

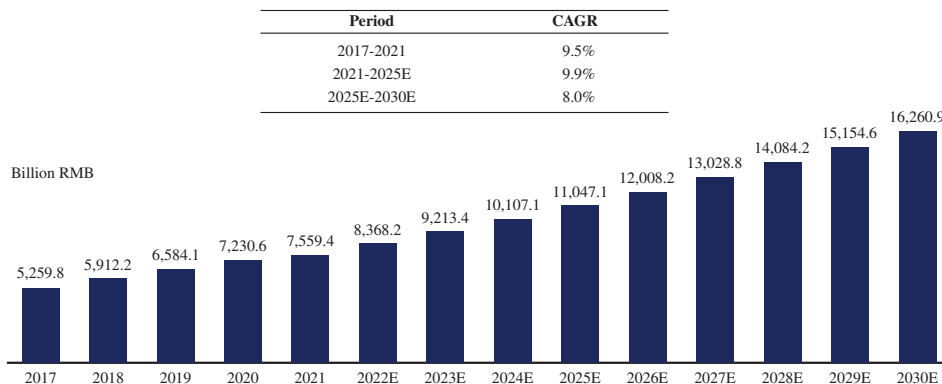
## INDUSTRY OVERVIEW

*The information and statistics set out in this section and other sections of this document were extracted from different official government publications, available sources from public market research and other sources from independent suppliers, and from the independent industry report prepared by Frost & Sullivan. We engaged Frost & Sullivan to prepare the Frost & Sullivan Report, an independent industry report, in connection with the [REDACTED]. The information from official government sources has not been independently verified by us, the [REDACTED], the [REDACTED], Joint Sponsors, [REDACTED], [REDACTED], the [REDACTED], any of the [REDACTED], any of their respective directors and advisers, or any other persons or parties involved in the [REDACTED], and no representation is given as to its accuracy.*

### OVERVIEW OF HEALTHCARE SERVICES MARKET IN CHINA

With the accelerated growth of the aging population, rising health awareness and increasing life expectancy, China’s total healthcare expenditure has grown rapidly in recent years and ranked the second highest globally, reaching RMB7,559.4 billion in 2021, and it is expected to grow further to reach RMB11,047.1 billion in 2025 at a CAGR of 9.9% from 2021 to 2025. Moreover, healthcare expenditure per capita in China has also experienced significant growth. From 2017 to 2021, it grew at a CAGR of 9.2% from RMB3,757 to RMB5,348, and is expected to reach RMB7,724 by 2025 and RMB11,243 by 2030, representing a CAGR of 9.6% from 2021 to 2025 and a CAGR of 7.8% from 2025 to 2030.

**Total Healthcare Expenditure in China, 2017-2030E**

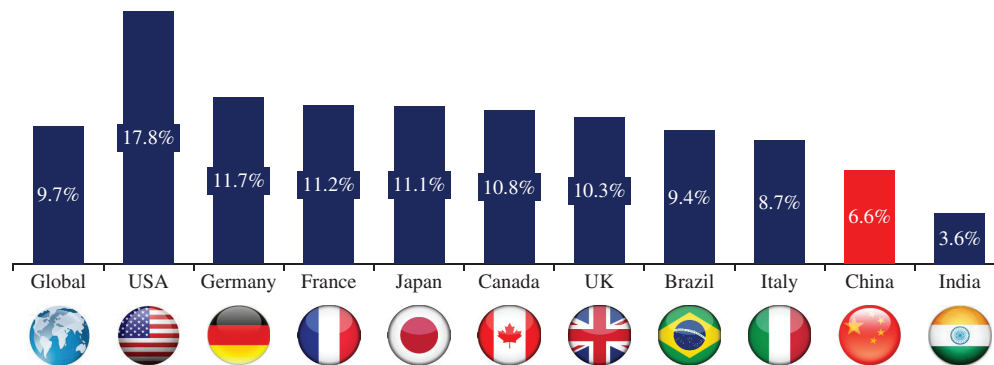


Source: NBSC, Frost & Sullivan Analysis

For most of the top 10 countries by GDP, healthcare expenditure as a percentage of GDP is approximately 10%. Of the top 10 countries by GDP, the United States has the highest percentage of healthcare expenditure at 17.8%, compared to a relatively low percentage of 6.6% for China and is expected to increase to be closer to the peer average.

## INDUSTRY OVERVIEW

### Healthcare Expenditure as a Percentage of Top 10 GDP Countries in 2019

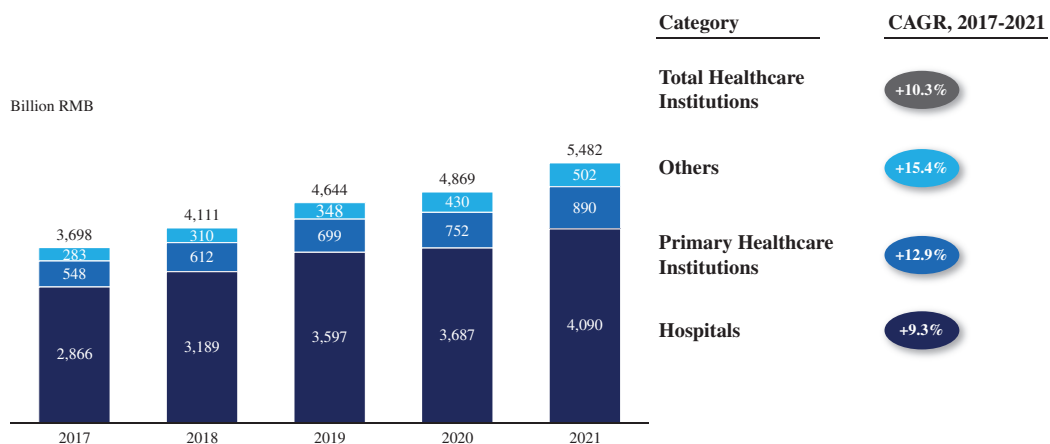


Source: NBSC, BEA, Frost & Sullivan analysis

China’s healthcare services market has witnessed continuous and robust growth. The total size of the healthcare services market, as measured by total revenues generated by all types of healthcare institutions, has increased at a CAGR of 10.3% from RMB3,698 billion in 2017 to RMB5,482 billion in 2021, and is expected to further grow at a CAGR of 7.3% and reach RMB7,269 billion by 2025.

Healthcare service providers in China primarily consist of hospitals (public and private hospitals), primary healthcare institutions (including community healthcare centers, rural healthcare centers and village clinics), and other healthcare institutions (such as women and children healthcare institutions, special disease prevention agencies and center of disease control). Hospitals play the most important role in China’s healthcare services industry, with hospitals’ revenue taking 74.6% of the market share among the entire healthcare institution market in China in 2021. The following chart shows the evolution of the revenue composition of China’s healthcare institutions from 2017 to 2021.

### Revenue of Healthcare Institutions in China, 2017-2021

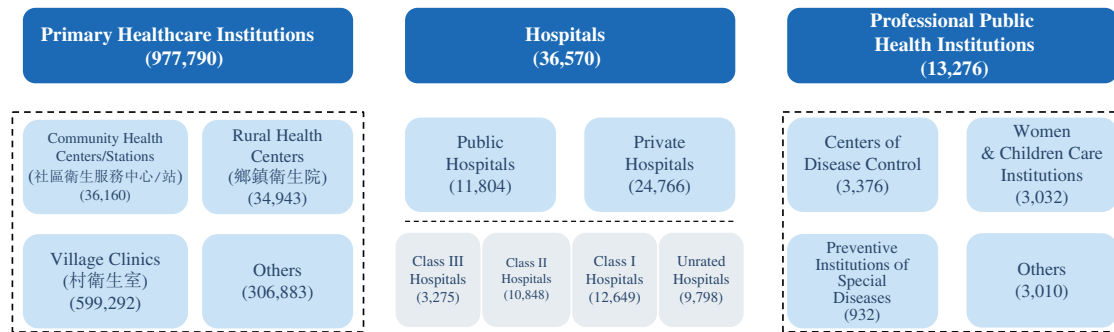


Source: NHC, Frost & Sullivan Analysis

The total number of hospitals in China reached 36,570 in 2021. In particular, from 2017 to 2021, there has seen a significant growth in private hospitals in terms of total number and capacity, while public hospital growth has been comparatively stagnant. The number of private hospitals grew at a CAGR of 7.2% from 18,759 in 2017 to 24,766 in 2021, accounting for 67.7% of total hospitals in 2021, whereas the number of public hospitals has seen a decline in the same period.

## INDUSTRY OVERVIEW

### China Healthcare Service System, 2021

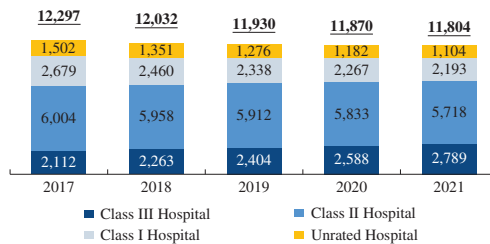


Source: NHFPC, Frost & Sullivan analysis

#### The Number of Public Hospitals by Grade, 2017-2021

	CAGR 2017-2021
Total Public Hospitals	-1.0%
Class III Hospitals	7.2%
Class II Hospitals	-1.2%
Class I Hospitals	-4.9%
Unrated Hospitals	-7.4%

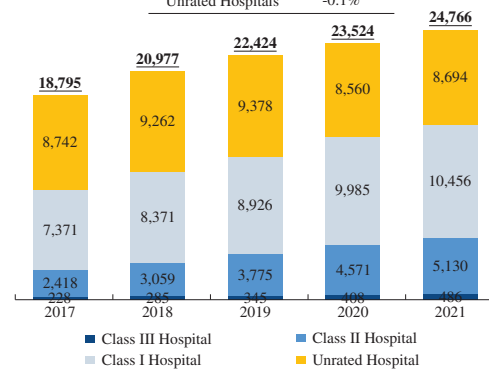
Unit



#### The Number of Private Hospitals by Grade, 2017-2021

	CAGR 2017-2021
Total Private Hospital	7.2%
Class III Hospitals	20.8%
Class II Hospitals	20.7%
Class I Hospitals	9.1%
Unrated Hospitals	-0.1%

Unit



Source: NHC, Frost & Sullivan analysis

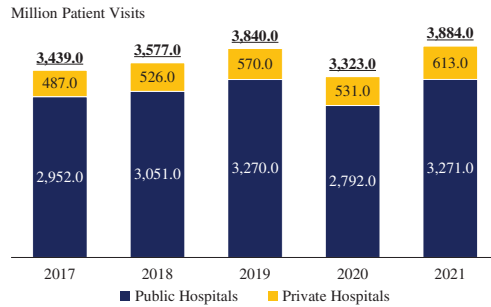
Public policies have encouraged growth in the private healthcare market. In 2013, the National Health and Family Planning Commission and State Administration of Traditional Chinese Medicine issued the Several Opinions on Accelerating the Development of Socially-run Medical Institutions (《關於加快發展社會辦醫的若干意見》), allowing non-public medical institutions to be included in the designated scope of medical insurance and allowing doctors to practice at multiple sites to help them simultaneously work in private and public hospitals. In 2016, the National Health and Family Planning Commission issued the Notice on Printing and Distributing the Guiding Principles for the Setup Plan of Medical Institutions (2016-2020) (《關於印發醫療機構設置規劃指導原則(2016-2020年)的通知》), encouraging private medical institution development and accelerating the formation of a diversified medical institution pattern, so that private hospitals have gradually gained the same position as public hospitals in applying for designated institutions of medical insurance and scientific research and teaching. In addition, by providing service-oriented care with lengthier patient visits and an increased emphasis on preventative care, private hospitals have gradually gained the trust from the public and created a positive perception, which in turn encouraged further growth of private hospitals.

## INDUSTRY OVERVIEW

Although public hospitals have historically received more than 80% of both inpatient and outpatient visits, private hospitals visits have started to catch up in recent years. Outpatients and inpatients received by private hospitals have accounted for a growing percentage of total hospital patient visits from 2017 to 2021, increasing from 14.2% to 15.8% for outpatients and from 17.5% to 18.4% for inpatients.

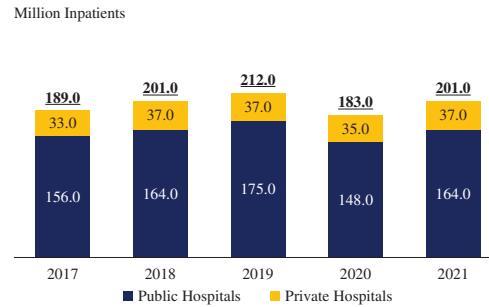
### Outpatient Visits of Hospitals in China, 2017-2021

	Public Hospitals	Private Hospitals	Total
CAGR (2017-2021)	2.6%	5.9%	3.1%



### Inpatients of Hospitals in China, 2017-2021

	Public Hospitals	Private Hospitals	Total
CAGR (2017-2021)	1.3%	2.9%	1.6%



Source: Frost & Sullivan analysis

## Pain Points and Unmet Needs of Healthcare Services Market in China

Despite its rapid growth, China’s healthcare services market is still immature. Pain points and unmet needs of the market include the following:

### *Uneven Geographical Distribution of Medical Services*

China has both a shortage of medical resources and uneven geographical distribution of existing medical resources. For example, as one of the most developed cities in China, Beijing has abundant medical resources, with more than 110 Class III hospitals and more than five Class III hospitals per million population in 2021. In contrast, provinces such as Hebei and Henan had less than 1.5 Class III hospital per million population in 2021. As such, there is expected to be an increasing number of hospitals established in lower tier cities, which will drive the demand for ICL testing in these areas.

### *Concentration of Medical Resources and Diagnostic Demands in Higher-tiered Hospitals*

China’s medical resources are concentrated in large Class III hospitals, and patients also preferentially seek healthcare services in higher-tier hospitals, which leads to a severe concentration of medical resources and diagnosis demand in higher-tier hospitals. In 2021, Class III hospitals accounted only for 9.0% of the total number of hospitals in China, while receiving 57.5% of the total outpatient visits. The severe concentration of medical resources and diagnosis demand have caused poor patient experiences. For instance, on average, diagnosis time only accounted for 4.4% (approximately eight minutes) out of the approximate average of 180 minutes per outpatient visit in 2021, according to Frost & Sullivan. In addition, higher-tiered hospitals often charge more per outpatient visit. In 2021, Class III hospitals charged the most at RMB370.0 per outpatient visit on average, followed by RMB232.1 per visit for Class II hospitals and RMB174.6 per visit for Class I hospitals. Various initiatives have been rolled out by the Chinese government to drive a hierarchical healthcare system, including hospital alliances, publication of standardized referral pathways and reimbursement reform, to improve patients’ access to primary care and balance public

---

## INDUSTRY OVERVIEW

---

medical resources. For example, the hospital alliance system is a network of medical treatment providers within a specific region, consisting of one central leading hospital, some lower tier hospitals along with community medical service facilities, and a referral mechanism to facilitate patient transfers within the system, in order to more efficiently utilize the provision of healthcare services. In response to the hierarchical medical system, medical institutions at all levels are inclined to outsource testing items to ICLs.

### *Heavy Reliance on Drug Sales in the Revenue Structure of Medical Institutions*

Even though revenues generated by public hospitals in China has experienced gradual growth in recent years, such revenues have been focused on sales of drugs rather than examination or treatment, according to Frost & Sullivan. In 2021, revenue generated by drug sales in public hospitals accounted for 38.8% and 24.8% of outpatient revenues and inpatient revenues, respectively, and was the largest contributor of public hospital revenue. On the contrary, revenues generated by examinations accounted for only 20.4% and 10.2% of outpatient revenues and inpatient revenues, respectively. In recent years, a series of healthcare reforms have been carried out by the Chinese government to optimize the hospital revenue structure by reducing their reliance on medication and putting more emphasis on examination and treatment, which requires more expertise and service capabilities of physicians and hospitals. It is expected that revenues generated by examination and treatment will contribute a growing percentage of total revenues of hospitals. The change in the revenue structure and emphasis on examination and treatment may potentially result in an increasing demand for clinical testing, which will lead to more outsourcing demand to ICLs.

### *Overwhelming Financial Burden on Public Healthcare System*

The Chinese government has made strong efforts to increase the accessibility and affordability of healthcare services through its healthcare reforms. Huge amount of investments have been made to construct and upgrade healthcare infrastructure and expand medical insurance coverage. A medical insurance system encompassing URBMIS and UEBMIS have been established to cover 96.5% of the Chinese population in 2021. While the funding for China’s basic medical insurance fund is expected to grow with a CAGR of 6.6% from 2021 to 2025, expenditure is expected to experience a much higher growth with a CAGR of 8.9% in the same period, and surpass the funding in 2028, which puts a severe financial burden on both individuals and the government funding this program. The government continues to expand the scope of medical insurance payments. The funding for basic medical insurance increased from RMB1,793.2 billion in 2017 to RMB2,872.8 billion in 2021, with a CAGR of 12.5%. The expenditure of basic medical insurance increased from RMB1,442.2 billion in 2017 to RMB2,404.3 billion in 2021, with a CAGR of 13.6%. The growth rate of commercial health insurance premiums from 2017 to 2021 is also less than the growth rate of expenditure. In order to respond to costs pressure, public medical institutions could choose to outsource laboratory testing, which encourages the development of ICL to some extent.

## OVERVIEW OF THE ICL MARKET IN CHINA

Unless otherwise indicated, China’s ICL market data presented in this Document excludes the data of COVID-19 testing. For market data related to COVID-19 testing, please see “– Impact of COVID-19 on China’s ICL Market.”

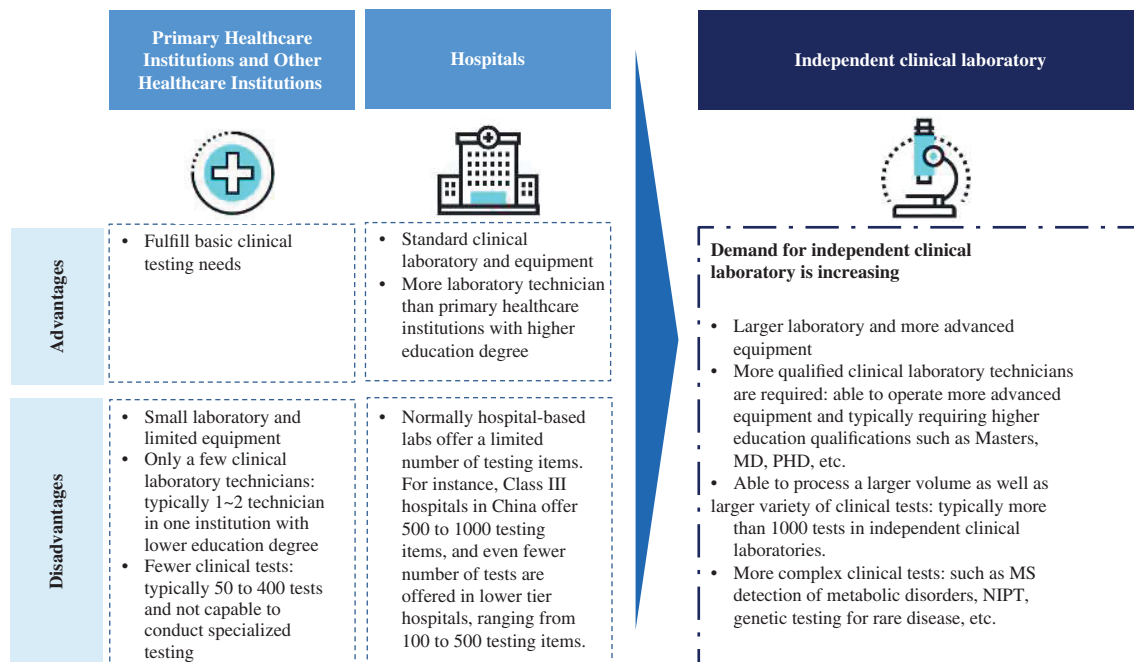
## INDUSTRY OVERVIEW

### Introduction of Clinical Diagnostic Testing

Clinical diagnostic tests are a group of medical tests carried out in laboratories that provide information about a person’s health status. This information can assist physicians to make precise and personalized diagnostic decisions around patient care. According to Frost & Sullivan, roughly 70% to 80% of clinical decisions are based on some forms of laboratory testing. Moreover, clinical tests also are able to assist pharmaceutical and biotech companies in developing new drugs and vaccines, support private employers to detect alcohol and drug abuse of their employees, and help insurance providers assess the risks relating to applicants’ health conditions.

Clinical diagnostic tests are generally carried out by three types of providers, namely, hospital-based laboratories, independent clinical laboratories, or ICLs, and others, such as, physician offices, nursing homes, and ambulatory surgery centers, among which hospital-based laboratories have been the largest providers of clinical testing services, both in terms of revenue and test volume. A hospital-based laboratory typically performs testing only for its own captive patients, whereas ICLs, on the other hand, are independent from hospitals, and receive samples from a plethora of hospitals and research institutions for analysis. Compared to hospital-based laboratories, ICLs are generally larger in scale. They normally have more advanced equipment and more technically trained laboratory personnel, which enable them to perform specialized tests and process larger volume of tests more cost-effectively. According to Frost & Sullivan, hospital-based laboratories typically have a test menu of around 800, mostly routine test items, fulfilling the basic diagnostic demands of patients of seen at a single hospital, whereas ICLs typically are capable of performing over 1,000 test items, consisting of a broad range of test types, including specialized esoteric tests.

The following chart summarizes the advantages and disadvantages of clinical testing service providers in China.



Source: Frost & Sullivan analysis



---

## INDUSTRY OVERVIEW

---

### **History of ICLs in China**

An ICL is a medical institution is an independent legal entity with qualifications to engage in clinical testing or pathology laboratory services under the permission of the health administrative department. The development of ICL industry in China can be divided into five stages, infancy stage (1980s–1994), exploration stage (1994–2004), primary development stage (2004–2016), rapid development stage (2016–2019) and accelerated development stage (2019 till now).

#### ***Infancy stage (1980s–1994)***

Prior to 1980s, all of the medical diagnosis services in China were provided by the clinical laboratory and pathology departments under medical institutions. With the development of diagnostic technology and changes in clinical needs, small and medium-sized hospitals had been unable to undertake comprehensive tests due to their limited capacity, resulting in the need to transfer their patients’ samples to large hospitals for diagnosis. In the mid-1980s, Yangzhou medical examination center began to provide medical testing services.

#### ***Exploration stage (1994–2004)***

Later, with the opening of market development for medical services, some testing service centers began to cooperate with hospitals to form as single ICLs, which only provide limited testing and did not achieve scale benefits. In 1994, the first ICL was established in China and was affiliated with a medical college. From 1994 to 2004, the ICL industry in China began to slowly develop.

#### ***Primary development stage (2004–2016)***

In 2004, Ministry of Health organized the first ICL seminar in China which brought together medical experts, suppliers of medical devices and reagents across China. Since then, a large number of domestic ICLs and chain institutions had been established. In 2009, the Ministry of Health issued Basic Standards for Medical Laboratory, officially recognizing the legal status of ICLs, and since then the industry has experienced significant growth. Since 2014, the ICL industry has entered a new stage of innovative development. ICLs in China started to expand rapidly in a larger scale. On September 8, 2015, the General Office of the State Council issued the Guiding Opinions on Boosting the Construction of a Tiered Diagnosis and Treatment System (《關於推進分級診療制度建設的指導意見》) to guide localities in promoting the development of a hierarchical system for provision of diagnostic and medical services. With the implementation of these policies, the ICL market continued to flourish.

#### ***Rapid development stage (2016-2019)***

In 2016, the National Health Commission issued the Basic Standards and Practice of Medical Test Laboratories (for Trial Implementation) (《醫學檢驗實驗室基本標準和管理規範(試行)》), which encouraged the development of chain ICLs and application of new testing technology, promoting the expansion of esoteric testing market. In 2018, Nation Health Commission issued a policy that the medical testing services of public hospitals can be outsourced to third-party medical institution, further boosting the growth of the ICL market.

#### ***Accelerated development stage (2019 till now)***

In response to the outbreak of COVID-19 late in 2019, the government has issued many regulations on standardize the management and quality control systems of ICLs to improve their level of accuracy and consistency. In March 2021, the State Council issued Regulations for the Supervision and Administration of Medical Devices (《醫療器械監督管理條例》), which provided that for in-vitro diagnostic reagents that do not have an approved marketed version in China, qualified medical institutions can develop them on their own according to the clinical needs of their own laboratories, and use them in their own laboratories under the guidance of qualified medical personnel. This can be seen as a favorable policy for laboratory developed tests, or LDT. Due to increasing demand and favorable policies, the number of ICLs in China increased from less than 70 in 2009 to over 2,100 in 2021.

---

## INDUSTRY OVERVIEW

---

### **Key Growth Drivers of China’s ICL Market**

The growth of China’s ICL market is and will continue to be driven by the following key factors:

#### ***Growing Test Volume Driven by Population Aging and Better Diagnostic Services***

The population in China has aged rapidly, with the number of people aged above 65 grew at a CAGR of 6.1% from 2017 to 2021 and is expected to grow further at a CAGR of 5.4% from 2021 to 2025 and reach 247.1 million by the end of 2025. China’s severe aging issue has directly led to a surge in the prevalence of chronic diseases and an increase in the patient flow of serious diseases, both of which have and will continue to drive the testing demands, thereby boost the testing volume. In addition, the growing health awareness and soaring instances of chronic diseases are pushing people to conduct early detection and take initiatives for preventive measures. Health check industry in China has experienced growth with a CAGR of 4.3% from RMB118.3 billion in 2017 to RMB140.0 billion in 2021 and is expected to reach RMB178.4 billion by 2026. The number of people who seek medical check-ups in China reached 447.4 million in 2021, and is expected to grow with a CAGR of 4.4% to 521.1 million by 2026. Driven by increasing demand from customers, there has been a growing outsourcing rate of tests from health check centers as they are incentivized to seek cost competitive tests performed with premium quality.

In addition, the evolving field of precision medicine and emergence of novel technologies have also significantly stimulated the development of China’s ICL market. Precision medicine is a medical model that proposes the personalization of medical decisions, treatments, practices, or products being tailored to a subgroup of patients, instead of a one-drug-fits-all model. Precision medicine is expected to shift the emphasis of medicine and treatment from reaction to prevention, improve disease detection, and preempt disease progression, which thereby drives the demand for more precise and higher-quality healthcare services. In 2015, the Ministry of Science and Technology held the “National Expert meeting on Precision Medicine Strategy” for the first time, which represented that China has entered the era of “precise medicine” at the strategic level. ICLs are increasingly important in the era of precision medicine. It will largely help physicians to integrate individual health data and information from clinical factors, real-time monitoring factors, molecular/diagnosis factors (multi-omics including epigenetics), and exogenous factors (environmental, behavioral, socio-economic, lifestyle) to develop personalized evidenced-based treatment interventions and ultimately deliver superior therapeutic outcomes for patients.

#### ***Increasing Outsourcing Demand from Hospitals***

In China, people tend to directly visit and consult specialists in the hospitals due to the lack of a general practitioner referral system, which leads to severe hospitals overcrowding. Hospitals have been increasingly outsourcing clinical testing to private sectors to reduce the burden of overcrowded public facilities. With increased cost control pressures resulting from healthcare reforms, hospitals have been further incentivized to outsource their clinical testing to independent laboratories. In addition, National Healthcare Security Administration has implemented many regulation to control healthcare costs from hospitals, such as Technical Specifications on National Healthcare Security DRGs Grouping and Payment (《國家醫療保障DRG分組與付費技術規範》). Under this specification, reimbursement is calculated based on the care given to a “typical” patient within the group to treat a specific disease, instead of being reimbursed for every treatment item a patient receives. In order to maintain a profit level, hospitals are more incentivized to reduce the expenditure of their overall treatment costs and clinical testing costs. The implement of DRG system standardizes testing prices in hospitals and encourages cost containment initiatives. Cost control pressure in both public and private hospitals will drive the collaboration with ICLs who are able to provide comprehensive and high-quality testing services at lower costs.



---

## INDUSTRY OVERVIEW

---

On September 5, 2018, China National Health Development Research Center issued a project report on effect evaluation and experience summary of independent clinical Laboratory (“第三方醫學實驗室效果評估及經驗總結項目報告”) in Guangzhou and pointed out that ICLs can save approximately 1% of China’s total medical insurance expenditures, thereby saving nearly RMB22.1 billion of medical insurance funds in 2019. Due to ICLs’ outstanding cost-saving capabilities, Chinese government was devoted to continuously expanding medical insurance coverage for tests outsourced to ICLs, which is expected to further encourage testing outsource to ICLs from hospitals to ICLs. China National Health Development Research Center estimated that the testing costs saved by ICLs from 2016 to 2020 amounted to RMB10.4 billion, RMB13.7 billion, RMB17.6 billion, RMB22.1 billion and RMB27.4 billion, respectively. Owing to ICLs’ cost-saving capabilities, the government intended to increase its recognition of ICLs by connecting them to the medical insurance system.

Furthermore, due to hierarchical medical system implemented recently, medical institutions at all levels have a strong motivation to outsource testing items to ICLs. For primary medical institutions that lack testing equipment and professionals, and normally offer less than 400 testing items, it is difficult for them to accommodate the rapid increase in patient flow. Thus, it has seen an increasing demand for test outsourcing. For tertiary hospitals with better testing capacity offering more than 800 testing items, decreasing amount of tests performed resulting from patient diversion makes outsourcing clinical testing to ICLs an economic choice. In particular, when it comes to esoteric testing items with the characteristics of low volume, high cost, and high technical requirements, tertiary hospitals prefer outsourcing esoteric tests to ICLs for cost efficiency and better quality.

### *Unique Advantages of ICLs over Hospital-based Laboratories*

Compared to hospital-based laboratories, ICL chain operators have a broad laboratory network coverage, which enables them to more easily connect to and cater to hospitals in different classes across regions. Moreover, once ICLs have expanded to a certain scale, they are capable of performing a large volume of tests with lower costs, benefited from centralized management, procurement and optimized utilization of equipment, human resources, reagents and facilities. In addition, ICLs generally are capable of performing a broad range of tests. Furthermore, with more capital resources and capital investment, ICLs are more advanced in introducing and applying new technologies and equipment, and are more proactive in achieving clinical laboratory accreditation and hire experienced and quality personnel to enhance their competitiveness, which enable them to deliver higher quality testing services.

### *Series of Healthcare Reforms Benefiting the ICL Market*

Chinese government had carried out a series of healthcare reforms and introduced favorable policies aiming to reshape the clinical laboratory industry and to further support the growth and investment in the private sector. For example, in 2013, the NHFPC issued The Catalogue of Clinical Testing Items, which standardized the development of routine and esoteric testing. Furthermore, the stricter restriction on insurance pricing and healthcare services pricing reform will further lower the testing and examination costs at public hospitals. It is expected that such reform will turn hospitals’ testing centers from revenue-oriented to cost-oriented, encouraging them to outsource more tests to ICLs that have more scale and cost advantages. In 2015, Guiding Opinions on Boosting the Construction of a Tiered Diagnosis and Treatment System explored the establishment of independent regional medical testing institutions, pathological diagnosis institutions, medical imaging inspection institutions, disinfection supply institutions, and blood purification institutions to control cost through regional resource sharing. In December 2016, Plan for Deepening Reform of the Medical and Healthcare System during the 13th Five-Year Plan Period (《“十三五”深化醫藥衛生體制改革規劃》) issued by NDRC specifically requires hospitals decrease repeat testing, lower test prices, and reduce the growth of healthcare expenditure in public hospitals to 10% by the end of 2017. In May 2022, NDRC released the 14th Five-Year Plan which unveiled a new road map to spur China’s bioeconomy, in a bid to promote high-quality development of the sector. The new plan pledged to promote the integration and innovation of biotechnology and information technology, as well as accelerate the development of biomedicine, biological breeding, biomaterials, bioenergy and other industries to enhance bioeconomy in scope and strength.

---

## INDUSTRY OVERVIEW

---

In March 2021, the State Council issued Regulations for the Supervision and Administration of Medical Devices (《醫療器械監督管理條例》), which provides that for in-vitro diagnostic reagents that do not have the same product on the market in China, qualified medical institutions can develop them on their own according to the clinical needs of their own units, and use them in their own units under the guidance of medical practitioners. This can be seen as a favorable policy for laboratory developed tests, or LDT.

### *Increasing Demand of Drug Innovation from CROs and Pharmaceutical Companies*

In an effort to promote pharmaceutical innovation and drive the sustainable development of the healthcare market, the Chinese government has issued a series of favorable policies to encourage R&D activities. Driven by such favorable policies, pharmaceutical companies have continued to increase their R&D expenditures on drug innovation. In recent years, the R&D process has become more complex due to a number of factors, including (i) increasing number of large-scale multi-regional clinical trials, (ii) more stringent regulations on R&D activities, (iii) more innovative and complicated scientific methods used to address unmet medical needs, and (iv) the adoption of advanced technologies in the R&D processes. This has driven more pharmaceutical companies to outsource a broader range of R&D activities to reliable CROs with advanced technology and experienced technicians. With increasing number of clinical trials conducted in CROs, CROs have been increasingly willing to collaborate with eligible ICLs to which they can outsource tests, to enhance clinical trial efficiency and save costs. In particular, although the types of clinical testing services demanded by CROs and pharmaceutical companies vary from case to case based on their specific needs, they all require having samples processed using the same analytical methodology to avoid unintentional differences in laboratory results and reference ranges. Furthermore, these clients require more detailed tracking and analysis to comply with the stringent requirements for research and clinical trials. These clients can also require various types of protocol-specific tests for use in research or clinical trials, such as pharmacokinetic parameters, metabolite concentration, genetic mutation and biomarker tests that may be proprietary and/or for research use only.

### *Emerging Technologies Benefitting the Growth of the ICL Market*

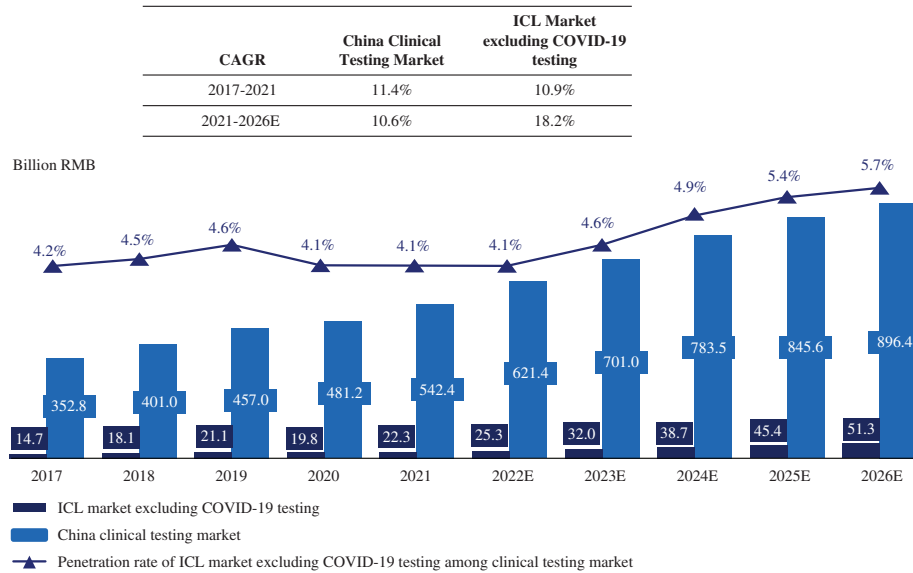
New technology such as novel gene sequencing platform, automation lab system, 5G network and advanced logistics system will have wider application, which will reshape and boost the ICL industry. For example, the advanced gene sequencing technique, or the next generation sequencing is more and more widely used in cancer research due to its advantages over traditional genomic analysis methods in terms of high accuracy, speed, and precision, low sample requirements. In addition, 5G network is critical to logistics system, improving its working efficiency, goods positioning and tracking efficiency. The emergence of 5G network is validated by numerous intelligent projects, for instance, autonomous vehicle and delivery, intelligent logistics warehouse and tracking. 5G network has the characteristics of high-speed data transmission, wide geographical coverage, low power dissipation, low transmission delay. The advancement of the logistics system with 5G network also provides efficient operation for ICLs, which is considered to have precise tracking, good surveillance on quality of specimen and high efficiency of data transmission. More importantly, the quality of the logistics system will also directly affect the test results of the laboratory, since specimen may be damaged or inactivated during transportation and consequently cause any inaccuracy of the test results.

## INDUSTRY OVERVIEW

### Market Size and Growth of the ICL Market in China

The market size of China’s clinical testing industry grew at a CAGR of 11.4% from RMB352.8 billion in 2017 to RMB542.4 billion in 2021, and is expected to reach RMB896.4 billion by 2026, representing a CAGR of 10.6%.

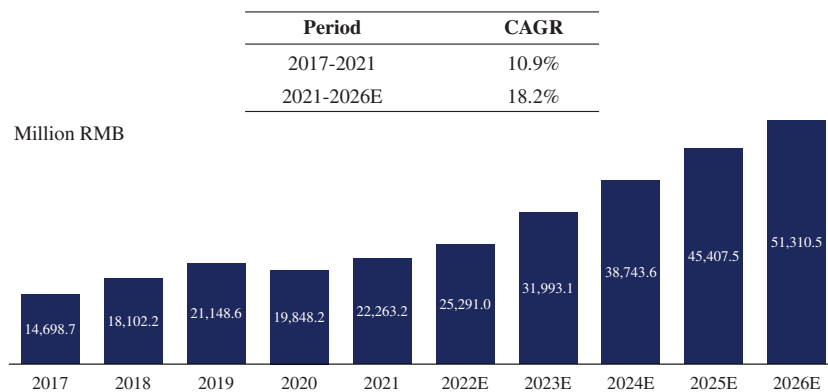
#### Breakdown of China Clinical Testing Market, 2017-2026E



Source: Frost & Sullivan analysis

Meanwhile, China’s ICL market without COVID-19 testing grew by a 10.9% CAGR from RMB14.7 billion in 2017 to RMB22.3 billion in 2021, and is expected to grow up to RMB51.3 billion by 2026 at a CAGR of 18.2% from 2021 to 2026.

#### China ICL Market Size and Forecast without COVID-19 Testing, 2017-2026E

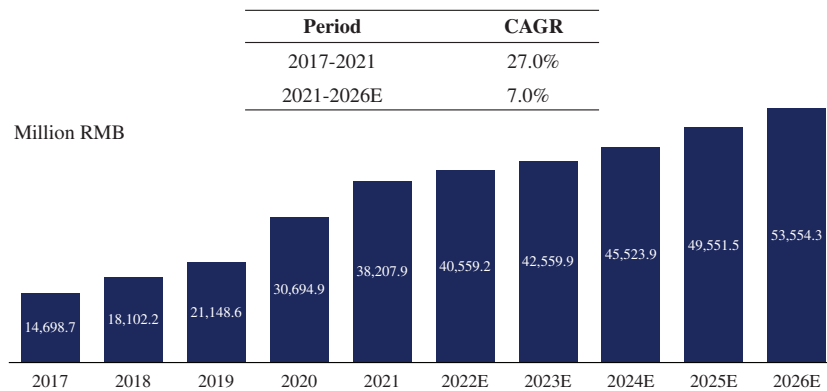


Source: Frost & Sullivan analysis

China’s ICL market with COVID-19 testing grew significantly by a 27.0% CAGR from RMB14.7 billion in 2017 to RMB38.2 billion in 2021, and is expected to grow up to RMB53.6 billion by 2026 at a CAGR of 7.0% from 2021 to 2026.

## INDUSTRY OVERVIEW

### China ICL Market Size and Forecast with COVID-19 Testing, 2017-2026E

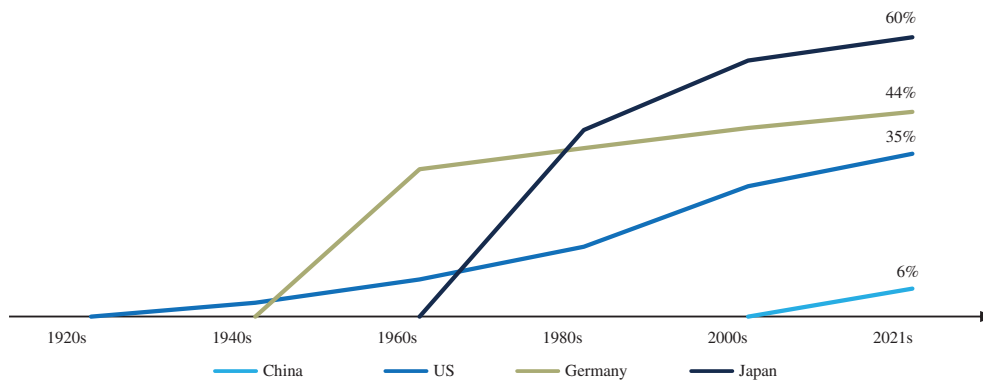


Source: Frost & Sullivan analysis

### Comparison between China’s and Global ICL Markets

Despite the rapid growth, China’s ICL market is still in its infancy compared to other developed countries. ICLs originated from the United States in the 1920s. After nearly a century of development, it has evolved into an independently operated medical laboratory platform and has now become an indispensable part of the medical service system. However, China’s first ICL was established in 1994 and the ICL industry has only developed relatively recently. In 2021, China only saw ICL penetration rate, measured by the ICL testing market size as a percentage of the total clinical testing market size, of approximately 6%, significantly less than 60% for Japan, 44% for Germany and 35% for the United States.

### Development of ICL Penetration Rate in Different Countries

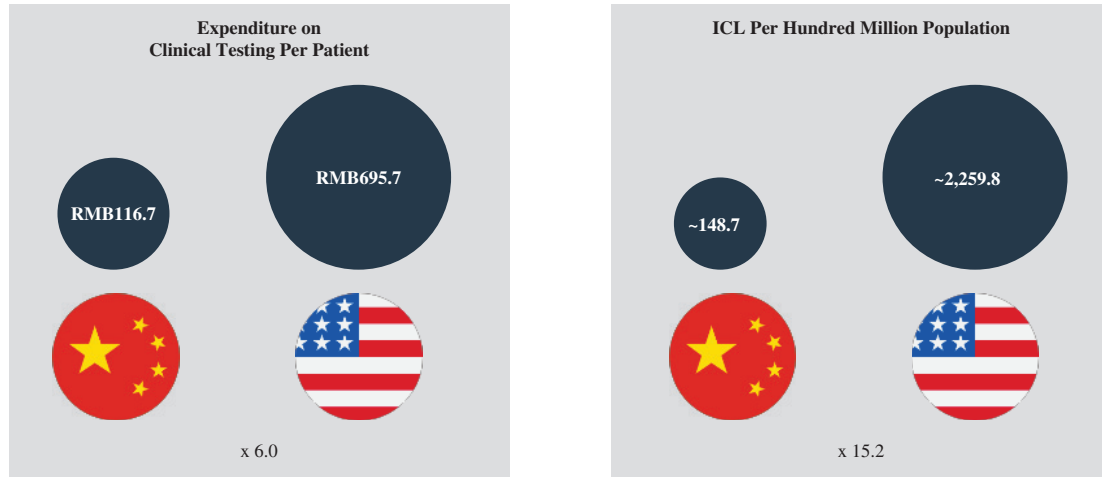


Source: Frost & Sullivan analysis

By the end of 2021, there were over 2,100 ICLs in China, whereas there were over 7,500 ICLs in the United States. China also lags behind in terms of expenditures on clinical testing per patient, with this figure one-sixth the size of that of the United States in 2021. There is still an ample room of further development of China’s ICL market.

## INDUSTRY OVERVIEW

### Comparison between China and U.S. by Expenditure on Clinical Testing and Number of ICLs Per Hundred Million Population, 2021



Source: National Health Commission, Frost & Sullivan analysis

### The ICL Routine and Esoteric Testing Markets in China

Routine testing consists of commonly tested items for the purpose of providing information for the diagnosis, prevention, or treatment of a disease available in most clinical labs. Esoteric testing refer to tests that are less common and typically require specialized technologies or equipment to perform.

The following table sets forth a comparison between routine testing and esoteric testing:

#### Clinical Diagnostic Testing by Service Types

	Routine testing	Esoteric testing
<b>Testing Items</b>	Blood chemistry, bodily fluid biochemistry, blood type check, immunoglobulin examination, thyroid-related hormone and antibody testing, etc. Clinical Immunology, Microbiologic culture and organism identification, blood cultures, antimicrobial sensitivity tests; Urinalysis, and Enzyme-linked immunosorbent assay (ELISA)	Molecular testing for infectious disease such as Mycobacterium tuberculosis, hepatitis virus, influenza, HPV, HBV, Molecular testing for genetic functions and variations or tumor genetics such as BRCA1/2, prostate cancer biomarkers detection, cardiovascular disease risk prediction series; Pharmacogenomics testing such as CYP2C19; Cytogenetic testing including Fluorescence In Situ Hybridization (FISH); Liquid chromatography/mass spectrometry (LC-MS) in newborn screening, therapeutic drug monitoring (TDM)
<b>Technology Platforms</b>	Routine clinical chemistry, routine hematology, routine microbiology, routine immunology, etc.	Molecular diagnostics, protein chemistry, cellular immunology, advanced microbiology, etc.
<b>Requirements for Personnel</b>	Cost effective and highly efficient labor force	Higher educational and technical requirements
<b>Features</b>	<ul style="list-style-type: none"> <li>Homogeneous and standardize</li> <li>Importance to achieve operating scale benefits</li> <li>Broad market demand</li> </ul>	<ul style="list-style-type: none"> <li>Higher R&amp;D investment</li> <li>Smaller volumes and more narrow customer demand</li> <li>Requires higher sales and marketing spend</li> </ul>
<b>Major Service Provider</b>	Hospitals, ICLs, Co-constructed clinical laboratories	ICLs

Source: Frost & Sullivan analysis

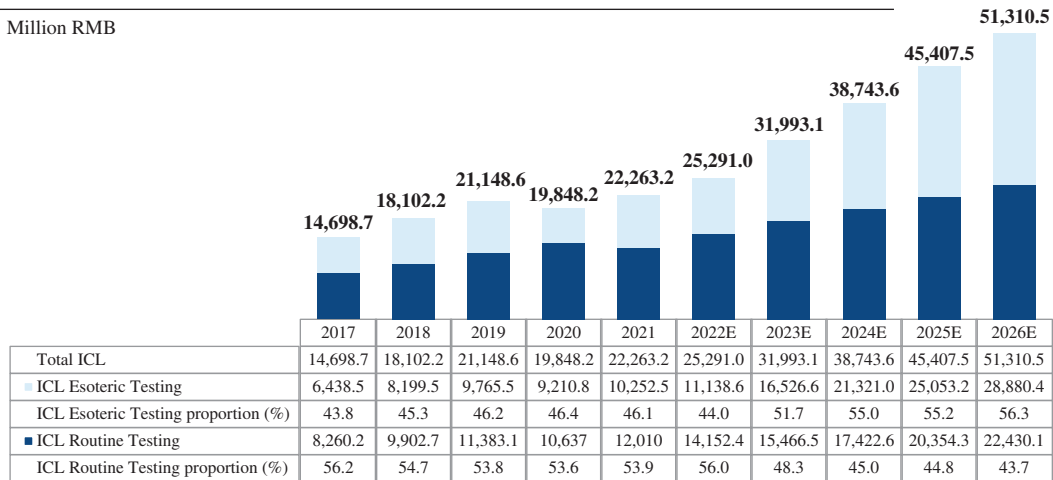
China’s ICL market can be broken down by routine testing and esoteric testing. China ICL routine testing market has grown at a CAGR of 9.8% from RMB8.3 billion in 2017 to RMB12.0 billion in 2021, and is expected to reach RMB22.4 billion in 2026, representing a CAGR of 13.3% from 2021 to 2026. Compared to ICL routine testing, esoteric testing grew at a faster rate, with a CAGR of 12.3% from RMB6.4 billion in 2017 to RMB10.3 billion in 2021, and is expected to grow at a CAGR of 23.0% to reach RMB28.9 billion by 2026.

## INDUSTRY OVERVIEW

### Breakdown of China ICL Market by Routine Testing and Esoteric Testing without COVID-19 Testing, 2017-2026E

Period, CAGR	ICL Esoteric Testing	ICL Routine Testing	Total
2017-2021	12.3%	9.8%	10.9%
2021-2026E	23.0%	13.3%	18.2%

Million RMB



Source: Frost & Sullivan analysis

### Demand for Clinical Laboratory Services from Research Institutions

CRO central laboratory (central laboratory for clinical trials) is an independent medical laboratory providing in vitro diagnostic services for phase I-IV clinical trials. It is committed to providing scientific, compliance and one-stop comprehensive solutions for clinical trials of Chinese and foreign pharmaceutical companies, biotechnology companies, CRO companies, medical device companies and medical institutions. CRO central laboratories create a seamless service chain that covers research scheme design, diagnostic and testing services, laboratory materials supports, laboratory projects management, sample cold chain transportation, biological sample management, data management and statistical analysis and other services. Resulting from the increased R&D needs in Chinese pharmaceutical market and, benefiting from the favorable government policies, demand for clinical trial testing has increased, which further drives the development of ICL central laboratory services.

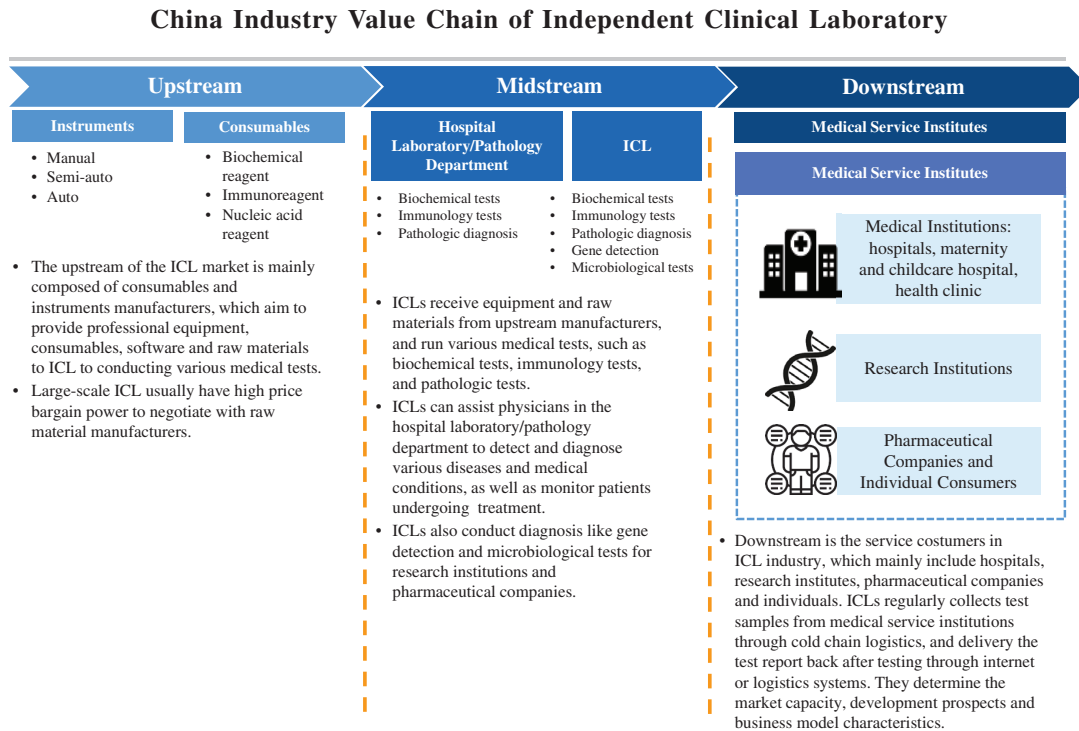
The CRO market in China has experienced a growth from RMB29.0 billion in 2017 to RMB64.0 billion in 2021 with a CAGR of 21.9%. The market is anticipated to maintain the rapid growth and further reach RMB155.8 billion in 2025, representing a CAGR of 25.0% from 2021 to 2025. The CRO market for clinical stage grew from RMB15.7 billion in 2017 to RMB32.7 billion in 2021, representing a CAGR of 20.1%. The CRO market for clinical stage is expected to grow from RMB32.7 billion in 2021 to RMB85.0 billion in 2025, representing a CAGR of 27.0%.



## INDUSTRY OVERVIEW

### Value Chain of China’s ICL Market

The following diagram illustrates the upstream and downstream sectors of China’s ICL market:



Source: Frost & Sullivan analysis

### Entry Barriers of China’s ICL Market

Despite the drivers discussed above, there remains significant entry barriers and challenges to the new entrants in China’s ICL market:

**Complex Regulatory Framework.** The ICL market in China is heavily regulated. It is difficult and time-consuming for ICL players to apply for licenses and certificates to open laboratories and obtain approvals for testing techniques. Opening an ICL requires a Medical Institution Practicing License issued by the provincial and municipal health departments. As ICLs provide 80% of the clinical decision-making information, the regulatory authorities typically consciously limit the number of ICLs in a certain area.

**High Technological Requirements.** The development of ICLs require a lot of research investment and operation experiences. New technologies, including novel gene sequencing platform, automation lab system, 5G internet and better logistics system will enjoy wider application in the ICL industry. New ICLs may encounter difficulties with respect to diagnostics technology, cold-chain logistics, operation system build-up and other advanced technologies.

**High Stickiness between ICLs and Hospitals.** Maintaining a sustainable relationship with hospitals is of vital importance to the success of ICL players. Before a hospital intakes an ICL, it is time consuming to screen and assess an ICL’s qualifications, and it takes enormous amount of time and efforts to build customized testing services with ICLs. As such, hospitals often prefer established ICLs that they are familiar with, and new entrants are often faced with unfavorable terms from hospitals, or if they are able to get business from such hospitals at all.

## INDUSTRY OVERVIEW

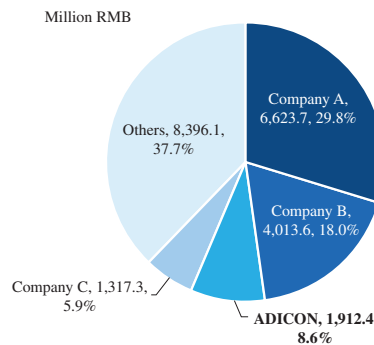
*Economies of Scale.* Existing and successful ICLs generally have a large network of laboratories and are able to drive down their costs and enjoy higher cost efficiency in procuring logistics services, establishing distribution network and lowering average fixed cost through centralized management. Because of the large quantity of consumables purchased by ICLs, the centralized purchase of diagnostic instruments and reagents can effectively reduce their purchase cost. The large-scale inspection of samples can reduce the fixed cost per inspection, and the test price is usually 70% to 80% of the standard tests. Large-scale companies may have higher cost efficiency of cost management of R&D, personnel training, storage and transportation.

*Professional Team.* Large scale ICLs require diagnostic technicians, advanced equipment and laboratory technology platform to ensure the accuracy of diagnostic results. It is difficult for a start-up company to have the same financial resources to equip with advanced equipment and experimental technology platform, and carry out professional training for diagnostic technicians.

### Competitive Landscape

In 2021, top four major ICLs accounted for 62.3% of the total ICL market share in China. In the future, leading ICLs will continue to accelerate the chain-based expansion of laboratory network nationwide to further enhance their competitiveness. The rest of the market is relatively fragmented with a number of regional market players.

#### Breakdown of China ICL Market by Companies without COVID-19 Testing, 2021



Source: Frost & Sullivan analysis

Note: The market share is calculated based on the China ICL market size without COVID-19 testing.

The following table shows basic information of top four ICLs in China in terms of market share by the end of 2021.

Rank	Name	Market Share	Listing Venue	Year of Establishment	Geographic Coverage	Business Model
1.	Company A	29.8%	Shanghai Stock Exchange	1994	Mainland China and Hong Kong	An independent third-party medical diagnostic service organization with diagnostic service outsourcing as its core business.
2.	Company B	18.0%	Shenzhen Stock Exchange	2001	Mainland China	An independent third-party medical diagnostic service organization, medical diagnostic distributor and medical diagnostic equipment manufacturer.
3.	Our Company	8.6%	/	2004	Mainland China	An independent third-party medical diagnostic service organization with diagnostic service outsourcing as its core business.
4.	Company C	5.9%	Shenzhen Stock Exchange	1999	Asia, US, and EU	A genomic focused equipment and diagnostic service organization.

## INDUSTRY OVERVIEW

The following table sets forth the key operating metrics of top four ICLs in China in terms of market share by the end of 2021.

Rank	Name	Number of Laboratories	Testing Item	Number of Cooperated Medical Institutions	Number of Employees	ICL Business Revenue (FY2021) <sup>(2)</sup>
1.	Company A	39	3,000	~23,000	12,371	6,623.7
2.	Company B	38	2,800	~20,000	11,123	4,013.6
3.	Our Company	26	3,100	~16,000	5,285	1,912.4
4.	Company C	17	N/A <sup>(1)</sup>	~4,000	4,333	1,317.3

*Notes:*

(1) The number of testing items of Company C is not publicly available.

(2) In RMB millions.

### Future Trends of China’s ICL Market

Frost & Sullivan forecasts the future trends of ICL market in China will primarily focus on the following:

*Technology Advancement.* Advancement in technology has been impacting healthcare practices. For example, next generation DNA sequencing is more widely used in cancer research due to its advantages over traditional genomic analytic methods in terms of higher accuracy, speed and precision as well as lower sample requirements. Moreover, emerging new mobile technologies, information technologies, automated laboratory systems, and ever advancing logistics capabilities have been changing the way that medical institutions deliver the healthcare services, and further boosting the growth of the ICL market.

*Increasing Consolidation.* Large ICLs have a competitive advantage due to their large networks, extensive test offerings, and lower cost structures resulting from their scale effects. These advantages enable them to serve customers more effectively. In the future, small ICL companies without competitive advantages are likely to be phased out and the industry will become more concentrated.

*Growing Market for Esoteric Tests.* Compared to routine tests, esoteric tests are more difficult to be operated in hospital-based laboratories due to the higher costs and lower single hospital demand. This, however, presents great opportunities for ICLs which enjoy cost-effective advantages over hospital-based laboratories, resulting from their scale effect. It is expected that esoteric tests will comprise a larger proportion of the overall clinical laboratory market in the future.

*Increasing number of ICL players.* The advancement of new technologies and influx of capital investment has stimulated the emergence of new entrants in the ICL market in China. The total number of ICLs have increased from less than 70 in 2009 to more than 2,100 in 2021. Players with strong technology and access to capital become future leaders in the market.

*Growing Esoteric Test Menu.* There is a huge gap between China’s esoteric testing items, roughly 3,000, to that of the leading European Union and the United States providers with roughly 5,000, respectively. As the esoteric testing market gets more mature, the range of the testing items will expand accordingly in terms of the number of testing items and therapeutic areas covered, gradually catching up to the developed countries.

---

## INDUSTRY OVERVIEW

---

### IMPACT OF COVID-19 ON CHINA’S ICL MARKET

After the outbreak of COVID-19 in late 2019, the demand for COVID-19 related tests in China had soared starting from the first quarter of 2020. COVID-19 related tests primarily include nucleic acid tests using PCR technology and immuno-based detection tests, both of which are categorized as esoteric tests. The market size of ICL COVID-19 testing services reached RMB15.9 billion in 2021 and is expected to reach RMB15.3 billion in 2022. Driven by the dramatic increase of COVID-19 tests, the market size of esoteric testing service has shown a strong growth potential during the pandemic. However, as government has lifted the COVID-19 restrictions and mass testings requirements in December 2022, the COVID-19 testing market size is expected to gradually decrease in the next few years and reach RMB4.1 billion in 2025, though it is not expected to diminish completely, accordingly to Frost & Sullivan. However, the future demand for COVID-19 tests is subject to a number of uncertainties, including future development of the disease and treatment, and it is difficult to predict.

### SOURCE OF INFORMATION

In connection with the [REDACTED], we have engaged Frost & Sullivan to conduct a detailed analysis and prepare an industry report on China’s ICL industry. Frost & Sullivan is an independent global market research and consulting company which was founded in 1961 and is based in the United States. Services provided by Frost & Sullivan include market assessments, competitive benchmarking, and strategic and market planning for a variety of industries. We incurred a total of RMB680,000 in fees and expenses for the preparation of the Frost & Sullivan Report. The payment of such amount was not contingent upon our successful [REDACTED] or on the results of the Frost & Sullivan Report. Except for the Frost & Sullivan Report, we did not commission any other industry report in connection with the [REDACTED].

We have included certain information from the Frost & Sullivan Report in this document because we believe such information facilitates an understanding of China’s ICL industry for potential investors. Frost & Sullivan prepared its report based on its in-house database, independent third party reports and publicly available data from reputable industry organizations. Where necessary, Frost & Sullivan contacts companies operating in the industry to gather and synthesize information in relation to the market, prices and other relevant information. Frost & Sullivan believes that the basic assumptions used in preparing the Frost & Sullivan Report, including those used to make future projections, are factual, correct and not misleading. Frost & Sullivan has independently analyzed the information, but the accuracy of the conclusions of its review largely relies on the accuracy of the information collected. Frost & Sullivan research may be affected by the accuracy of these assumptions and the choice of these primary and secondary sources.