puri Indah, Denpasar Balli and mangga besar.

Source: Company Website, ken Research analysis

10.6. Parahita

Table 10-15: Competitive Landscape of Parahita, Indonesia including Company Overview, Services, Key Developments and Number of Branches

Parameters	Description
Company	• Parahita is one of the leading diagnostic centers in Indonesia

Overview	• The company's laboratory is based in Surabaya, and several branches are spread in Sidoarjo, Gresik, Malang, Jember, Banyuwangi, Solo, Yogyakarta, Bandung, Bekasi, Jakarta, Tanggerang, Makkasar • The Parahita Diagnostic Center provides services in support of research supported by the Research & Esoteric Laboratory with new types of checks / research specially provided for academic research, epidemiological studies and scientific publications.
Services	• Laboratory Tests • Check panel • Elektromedis
Key Developments	• In order to expand the health service in the field of Clinical Laboratory, PT Cita Mulia opened the branch of Parahita Diagnostic Center in Banyuwangi.
Number of Branches	• It has 18 branches located across Indonesia as of 2016

Source: Company Website, ken Research analysis

11. Indonesia Clinical Laboratory Market Future Outlook and Projections, 2018-2022

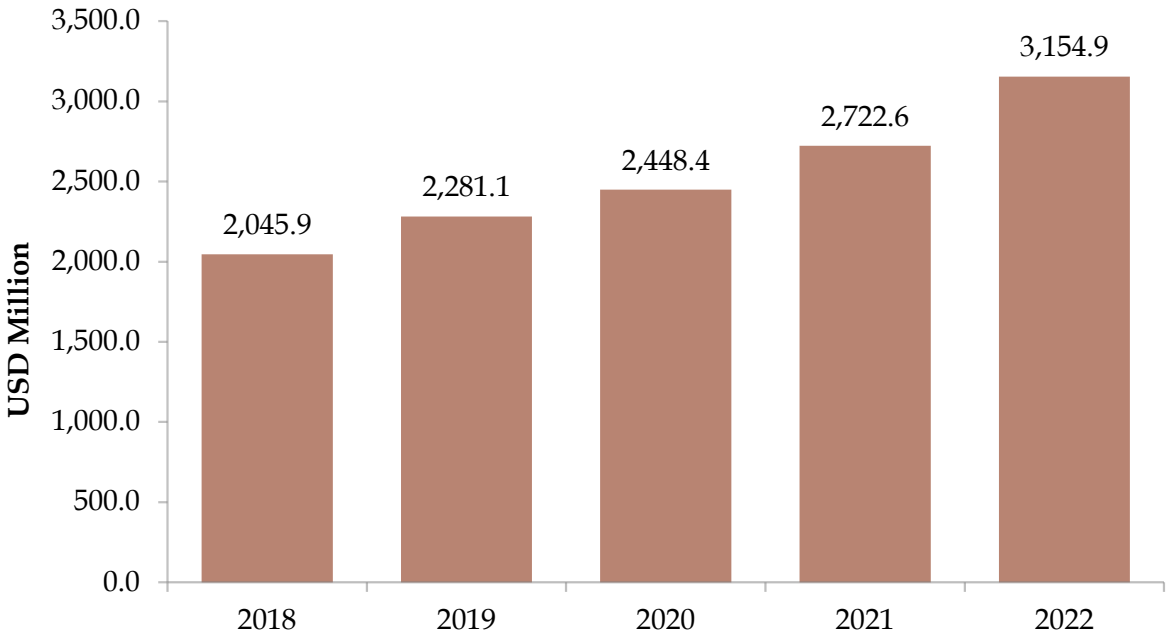
Table 11-1: Rationale for Indonesia Clinical Laboratory Market Future outlook and Projections, 2018-2022

Period	Description
Short/Medium Term (2018-2020)	• Independent private laboratories market is growing at a high pace owing to the rising collaboration between the hospitals and independent laboratories. • Further, the major private independent laboratories chains are expected to undergo geographic expansion beyond key cities into underdeveloped areas. This will further lead to increase in market share in the overall Indonesia clinical laboratory market. For instance Prodia plans to establish up to 33 new clinical laboratories by 2021 • It is also expected that the implementation of JKN will increase the demand for laboratory services. This will lead the public hospitals to refer samples to private independent laboratories for clinical testing, resulting in the growth of external referrals for private independent laboratories • Further, with rising awareness of preventive healthcare and rising disposable income, the number of walk-in patients is expected to increase.
Long Term Outlook (2020-2022)	• The esoteric tests segment is expected to register a high growth during this period. The standardization of the Coordination of Benefits (CoB) agreement between private insurers and JKN will create opportunities for private independent laboratories to collaboration with private hospitals resulting in increase in external referrals. Private hospitals without facilities to perform specialized or esoteric tests will be able to refer out these tests to private independent laboratories for those patients who require these tests and are covered through the CoB scheme • Further, the industry will witness a rising trend towards precision medicine also known as personalized medicine. Precision medicine is an emerging approach for disease treatment and prevention that takes into account an individual's genetic history, environment and lifestyle during treatment. For instance, Prodia plans to focus on the development of next-generation diagnostic technologies for precision medicine • Precision medicine can be successfully implemented with the availability of diagnostic information, such as individual gene sequencing.

	• Further, the market will witness advancements in technology. Growth in the availability of testing equipment that can be operated locally and that does not require free-standing clinical laboratories and advancements in self-testing kits that can be operated by customers themselves will result in a decrease in the volume of tests at laboratories.
Key Opportunities for Future	• Independent market players should focus their attention towards untapped markets of Kalimantan, Sulawesi and Papua. Customers in these regions have a high regard for key players given their comprehensive service offerings and test quality indicating opportunities for high growth • The market players could open their centers nearby small hospital settings which does not have advance diagnostic centers in their hospital settings. This would provide a benefit of location to the centers attracting large number of patients from hospitals itself. • Further, the market for rapid tests will grow at a CAGR of 13% between 2016 and 2021 in Indonesia. The growth will be driven by factors such as increasing rate of infectious diseases such as dengue, malaria, hepatitis, and HIV, the government's healthcare initiatives, and product advancements and innovations by rapid test manufacturers

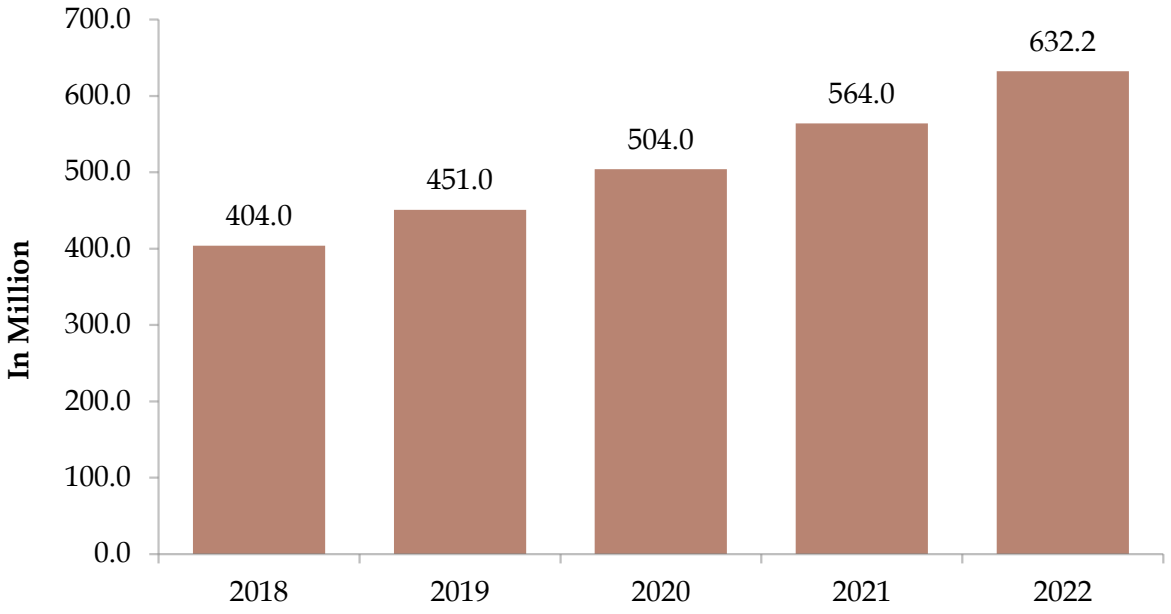
Source:Ken Research Analysis

Figure 11-1: Indonesia Clinical Laboratory Market Future Outlook and Projections on the Basis of Revenue in USD Million, 2018-2022



Source: Ken Research Analysis

Figure 11-2: Indonesia Clinical Laboratory Market Future Outlook and Projections on the Basis of Number of Tests in Million, 2018-2022



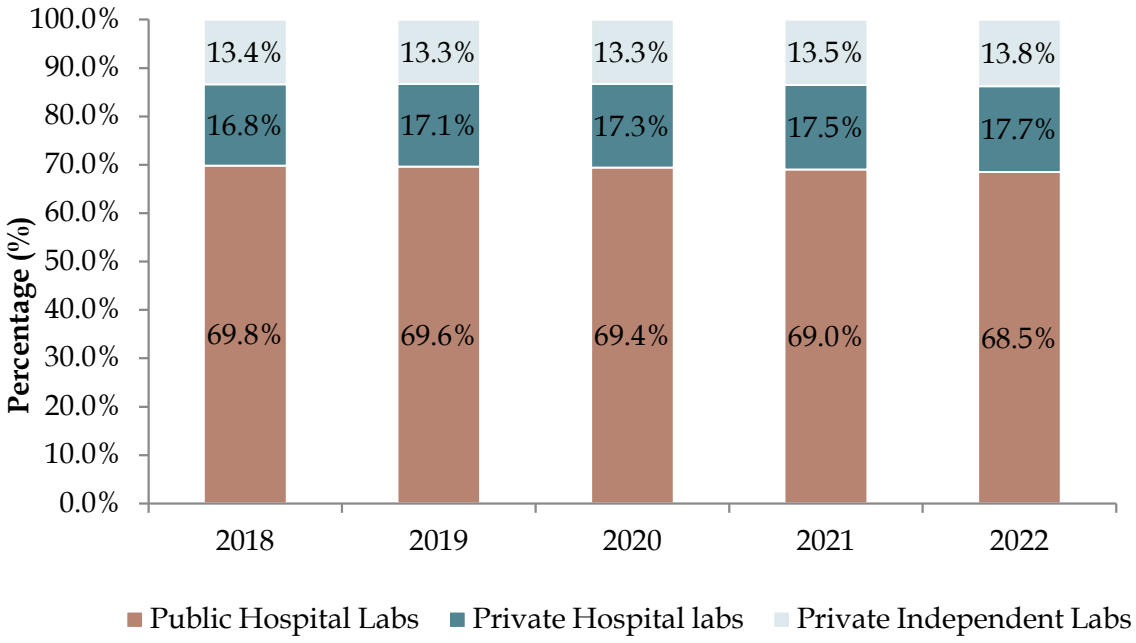
Source: Ken Research Analysis

Table 11-2: Indonesia Clinical Laboratory Market Future Outlook and Projections by Type of Laboratory (Public Hospital Labs, Private Hospital Labs, Private Independent Labs) on the Basis of Number of Tests in Million, 2018-2022

Type of Lab	2018	2019	2020	2021	2022
Public Hospital Labs	282	314	350	389	433
Private Hospital labs	68	77	87	99	112
Private Independent Labs	54	60	67	76	87
Total	404	451	504	564	632

Source: Ken Research Analysis

Figure 11-3: Indonesia Clinical Laboratory Market Future Outlook and Projections by Type of Laboratory (Public Hospital Labs, Private Hospital Labs, Private Independent Labs) on the Basis of Number of Tests in Percentage (%), 2018-2022



Source: Ken Research Analysis

11.1. By Type of Private Independent Laboratory (Laboratory Chains and Single Independent Laboratory), 2022

Table 11-3: Indonesia Private Independent Laboratory Market Future Outlook and Projections by Type (Laboratory Chains and Single Independent Laboratory) on the Basis of Revenue in USD Million, 2022

Particulars	Revenue (USD Million)
Laboratories Chains	408.6
Single Independent Labs	175.1
Total	583.6

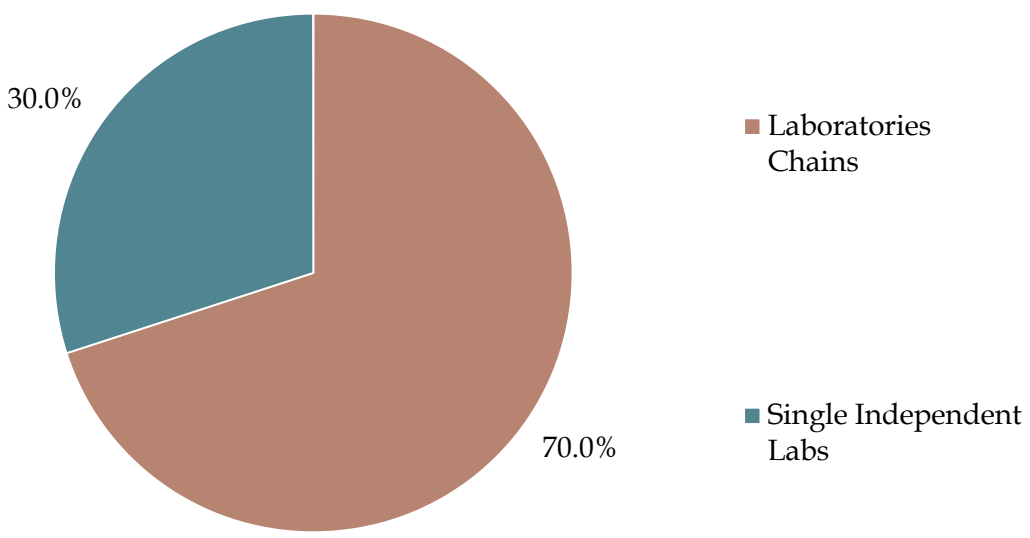
Source: Ken Research Analysis

Table 11-4: Rationale for Indonesia Private Independent Laboratory Market Future Outlook and Projections by Type (Laboratory Chains and Single Independent Laboratory), 2022

Particulars	Description
Laboratories Chains	• The market share of laboratory chains is expected to increase from 66.0% in 2016 to 70.0% in 2022 at a CAGR of 11.3%. This will be supported by expansion of major laboratory chains to underdeveloped regions such as Kalimantan, Sulawesi and Papua. • Further, increase in tie ups with public and private hospitals and insurance companies will increase the volume of tests for private laboratory chains through referrals. Technology advancements coupled with growing awareness will augment the demand for specialized tests such as hormone testing, microbiology and others
Single Independent Labs	• Single independent laboratories revenue is expected to grow at a CAGR of 11.3% from 2016 to 2022 with a market share of 30.0% in 2022. Increase in test volumes due to universal health coverage will boost market growth for single independent labs • The demand for healthcare will accelerate due to healthcare policies by Department of Health which will require the country to develop medical facilities and also improve the quality of medical services. The market will be facilitated by increase in new entrants. The market will be facilitated by increase in new entrants. • Further, to address these demands, Marubeni and Lippo will examine the possibility of introducing high-quality Japanese clinical laboratory testing services which will contribute to the improvement in the quality of medical services in Indonesia.

Source: Ken Research Analysis

Figure 11-4: Indonesia Private Independent Laboratory Market Future Outlook and Projections by Type (Laboratory Chains and Single Independent Laboratory) on the Basis of Revenue in Percentage (%), 2022



Source: Ken Research Analysis

11.2. By Type of Test (Routine, Non Laboratory and Esoteric), 2022

Table 11-5: Indonesia Private Independent Laboratory Market Future Outlook and Projections by Type of Test (Routine, Non Laboratory and Esoteric) on the Basis of Revenue in USD Million, 2022

Particulars	Revenue (in USD Million)
Routine	414.4
Esoteric	122.6
Non Laboratory	46.7
Total	583.6

Source: Ken Research Analysis

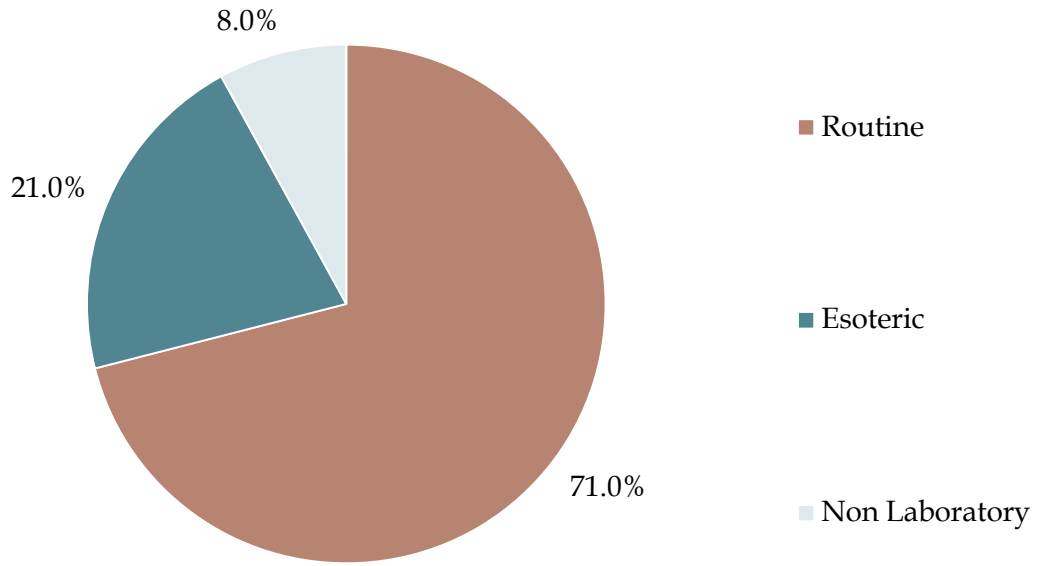
Table 11-6: Indonesia Private Independent Laboratory Market Future Outlook and Projections by Type of Test (Routine, Non Laboratory and Esoteric), 2022

Particulars	Description
Routine	• The routine test is estimated to account for 71.0% of the revenue in Indonesia private independent laboratory market in 2022. The growth

	will be supported by growing number of walk-in patients and corporate clients. • Major type of routine tests include urinalysis, hematocrit, white blood cell count, platelet count, six-factor automated multiple analysis (serum sodium, potassium, chloride, bicarbonate, glucose, and blood urea nitrogen), prothrombin time, partial thromboplastin time, chest x-ray, and electrocardiogram
Esoteric	• Esoteric test segment is expected to be the fastest growing market with a CAGR of 14.6% from 2016 to 2022. • The revenue growth will be supported by higher margins and increase in number of referrals from public hospitals, laboratories and private hospitals without facilities to perform esoteric tests. • Further since performing esoteric test involves skilled labour and advanced equipments therefore, small players do not see this as a profitable investment. Such tests are then outsourced to private laboratories
Non Laboratory	• Non lab tests will account for 8.0% of the revenue share in overall private independent laboratory market in 2022. • The growth will be facilitated by increase in diagnostic imaging techniques such as ultrasound which is the most frequently used procedure, followed by X-ray, CT, MRI, and nuclear medicine. Further, the demand for such services will increase due to the prevalence of cardiovascular and other chronic diseases.

Source: Ken Research Analysis

Figure 11-5: Indonesia Private Independent Laboratory Market Future Outlook and Projections by Type of Test (Routine, Non Laboratory and Esoteric) on the Basis of Revenue in Percentage (%), 2022



Source: Ken Research Analysis

12. ANALYST RECOMMENDATION

Table 12-1: Analyst Recommendation for Indonesia Clinical Laboratory Market

Parameters	Description
Build tie ups and geographic coverage	• Clinical laboratories receive customers majorly through doctor referrals, corporate clients and external referrals. Further, with the implementation of JKN, the demand for laboratory services is expected to increase from public sector. • Therefore, it is important for a clinical laboratory to tie up with major public and private hospitals, corporates and health insurance companies to gain customers through referrals. • Further, setting up laboratories at strategic locations such as near hospitals will help the laboratory to gain market share. Major cities to be focused include Java (East, West and Central) and Sumatra
Offer services online	• Offering online services would help the laboratory to gain more customer walk-ins. • Online services include listing various tests to be done for particular medical condition, applying for tests to be done, online payment for the services, online access to test results along with recommendations. • Further, through online portals, the clinical laboratories can share important information and health related articles and videos to engage the audience.
Build a strong service portfolio	• Service portfolio for a clinical laboratory should include routine tests as well as esoteric tests. Though esoteric tests require heavy investment and qualified staff but with the prevalence of chronic diseases such as cancer, stroke, HIV and others in the country, the demand for such tests will increase. Further, such tests involve higher margins • The laboratory can offer check up packages targeting specific age groups such as for children, teens and old age or disease such as allergies, malnutrition, epilepsy and others • Pathology testing by test segments will increase by 10–20% annually. Companies can focus on building capabilities in this segment • In the long run, higher demand for specialized tests can be expected with rising private care expenditure. • Disease diagnosis tests such as tumor marker and cardiovascular tests will increase as the demand for haematology and clinical chemistry tests has increased in 2015 by 10% from 2014.

Source: Ken Research Analysis

13. Macro Economic Factors Affecting Indonesia Healthcare Market

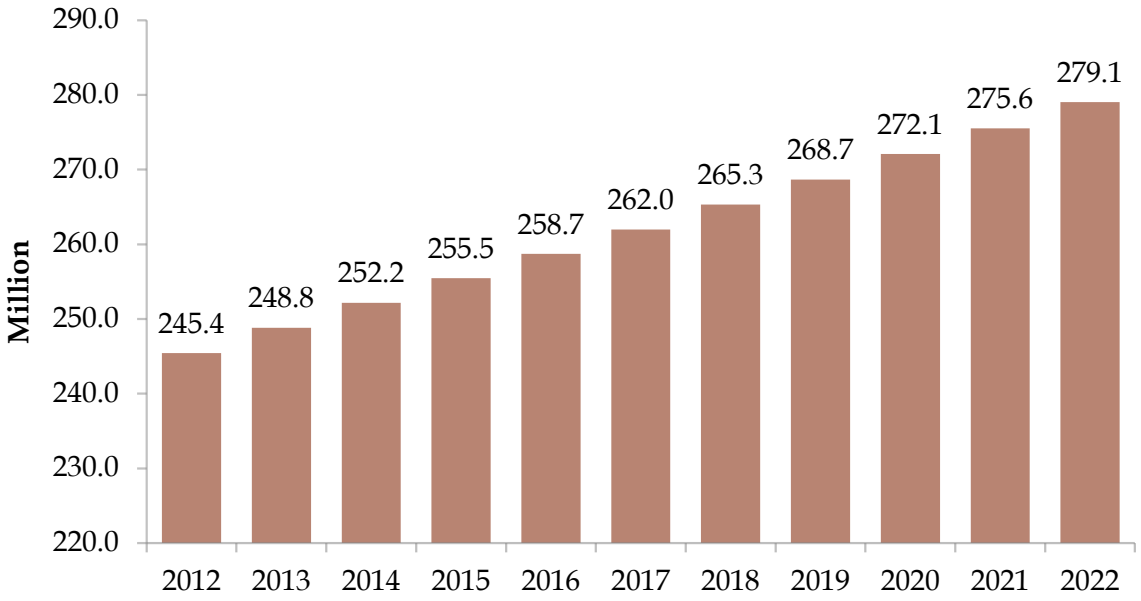
13.1. Population, 2012-2022

Table 13-1: Key Developments in Population of Indonesia, 2012-2022

Period	Description
2012-2017	• The population of Indonesia increased from 245.4 million in 2012 to 262.0 million in 2017 at a CAGR of 1.3%. This has a strong positive relationship with the overall healthcare market in Indonesia • Increase in old age population added to the revenue of the healthcare market. The individual's healthcare expenditure increases with age. The share of population above 65 years has increased from 4.9% in 2011 to 6.8% in 2016. • Further, growing population has led to an increased demand for healthcare facilities such as hospitals beds, medicines and various clinical lab services
2018-2022	• The population of Indonesia is estimated to increase from 262.0 million in 2017 to 279.1 million in 2022 at a CAGR of 1.3%. • With greater economic development and increased spending on medical services, the growing population will demand for advanced facilities and modern methods of treatment supported by increased awareness about various healthcare practices. • Further, the growing middle class population will lead to technological innovations in mobile health which will advance cost-effective health solutions

Source: World Bank, Ken Research Analysis

Figure 13-1: Population of Indonesia in Million, 2012-2022



Source: World Bank

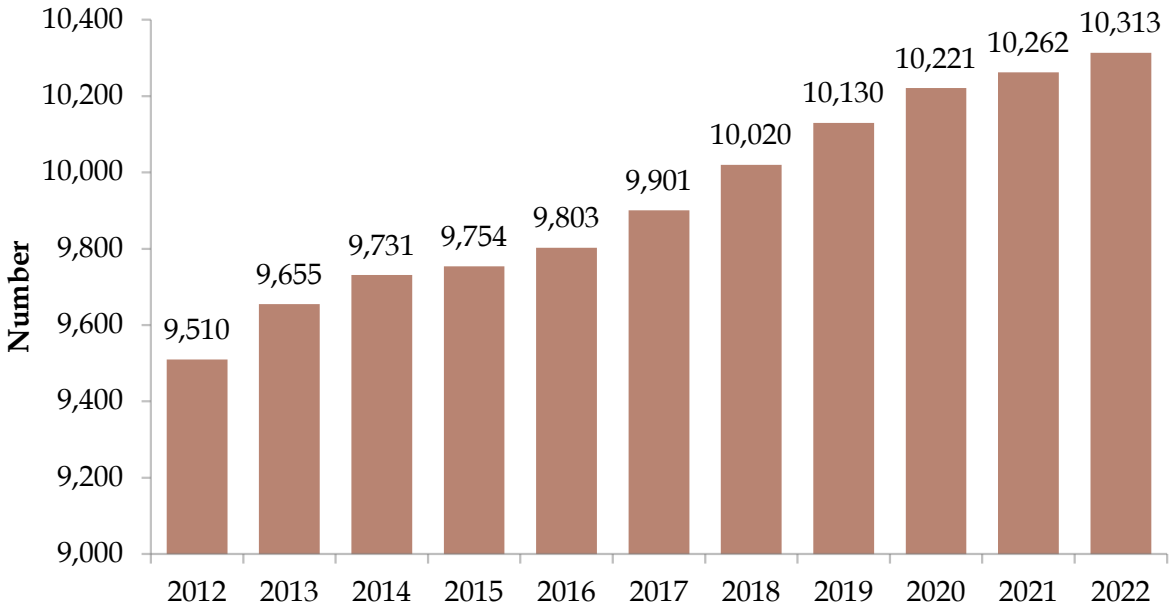
13.2. Number of Health Centers, 2012-2022

Table 13-2: Key Developments in Number of Health Centers in Indonesia, 2012-2022

Period	Description
2012-2017	• Number of health centers increased from 9,510 in 2012 to 9,901 in 2017 at a CAGR of 0.8%. • With the implementation of JKN by the government in 2014, the demand for healthcare services has increased. This has driven the public and private healthcare providers to set up health centers in the country. • Further, the prevalence of various chronic diseases such as diabetes, HIV, B has supported the growth of health centers in Indonesia. For instance, there were 10 million cases of diabetes in Indonesia in 2015 with 6.6% prevalence in Males and 7.3% prevalence in females.
2018-2022	• The number of health centers is predicted to increase from 9,901 in 2017 to 10,313 in 2022 at a CAGR of 0.8%. • The major factors behind growing number of health centers would be increase in government expenditure on health care services in underdeveloped provinces of Indonesia. • Further, entry of new players in the public and private healthcare companies will further lead to increased investment in this sector

Source: Ministry of Health, Ken Research Analysis

Figure 13-2: Number of Health Centers in Indonesia, 2012-2022



Source: Ministry of Health, Ken Research Analysis
Notes: health centers include primary healthcare ccenters (puskesmas) and private polyclinics

13.3. Budget Allocation on Healthcare, 2012-2022

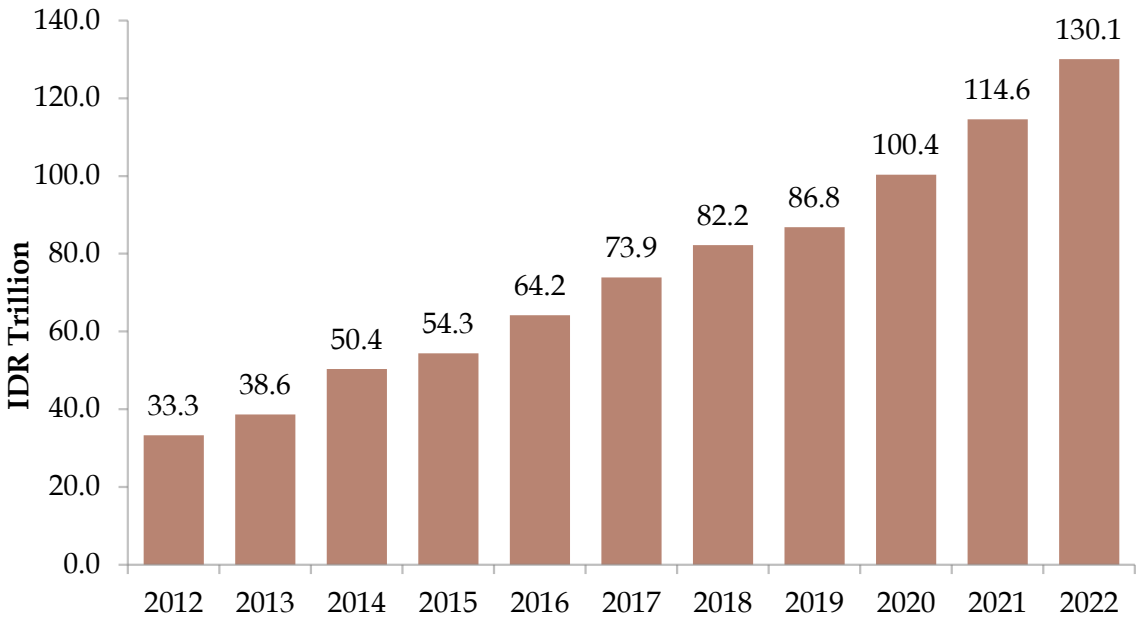
Table 13-3: Key Developments in Budget Allocation on Healthcare in Indonesia, 2012-2022

Period	Description
2012-2017	• Healthcare segment is considered as priority segment by the Government of the Indonesia and the segment has experienced tremendous growth in the recent years. Presence of diverse population, high prevalence of chronic diseases, aging population and enhancing innovation in the region are the major factors which has led to increased spending on healthcare in the country. • Government spending in 2012 amounted to IDR 33.3 trillion which increased to IDR 73.9 trillion by 2017. In 2012, the number of hospitals was counted to 2,083 which increased to 2,601 by 2017. The rising government healthcare expenditure especially on infrastructure resulted in high revenue generation of medical devices, and pharmaceutical companies, hence boosting the market.

2018-2022	• In the future also, the government is in plans to invest a high amount of currency. Government expenditure is forecast to increase at a CAGR of 12.0% during 2017-2022. • This will be driven government's efforts to make healthcare accessible in all regions of Indonesia.

Source: Ministry of Health, Ken Research Analysis

Figure 13-3: Budget Allocation on Healthcare in Indonesia in IDR Trillion, 2012-2022



Source: Ministry of Health, Ken Research Analysis

13.4. Obese Population, 2012-2022

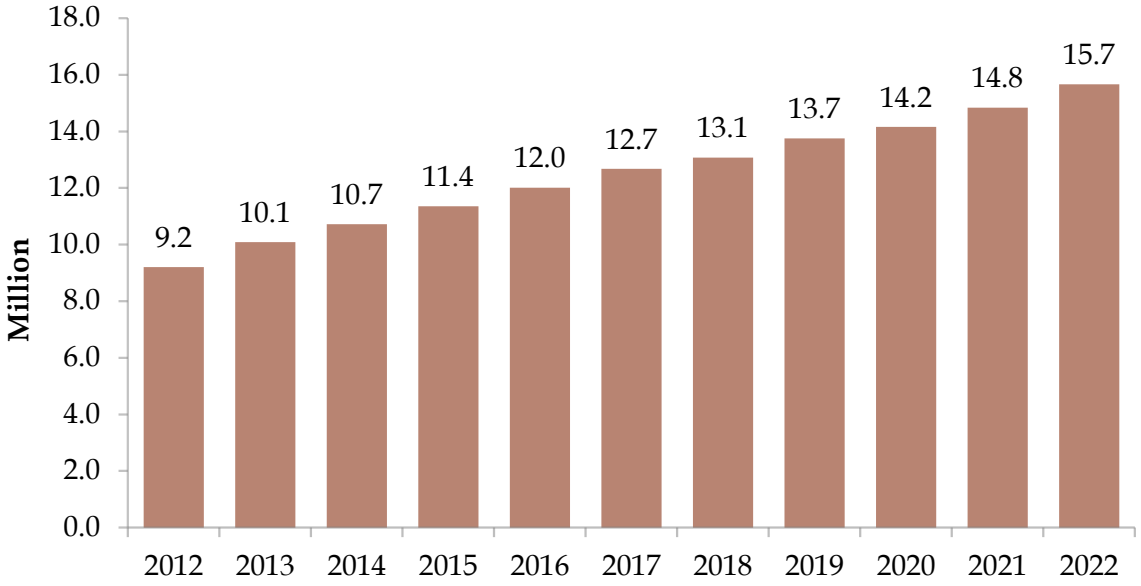
Table 13-4: Key Developments in Obese Population in Indonesia, 2012-2022

Period	Description
2012-2017	• Obesity is one of the major causes of various diseases such as kidney disease, diabetes, cardiovascular diseases, hypertension, cholesterol and musculoskeletal disorders. They are also regarded as important risk factors for endometrial, breast, and colon cancers. • It has been observed that more than 4.6% of the people residing in Indonesia are obese or overweight. Consequently, the major outcome of obesity, diabetes affected more than 10 million people in 2015. Moreover, it has been recorded that diabetes was responsible for 100,400 deaths annually in Indonesia. • The scenario is expected to worsen during the forecast year as the obesity

	prevalence rate is very high among the children in the Indonesia. These children would act as potential patients or customers for healthcare professionals during the forecast period as they suffer from chronic diseases such as type-2 diabetes, hypertension and chronic kidney disease due to overweight, generating revenue for the market.
2018-2022	• The growing population and high diabetes incidence rate is expected to increase the diabetes overall prevalence during the forecast period. Similarly, obesity prevalence would also increase owing to the sedentary lifestyle of the people. • The obese population in Indonesia is expected to increase from 12.7 million in 2017 to 15.7 million in 2022 at a CAGR of 4.3%

Source: Ministry of Health, Ken Research Analysis

Figure 13-4: Obese Population in Indonesia in Million, 2012-2022



Source: Ministry of Health, Ken Research Analysis

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