About the authors

**Emile Dirks** is a PhD candidate in political science at the University of Toronto.

**Dr James Leibold** is an Associate Professor and Head of the Department of Politics, Media and Philosophy at La Trobe University and a non-resident Senior Fellow at ASPI.

Acknowledgements

The authors would like to thank Danielle Cave, Derek Congram, Victor Falkenheim, Fergus Hanson, William Goodwin, Bob McArthur, Yves Moreau, Kelsey Munro, Michael Shoebridge, Maya Wang and Sui-Lee Wee for valuable comments and suggestions with previous drafts of this report, and the ASPI team (including Tilla Hoja, Nathan Ruser and Lin Li) for research and production assistance with the report. ASPI is grateful to the Institute of War and Peace Reporting and the US State Department for supporting this research project.

What is ASPI?

The Australian Strategic Policy Institute was formed in 2001 as an independent, non-partisan think tank. Its core aim is to provide the Australian Government with fresh ideas on Australia’s defence, security and strategic policy choices. ASPI is responsible for informing the public on a range of strategic issues, generating new thinking for government and harnessing strategic thinking internationally.

ASPI International Cyber Policy Centre

ASPI’s International Cyber Policy Centre (ICPC) is a leading voice in global debates on cyber and emerging technologies and their impact on broader strategic policy. The ICPC informs public debate and supports sound public policy by producing original empirical research, bringing together researchers with diverse expertise, often working together in teams. To develop capability in Australia and our region, the ICPC has a capacity building team that conducts workshops, training programs and large-scale exercises both in Australia and overseas for both the public and private sectors. The ICPC enriches the national debate on cyber and strategic policy by running an international visits program that brings leading experts to Australia.

ASPI’s International Cyber Policy Centre has no core funder. Rather, it is supported by a mixed funding base that includes sponsorship, research and project support from across governments, industry and civil society.

Important disclaimer

This publication is designed to provide accurate and authoritative information in relation to the subject matter covered. It is provided with the understanding that the publisher is not engaged in rendering any form of professional or other advice or services. No person should rely on the contents of this publication without first obtaining advice from a qualified professional.

ASPI

Tel +61 2 6270 5100
Email enquiries@aspi.org.au
www.aspi.org.au
www.aspistrategist.org.au
facebook.com/ASPI.org
@ASPI_ICPC

© The Australian Strategic Policy Institute Limited 2020

This publication is subject to copyright. Except as permitted under the Copyright Act 1968, no part of it may in any form or by any means (electronic, mechanical, microcopying, photocopying, recording or otherwise) be reproduced, stored in a retrieval system or transmitted without prior written permission. Enquiries should be addressed to the publishers. Notwithstanding the above, educational institutions (including schools, independent colleges, universities and TAFEs) are granted permission to make copies of copyrighted works strictly for educational purposes without explicit permission from ASPI and free of charge.

First published June 2020.

ISSN 2209-9689 (online)
ISSN 2209-9670 (print)

Cover image: DNA molecules with binary code, 3d render: iStockphoto/ymgerman.
Genomic surveillance

Inside China’s DNA dragnet

Emile Dirks and James Leibold
<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>What’s the problem?</td>
<td>03</td>
</tr>
<tr>
<td>What’s the solution?</td>
<td>03</td>
</tr>
<tr>
<td>Executive summary</td>
<td>04</td>
</tr>
<tr>
<td>China’s national Y-STR database</td>
<td>07</td>
</tr>
<tr>
<td>Building comprehensive social control</td>
<td>11</td>
</tr>
<tr>
<td>Corporate complicity</td>
<td>17</td>
</tr>
<tr>
<td>Human rights violations</td>
<td>21</td>
</tr>
<tr>
<td>1. Lack of legal authority</td>
<td>21</td>
</tr>
<tr>
<td>2. Lack of informed consent</td>
<td>22</td>
</tr>
<tr>
<td>3. Lack of privacy</td>
<td>23</td>
</tr>
<tr>
<td>Recommendations</td>
<td>25</td>
</tr>
<tr>
<td>Appendix 1: Data sources</td>
<td>26</td>
</tr>
<tr>
<td>Appendix 2: How Y-STR samples are collected</td>
<td>27</td>
</tr>
<tr>
<td>1. Preparatory meetings</td>
<td>27</td>
</tr>
<tr>
<td>2. Creating family trees</td>
<td>27</td>
</tr>
<tr>
<td>3. Compulsory collection of blood samples</td>
<td>29</td>
</tr>
<tr>
<td>4. Data sharing with public security bureaus</td>
<td>33</td>
</tr>
<tr>
<td>Appendix 3: Estimating the scale of Y-STR sample collection</td>
<td>34</td>
</tr>
<tr>
<td>Appendix 4: Companies participating in national Y-STR data collection</td>
<td>38</td>
</tr>
<tr>
<td>Notes</td>
<td>42</td>
</tr>
</tbody>
</table>
What’s the problem?

The Chinese Government is building the world’s largest police-run DNA database in close cooperation with key industry partners across the globe. Yet, unlike the managers of other forensic databases, Chinese authorities are deliberately enrolling tens of millions of people who have no history of serious criminal activity. Those individuals (including preschool-age children) have no control over how their samples are collected, stored and used. Nor do they have a clear understanding of the potential implications of DNA collection for them and their extended families.

Earlier Chinese Government DNA collection campaigns focused on Tibet and Xinjiang, but, beginning in late 2017, the Ministry of Public Security expanded the dragnet across China, targeting millions of men and boys with the aim to ‘comprehensively improve public security organs’ ability to solve cases, and manage and control society’.¹ This program of mass DNA data collection violates Chinese domestic law and global human rights norms. And, when combined with other surveillance tools, it will increase the power of the Chinese state and further enable domestic repression in the name of stability maintenance and social control.

Numerous biotechnology companies are assisting the Chinese police in building this database and may find themselves complicit in these violations. They include multinational companies such as US-based Thermo Fisher Scientific and major Chinese companies like AGCU Scientific and Microread Genetics. All these companies have an ethical responsibility to ensure that their products and processes don’t violate the fundamental human rights and civil liberties of Chinese citizens.

What’s the solution?

The forensic use of DNA has the potential to solve crimes and save lives; yet it can also be misused and reinforce discriminatory law enforcement and authoritarian political control. The Chinese Government and police must end the compulsory collection of biological samples from individuals without records of serious criminal wrongdoing, destroy all samples already collected, and remove all DNA profiles not related to casework from police databases. China must enact stringent restrictions on the collection, storage, use and transfer of human genomic data.

The Chinese Government must also ensure that it adheres to the spirit of the International Covenant on Civil and Political Rights (1966), the International Declaration on Human Genetic Data (2003), the Universal Declaration on the Human Genome and Human Rights (1997) and the Convention on the Rights of the Child (1989), as well as China’s own Criminal Law (2018). National and international legal experts have condemned previous efforts to enrol innocent civilians and children in forensic DNA databases, and the UN Special Rapporteur on the right to privacy should investigate the Chinese Government’s current collection program for any violations of international law and norms.²

Foreign governments must strengthen export controls on biotechnology and related intellectual property and research data that’s sold to or shared with the Chinese Government and its domestic public and private partners. Chinese and multinational companies should conduct due diligence and independent audits to ensure that their forensic DNA products and processes are not being used in ways that violate the human and civil rights of Chinese citizens.
Executive summary

Forensic DNA analysis has been a part of criminal investigations for more than three decades. Dozens of countries have searchable DNA databases that allow police to compare biological samples found during forensic investigations with profiles stored in those databases. China is no exception.

In 2003, China’s Ministry of Public Security began building its own forensic DNA database. Like other such databases, it contains samples taken from criminal offenders and suspects. However, since 2013, Chinese authorities have collected DNA samples from entire ethnic minority communities and ordinary citizens outside any criminal investigations and without proper informed consent. The Chinese Government’s genomic dataset likely contains more than 100 million profiles and possibly as many as 140 million, making it the world’s largest DNA database, and it continues to grow (see Appendix 3).

This ASPI report provides the first comprehensive analysis of the Chinese Government’s forensic DNA database and the close collaboration between Chinese and multinational companies and the Chinese police in the database’s construction. It draws on more than 700 open-source documents, including government bid tenders and procurement orders, public security bureaus’ Weibo and Weixin (WeChat) posts, domestic news coverage, social media posts, and corporate documents and promotional material (see Appendix 1). This report provides new evidence of how Xinjiang’s well-documented biosurveillance program is being rolled out across China, further deepening the Chinese Government’s control over society while violating the human and civil liberties of millions of the country’s citizens.

The indiscriminate collection of biometric data in China was first reported by Human Rights Watch. Beginning in 2013, state authorities obtained biometric samples from nearly the entire population of the Tibetan Autonomous Region (3 million residents) under the guise of free annual physical exams (Figure 1). In 2016, a similar program was launched in Xinjiang, where data from nearly all of the region’s 23 million residents was collected.

Figure 1: Blood being collected as part of the free physical exam projects in Lhasa, Tibet Autonomous Region, May 2013, and Urumqi, Xinjiang Uyghur Autonomous Region, February 2018
In those minority regions, DNA collection was only one element of an ongoing multimodal biometric surveillance regime, which also includes high-definition photos, voiceprints, fingerprints and iris scans, which are then linked to personal files in police databases. In both Xinjiang and Tibet, authorities intentionally concealed the reasons for biometric collection. When that data was combined with an extensive system of security cameras and intrusive monitoring of local families, the Chinese Government was able to extend its control over these already tightly monitored communities.

Such programs, however, were only the beginning. Starting in late 2017, Chinese police expanded mass DNA data collection to the rest of the country. Yet in contrast to the wholesale approach adopted in Tibet and Xinjiang, authorities are using a more cost-efficient but equally powerful method: the collection of DNA samples from selected male citizens. This targeted approach gathers Y-STR data—the ‘short tandem repeat’ or unique DNA sequences that occur on the male (Y) chromosome. When these samples are linked to multigenerational family trees created by the police, they have the potential to link any DNA sample from an unknown male back to a specific family and even to an individual man.

In this report, we document hundreds of police-led DNA data-collection sorties in 22 of China’s 31 administrative regions (excluding Hong Kong and Macau) and across more than a hundred municipalities between late 2017 and April 2020. Evidence suggests that, in some locations, blood collection has occurred in preschools (Figure 2) and even continued during the Covid-19 pandemic. Figure 2: One of more than 1,500 blood samples collected from kindergarten and elementary school students in Xiabaishi Township, Fujian Province, June 2019

The scale and nature of this program are astounding. We estimate that, since late 2017, authorities across China have sought to collect DNA samples from 5–10% of the country’s male population, or roughly 35–70 million people (Figure 3, and see Appendix 3). These ordinary citizens are powerless to refuse DNA collection and have no say over how their personal genomic data is used. The mass and compulsory collection of DNA from people outside criminal investigations violates Chinese domestic law and international norms governing the collection, use and storage of human genetic data.
The corporate world is profiting handsomely from this new surveillance program. Leading Chinese and multinational companies are providing the Chinese police with the equipment and intellectual property needed to collect, store and analyse the Y-STR samples. Key participants include Thermo Fisher Scientific, which is a US-headquartered biomedical and bioinformatics company, and dozens of Chinese companies, including AGCU Scientific, Forensic Genomics International, Microread Genetics and Highershine (see Appendix 4). Under China’s 2019 Regulations on Human Genetic Resource Management, if these companies partner with public security bureaus to develop new forensic products, any results and patents must be shared with the police. The continued sale of DNA profiling products and processes to China’s public security bureaus is inconsistent with claims that these companies have made to improve the quality of life and wellbeing of the communities they serve.
China’s national Y-STR database

In 2003, China's Ministry of Public Security established a national DNA database for police forensic work.12 Over the following decade, police collected DNA samples during criminal investigations. However, by the early 2010s, Chinese authorities began to engage in the mass collection of DNA from even wider groups. This included not only programs in Tibet and Xinjiang, which were the first to start, but also more targeted efforts elsewhere. Between 2014 and 2016, the Public Security Bureau of Henan Province collected DNA samples from 5.3 million men, or roughly 10% of the province’s male population.13 The province’s police saw the project as a massive improvement in their ability to conduct forensic investigations and extend state surveillance over even more of Henan’s population.

The success of that project encouraged its expansion nationwide and, on 9 November 2017, the Ministry of Public Security held a meeting in Henan’s provincial capital, Zhengzhou, calling for the construction of a nationwide Y-STR database (Figure 4).14

Figure 4: Ministry of Public Security Meeting on Promoting Nationwide Y-STR Database Construction, Zhengzhou, Henan Province, November 2017

Data collection quickly expanded across the country. Between November 2017 and April 2020, documented instances of police-led Y-STR sample collection have been found in 22 of China’s 31 administrative regions (excluding Hong Kong and Macau) and in more than a hundred municipalities.15 Those are only the instances for which we have direct evidence. Given the national scope of this program, these figures are certainly an underestimate.

Unlike autosomal STR data, which is present in the DNA of both males and females, Y-STRs (the short tandem repeats on Y chromosomes) are found only in male DNA.16 Passed directly from father to son, they aren’t recombined with every successive generation. There’s therefore little variation in Y-STRs, apart from random mutations, and the Y-STR profile of a man will be nearly identical to that of his
patrilineal male blood relatives. This means that forensic traces drawn from Y-STR data can point only to a genetically related group of men and not to an individual man.

However, when combined with accurate genealogical records (family trees) and powerful next-generation gene sequencers, Y-STR analysis can be a powerful tool. Because surnames are usually inherited from fathers, men who share a common surname are likely to share a common paternal ancestor and a common Y-STR profile. Likewise, if the Y-STR profiles of two men match, their surnames are likely to match, too. Therefore, if a Y-STR database contains a large representative sample of DNA profiles and corresponding family records, even an unknown male’s data can potentially be matched to a family name and even an individual, so long as investigators have on file the Y-STR data of that male’s father, uncle or even third cousin (Figure 5).

**Figure 5: Illustration of shared Y-STR profile among patrilineal male relatives (translated)**

Source: ‘The “hero” behind the murder case of the girl from the Southern Medical University: What is the Y-STR family investigation technique?’ (南医大女生被害案背后 “功臣”：Y-STR家系排查技术是什么), Youku Video Net (优酷影视网), 25 February 2020, online. Partially translated from Chinese by ASPI.

For the Chinese Government, Y-STR analysis presents a more cost-effective and efficient method of building a national genetic panopticon. Unlike in Tibet and Xinjiang, authorities don’t need to collect DNA samples from all Chinese citizens in order to dramatically increase their genomic surveillance capacity. Authorities in Henan achieved 98.71% genetic coverage of the province’s total male population by collecting Y-STR samples from 10% of the province’s men and developing family trees for nearly all of the province’s patrilineal families. Following a similar program nationally, Chinese authorities could achieve genetic coverage for nearly all men and boys in China.

This is highly disturbing. In China’s authoritarian one-party system, there’s no division between policing crime and suppressing political dissent. A Ministry of Public Security-run national database of Y-STR samples connected to detailed family records for each sample would have a chilling impact not only on dissidents, activists and members of ethnic and religious minorities, but on their extended family members as well.
The Chinese state has an extensive history of using threats and violence against the families of regime targets in order to stamp out opposition to the Communist Party. Leaked documents obtained by the International Consortium of Investigative Journalists and The New York Times reveal that authorities in Xinjiang collect information on family members of detainees in the region’s re-education camps, and a detainee’s release is conditional upon the behaviour of their family members outside the camps. The repression of family members extends far beyond Xinjiang. Parents and children of prominent human rights lawyers, and the siblings of overseas government critics, are routinely detained and tortured by Chinese police.

By forcing a dissident’s family to pay the price for their relative’s activism, these tactics cruelly yet effectively increase the cost of resistance. A police-run Y-STR database containing biometric samples and detailed multigenerational genealogies from all of China’s patrilineal families is likely to increase state repression against the family members of dissidents and further undermine the civil and human rights of dissidents and minority communities.
We also know that Chinese researchers are increasingly interested in forensic DNA phenotyping. This computational analysis of DNA samples—also known as ‘biogeographic ancestry inferences’—allows investigators to predict the biogeographical characteristics of an unknown sample, such as hair and eye colour, skin pigmentation, geographical location, and age. Chinese scientists have been at the forefront of these controversial methods, claiming to be able to identify whether a sample belongs to an ethnic Uyghur or a Tibetan, among other ethnic groups. Scientists have warned about the potential for ethnic discrimination, yet Chinese scientists are using these methods to assist the Chinese police in targeting ethnic minority populations for greater surveillance, while Chinese and foreign companies are competing to provide the Chinese police with the tools to do their work.

Figure 8: Blood collection in Xi’an, Shaanxi Province, April 2020, and Tongchuan, Shaanxi Province, February 2019

Sources: ‘The technical squadron of the Criminal Police Brigade of the Huyi Branch Bureau fully endeavoured to ensure the smooth progress of the construction of the Y library’ (鄠邑分局刑警大队技术中队全力保障Y库建设工作顺利进行), Meipian (美篇网), 2 April 2020, online; ‘Chen Jiashan Police Station catches up and surpasses, and completes the Y library information collection task’ (陈家山派出所追赶超越 全面完成Y库信息采集任务), Meipian (美篇网), 24 February 2019, online.

A national database containing the genetic information of tens of millions of ordinary Chinese citizens is a clear expansion of the already unchecked authority of the Chinese Government and its Ministry of Public Security. Chinese citizens are already subjected to extensive surveillance. Even beyond Tibet and Xinjiang, religious believers and citizen petitioners across China are added to police databases to track their movements, while surveillance cameras have expanded across the country’s rural and urban areas. The expansion of compulsory biometric data collection only increases the power of the Chinese state to undermine the human rights of its citizens.
Building comprehensive social control

A range of justifications have been provided by Chinese authorities for the mass collection of DNA samples from boys and men across China. Some of those reasons can be found in a notice released online on 1 April 2019 by the Public Security Bureau in Putian, Fujian Province:

**Blood Collection Notice**

In order to cooperate with the foundational investigative work of the seventh national census and the third generation digital ID cards, our district’s public security organs will on the basis of earlier village ancestral genealogical charts, select a representative group of men from whom to collect blood samples.

This work will not only help carry on and enhance the genealogical culture of the Chinese people, but will also effectively prevent children and the elderly from going missing, assist in the speedy identification of missing people during various kinds of disasters, help police crack cases, and to the greatest extent retrieve that which is lost for the masses. This is a great undertaking that will benefit current and future generations, and we hope village residents will enthusiastically cooperate.35

From this and other similar notices found across the Chinese internet, it can be difficult to assess the primary motive behind this program. Yet there are clear indications that it is the forensic and social control applications of the program—commonly referred to as the construction of a ‘male ancestry inspection system’—which most interest authorities. An 18 November 2019 article from *People’s Daily Hubei* states:
The construction of a male ancestry investigation system is currently important work being carried out across the country by the Ministry of Public Security. Through foundational work such as illustrative mapping of male ancestral families, the extraction of biological specimens, and the collection of samples and building of databases, we will further understand and grasp the information of male individuals. In this way we will strengthen the use of male hereditary marker DNA technology, continue to increase the efficiency of the investigative screening of criminal offenders, comprehensively improve public security organs’ ability to solve cases, and manage and control society, and maximise the efficiency of criminal technologies to crack cases.36

At first glance, it might appear that Chinese police are engaged in the mass screening of local men as part of ongoing forensic investigations. So-called ‘DNA dragnets’ are rare but not unheard of: in 2012, Dutch police collected Y-STR data through cheek swabs from 6,600 male volunteers as part of an investigation into the 1999 rape and murder of a teenage girl,37 while Y-STR samples were collected from 16,000 men as part of a criminal investigation into the 2011 murder of an Italian teenager.38

Yet such mass screenings are highly controversial. Both the Forensic Genetics Policy Initiative39 and the Irish Council for Civil Liberties40 note that police pressure can transform the ‘voluntary’ submission of samples into compulsory acts, while the American Civil Liberties Union has condemned police-led DNA dragnets in the US as ‘a serious intrusion on personal privacy’.41 Best practices require that DNA samples collected in such mass screenings should be connected to a specific criminal investigation, provided only by volunteers in the geographically restricted area in which the offence took place, and be destroyed following the completion of the investigation.

The Chinese Government’s program of male DNA data collection violates all of those principles. In none of the hundreds of instances of police-led mass DNA collection-related work uncovered in our research is data collection described as part of an ongoing forensic investigation. Nor are any of the men or boys targeted for DNA collection identified as criminal suspects or as relatives of potential offenders. Finally, China’s authoritarian political system makes refusing police requests for DNA samples impossible.

Figure 9: Blood collection in Kaifeng, Henan Province, August 2019 (cropped), and Ordos, Inner Mongolia, October 2018 (still image from video)

Sources: ‘Xinghua Camp has taken several measures to complete the Y-DNA blood collection task’ (杏花营所多项举措完成DNAY库采血任务), Meipian (美篇网), 14 August 2019, online; ‘Albas police station actively carries out blood collection work of Y library construction’ (阿尔巴斯派出所积极开展Y库建设采血工作), Meipian (美篇网), 24 October 2018, online.
Instead, the Chinese Government’s national Y-STR database appears to be part of larger efforts to deepen comprehensive social control and develop multimodal biometric profiles of individual citizens. Those profiles would allow state security agents to link personal information to biometric profiles, including DNA samples, retinal scans, fingerprints and vocal recordings. When completed, such a system could allow Chinese police to connect biometric data from any unknown sample to identifying personal information.

As in the earlier campaigns in Tibet and Xinjiang, DNA collection occurs in a range of places, including private homes, schools, streets, shops and village offices (see Appendix 2 for a full description of the collection process). Unlike in those two regions, the current program seems aimed at all Chinese men and boys, irrespective of ethnicity or religious faith. Yet there’s evidence that in one case police targeted ethnic Hui Muslims at a local cultural event, in a possible extension of the anti-Muslim campaign that began in Xinjiang (Figure 10).

Figure 10: DNA sample collection in a private residence in Jinhua, Zhejiang Province, September 2018, and at a Hui ethnic minority community centre in Shiyan, Hubei Province, October 2019

Sources: ‘The Baima Police Station of the County Public Security Bureau went to the jurisdiction to carry out blood collection work’ (县公安局白马派出所到辖区开展血液采集工作), Pujiang County Public Security Bureau (浦江县公安局), 28 September 2018, online; ‘The Hubeikou Police presented safety lectures to the Hui ethnic people on the spot and collected male blood samples during the holy Ramadan festival of the Hui ethnic people’ (湖北口派出所利用回族群众圣纪节日,给到场回族群众做法制安全讲座, 并采集男性血样), Hexie Hubeikou Microblog (和谐湖北口微博), 10 October 2019, online.

The scale of data collection is enormous. Tens of thousands of DNA samples have been collected in single localities. In Tunliu County in Chanzhi, Shanxi Province, local authorities recommended collecting blood samples from 36,000 men, or roughly 26% of the county’s male residents; in Laoting County in Tangshan, Hebei Province, 56,068 samples were recommended for collection from the county’s 320,144 men; and an invitation for bids for the construction of a Y-STR database for the Xian’an District of Xianning, Hubei Province, states that 40,000 blood samples were collected from the district’s roughly 300,000 male residents. These figures alone—a mere fraction of the total size of the Chinese Government’s current DNA collection program—represent some of the largest targeted DNA dragnets in police history.

More disturbing still is the compulsory collection of DNA samples from children (Figure 11). Unconnected to any criminal investigation, police have collected blood samples from students at schools across China, including in Shaanxi, Sichuan, Jiangxi, Hubei, Fujian and Anhui. In a single township in Fujian, more than 1,500 blood samples were taken from students at local kindergartens and elementary schools. In some cases, teachers have been enlisted to assist in DNA collection.
These accounts are in keeping with a 2017 *Wall Street Journal* investigation that found that police in rural Qianwei, Sichuan Province, collected DNA samples from male schoolchildren without explanation (Figure 12).60 This is a clear violation of Article 16 of the UN’s Convention on the Rights of the Child (to which China is a signatory) against the ‘arbitrary or unlawful interference with [a child’s] privacy’61 and an abuse of the authority police have over vulnerable adolescents.

While DNA samples are taken from men and boys outside of a police investigation, data samples are stored permanently in the Ministry of Public Security’s National Public Security Organ DNA Database (Figure 13).62
Like the FBI’s Combined DNA Index System (CODIS) in the US, China’s national database permits DNA samples collected by police to be compared with samples stored in hundreds of local and provincial databases across the country. This database also contains additional core STR loci (locations on a chromosome) for enhanced discriminatory capacity tailored to the ethnic make-up of China’s population.

The Chinese Government’s DNA database feeds into a constantly evolving program of state surveillance under the banner of the Golden Shield Project, which is led by the Ministry of Public Security. The project seeks to make the personal information of millions of Chinese citizens, including forensic and personal data, available to local police officers nationwide. According to the website of Highershine Biological Information Technology Co. Ltd, a company that builds Y-STR databases for the Ministry of Public Security, its databases allow DNA data to be compared with non-genetic data on Chinese citizens contained in the national personal residence database system and the comprehensive police database system, which are both part of China’s Golden Shield Project (Figure 14).
Evidence already suggests that this new DNA database is being integrated with other forms of state surveillance and ‘stability maintenance’ social control operations.66 Local officials in Sichuan Province have linked Y-STR data collection to the Sharp Eyes Engineering Project,67 which is a national surveillance program aimed at expanding video monitoring across rural and remote areas.68 The Chinese company Anke Bioengineering has also spoken of building a ‘DNA Skynet’,69 in an apparent allusion to another national surveillance program.70
Corporate complicity

Chinese and multinational companies are working closely with the Chinese authorities to pioneer new, more sophisticated forms of genomic surveillance. According to Ping An Securities, China’s forensic DNA database market generates ¥1 billion (US$140 million) in sales each year and is worth around ¥10 billion (US$1.4 billion) in total.71 Competition is intense. While multinational companies currently dominate equipment sales, domestic players are making significant inroads, and biotechnology is listed as a critical sector in the Chinese Government’s Made in China 2025 strategy.72 More than two dozen Chinese and multinational companies are known to have supplied local authorities with Y-STR equipment and software (see Appendix 4).

One of the key domestic producers of Y-STR analysis kits is AGCU Scientech Inc.,73 which is a subsidiary of one of China’s largest and fastest growing biotech companies, Anhui Anke Bioengineering (Group) Co. Ltd.74 AGCU’s founder and Anke’s vice president is Dr Zheng Weiguo.75 After working for Thermo Fisher affiliate Applied Biosystems and other companies in the US, he was invited by the Ministry of Public Security to help develop the Chinese Government’s DNA database in 2004 and set up AGCU in the city of Wuxi under the Thousand Talents Program in 2006.76 He now serves as an expert judge for this Chinese Government talent recruitment program and has been awarded numerous state prizes for his scientific and patriotic contributions.77

AGCU has partnered with public security bureaus across China to apply for patents for Y-STR testing kits78 and in 2018 entered into an exclusive distribution partnership with US biotech company Verogen to sell Illumina’s next-generation DNA sequencers in China.79 AGCU is now actively promoting Illumina next-generation solutions at domestic and international trade fairs organised by the Ministry of Public Security (Figure 15).80

Figure 15: An AGCU engineer discusses Y-STR data systems at the Public Security Bureau of Pingxiang, Jiangxi Province, August 2018

Source: ‘Pingxiang City Public Security Bureau Male Family Investigation System Construction Promotion Conference and “FamilyCraftsmen” training class’ (萍乡公安机关男性家族排查系统建设工作推进会暨“家系工匠”培训班), Meipian (美篇网), 17 August 2018, online.
Other players include Forensic Genomics International,\(^8^1\) which is a fully owned subsidiary of the Beijing Genomic Institute Group—a company with an increasingly global footprint. In August 2018, Forensic Genomics International signed a strategic partnership agreement with the Public Security Bureau of Xi’an\(^8^2\) and has worked with other public security bureaus to build Y-STR databases as part of this national program.\(^8^3\) Another company is Micreread Genetics Co. Ltd, a leading life sciences company with a joint genetic lab in Kazakhstan,\(^8^4\) which has won contracts to provide public security bureaus with Y-STR testing kits\(^8^5\) and database construction services.\(^8^6\)

Beijing Hisign Technology Co. Ltd is also providing Y-STR database solutions to the Ministry of Public Security.\(^8^7\) Founded by former People’s Liberation Army member Liu Xiaochun,\(^8^8\) Hisign has developed a range of big-data biometric surveillance products used to collect, store and analyse finger (palm) patterns, facial scans and forensic DNA samples (Figure 16).\(^8^9\) Its Y-STR databases, which the company boasts can be 'seamlessly connected with the DNA National Library' and which can 'provide intelligent family tree mapping', are used by the public security bureaus of eight provinces, autonomous regions and directly administered cities.\(^9^0\)

Figure 16: Hisign’s Y-STR database genealogical mapping function

A number of leading multinational companies are also providing DNA sequencers and other forensic technologies to public security bureaus across China. They include the China subsidiaries of Thermo Fisher Scientific and Eppendorf. Of those companies, Thermo Fisher’s role is most prominent. This corporate giant has 5,000 employees in China, which contributed over 10% of the company’s US$25 billion in revenue in 2019.\(^9^1\)

The company’s involvement in biometric surveillance in Xinjiang is well documented.\(^9^2\) But, while it has vowed to stop selling human identification products in the region,\(^9^3\) Thermo Fisher’s extensive involvement in the Ministry of Public Security’s national DNA database program is less well known.

One week before the launch of the national Y-STR data program, representatives from Thermo Fisher joined Chinese academics and police officials at a conference held by the Forensic Science Association of China in Chengdu, Sichuan, from 1 to 3 November 2017 (Figure 17).\(^9^4\) Recorded presentations from the conference give a clear sense of how closely Thermo Fisher has worked with the Ministry of Public Security to improve police collection of Y-STR data.
In a talk by Dr Zhong Chang, a researcher at Thermo Fisher, two of the company’s DNA kits—the VeriFiler Plus PCR amplification kit\(^9\) and Yfiler Platinum PCR amplification kit\(^9\)—are described as having been created in direct response to the Ministry of Public Security’s need for enhanced discriminatory capacity tailored to the ethnic make-up of China’s population.\(^7\) More disturbingly, Thermo Fisher’s Huaxia PCR amplification kit was developed specifically to identify the genotypes of Uyghur, Tibetan and Hui ethnic minorities.\(^8\)

Such kits have been instrumental to the current national Y-STR collection program aimed at ordinary men and boys, and numerous local public security bureaus have purchased Thermo Fisher Y-STR analysis kits as part of the construction of male ancestry investigation systems\(^9\) and Y-STR databases.\(^10\)

Thermo Fisher may defend these sales, as it did to Human Rights Watch in 2017, on the grounds that it’s impossible ‘to monitor the use or application of all products’ that it makes.\(^10\) That may be true, but the company is clearly aware of how its products are being used, and it actively promotes its close collaboration with the Chinese police in its Chinese-language publicity material. In a profile of Gianluca Pettiti, Thermo Fisher’s former head of China operations and current President of Specialty Diagnostics,\(^10\) the company boasts: ‘In China, our company is providing immense technical support for the construction of the national DNA database, and has already helped to build the world’s largest DNA database.’\(^10\) Similarly, in 2018, the company’s Senior Director of Product Management, Lisa Calandro, discussed the ‘sinicizing’ of their forensic science product line for the Chinese market.\(^10\)

Even if multinational companies object to the use of their genetic products as part of China’s surveillance regime, new legislation puts them at risk of acting as the handmaidens of repressive practices. Under China’s 2019 Regulations on Human Genetic Resource Management, any patents emerging from joint research projects must be shared between foreign-owned and Chinese entities.\(^10\) That means that, if Chinese or international biomedical companies partner with the public security
bureaus, their research results and patents must be shared with the police. Furthermore, Article 16 of the Regulations grants the Chinese state sweeping powers to make use of DNA datasets created by public or private researchers for reasons of ‘public health, national security and the public interest’. This means that any genetic data or processes in China may be used by Chinese authorities in ways these companies might have never intended.
Human rights violations

The Chinese Government’s genomic surveillance program is out of step with international human rights norms and best practices for the handling of human genetic material. Article 9 of the UN Universal Declaration on the Human Genome and Human Rights states that ‘limitations to the principles of consent and confidentiality may only be prescribed by law, for compelling reasons within the bounds of public international law and the international law of human rights’, while Article 12 of the UN International Declaration on Human Genetic Data states that the collection of genetic data in ‘civil, criminal or other legal proceedings’ should be ‘in accordance with domestic law consistent with the international law of human rights’.

The Chinese Government’s DNA dragnet is also a clear violation of the International Covenant on Civil and Political Rights’ prohibition against ‘arbitrary or unlawful interference’ with a person’s privacy, and Article 16 of the UN Convention on the Rights of the Child (to which China is a signatory) against the ‘arbitrary or unlawful interference with [a child’s] privacy’.

There are three areas in particular where this program appears to violate the human rights of Chinese citizens:

1. Lack of legal authority

The compulsory collection of biological samples among non-criminal offenders is not currently authorised under Chinese law. Article 132 of the revised 2018 Criminal Procedures Law only permits the collection of fingerprints, blood and urine samples from victims or suspects in criminal proceedings. Chinese authorities are aware of this issue. Chinese scholars and experts have warned about the lack of a clear legal basis for the collection of biometric samples by police outside criminal investigations, while others have cautioned about the potential for mass social unrest if compulsory collection should occur.

Figure 18: Blood collection in Tongchuan, Shaanxi Province, February 2019 (cropped), and Xi’an, Shaanxi Province, January 2020

Sources: ‘Wangjiabian Police Station solidly carried out the security work of opening the school campus’ (王家砭派出所扎实开展开学校园安保执勤工作), Meipian (美篇网), 20 February 2019, online; ‘The Zoukou Police Station combined with the “Millions of Police Entering Tens of Millions Community” activity, went deep into the jurisdiction to carry out male “Y” blood sample collection work’ (零口派出所结合“百万警进千万家”活动, 深入辖区开展男性“Y”系血样采集工作), Meipian (美篇网), 14 January 2020, online.
The compulsory collection of DNA samples in China has sparked controversy in the past. The mass DNA screening of 3,600 male university students by police in 2013 following a spate of campus thefts was condemned as disproportionate and a violation of China’s Criminal Law. When discussing the creation of a nationwide Y-STR database in 2018, Pei Yu of the Hubei Police Academy warned that the ‘large-scale coercive collection of blood’ from ordinary civilians would violate both Chinese domestic law and international norms and suggested that this would be a major legal hurdle for Chinese authorities.

Police notices and social media posts make it clear that the authorities are worried about potential pushback. Posters urge public cooperation, while police are told to carry out careful propaganda work aimed at dispelling any concerns about blood collection. Yet online posts suggest that some still question the legal basis of this program.

2. Lack of informed consent

Outside of a criminal investigation, the voluntary submission of genetic samples requires prior, free and informed consent. The Chinese Government’s current program of compulsory Y-STR data collection isn’t part of any criminal investigation. Yet there’s no evidence in the sources reviewed for this report that Chinese authorities sought people’s consent before collecting Y-STR samples; nor are those who have given samples likely to be aware of how this program could subject them and their families to greater state surveillance and potential harm.

Police provide contradictory explanations or speak in vague generalities about the purpose of the DNA collection program. A local resident, for example, expressed confusion about why men in his village were being targeted for blood collection in a 2019 social media post. Other posts express concern about being compelled to provide biometric samples. In a post made in late 2018, a netizen reported that men were being required to submit blood samples to police when applying to change their residency permits. Extensive police powers (both legal and extra-legal) make it virtually impossible for someone to refuse a request for biometric data in China.
3. Lack of privacy

Despite some assurances that personal information will be protected, police are given a wide remit to make use of genetic resources. DNA collected in Tibet and Xinjiang as part of a free ‘physicals for all’ program was used to enhance biosurveillance over those ethnic minority populations, without the knowledge of those from whom DNA samples were taken. Legal experts and ordinary citizens have also expressed concerns about the lack of robust privacy protections when it comes to Y-STR sample collection.

Figure 20: Blood collection in Yantai, Shandong Province, March 2019, and Yulin, Shaanxi Province, April 2019

Online posts note that police blood collection outside of a criminal investigation constitutes an infringement on personal privacy. In one post, a father claimed that a police officer threatened to revoke his residency permit if he didn’t provide a Y-STR sample for his child. The father wrote that, when he expressed confusion about the purpose of the program, he was asked: ‘Don’t you trust the government?’

A nationwide program of male DNA collection not only represents a serious challenge to the privacy of those whose profiles are contained in the database, but also undermines the privacy of their relatives, who may be unaware that their personal information is contained in the family trees that police have created as part of this project.

These concerns about legality, consent and privacy are all the more evident when the Chinese Government’s program is compared with two other national DNA collection programs: the UK’s National DNA Database, which until recently stored DNA samples taken from people merely suspected (but not convicted) of recordable offences, and a 2015 law in Kuwait, which would have required all residents and visitors to Kuwait to provide DNA samples to the government. Both programs were highly controversial.

In a 2008 ruling by the European Court of Human Rights, the UK’s program was found to have ‘fail[ed] to strike a fair balance between the competing public and private interests’. Likewise, the UN Human Rights Committee’s 2016 periodic review of Kuwait raised concerns about the ‘compulsory nature and the sweeping scope’ of the program, the ‘lack of clarity on whether necessary safeguards are in place...
to guarantee the confidentiality and prevent the arbitrary use of the DNA samples collected’ and ‘the absence of independent control’.129

In both cases, the collection regime was dramatically scaled back or scrapped altogether. In the UK, the European Court’s ruling led to the UK’s Protection of Freedoms Act in 2012130 and the subsequent destruction of 1.76 million DNA profiles taken from people innocent of any criminal offence.131 In the case of Kuwait, the law was eventually found to violate constitutional protections of personal liberty and privacy by the country’s supreme court in 2017.132

The criticisms leveled against the UK’s and Kuwait’s DNA programs could easily apply to the Chinese Government’s current campaign of mass DNA collection, but a similar outcome is highly unlikely. China lacks independent courts that can check the power of the Chinese Government, the Communist Party and domestic security forces.133 Nor has the Chinese Government been receptive to criticisms of earlier mass DNA collection programs made by international human rights organisations.134 Finally, China’s authoritarian political system lacks a free press, opposition political parties and a robust civil society that can openly challenge the legality of this program.135
**Recommendations**

DNA analysis is now considered the gold standard for police forensics. Recent innovations in DNA sequencing and big-data computing make the process of analysing biometric samples more efficient and cost-effective. Yet forensic DNA collection has also been linked to the abuse of police power, and even commercial genealogical websites can lead to the loss of genetic privacy for the relatives of those who have voluntarily uploaded their data. In order to defend against possible abuses, compulsory police collection and storage of biometric data must be strictly limited to those convicted of serious criminal wrongdoing.

As detailed in this report, there’s no evidence that Chinese authorities are adhering to these standards. Unconstrained by any checks on the authority of its police, the Chinese Government’s police-run DNA database system is extending already pervasive surveillance over society, increasing discriminatory law enforcement practices and further undermining the human rights and civil liberties of Chinese citizens. The tools of biometric surveillance and political repression first sharpened in Xinjiang and Tibet are now being exported to the rest of China.

In the light of our report, ASPI recommends as follows:

- The Chinese Government should immediately cease the indiscriminate and compulsory collection of DNA samples from ordinary Chinese civilians, destroy any biological samples already collected, and remove the DNA profiles of people not convicted of serious criminal offences from its forensic databases.

- The UN Special Rapporteur on the right to privacy should investigate possible human rights violations related to the Chinese Government’s DNA data collection program and broader programs of biosurveillance.

- Governments and international organisations should consider tougher export controls on equipment and intellectual property related to forensic DNA collection, storage and analysis being sold in Chinese markets.

- Biotechnology companies should ensure that their products and services adhere to international best practices and don’t contribute to human rights abuses in China, and must suspend sales, service and research collaborations with Chinese state authorities if and when violations are identified.
Appendix 1: Data sources

In chronicling the Chinese Government’s latest DNA dragnet, this report draws on more than 700 Chinese-language open-source documents that refer to the current program of Y-STR data collection, as well as related research on the forensic applications of Y-STR analysis in China and materials concerning China’s domestic forensic science market.

The sources listed in Table 1 don’t include the Chinese- and English-language sources we have cited concerning China’s broader systems of surveillance and governance, China’s earlier biometric data collection programs in Xinjiang and Tibet, or reports on DNA collection programs outside of China.

Table 1: List of primary data sources

<table>
<thead>
<tr>
<th>Type of source</th>
<th>Number of sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government websites and notices discussing the current program of Y-STR data collection</td>
<td>106</td>
</tr>
<tr>
<td>Weibo posts made by local public security bureaus concerning the current program of Y-STR data collection</td>
<td>143</td>
</tr>
<tr>
<td>Government tenders and procurement orders for Y-STR kits and database-construction-related services</td>
<td>106</td>
</tr>
<tr>
<td>Promotional material produced by companies involved in the current program of Y-STR data collection</td>
<td>23</td>
</tr>
<tr>
<td>Patent applications for Y-STR kits jointly developed by AGCU Scientech Inc. and public security bureaus</td>
<td>5</td>
</tr>
<tr>
<td>Domestic Chinese news coverage and online posts about the current program of Y-STR data collection</td>
<td>56</td>
</tr>
<tr>
<td>Posts on the photo-sharing site Meipian concerning the current program of Y-STR data collection</td>
<td>240</td>
</tr>
<tr>
<td>Videos of Y-STR sample collection</td>
<td>6</td>
</tr>
<tr>
<td>Public Weixin (WeChat) posts concerning the current program of Y-STR data collection</td>
<td>54</td>
</tr>
<tr>
<td>Chinese-language forum posts discussing the concerns of Chinese citizens about compulsory DNA data collection</td>
<td>9</td>
</tr>
<tr>
<td>Chinese academic articles on Y-STR data collection</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>757</strong></td>
</tr>
</tbody>
</table>

Documented instances of police-led Y-STR data collection have been found in 22 of China’s 31 administrative regions (excluding Hong Kong and Macau),\(^{138}\) and in more than a hundred municipalities. It’s important to note that this total is likely to be an underestimate; instances of DNA collection may go unreported, and the true scale of the program is likely to be much greater. Data collection also appears to be continuing in some locations.
Appendix 2: How Y-STR samples are collected

The Chinese Government’s Y-STR data collection program appears to happen mostly in rural areas or townships and villages located on the periphery of cities. This may be because it is easier for police to produce accurate genealogies of patrilineal families and collect samples from multiple members of the same family in rural areas, where multiple generations of a single family are more likely to live in close proximity. Furthermore, many current urban residents are first- or second-generation migrants who can trace their ancestry back to extended families living in rural areas. Greater genetic coverage of Chinese men is more likely to be achieved by focusing on their ancestral families, rather than recent migrants to major cities. Finally, Chinese authorities may be focusing on rural areas because they believe their program will face less public scrutiny there than in more developed urban areas.

No matter where data collection occurs, this program is broken down into four stages:

1. Preparatory meetings

Local Y-STR data-collection work begins with meetings led by the public security bureaus where police officers and other government officials are introduced to the role Y-STR data collection can play in combating crime and strengthening ‘social management’ (Figure 21).

![Figure 21: Local officials meeting to discuss male ancestry inspection systems, Anlu, Hubei Province, September 2019, and Weinan, Shaanxi Province, August 2018](sources: 'Chendian Township held a training seminar on mobilisation of the male family tree investigation system' (陈店乡举办男性家族排查系统建设工作动员业务培训班)，3 September 2019, online; 'Weinan Municipal Public Security Bureau's male family investigation system construction site promotion meeting was successfully held in Heyang' (渭南市公安局男性家族排查系统建设现场推进会在合阳圆满召开), 9 August 2018, online.

During these meetings, officers are organised into subgroups responsible for particular data-collection-related tasks. Meetings end with the signing of letters of responsibility, which lay out the obligations government offices have for completing Y-STR data-collection work.

2. Creating family trees

The next step is creating family trees for local men and boys. Collecting accurate genealogical information on local patrilineal families is of vital importance. This information will be used to identify a representative sample of men and boys from whom to collect genetic data and, in the future, will allow police to connect Y-STR data from an unknown male to a particular patrilineal surname and all the men sharing that name.
To collect genealogical information on male family members, police officers visit individual families, often accompanied by village cadres. Through these visits, police try to map out family genealogies going back from five to eight generations (Figure 22).

Figure 22: Collecting genealogical data by hand, Chaohu, Anhui Province, April 2018, and Jinan, Shandong Province, September 2018

A mock illustration of these family trees is found in a 21 August 2018 government notice on Y-STR data collection in Sui County, Hubei Province, where names, mobile numbers and ID card numbers are collected (Figure 23).

Figure 23: Mock genealogical chart, Sui County, Hubei Province

Family trees are first drawn by hand, and police officers and local officials work with members of targeted families to ensure accuracy (Figure 24). Not all local males are targeted, however. According to the same 2018 work notice from Sui County, only information on permanent residents in the rural or semi-rural counties, townships or ‘villages within cities’ of these municipalities is recorded.

Source: ‘Notice of the County Government Office on printing and distributing the work plan for the construction of the “Y-STR” DNA database in Sui County’ (县人民政府办公室关于印发随县“Y-STR”DNA数据库建设工作方案的通知), Sui County Government (随县政府网), 4 September 2018, online. This mock chart captures five generations of a single patrilineal family with the names, phone numbers and presumably state ID numbers to be recorded for each individual identified.
After family trees are checked for errors, the finished charts are entered into computer databases using the commercially available genealogical mapping software ‘Ancestry Artisan’ (Figure 25).

3. Compulsory collection of blood samples

Based on the family trees, a non-random sample of local men is targeted for compulsory Y-STR data collection (Figure 26). Estimates for the proportion of local men targeted vary from roughly 8.1% in Dongsheng District, Lingqiu County, Shanxi Province,146 and 9.6% in Ordos, Dongsheng District, Inner Mongolia,147 to 25.4% in Tongchuan, Yijun County, Shaanxi Province,148 and 26.4% in Changzhi, Tunliu County, Shanxi Province.149
Samples are taken in the form of blood via a pinprick to the finger, and blood is collected on a paper card, which is then inserted into an envelope (Figure 27). This method of sample collection allows large amounts of data to be collected in the absence of storage space.

In some cases, blood is collected from individuals in their community, as shown in a video from 17 May 2019 of a police officer in Anqing, Anhui Province, taking blood from an elderly man (Figure 28).
In other cases, samples are collected simultaneously from numerous men at a designated location. A July 2019 video (possibly from Sichuan Province) shows dozens of men—many holding what appear to be copies of their family trees—having their blood taken by public security officers (Figure 29).

Uniformed police officers aren’t the only ones who conduct blood collection. In a June 2019 video shot at a village government office in the Fuling District of Chongqing, local officials are seen recording identifying information for numerous men on sample collection envelopes before collecting blood samples (Figure 30).
According to the website of Bosun Life—a Beijing-based company that builds Y-STR databases—one person is selected for Y-STR collection out of a family of five to six, while two people are selected from a family of up to fifty.152

Local governments are under intense pressure to meet DNA sample-collection targets set by superiors higher up in the state, and there’s evidence that systems of rewards and punishments have been instituted to ensure that sample-collection quotas are met.153
4. Data sharing with public security bureaus

Once local blood collection is complete, data is entered into specialised police-run Y-STR databases (Figure 32). Numerous requests for tenders and procurement orders for the construction of Y-STR databases have been found for local public security bureaus across China.154

Figure 32: Data entry, Wulanhaote, Inner Mongolia, September 2019

In turn, these local databases are connected to a network of provincial Y-STR databases and the national forensic DNA database, as stated in government tenders (Figure 33).155

Figure 33: Data sharing between public security bureaus using Yingdi’s Y-STR database system (translated)
Appendix 3: Estimating the scale of Y-STR sample collection

While we know Y-STR samples have been collected from males across China, it’s difficult to determine how many boys and men in total have been targeted. However, a rough estimate can be produced. This requires first calculating the size of the pool from which samples could be taken. The scale of the Henan Y-STR database gives us a good indication of the proportion of men and boys who may have been targeted. Between 2014 and 2016, 5.3 million Y-STR profiles were collected from a total male population of roughly 49.6 million, or roughly 10% of all males. This was believed to have given authorities nearly 98.71% coverage of the province’s male population.\textsuperscript{156}

In some cases, precise figures indicating the scale of male data collection in particular localities are available. By comparing the total number of Y-STR samples collected to the population of local males (roughly estimated to be half the total local population), we’re able to estimate the percentage of men and boys from whom biometric data may have been taken (Table 2).

Table 2: Local data on Y-STR sample collection

<table>
<thead>
<tr>
<th>Locality (province)</th>
<th>Total population</th>
<th>Estimated male population</th>
<th>No. of Y-STR samples collected</th>
<th>Samples as % of estimated male population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donglan County, Hechi (Guangxi)</td>
<td>223,500</td>
<td>111,750</td>
<td>10,841\textsuperscript{a}</td>
<td>9.7%</td>
</tr>
<tr>
<td>Laoting County, Tangshan (Hebei)</td>
<td>500,000</td>
<td>320,144</td>
<td>56,068\textsuperscript{b}</td>
<td>17.5%</td>
</tr>
<tr>
<td>Xian’an District, Xianning (Hubei)</td>
<td>628,000</td>
<td>314,000</td>
<td>40,000\textsuperscript{c}</td>
<td>12.7%</td>
</tr>
<tr>
<td>Dongsheng District, Ordos (Inner Mongolia)</td>
<td>262,900</td>
<td>131,450</td>
<td>12,667\textsuperscript{d}</td>
<td>9.6%</td>
</tr>
<tr>
<td>Yaozhou District, Tongchuan (Shaanxi)</td>
<td>236,100</td>
<td>118,050</td>
<td>26,000\textsuperscript{e}</td>
<td>22.0%</td>
</tr>
<tr>
<td>Yijun County, Tongchuan (Shaanxi)</td>
<td>92,100</td>
<td>46,050</td>
<td>11,735\textsuperscript{f}</td>
<td>25.4%</td>
</tr>
<tr>
<td>Yintai District, Tongchuan (Shaanxi)</td>
<td>209,500</td>
<td>104,750</td>
<td>12,000\textsuperscript{g}</td>
<td>11.4%</td>
</tr>
<tr>
<td>Yulin, Jia County (Shaanxi)</td>
<td>269,700</td>
<td>134,850</td>
<td>24,608\textsuperscript{h}</td>
<td>18.2%</td>
</tr>
</tbody>
</table>
We know from government records that, in areas where Y-STR data collection has occurred, anywhere from roughly 8.1% to 26.4% of all males have been targeted. The wide variation in those figures may reflect efforts to collect more data than needed.

Government procurement orders can also be used to estimate the scale of Y-STR sample collection (Table 3). Some of those orders provide precise figures for the number of Y-STR sample-collection cards local authorities have purchased. By comparing the number of sample-collection cards to the local male population (roughly estimated to be half the total local population), we can estimate the percentage of local men who may have been targeted for DNA data collection.
<table>
<thead>
<tr>
<th>Locality (province)</th>
<th>Total population</th>
<th>Estimated male population</th>
<th>No. of Y-STR blood sample cards purchased or requested</th>
<th>Samples as % of estimated male population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lu’an, Anhui</td>
<td>5,882,000</td>
<td>2,941,000</td>
<td>35,000&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.1%</td>
</tr>
<tr>
<td>(Note: According to the contract, this order seems to be supplementing an earlier order, hence the smaller figure.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wuhu, Fanchang County (Anhui)</td>
<td>269,000</td>
<td>134,500</td>
<td>28,000&lt;sup&gt;b&lt;/sup&gt;</td>
<td>20.8%</td>
</tr>
<tr>
<td>Fuyang, Taihe County (Anhui)</td>
<td>1,773,000</td>
<td>886,500</td>
<td>100,000&lt;sup&gt;c&lt;/sup&gt;</td>
<td>11.2%</td>
</tr>
<tr>
<td>Fuyang, Yingshang County (Anhui)</td>
<td>1,295,000</td>
<td>647,000</td>
<td>100,000&lt;sup&gt;d&lt;/sup&gt;</td>
<td>15.4%</td>
</tr>
<tr>
<td>Fuzhou, Changle District (Fujian)</td>
<td>725,000</td>
<td>362,500</td>
<td>44,000&lt;sup&gt;e&lt;/sup&gt;</td>
<td>12.1%</td>
</tr>
<tr>
<td>Hezhou (Guangxi)</td>
<td>2,072,600</td>
<td>1,036,300</td>
<td>130,000&lt;sup&gt;f&lt;/sup&gt;</td>
<td>12.5%</td>
</tr>
<tr>
<td>Wuzhou, Teng County (Guangxi)</td>
<td>1,079,800</td>
<td>539,900</td>
<td>40,000&lt;sup&gt;g&lt;/sup&gt;</td>
<td>7.4%</td>
</tr>
<tr>
<td>Tongren (Guizhou)</td>
<td>3,168,800</td>
<td>1,584,400</td>
<td>168,300&lt;sup&gt;h&lt;/sup&gt;</td>
<td>10.6%</td>
</tr>
<tr>
<td>Changde (Hunan)</td>
<td>5,827,000</td>
<td>2,913,500</td>
<td>500,000&lt;sup&gt;i&lt;/sup&gt;</td>
<td>17.1%</td>
</tr>
<tr>
<td>Shaoyang, Longhui County (Hunan)</td>
<td>1,200,000</td>
<td>600,000</td>
<td>118,000&lt;sup&gt;j&lt;/sup&gt;</td>
<td>19.6%</td>
</tr>
<tr>
<td>Pingxiang (Jiangxi)</td>
<td>1,933,200</td>
<td>966,000</td>
<td>73,000&lt;sup&gt;k&lt;/sup&gt;</td>
<td>7.5%</td>
</tr>
<tr>
<td>Shangrao (Jiangxi)</td>
<td>7,810,000</td>
<td>3,905,000</td>
<td>500,000&lt;sup&gt;l&lt;/sup&gt;</td>
<td>12.8%</td>
</tr>
<tr>
<td>Hanzhong (Shaanxi)</td>
<td>3,437,000</td>
<td>1,718,500</td>
<td>269,201&lt;sup&gt;m&lt;/sup&gt;</td>
<td>15.6%</td>
</tr>
<tr>
<td>Xianyang, Xunyi County (Shaanxi)</td>
<td>267,100</td>
<td>133,550</td>
<td>35,000&lt;sup&gt;n&lt;/sup&gt;</td>
<td>26.2%</td>
</tr>
<tr>
<td>Heze (Shandong)</td>
<td>8,765,000</td>
<td>4,382,500</td>
<td>600,000&lt;sup&gt;o&lt;/sup&gt;</td>
<td>13.6%</td>
</tr>
<tr>
<td>Ningbo, Xiangshan County (Zhejiang)</td>
<td>541,700</td>
<td>270,850</td>
<td>70,000&lt;sup&gt;p&lt;/sup&gt;</td>
<td>25.8%</td>
</tr>
</tbody>
</table>

Sources:
<sup>a</sup> 'Supplementary samples inspection project contract of the male family tree analysis system of the four districts of Lu’an City’ (六安市辖四区男性家庭排 查系统样本补充检验项目合同), Liu’an Public Resources Trading Center (六安市公共资源交易中心), 1 April 2020, online.
<sup>b</sup> ‘Fangchang County police purchased male family tree investigation system construction, sample inspection and storage service project contract’ (繁昌县公安局购置男性家族排查系统建设样本检验入库务项目合同), Wuhu Public Resources Trading Center (芜湖市公共资源交易中心), 9 December 2019, online.
<sup>c</sup> Transaction announcement of Taihe County police male family tree inspection project’ (太和县公安局男性家族排查系统样本检测入库务项目成交公告), Taihe Government website (太和县人民政府), 16 May 2019, online.
<sup>d</sup> The blood sample test service project of the male family screening system of Yingshang County Public Security Bureau was announced’ (颍上县公安局男性家族排查系统血样检测服务项目中公示), Bidcenter.com.cn (采招网), 18 October 2019, online.
<sup>e</sup> ‘Changle District police male family screening system construction personnel inspection reagent project’ (长乐区公安局男性家族排查系统检测人员检验试剂项目), Fuzhou Changle Government website (福州市长乐区政府网), 6 Jan 2020, online.
<sup>f</sup> Guangxi Guichun Project Management Consulting Co. Ltd, ‘About Hezhou City Public Security Bureau male family exclusion system’ (广西桂春工程项目管理咨询有限公司关于贺州市公安局男性家族排除系统), Wangyou Bidding Website (网优招投标网), 3 December 2019, online.
<sup>g</sup> ‘Result announcement of Yunzhilong Tendering Group Co. Ltd DNA blood sample collection card purchase’ (云之龙招标集团有限公司DNA血样采集卡采购 WZZC2019-J1-30001-YZLW结果公告), China Government Procurement website (中国政府采购网), 10 April 2019, online.
<sup>h</sup> ‘Changde police male family screening system construction and inspection service project’ (常德市公安局男性家族排查系统建设检测服务项目), Changde Government Procurement Network (常德市政府采购网), 2009, online.
<sup>i</sup> ‘Changde City Public Security Bureau male family investment system database construction service purchase project’ (常德市公安局男性家族排查系统数据库建设服务采购项目), Tengrong Public Resources Trading Center (铜仁市公共资源交易中心), 4 February 2020, online.
<sup>j</sup> ‘Transaction announcement of the completion of the blood sample collection card purchase for the construction of the Longhui Police male family screening system’ (隆回县公安局男性家族排查系统血样采集卡及耗材采购项目成交公告), Longhui Government Procurement Network (隆回县政府采购网), 19 March 2020, online.
From these records, we can estimate that local authorities have purchased enough Y-STR analysis kits to collect samples from anywhere between roughly 7.4% and 26.2% of all local males. The wide variation in these figures may again reflect efforts to collect more data than needed.

The large proportion of men and boys targeted for data collection in some localities may be offset by lower levels of data collection in other areas. We have also considered the possibility that in some areas of the country data collection might not be taking place. While we know that this is a nationwide campaign, we don’t yet have precise figures for the number of municipalities in which data collection has occurred. For example, mass Y-STR collection doesn’t so far seem to be taking place in first-tier cities such as Beijing or Shanghai.

Based on these considerations, and the scale of the earlier provincial Y-STR database built by the Henan Public Security Bureau,\(^\text{157}\) we therefore estimate that the Chinese Government may be seeking to collect Y-STR profiles from as many as one out of every 10 males in China.

The proportion of men and boys within individual families targeted for Y-STR sample collection also gives us clues about the possible scale of this program. There are indications that the authorities aim to collect samples from at least two men from every family of six to 50 people, and a further one or two samples from families of more than 50 members.\(^\text{158}\) It isn’t clear how rigorously police are adhering to these standards, but at a minimum this suggests that the Chinese Government aims to collect Y-STR samples from roughly five out of every 100 men.

We therefore conservatively estimate that authorities aim to collect DNA samples from around 5-10% of China’s total male population of roughly 700 million. Based on these calculations, a completed nationwide system of Y-STR databases will likely contain at least 35–70 million genomic profiles.

How do these tens of millions of Y-STR samples relate to the Chinese Government’s broader genomic surveillance capabilities? According to a report by the Chinese insurance company Ping An, in 2016 Chinese authorities possessed DNA records for 44.35 million people, including 40.7 million from forensic databases, 1.49 million from crime-scene databases, 594,000 from missing people databases, and 513,000 in so-called ‘base level’ DNA databases.\(^\text{159}\) To those numbers we can add the roughly 23 million profiles taken in Xinjiang and 3 million in Tibet, for a new total of roughly 70 million—a total slightly lower than the figure of 80 million cited in recent Chinese press reports\(^\text{160}\) but identical to that provided on the website for Hisign Technology.\(^\text{161}\)
If we add the estimated 35–70 million Y-STR profiles to the 70 million profiles authorities already possess, the Chinese Government likely has 105–140 million profiles on file. That doesn't include DNA profiles currently being enrolled in the ‘newborn genebank’ that is being trialed in the Guangxi Zhuang Autonomous Region and Chongqing.

Appendix 4: Companies participating in national Y-STR data collection

Table 4 lists Chinese and multinational companies that are known to provide the equipment, consumables, services and intellectual property used by the Ministry of Public Security and public security bureaus across China as part of the ongoing national program of Y-STR data collection.

<table>
<thead>
<tr>
<th>Company</th>
<th>Product(s) sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuanqi Technology 北京沅启科技有限公司</td>
<td>Y-STR database construction(^a)</td>
</tr>
<tr>
<td>Yingdi Technology Development 武汉英迪科技发展有限公司</td>
<td>Y-STR database construction(^b)</td>
</tr>
<tr>
<td>Highershine 北京海华鑫安生物信息技术有限责任公司</td>
<td>Y-STR database construction(^c)</td>
</tr>
<tr>
<td>AGCU Scientech 无锡中德美联生物科技有限公司</td>
<td>Y-STR kits; Y-STR database construction(^d)</td>
</tr>
<tr>
<td>Health Gene Technologies 宁波海山施基生物科技有限公司</td>
<td>Y-STR database construction(^e)</td>
</tr>
<tr>
<td>Dianan Technology 杭州典安科技有限公司</td>
<td>Y-STR kits; Y-STR database construction(^f)</td>
</tr>
<tr>
<td>Kelitai Technology 重庆科立泰科技有限公司</td>
<td>Y-STR kits(^g)</td>
</tr>
<tr>
<td>Huizhong Hengan Biotechnology 北京汇众恒安生物科技有限公司</td>
<td>Y-STR kits(^h)</td>
</tr>
<tr>
<td>Shengyuan Police Investigation Equipment 泉州圣源警用侦察设备有限公司</td>
<td>Y-STR database construction(^i)</td>
</tr>
<tr>
<td>Wis-Tong Technology 北京中际慧通科技有限公司</td>
<td>Y-STR kits; Y-STR database construction(^j)</td>
</tr>
<tr>
<td>Enwei Tiancheng Technology 北京恩威天诚科技有限公司</td>
<td>Y-STR kits(^l)</td>
</tr>
<tr>
<td>Juzheng Technology 江西巨正科技有限公司</td>
<td>Y-STR kits(^m)</td>
</tr>
<tr>
<td>China National Scientific Instruments and Materials 中国科学器材有限公司</td>
<td>Y-STR kits(^n)</td>
</tr>
<tr>
<td>Company Name</td>
<td>Main Activities</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>Hisign Technology</td>
<td>Y-STR kits; Y-STR database construction</td>
</tr>
<tr>
<td>Beijing Haixin High-tech Information Technology</td>
<td></td>
</tr>
<tr>
<td>Yuandongli Information Technology</td>
<td>Y-STR database construction</td>
</tr>
<tr>
<td>Zhengzhou Information Science Technology</td>
<td></td>
</tr>
<tr>
<td>Micread Genetics</td>
<td>Y-STR database construction</td>
</tr>
<tr>
<td>Anhui Chuan'an Electronic Technology</td>
<td></td>
</tr>
<tr>
<td>Zhengzhou Information Science Technology</td>
<td>Y-STR database construction</td>
</tr>
<tr>
<td>Zhongtai Ruida Technology</td>
<td>Y-STR kits; Y-STR database construction</td>
</tr>
<tr>
<td>Wuhan Information Science Technology</td>
<td></td>
</tr>
<tr>
<td>Xindun Keweifang Police Technology</td>
<td>Y-STR kits</td>
</tr>
<tr>
<td>Hunan Enshin Medicine Technology</td>
<td></td>
</tr>
<tr>
<td>APG Bio</td>
<td>Y-STR database construction</td>
</tr>
<tr>
<td>Tianjin Bio</td>
<td></td>
</tr>
<tr>
<td>Chengdu Wofute Technologies</td>
<td>Y-STR kits</td>
</tr>
<tr>
<td>Chengdu Information Science Technology</td>
<td></td>
</tr>
<tr>
<td>Bosun Life</td>
<td>Y-STR database construction</td>
</tr>
<tr>
<td>Beijing Bosun Technology</td>
<td></td>
</tr>
<tr>
<td>Yongtai Anda Technology</td>
<td>Y-STR database construction</td>
</tr>
<tr>
<td>Beijing Yongtai Technology</td>
<td></td>
</tr>
<tr>
<td>Forensic Genomics International</td>
<td>Y-STR kits</td>
</tr>
<tr>
<td>Shenzhen Information Science Technology</td>
<td></td>
</tr>
<tr>
<td>Eppendorf China Limited</td>
<td>Y-STR kits</td>
</tr>
<tr>
<td>Aibi Health China Limited</td>
<td></td>
</tr>
<tr>
<td>Thermo Fisher Scientific (China) Co. Ltd.</td>
<td>Y-STR kits</td>
</tr>
<tr>
<td>Chengdu Dianke Technology</td>
<td></td>
</tr>
<tr>
<td>Sources</td>
<td></td>
</tr>
<tr>
<td>a 'Y-STR database construction solution' (Y-STR数据库建设解决方案), Beijing Yuanqi Technology Co. Ltd (北京沅启科技有限公司), online.</td>
<td></td>
</tr>
<tr>
<td>b 'Solution page of Wuhan Yingdi Technology Development Co. Ltd (武汉英迪科技发展有限公司), Yingdi (武汉英迪科技发展有限公司), online.</td>
<td></td>
</tr>
<tr>
<td>c 'DNA database collection terminal (DNA建库采集终端), Beijing Haihuaxi National Biologial Information Technology Co. Ltd (北京华鑫安生物科技有限责任公司), online.</td>
<td></td>
</tr>
<tr>
<td>d 'Announcement on the winning bid for the Laiwu City police DNA Y-STR database construction project' (莱芜市公安局DNA-STR数据库建设项目中标公告), Laiwu Government procurement website (莱芜市政府采购网站), 28 December 2018; ' packed male family tree investigation system construction, sample inspection and storage service project contract record (合同编号为: Laiwu Public Security Bureau Male Family Tree Investigation System Construction Project, Laiwu Public Security Bureau), online.</td>
<td></td>
</tr>
<tr>
<td>e 'Announcement on the winning bid for the Laiwu City police DNA Y-STR database construction project' (Ganzhou County Public Security Bureau Male Family Tree Investigation System Construction Project), Ganzhou County Government Open Information Net (赣州市政府信息公开网), 20 November 2019; 'Bidding announcement on the blood sample testing service project of the Criminal Investigation Male Family Investigation System of Tongling City Public Security Bureau (铜陵市公安局刑事侦查系统血样检测服务项目采购公告), Tongling Public Resource Trading Center (铜陵公共资源交易中心), 19 September 2019, online.</td>
<td></td>
</tr>
<tr>
<td>f 'Dianjiang County Public Security Bureau male family investigation blood sample collection kit purchase' (垫江县公安局男性家族筛查血样采集套装采购), China Government Procurement Network (中国政府采购网), 27 May 2019, online.</td>
<td></td>
</tr>
</tbody>
</table>
h Announcement on the results of the construction project of the male family of Fuqing Public Security Bureau (福建省公安厅男性家族建设项目结果公告), China Government Procurement Network (政府采购网), 15 November 2019, online.

i Announcement on the results of the procurement projects for necessary reagents and consumables for male family of Criminal Investigation Brigade, Public Security Bureau, Mawei District, Fuzhou (福州市马尾区公安局刑侦大队男性家族系统检验试剂及分析服务采购项目结果公告), Fuzhou Government Procurement Network (福州市政府采购网), 27 November 2019, online.

j Announcement on the results of the construction of the male family of Investigation system (男性家族排查系统建设结果公告), China Government Procurement Network (政府采购网), 1 December 2018, online.

k Inspection and collection fees of samples collected by male family members and inspection fees for case evidence (男性家族入员采集样本检验与案件检验收费), Fujian Provincial Government Procurement Network (福建省政府采购网), 1 February 2019, online.

l Announcement of Minhou County Public Security Bureau Criminal Investigation Brigade on Minhou male family investigation system construction service procurement project results (闽侯县公安局关于闽侯男性家族排查系统建设采购项目结果公告), China Government Procurement Website (中国政府采购网), 28 November 2018, online.

m Announcement on the results of the procurement project for the construction of the male family system of the Zhangzhou Public Security Bureau (漳州市公安局男性家族排查系统建设采购项目结果公告), China Government Procurement Website (中国政府采购网), 12 April 2018, online.


p Announcement on the results of the construction project of the male family of Fuqing Public Security Bureau (福清市公安局男性家族建设项目结果公告), China Government Procurement Network (中国政府采购网), 28 August 2018, online.


r "Cangzhou City Public Security Bureau male family screening system test reagent consumables and terminal purchase order" (沧州市公安局男性家族排查系统检验试剂耗材及终端采购项目), Cangzhou City Procurement Network (沧州市政府采购网), 22 November 2018, online.

s Announcement on purchase transaction of family collection equipment of male family investigation system (男性家族排查系统采集设备采购成交公告), Hainan Provincial Government Procurement Administration Service Center (海南省公共资源交易中心), 6 September 2019, online.

t "Y library construction plan" (Y 馆建设方案), Beijing Yuere Gene Technology Co. Ltd (北京 yukarı基因技术有限公司), 18 October 2019, online.

u Announcement on the results of the purchase of 1 batch of procurement projects by the Criminal Investigation Bureau of the City Public Security Bureau of the National Male Family Investigation System Database Server (河南省公安厅男性家族排查系统数据库建设软件采购项目结果公告), China Government Procurement Network (中国政府采购网), 22 October 2018, online.

v "Qianan Prefecture Public Security Bureau Procurement of Qiannan Prefecture Y-STR DNA Database Construction Service Project winning bid (ideal announcement)" (前锦县公安局采购前锦县 Y-STR DNA数据库建设项目 (成交) 公告), Guizhou Provincial Government Procurement website (贵州省公共资源交易平台), 10 April 2019, online.


x "Qianan Prefecture Public Security Bureau Procurement of Qiannan Prefecture Y-STR DNA Database Construction Service Project winning bid (ideal announcement)" (前锦县公安局采购前锦县 Y-STR DNA数据库建设项目 (成交) 公告), Guizhou Provincial Government Procurement website (贵州省公共资源交易平台), 10 April 2019, online.

y "Announcement on the results of the procurement project for the construction of the male family of the Shangzhou Public Security Bureau (上街区公安局男性家族排查系统建设采购项目结果公告), China Government Procurement Website (中国政府采购网), 25 February 2019, online.

z Announcement on the results of the construction project of the male family of the Longhui County Public Security Bureau male family screening system (隆回县公安局男性家族排查系统建设的男家属血样检测服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 23 August 2019, online.

1 Announcement of the results of the procurement project for the construction of the male family of the Longhui County Public Security Bureau male family screening system (隆回县公安局男性家族排查系统建设的男家属血样检测服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 23 August 2019, online.

2 Announcement on the results of the construction project of the male family of the Longhui County Public Security Bureau male family screening system (隆回县公安局男性家族排查系统建设的男家属血样检测服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 23 August 2019, online.

3 "CS-MBL DNA database" (CS-MBL DNA数据库), Beijing Bosheng Siyuan Biological Technology Co. Ltd (北京博晟思远生物科技有限公司), online.

4 "Cangzhou City Public Security Bureau Y-STR DNA database construction service project for male family investigation (沧州市公安局男性家族排查系统 Y-STR数据库建设项目(中标)公告), China Government Procurement Website (中国政府采购网), 25 February 2019, online.

5 Announcement on the results of the construction project of the male family of the文昌市公安机关男性家族系统软件采购项目 (成交) 公告, Hainan Provincial Government Procurement Service Center (海南省公共资源交易中心), 29 April 2019.

6 "Announcement on the results of the construction project of the male family of the Wenchang City Public Security Bureau male family screening system (文昌市公安局男性家族系统检验试剂及分析服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 30 November 2018, online.

7 Announcement on the results of the construction project of the male family of the Wenchang City Public Security Bureau male family screening system (文昌市公安局男性家族系统检验试剂及分析服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 30 November 2018, online.

8 Announcement on the results of the construction project of the male family of the Wenchang City Public Security Bureau male family screening system (文昌市公安局男性家族系统检验试剂及分析服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 30 November 2018, online.

9 Announcement on the results of the construction project of the male family of the Wenchang City Public Security Bureau male family screening system (文昌市公安局男性家族系统检验试剂及分析服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 30 November 2018, online.

10 Announcement on the results of the construction project of the male family of the Wenchang City Public Security Bureau male family screening system (文昌市公安局男性家族系统检验试剂及分析服务采购项目采购结果公告), China Government Procurement Website (中国政府采购网), 30 November 2018, online.
Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODIS</td>
<td>Combined DNA Index System</td>
</tr>
<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
</tr>
<tr>
<td>STR</td>
<td>Short tandem repeat</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
</tbody>
</table>
Notes

1. ‘Hubei Xinyi police helped to solved a 20-year-old man’s duplicated household registration issue’ (湖北浠西警方帮孪生20年男子处理户籍问题), Renmin Net (人民网湖北频道), 18 November 2019, at online.

2. In his February 2019 report to the 40th session of the Human Rights Council, the Special Rapporteur on the right to privacy, Professor Joseph Cannataci, stated: ‘A question before the Special Rapporteur is whether it is necessary and proportionate for the entire population of a given country to have its DNA databanked: The Special Rapporteur’s mandate will be emptied out of these with States legislating such measures.’ In comments made in 2018 concerning the ‘unusually high number’ of individuals whose DNA samples were in Northern Ireland’s police DNA database, the Special Rapporteur noted that he ‘support[ed] the recommendations made by the Northern Ireland Human Rights Commission with a view that the retention of that data is strictly done based on the principles of necessity and proportionality.’ See Report of the Special Rapporteur on the right to privacy, Human Rights Council, UN, 27 February 2019, online, and End of mission statement of the Special Rapporteur on the right to privacy at the conclusion of his mission to the Untied Kingdom of Great Britain and Northern Ireland, Office of the High Commissioner for Human Rights, UN, 29 June 2018, online.


5. Tenzin Dalha, ‘Beijing’s export of surveillance technology’, Modern Diplomacy, 7 January 2020, online; Xinhua, ‘Basic completion of free physicals for urban and rural residents in Tibet—reaches 3 million people’ (西藏城乡居民免费健康体检基本惠及300余万人), Embassy of the People’s Republic of China in Canada, 6 December 2012, online; ‘Dang Xiong County, Lhasa City, organises free physicals for monks and nuns’ (拉萨市当雄县组织僧尼进行免费健康体检), China Tibet Net (中国西藏网), 23 November 2018, online; Xinhua, ‘Tibet continues to offer free physicals for seven years in row reaching 3 million people’ (西藏连续七年开展免费健康体检惠及300万人), China Daily, 7 April 2018, online.

6. ‘Xinjiang National Health Checkup: Cover the last mile and benefit the furthest family’ (新疆全民健康体检：覆盖最后一公里 惠及最远一家人), Xinhuaxun (新华网), 9 February 2019, online; ‘Free medical examination for all in Xinjiang is gradually normalised’ (新疆全民免费体检逐步实现常态化), Xinhuaxun (新华网), 24 January 2018, online; Xinjiang Kashi City promotes free health check-ups for all people’ (新疆喀什市推进全民免费健康体检), Renmin Net (人民网), 12 December 2017, online; Xinjiang has carried out 53.3 million free health examinations in three years (新疆三年开展免费健康体检5338万余次), Government of China Web (中国政府网), 4 July 2019, online; ‘China: Minority region collects DNA from millions’, Human Rights Watch, 13 December 2017, online.


10. ‘Xinjiang National Health Checkup: Cover the last mile and benefit the furthest family’ (新疆全民健康体检：覆盖最后一公里 惠及最远一家人), Xinhuaxun (新华网), 9 February 2019, online; ‘Free medical examination for all in Xinjiang is gradually normalised’ (新疆全民免费体检逐步实现常态化), Xinhuaxun (新华网), 24 January 2018, online; Xinjiang Kashi City promotes free health check-ups for all people’ (新疆喀什市推进全民免费健康体检), Renmin Net (人民网), 12 December 2017, online; Xinjiang has carried out 53.3 million free health examinations in three years (新疆三年开展免费健康体检5338万余次), Government of China Web (中国政府网), 4 July 2019, online; ‘China: Minority region collects DNA from millions’, Human Rights Watch, 13 December 2017, online.


16. ‘Xinjiang National Health Checkup: Cover the last mile and benefit the furthest family’ (新疆全民健康体检：覆盖最后一公里 惠及最远一家人), Xinhuaxun (新华网), 9 February 2019, online; ‘Free medical examination for all in Xinjiang is gradually normalised’ (新疆全民免费体检逐步实现常态化), Xinhuaxun (新华网), 24 January 2018, online; Xinjiang Kashi City promotes free health check-ups for all people’ (新疆喀什市推进全民免费健康体检), Renmin Net (人民网), 12 December 2017, online; Xinjiang has carried out 53.3 million free health examinations in three years (新疆三年开展免费健康体检5338万余次), Government of China Web (中国政府网), 4 July 2019, online; ‘China: Minority region collects DNA from millions’, Human Rights Watch, 13 December 2017, online.


20. ‘Xinjiang National Health Checkup: Cover the last mile and benefit the furthest family’ (新疆全民健康体检：覆盖最后一公里 惠及最远一家人), Xinhuaxun (新华网), 9 February 2019, online; ‘Free medical examination for all in Xinjiang is gradually normalised’ (新疆全民免费体检逐步实现常态化), Xinhuaxun (新华网), 24 January 2018, online; Xinjiang Kashi City promotes free health check-ups for all people’ (新疆喀什市推进全民免费健康体检), Renmin Net (人民网), 12 December 2017, online; Xinjiang has carried out 53.3 million free health examinations in three years (新疆三年开展免费健康体检5338万余次), Government of China Web (中国政府网), 4 July 2019, online; ‘China: Minority region collects DNA from millions’, Human Rights Watch, 13 December 2017, online.


See, for example, PM Schneider, B Prainsack, M Kayser, ‘The use of forensic DNA phenotyping in predicting appearance and biogeographic ancestry’, *Deutsches Ärzteblatt International*, 2019, 116, online.

Yang Xin, ‘Idiosyncratic inheritance of SNP locus among Tibetan groups in low oxygen environments’ (藏族人群低氧诱导因子特异性SNP位点遗传多样性), *Thermo Fisher* (China), 2016, online; Jessica Batke, ‘“This is not forensic genetics anymore. This is surveillance.” A Q&A with Yves Moreau on DNA profiling in Singapore and corporate ethics’, *ChinaFile*, 18 March 2020, online; Yves Moreau, ‘Crack down on genomic surveillance’, *Nature*, 3 December 2019, online; ‘Uighurs and genetic surveillance in China’, *Nature*, 3 December 2019, online.
44

Policy Brief: Genomic surveillance: Inside China’s DNA dragnet
'Xi'an Public Security and Xi'an BGI signed a strategic cooperation agreement' (Xi'an Public Security WeChat (Xi'an Public Security), 1 August 2018, online.),

‘Announcement on winning bid for the second public purchase bidding of male family inspection service of Langzhong Public Security Bureau, Nanchong City, Sichuan Province’ (Criminal Technical Equipment Institute of Langzhong City Public Security Bureau, Nanchong City, Sichuan Province), 23 August 2019, online; ‘Announcement of procurement of the male family screening system and the autosomal DNA database construction project' (Male family screening system, and autosomal DNA database construction project results), China Government Procurement Network (China Government Procurement Network, online; ‘Sanning City Male Family Inspection System Construction Reagent Consumable Goods Procurement Project’ (Sanning City male family inspection system project results), China Medical Tendering Network (China Medical Tendering Network), 27 March 2020, online.


‘Announcement of the blood sample test service project of the male family screening system of Yingshang County Public Security Bureau’ (Yingshang County Public Security Bureau), 5 December 2019, online.

'Shi Yinglun, ‘Sino-Kazakh genetic lab opens in Nur-sultan’, 5 November 2019, online.'
City Level Nanchang Chenhui Tendering and Consulting Service Co. Ltd about Nanchang City Public Security Bureau Criminal Investigation Depar
tment—2018 Y Database Construction Procurement Project (tender number: NCCH2018-G0241) electronic public bidding winning announcement” (Nanchang City Public Security Bureau, 11 April 2019, online; see also ‘Is it legal for public security organs to collect DNA samples?’ (Qiu Geping (邱格屏), ‘Several key issues for China national DNA database development’ (现阶段我国DNA数据库发展中的几个关键问题), Forensic Science and Technology, 2015, 16(4):318–323, online.).

"Expert believes the compulsory collection of DNA samples from thousands of male students following a theft at a Shanghai University has no legal basis" (students’ fingerprints and DNA samples will be collected during the registration for a residency permit) (Beijing Youth Daily (北京青年报), 14 October 2013, online).

"If it is legal for a police station to collect male blood in the village?" (派出所到村里采集男性血液，这是合法的吗?) (Baidu Zhidao (百度知道), 17 February 2019, online; see also ‘Is it legal for police to collect fingerprints and DNA samples when registering for a residency permit?’ (公安部: 警察采集公民指纹和DNA数据是否合法?) (Human Rights Watch, no date, online; Qiu Geping (邱格屏), ‘PRC Regulation on the Management of Human Genetic Resources’ (中华人民共和国人类遗传资源管理条例), Chinese Government (中华人民共和国中央人民政府), 10 June 2019, online).

"What are the blood samples collected by male family members at the police station?" (血样属于个人隐私吗? 我们这里有人进行血样采集，是否侵犯个人隐私权，而公安机关一定有权采集吗?) (Tianya Shequ (天涯社区), 11 February 2019, online).

"Are blood samples private? Does anyone here collecting blood samples infringe personal privacy rights, and must public security organs collect DNA samples from individuals without the right to make such decisions?" (血样属于个人隐私吗? 我们这里有人进行血样采集，是否侵犯个人隐私权，而公安机关一定有权采集吗?) (China Foods (中国食品信息), 24 January 2019, online; Qiu Geping (邱格屏), ‘PRC Regulation on the Management of Human Genetic Resources’ (中华人民共和国人类遗传资源管理条例), Chinese Government (中华人民共和国中央人民政府), 10 June 2019, online).

"Could anyone here collect DNA samples and does it infringe personal privacy rights?" (血样属于个人隐私吗? 我们这里有人进行血样采集，是否侵犯个人隐私权，而公安机关一定有权采集吗?) (Beijing Youth Daily (北京青年报), 14 October 2013, online).
including personal names, birth-dates, ID numbers, bio-metric information, addresses, phone numbers, email addresses, health information, tracking information, and so forth. “See “Civil Code of the People’s Republic of China” (中华人民共和国法典), 28 May 2020, online.

128 ‘Case of S and MARPER v. the United Kingdom’, European Court of Human Rights, 4 December 2008, online.
130 Protection of Freedoms Act 2012, Chapter 9, Legislation of the UK, online.
132 ‘Kuwait: Court strikes down draconian DNA law’, Human Rights Watch, 17 October 2017, online.
134 See, for example, Li Ruohan, ‘China slams HRW’s report on alleged Xinjiang human rights violations’, Global Times, 13 December 2017, online.
136 Jan Ransom, Ashley Southall, ‘NYPD detectives gave a boy, 12, a soda. He landed in a DNA database’, New York Times, 6 October 2019, online.
138 These administrative regions (provinces, autonomous regions or directly administered municipalities) include Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Inner Mongolia, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan and Zhejiang.
139 Li Jiawe (李佳薇), Yuan Duanduan (袁端端), ‘Why is family DNA testing the key to the Bai Yin case? (为什么家族DNA检测是白银案落网的关键)’, Yunnan Zhongdun Web (云南中盾网), 17 April 2018, online.
140 ‘The Dehong police mobilised the deployment of ‘male family tree investigation system’ (德宏州公安局动员部署全州公安机关男性家族排查系统建设工作), Dehong Public Security (德宏州公安局), 18 June 2018, online; ‘Chendian Township held a training seminar on mobilisation of male family tree investigation system’ (陈店乡举办男性家族排查系统建设工作动员培训班), Anlu Government (安陆政府网), 3 September 2019, online.
141 ‘Qishui Town: Actively carry out the male family system investigation’ (企水镇积极开展男性家族系统排查工作), Leishu Net (雷狮网), 6 November 2018, online.
142 ‘Huainlin town carried out male family tree survey and mapping’ (槐林镇开展男性家族家系调查和图谱绘制工作), Chaohou Government (巢湖政府网), 10 April 2018, online.
143 ‘Huainlin town carried out male family tree survey and mapping’ (槐林镇开展男性家族家系调查和图谱绘制工作), Chaohou Government (巢湖政府网), 10 April 2018, online.
144 ‘Chengguan Police Station completed the construction of male Y DNA bank’ (城管派出所完成男性Y库建设工作), Nanyou Police (南苑警务网), 8 August 2018, online.
145 ‘Notice of the County Government Office on printing and distributing the work plan for the construction of the ‘Y-STR’ DNA database in Dongshe District’ (东胜区政务信息第44期), Sui County Government (随县政府网), 29 May 2019, online.
146 ‘Blood sample collection’ (血样采集), Meipian (美篇网), 23 November 2018, online.
148 ‘The construction of the male family tree investigation system of the Yijun County Police was praised by local government’ (以郑州市二里岗派出所之名欺诈公民), China Southern Magazine, 15(4), 11 October 2019, online.
149 ‘Bulletin on the progress of collection of blood samples from male families’ (男性家族血样采集工作进展情况通报), Meipian (美篇网), 5 November 2018, online.
150 ‘Baojia Town Police Station carried out the construction of male family tree investigation system’ (包家派出所开展男性家族排查系统建设工作), Dianjiang Mobile Station (垫江手机台), 11 September 2019, online.
151 ‘The pros and cons of storing DNA on cards’, Business Insider, 17 September 2012, online.
152 ‘Construction of ‘Y-STR’ DNA database’ (Y-STR DNA数据库建设), Bosun Life (北京博晟思远生物), online.
153 ‘Lulang police fully sprinted blood collection work of male families’ (六郎派出所全冲刺男性家族血样采集工作), Wuhu County Police (芜湖县公安局), 28 June 2019, online.
154 See for example, ‘Qiannan Prefecture Public Security Bureau procurement of Qiannan Prefecture Y-STR DNA database construction service project winning bid (deal) announcement’ (黔南州公安局采购黔南州Y-STR DNA数据库建设项目 (成交) 公告), Guizhou Provincial Government Procurement Network (贵州省采购网), 10 April 2019, online.
155 ‘Tongren City Public Security Bureau male family investigation system database construction service purchase project’ (铜仁市公安局男性家族排查系统数据库建设项目采购项目), Tongren Public Resources Trading Center (铜仁市公共资源交易中心), 3 March 2020, online.
158 ‘Cheating citizens in the name of Erijiang Police Station in Zhengzhou City’ (以郑州市二里岗派出所之名欺诈公民), People’s Net (人民网), 31 January 2018, online; ‘Construction of “Y-STR” DNA database’ (Y-STR DNA数据库建设), Bosun Life (北京博晟思远生物), online.
159 ‘Snapshot of the forensic DNA identification market’ (法庭DNA检测行业发展全景图), Ping An Securities Ltd, 6 October 2016, online.
160 ‘Li Haiyan: Let the “body code” speak’ (李海燕: 让“身体密码”开口说话), China Southern Magazine (中国南方杂志), 1 July 2019, online.
161 ‘Public Security Organ DNA Database Application System’ (公安机关DNA数据库应用系统), Beijing Haixin Kejin High-Tech Co. Ltd (北京海鑫科金高科技股份有限公司), online.
162 ‘Li Haiyan: Let the “body code” speak’ (李海燕: 让“身体密码”开口说话), China Southern Magazine (中国南方杂志), 1 July 2019, online.
163 ‘Snapshot of the forensic DNA identification market’ (法庭DNA检测行业发展全景图), Ping An Securities Ltd, 6 October 2016, online.
Some previous ICPC publications
WHAT’S YOUR STRATEGY?

Stay informed via the field’s leading think tank, the Australian Strategic Policy Institute.

_The Strategist_, ASPI’s commentary and analysis website, delivers fresh ideas on Australia’s defence and strategic policy choices as well as encouraging discussion and debate among interested stakeholders in the online strategy community. Visit and subscribe to an email digest at [www.aspistrategist.org.au](http://www.aspistrategist.org.au).

facebook.com/ASPI.org
@ASPI_org

To find out more about ASPI go to [www.aspi.org.au](http://www.aspi.org.au) or contact us on 02 6270 5100 and enquiries@aspi.org.au.