

# Genomic surveillance

Inside China's DNA dragnet

Emile Dirks and James Leibold



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## 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'.<sup>1</sup> 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.<sup>2</sup>

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.<sup>3</sup> 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.<sup>4</sup> 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).<sup>5</sup> In 2016, a similar program was launched in Xinjiang, where data from nearly all of the region's 23 million residents was collected.<sup>6</sup>

**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**



Sources: 'Tibet: People's physical examination to protect the health of the people on the plateau' (西藏: 全民体检为高原百姓保健康), *Government of China Web* (中国政府网), 15 May 2013, [online](#); '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), *Xinhuanet* (新华网), 9 February 2019, [online](#).



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.<sup>7</sup> When that data was combined with an extensive system of security cameras<sup>8</sup> and intrusive monitoring of local families,<sup>9</sup> 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.<sup>10</sup>

**Figure 2: One of more than 1,500 blood samples collected from kindergarten and elementary school students in Xiabaishi Township, Fujian Province, June 2019**



Source: ‘Xiabaishi police energetically launch male ancestry inspection system development work’ (下白石派出所大力开展男性家族排查系统建设工作), *Gugang Huangqi Weixin* (古港黄崎威信), 4 June 2019, [online](#).

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.

**Figure 3: Blood collection in Garze Tibetan Autonomous Prefecture, Sichuan Province, August 2019, and Binhe Township, Zhongwei, Ningxia Hui Autonomous Region, June 2018**



Sources: 'Batang police department continued to carry out information collection work of male family tree investigation system' (巴塘县公安局持续开展男性家族排查系统信息采集工作), *Batang Police WeChat* (巴塘县公安局微信), 20 August 2019, [online](#); 'Actively carry out DNA blood sample collection' (积极开展DNA血样采集工作), *Binhe National Security Web* (滨河治安安保), 13 June 2018, [online](#).

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,<sup>11</sup> 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.<sup>12</sup> 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.<sup>13</sup> 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).<sup>14</sup>

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



Source: 'The Criminal Investigation Bureau of the Chinese Academy of Sciences made an experienced introduction at the on-site promotion meeting for the construction of the Y-STR DNA database' (厅刑侦局在全国Y-STR DNA数据库建设现场推进会上作经验介绍), Shaanxi Public Security Party Construction Youth League (陕西公安党建青联), 10 November 2017, [online](#).

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.<sup>15</sup> 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.<sup>16</sup> 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,<sup>17</sup> 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.<sup>18</sup> 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.<sup>19</sup> 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.

Figure 6: Meeting on Y-STR database construction, Suide County, Shaanxi Province, March 2019



Source: Lu Fei (路飞), 'The successful completion of the training and mobilisation meeting of the Suide County public security bureaus for work on building a male ancestry inspection system' (绥德县公安局男性家族排查系统建设工作动员部署及应用培训会圆满完成), *Meipian* (美篇网), 28 March 2019, online.

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<sup>20</sup> and *The New York Times* reveal that authorities in Xinjiang collect information on family members of detainees in the region's re-education camps,<sup>21</sup> and a detainee's release is conditional upon the behaviour of their family members outside the camps.<sup>22</sup> The repression of family members extends far beyond Xinjiang. Parents<sup>23</sup> and children<sup>24</sup> of prominent human rights lawyers, and the siblings of overseas government critics,<sup>25</sup> 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.<sup>26</sup> 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.

Figure 7: Genealogical records collected from a single extended family, Hanjia Village, Liaoning Province, March 2018, and a meeting of police officers concerning family records in Weinan, Shaanxi Province, August 2018



Sources: 'Wolong Police Station carrying out Y-bank construction' (卧龙派出所深入开展Y库建设), *Meipian* (美篇网), 15 March 2018, online; 'To implement the spirit of the Heyang meeting, the Huazhou District Public Security Bureau went to Fuping to learn the process of the construction of a male family investigation system', (落实合阳会议精神·华州区公安局赴富平实地学习男性家族排查系统建设), Huazhou Criminal Investigation Bureau (华州刑侦), 10 August 2018, online.



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’<sup>27</sup>—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,<sup>28</sup> claiming to be able to identify whether a sample belongs to an ethnic Uyghur or a Tibetan, among other ethnic groups.<sup>29</sup> Scientists have warned about the potential for ethnic discrimination,<sup>30</sup> yet Chinese scientists are using these methods to assist the Chinese police in targeting ethnic minority populations for greater surveillance,<sup>31</sup> while Chinese and foreign companies are competing to provide the Chinese police with the tools to do their work.<sup>32</sup>

**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,<sup>33</sup> while surveillance cameras have expanded across the country’s rural and urban areas.<sup>34</sup> 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.<sup>35</sup>



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.<sup>36</sup>

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,<sup>37</sup> while Y-STR samples were collected from 16,000 men as part of a criminal investigation into the 2011 murder of an Italian teenager.<sup>38</sup>

Yet such mass screenings are highly controversial. Both the Forensic Genetics Policy Initiative<sup>39</sup> and the Irish Council for Civil Liberties<sup>40</sup> 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'.<sup>41</sup> 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.<sup>42</sup> 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,<sup>43</sup> schools,<sup>44</sup> streets,<sup>45</sup> shops<sup>46</sup> and village offices<sup>47</sup> (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,<sup>48</sup> 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;<sup>49</sup> 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.<sup>50</sup> 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).<sup>51</sup> Unconnected to any criminal investigation, police have collected blood samples from students at schools across China, including in Shaanxi,<sup>52</sup> Sichuan,<sup>53</sup> Jiangxi,<sup>54</sup> Hubei,<sup>55</sup> Fujian,<sup>56</sup> and Anhui.<sup>57</sup> In a single township in Fujian, more than 1,500 blood samples were taken from students at local kindergartens and elementary schools.<sup>58</sup> In some cases, teachers have been enlisted to assist in DNA collection.<sup>59</sup>

**Figure 11: Collecting blood samples from students, Poyang County, Jiangxi Province, November 2018, and Yunxi County, Hubei Province, March 2019**



Sources: 'Actively cooperate with students in collecting DNA samples' (积极配合做好学生DNA样本信息采集工作), *Dongxi Primary School Web* (东溪小学王网), 14 November 2018, [online](#); 'Safety management: Nine-year standard school in Shangjin Town actively cooperates with DNA information collection' (安全管理:上津镇九年一贯制学校积极配合做好DNA信息采集工作), Nine-year Standard School in Shangjin Town *WeChat* account (上津镇九年一贯制学校), 22 March 2019, [online](#).

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).<sup>60</sup> 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'<sup>61</sup> and an abuse of the authority police have over vulnerable adolescents.

**Figure 12: Police-led DNA collection from middle and elementary school students in Shifan County, Sichuan Province, September 2019, and in Hanzhong County, Shaanxi Province, October 2019**



Sources: 'Shigu Junior High School actively cooperates with the public security police to do a good job of collecting DNA samples from teenagers' (师古初中积极配合公安民警做好青少年DNA样本采集工作), *Shifang City Government Web* (什邡市人民政府), 12 September 2019, [online](#); 'This elementary school in Nanzheng District has launched the collection of student DNA samples' (南郑区这个小学·开展了学生DNA样本采集), *Eastday* (东方咨询), 12 October 2019, [online](#).

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).<sup>62</sup>



Figure 13: National Public Security Organ DNA Database screenshot (cropped)



Source: '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](#).

Like the FBI's Combined DNA Index System (CODIS) in the US,<sup>63</sup> 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.<sup>64</sup>

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.<sup>65</sup> 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).

Figure 14: Highershine's National Public Security Organ Male Family Ancestry Investigation System



Source: 'National Public Security Male Family Investigation System collects clients' (全国公安男性家族排查系统采集客户端), China Highershine (北京海华鑫安生物), [online](#).

Evidence already suggests that this new DNA database is being integrated with other forms of state surveillance and ‘stability maintenance’ social control operations.<sup>66</sup> Local officials in Sichuan Province have linked Y-STR data collection to the Sharp Eyes Engineering Project,<sup>67</sup> which is a national surveillance program aimed at expanding video monitoring across rural and remote areas.<sup>68</sup> The Chinese company Anke Bioengineering has also spoken of building a ‘DNA Skynet’,<sup>69</sup> in an apparent allusion to another national surveillance program.<sup>70</sup>



## 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.<sup>71</sup> 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.<sup>72</sup> 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.,<sup>73</sup> which is a subsidiary of one of China's largest and fastest growing biotech companies, Anhui Anke Bioengineering (Group) Co. Ltd.<sup>74</sup> AGCU's founder and Anke's vice president is Dr Zheng Weiguo.<sup>75</sup> 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.<sup>76</sup> 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.<sup>77</sup>

AGCU has partnered with public security bureaus across China to apply for patents for Y-STR testing kits<sup>78</sup> and in 2018 entered into an exclusive distribution partnership with US biotech company Verogen to sell Illumina's next-generation DNA sequencers in China.<sup>79</sup> AGCU is now actively promoting Illumina next-generation solutions at domestic and international trade fairs organised by the Ministry of Public Security (Figure 15).<sup>80</sup>

**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 "FamilyCraftsman" training class' (乡市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,<sup>81</sup> 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<sup>82</sup> and has worked with other public security bureaus to build Y-STR databases as part of this national program.<sup>83</sup> Another company is Microread Genetics Co. Ltd, a leading life sciences company with a joint genetic lab in Kazakhstan,<sup>84</sup> which has won contracts to provide public security bureaus with Y-STR testing kits<sup>85</sup> and database construction services.<sup>86</sup>

Beijing Hisign Technology Co. Ltd is also providing Y-STR database solutions to the Ministry of Public Security.<sup>87</sup> Founded by former People's Liberation Army member Liu Xiaochun,<sup>88</sup> 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).<sup>89</sup> 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.<sup>90</sup>

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



Source: 'YSTR database application system' (YSTR数据库应用系统), Hisign Technology (北京海鑫科金高科技股份有限公司网), [online](#).

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.<sup>91</sup>

The company's involvement in biometric surveillance in Xinjiang is well documented.<sup>92</sup> But, while it has vowed to stop selling human identification products in the region,<sup>93</sup> 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).<sup>94</sup> 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.

**Figure 17: Presentation on forensic Y-STR kits designed for the Chinese market by a representative of Thermo Fisher, Chengdu, Sichuan Province, November 2017**



Source: 'Dr Zhong Chang' (钟昌博士), *Tencent Video* (腾讯视频), 8 November 2017, online.

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<sup>95</sup> and Yfiler Platinum PCR amplification kit<sup>96</sup>—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.<sup>97</sup> More disturbingly, Thermo Fisher's Huaxia PCR amplification kit was developed specifically to identify the genotypes of Uyghur, Tibetan and Hui ethnic minorities.<sup>98</sup>

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<sup>99</sup> and Y-STR databases.<sup>100</sup>

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.<sup>101</sup> 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,<sup>102</sup> 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.'<sup>103</sup> 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.<sup>104</sup>

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.<sup>105</sup> 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.<sup>106</sup> 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',<sup>107</sup> 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'.<sup>108</sup>

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,<sup>109</sup> 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'.<sup>110</sup>

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.<sup>111</sup> 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,<sup>112</sup> while others have cautioned about the potential for mass social unrest if compulsory collection should occur.<sup>113</sup>

**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.<sup>114</sup> 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.<sup>115</sup>

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.<sup>116</sup> Yet online posts suggest that some still question the legal basis of this program.<sup>117</sup>

## 2. Lack of informed consent

Outside of a criminal investigation, the voluntary submission of genetic samples requires prior, free and informed consent.<sup>118</sup> 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.

**Figure 19: Blood collection in Shangrao, Jiangxi Province, October 2019 (cropped), and Lantian County, Xi'an, Shaanxi Province, January 2019**



Sources: 'Xianshan Primary School: District public security bureau visits the school to collect blood samples' (仙山小学:区公安局到校进行血样采集), *Meipian* (美篇网), 1 November 2019, [online](#); '(Striving for "Safety Vessel" Lantian Public Security in Action: Public Security police keeping the peace at the end of the Spring Festival' (争创“平安鼎”蓝田公安在行动: 年终岁尾春节至·公安民警守平安), *Meipian* (美篇网), 30 January 2019, [online](#).

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.<sup>119</sup> 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.<sup>120</sup> Extensive police powers (both legal and extra-legal) make it virtually impossible for someone to refuse a request for biometric data in China.<sup>121</sup>

### 3. Lack of privacy

Despite some assurances that personal information will be protected,<sup>122</sup> 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.<sup>123</sup> Legal experts and ordinary citizens have also expressed concerns about the lack of robust privacy protections when it comes to Y-STR sample collection.<sup>124</sup>

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



Sources: ‘Xiaoyang Police Station of Haiyang City: Check and fill the vacancies for the construction of the Y library’ (海阳市小纪派出所: 对Y库建设工作进行查漏补缺), *Shuimu Web* (水母网), 28 March 2019, [online](#); ‘Recent work trends of Sanchuankou Police Station of Public Security Bureau of Zizhou County’ (子洲县公安局三川口派出所近期工作动态), *Meipian* (美篇网), 7 May 2019, [online](#).

Online posts note that police blood collection outside of a criminal investigation constitutes an infringement on personal privacy.<sup>125</sup> 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.<sup>126</sup> 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.<sup>127</sup>

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’.<sup>128</sup> 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'.<sup>129</sup>

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 2012<sup>130</sup> and the subsequent destruction of 1.76 million DNA profiles taken from people innocent of any criminal offence.<sup>131</sup> 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.<sup>132</sup>

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.<sup>133</sup> Nor has the Chinese Government been receptive to criticisms of earlier mass DNA collection programs made by international human rights organisations.<sup>134</sup> 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.<sup>135</sup>

# 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,<sup>136</sup> and even commercial genealogical websites can lead to the loss of genetic privacy for the relatives of those who have voluntarily uploaded their data.<sup>137</sup> 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**

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

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),<sup>138</sup> 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.<sup>139</sup> 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).<sup>140</sup>

**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会), Anlu Government (安陆政府网), 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), Meipian (美篇网), 9 August 2018, [online](#).

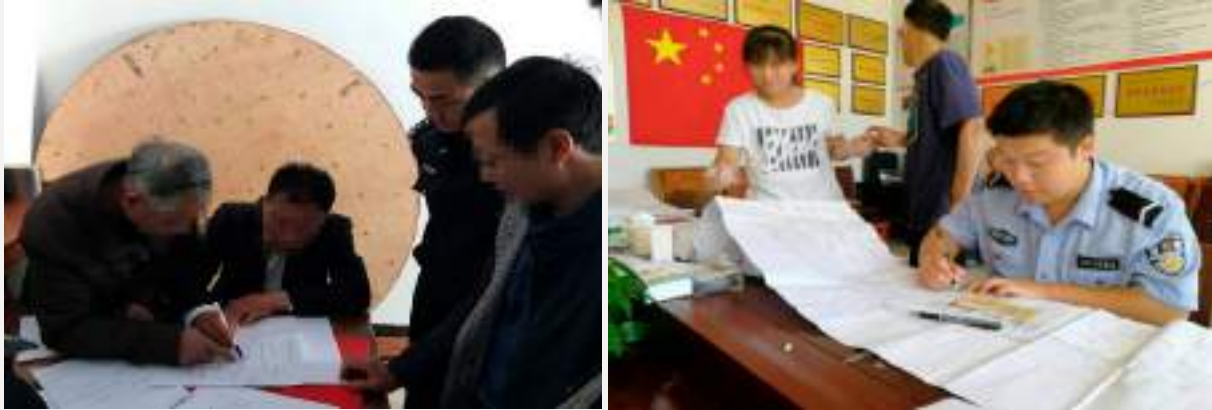
During these meetings, officers are organised into subgroups responsible for particular data-collection-related tasks. Meetings end with the signing of letters of responsibility, which lay out the obligations government offices have for completing Y-STR data-collection work.

### 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.<sup>141</sup> Through these visits, police try to map out family genealogies going back from five to eight generations (Figure 22).<sup>142</sup>

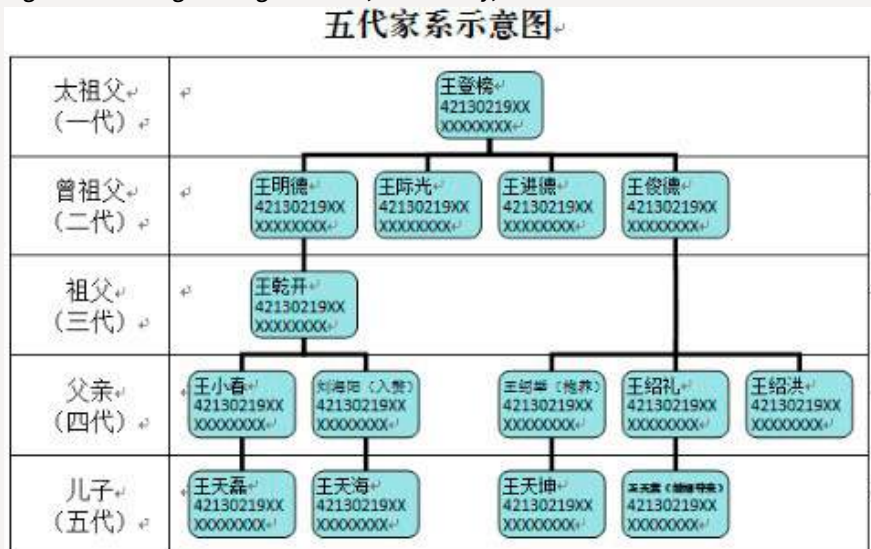
**Figure 22: Collecting genealogical data by hand, Chaohu, Anhui Province, April 2018, and Jinan, Shandong Province, September 2018**



Sources: 'Huailin 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), Chaohu Government (巢湖政府网), 10 April 2018, [online](#); 'The Chengguan Office successfully completed the Y library information collection task' (城关所圆满完成Y库信息采集任务) Chegguan Police Station (城关派出所), 29 September 2018, [online](#).

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**



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.

Family trees are first drawn by hand,<sup>143</sup> and police officers and local officials work with members of targeted families to ensure accuracy (Figure 24).<sup>144</sup> 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.<sup>145</sup>

**Figure 24: Completed family trees, Luliang, Shanxi Province, June 2018, and Baoji, Long County, Shaanxi Province, October 2018 (cropped)**



Sources: 'Lin County Public Security Bureau Y-STR DNA Family Investigation System Construction Database' (临县公安局:Y-STR DNA家族排查系统建设数据库), *Meipian* (美篇网), 26 June 2018, [online](#); Caojiawan Police Station of Long County Public Security Bureau completed the first male family survey map (陇县公安局曹家湾派出所完成首张男性家族系调查图谱), *Meipian* (美篇网), 10 October 2018, [online](#).

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).

**Figure 25: Inputting genealogical information, Tongchuan, Shaanxi Province, August 2018 (cropped)**



Source: 'Chengguan Police Station completed the construction of male Y DNA bank' (城关派出所全面完成男性Y库建设工作), *Nanyuan Police* (南苑警务网), 8 August 2018, [online](#).

### 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<sup>146</sup> and 9.6% in Ordos, Dongsheng District, Inner Mongolia,<sup>147</sup> to 25.4% in Tongchuan, Yijun County, Shaanxi Province<sup>148</sup> and 26.4% in Changzhi, Tunliu County, Shanxi Province.<sup>149</sup>



**Figure 26: Blood collection in Tongchuan, Shaanxi Province, June 2019, and Zhangzhou, Fujian Province, April 2019**



Sources: 'Tongchuan police: Hongqiao Yuhua Police Station completed the annual DNA blood sample information collection task' (铜川公安:虹桥玉华派出所完成全年DNA血样信息采集任务), Hongqiao Yuhua Police Station (虹桥玉华派出所), 9 June 2018, [online](#); "Changtai: Blood Collection Notice" (长泰:采血通告), *Soho* (搜狐网), 20 April 2019, [online](#).

Samples are taken in the form of blood via a pinprick to the finger,<sup>150</sup> 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.<sup>151</sup>

**Figure 27: Blood collection cards and envelopes, Tongchuan, Shaanxi Province, June 2019 (cropped), and Xi'an, Zhouzhi County, Shaanxi Province, May 2019**



Source: 'Jiufeng has taken multiple measures, combined points with points, broken common rules, and promoted quickly to strive to complete the construction of male family trees as soon as possible' (九峰所多策并举、点面结合、打破通例、快速推动、争取早日全面完成男性家系建设工作), *Meipian* (美篇网), 24 May 2019, [online](#).

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).

**Figure 28: Screen capture taken from video of blood collection in Anqing, Anhui Province, May 2019**



Source: 'In order to build the Y-DNA bank and not affect the farming time of the masses, the auxiliary policemen from Liuping Police Station entered the field on 17 May to collect blood samples for the Y-DNA bank from the people in the jurisdiction and publicise safety precautions', (为了Y库建设和不影响群众农耕时间5月17日柳坪派出所民辅警走进田间地头·为辖区群众采集Y库血样和宣传安全防范), Susong Liuping Police (宿松柳坪派出所), video, 17 May 2019, [online](#).

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).

**Figure 29: Screen capture taken from video of blood collection in Sichuan Province, July 2019 (cropped)**



Source: 'Rural: What are you doing together? It turns out collecting blood samples!' (农村:大家围在一起干吗了,原来是在采集血样!), Tencent Video (腾讯视频), video, 15 July 2019, [online](#).

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).



**Figure 30: Screen capture taken from video of blood collection in Fuling District, Chongqing Municipality, June 2019 (cropped)**



Source: 'The staff went to the village to collect DNA blood samples, which greatly conveniences the people' (工作人员到村里面进行DNA血样采集·极大的方便了人民群众), *Haokan Video* (好看视频), 11 June 2019, [online](#).

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.<sup>152</sup>

**Figure 31: Blood collection in Ningde, Zhejiang Province, April 2019**



Source: 'Nodded attention! Male family blood sample collection work started' (点头人注意! 男性家族血样采集工作开始了), *Sohu* (搜狐网), 30 April 2019, [online](#).

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.<sup>153</sup>

#### 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.<sup>154</sup>

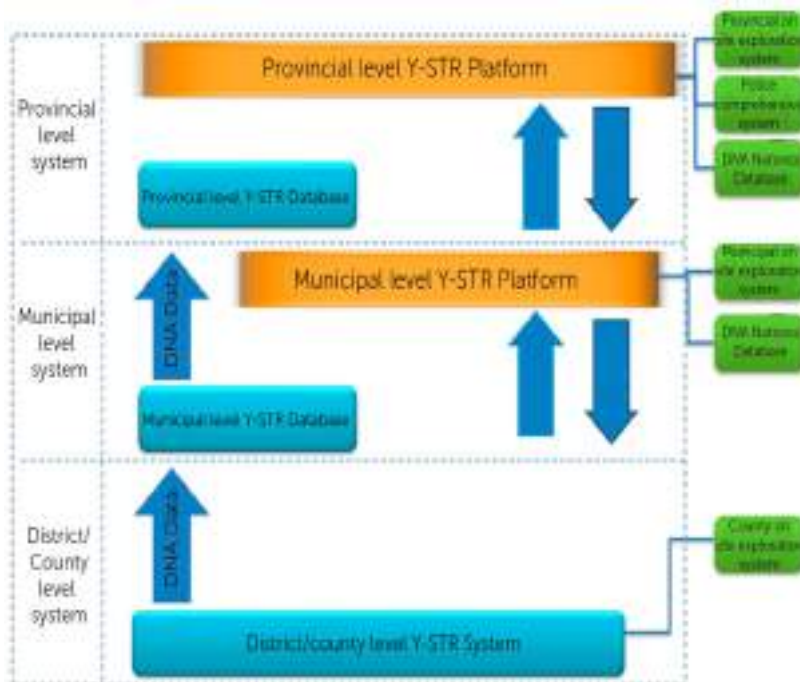
**Figure 32: Data entry, Wulanhaote, Inner Mongolia, September 2019**



Source: 'Collection of blood samples from male families' (男性家族血样采集工作), *Meipian* (美篇网), 17 September 2019, online.

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).<sup>155</sup>

**Figure 33: Data sharing between public security bureaus using Yingdi's Y-STR database system (translated)**



Source: 'Solution pages of police equipment' (解决方案列表), *Yingdi* (武汉英迪科技发展有限公司), online. Translated from Chinese by ASPI.

## 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.<sup>156</sup>

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**

Locality (province)	Total population	Estimated male population	No. of Y-STR samples collected	Samples as % of estimated male population
Donglan County, Hechi (Guangxi)	223,500	111,750	10,841 <sup>a</sup>	9.7%
Laoting County, Tangshan (Hebei)	500,000	320,144	56,068 <sup>b</sup>	17.5%
<i>(Note: Figures for male population come from original source. Figures for samples are recommended collection targets.)</i>				
Xian'an District, Xianning (Hubei)	628,000	314,000	40,000 <sup>c</sup>	12.7%
<i>(Note: Figures in the original source list a lower total male population of 270,000.)</i>				
Dongsheng District, Ordos (Inner Mongolia)	262,900	131,450	12,667 <sup>d</sup>	9.6%
<i>(Note: Figures for male population come from original source.)</i>				
Yaozhou District, Tongchuan (Shaanxi)	236,100	118,050	26,000 <sup>e</sup>	22.0%
Yijun County, Tongchuan (Shaanxi)	92,100	46,050	11,735 <sup>f</sup>	25.4%
Yintai District, Tongchuan (Shaanxi)	209,500	104,750	12,000 <sup>g</sup>	11.4%
Yulin, Jia County (Shaanxi)	269,700	134,850	24,608 <sup>h</sup>	18.2%

Changzhi, Tunliu County (Shanxi) <i>(Note: Figure for samples is the government's projected estimate for total samples collected.)</i>	273,000	136,500	36,036 <sup>i</sup>	26.4%
Datong, Lingqiu County (Shanxi) <i>(Note: Figure for samples is the government's projected estimate for total samples collected.)</i>	245,858	122,929	10,000 <sup>j</sup>	8.1%

Sources

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- j 'Blood sample collection' (血样采集), *Meipian* (美篇网), 23 November 2018, [online](#).

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 3: Government bid invitations and procurement orders for Y-STR blood sample collection cards**

Locality (province)	Total population	Estimated male population	No. of Y-STR blood sample cards purchased or requested	Samples as % of estimated male population
Lu'an, Anhui <i>(Note: According to the contract, this order seems to be supplementing an earlier order, hence the smaller figure.)</i>	5,882,000	2,941,000	35,000 <sup>a</sup>	1.1%
Wuhu, Fanchang County (Anhui)	269,000	134,500	28,000 <sup>b</sup>	20.8%
Fuyang, Taihe County (Anhui)	1,773,000	886,500	100,000 <sup>c</sup>	11.2%
Fuyang, Yingshang County (Anhui)	1,295,000	647,000	100,000 <sup>d</sup>	15.4%
Fuzhou, Changle District (Fujian)	725,000	362,500	44,000 <sup>e</sup>	12.1%
Hezhou (Guangxi)	2,072,600	1,036,300	130,000 <sup>f</sup>	12.5%
Wuzhou, Teng County (Guangxi)	1,079,800	539,900	40,000 <sup>g</sup>	7.4%
Tongren (Guizhou)	3,168,800	1,584,400	168,300 <sup>h</sup>	10.6%
Changde (Hunan)	5,827,000	2,913,500	500,000 <sup>i</sup>	17.1%
Shaoyang, Longhui County (Hunan)	1,200,000	600,000	118,000 <sup>j</sup>	19.6%
Pingxiang (Jiangxi)	1,933,200	966,000	73,000 <sup>k</sup>	7.5%
Shangrao (Jiangxi)	7,810,000	3,905,000	500,000 <sup>l</sup>	12.8%
Hanzhong (Shaanxi)	3,437,000	1,718,500	269,201 <sup>m</sup>	15.6%
Xianyang, Xunyi County (Shaanxi)	267,100	133,550	35,000 <sup>n</sup>	26.2%
Heze (Shandong)	8,765,000	4,382,500	600,000 <sup>o</sup>	13.6%
Ningbo, Xiangshan County (Zhejiang)	541,700	270,850	70,000 <sup>p</sup>	25.8%

Sources

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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,<sup>157</sup> 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.<sup>158</sup> 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.<sup>159</sup> 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<sup>160</sup> but identical to that provided on the website for Hisign Technology.<sup>161</sup>

If we add the estimated 35–70 million Y-STR profiles to the 70 million profiles authorities already possess,<sup>162</sup> 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.<sup>163</sup>

## 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 4: Chinese and multinational companies involved in the Y-STR data collection program**

Company	Product(s) sold
Yuanqi Technology 北京沅启科技有限公司	Y-STR database construction <sup>a</sup>
Yingdi Technology Development 武汉英迪科技发展有限公司	Y-STR database construction <sup>b</sup>
Highershine 北京海华鑫安生物信息技术有限责任公司	Y-STR database construction <sup>c</sup>
AGCU Scientech 无锡中德美联生物技术有限公司	Y-STR kits; Y-STR database construction <sup>d</sup>
Health Gene Technologies 宁波海尔施基因科技有限公司	Y-STR database construction <sup>e</sup>
Dianan Technology 杭州典安科技有限公司	Y-STR kits; Y-STR database construction <sup>f</sup>
Kelitai Technology 重庆科立泰科技有限公司	Y-STR kits <sup>g</sup>
Huizhong Hengan Biotechnology 北京汇众恒安生物科技有限公司	Y-STR kits <sup>h</sup>
Shengyuan Police Investigation Equipment 泉州圣源警用侦察设备有限公司	Y-STR database construction <sup>i</sup>
Wis-Tong Technology 北京中际慧通科技有限公司	Y-STR kits <sup>j</sup> ; Y-STR database construction <sup>k</sup>
Enwei Tiancheng Technology 北京恩威天诚科技有限公司	Y-STR kits <sup>l</sup>
Juzheng Technology 江西巨正科技有限公司	Y-STR kits <sup>m</sup>
China National Scientific Instruments and Materials 中国科学器材有限公司	Y-STR kits <sup>n</sup>

Hisign Technology 北京海鑫高科指纹技术有限公司	Y-STR kits <sup>o</sup> ; Y-STR database construction <sup>p</sup>
Yuandongli Information Technology 郑州源动力信息科技有限公司	Y-STR database construction <sup>q</sup>
Microread Genetics 苏州阅微基因技术有限公司	Y-STR database construction <sup>r</sup>
Shiji Chang'an Electronic Technology 郑州世纪长安电子技术有限公司	Y-STR database construction <sup>s</sup>
Zhongtai Ruida Technology 武汉中泰瑞达科技有限公司	Y-STR kits <sup>t</sup> ; Y-STR database construction <sup>u</sup>
Xindun Kewei Police Technology 湖南鑫盾科威警用科技有限公司	Y-STR kits <sup>v</sup>
APG Bio 潍坊环亚生物医药科技有限公司	Y-STR database construction <sup>w</sup>
Chengdu Wofute Technologies 成都沃夫特科技有限公司	Y-STR kits <sup>x</sup>
Bosun Life 北京博晟思远生物科技有限公司	Y-STR database construction <sup>y</sup>
Yongtai Anda Technology 北京永泰安达科技有限公司	Y-STR database construction <sup>z</sup>
Forensic Genomics International 深圳华大法医科技有限公司	Y-STR kits <sup>aa</sup>
Eppendorf China Limited 艾本德中国有限公司	Y-STR kits <sup>bb</sup>
Thermo Fisher Scientific (China) Co. Ltd. 赛默飞世尔科技(中国)有限公司	Y-STR kits <sup>cc</sup>

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## Acronyms and abbreviations

CODIS	Combined DNA Index System
DNA	Deoxyribonucleic acid
STR	Short tandem repeat
UN	United Nations

# Notes

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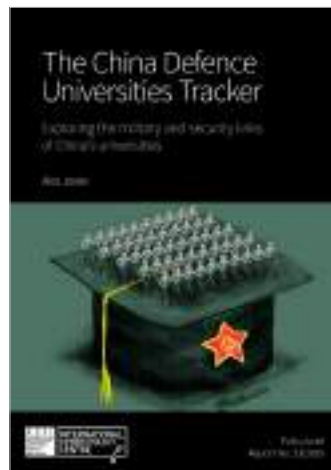
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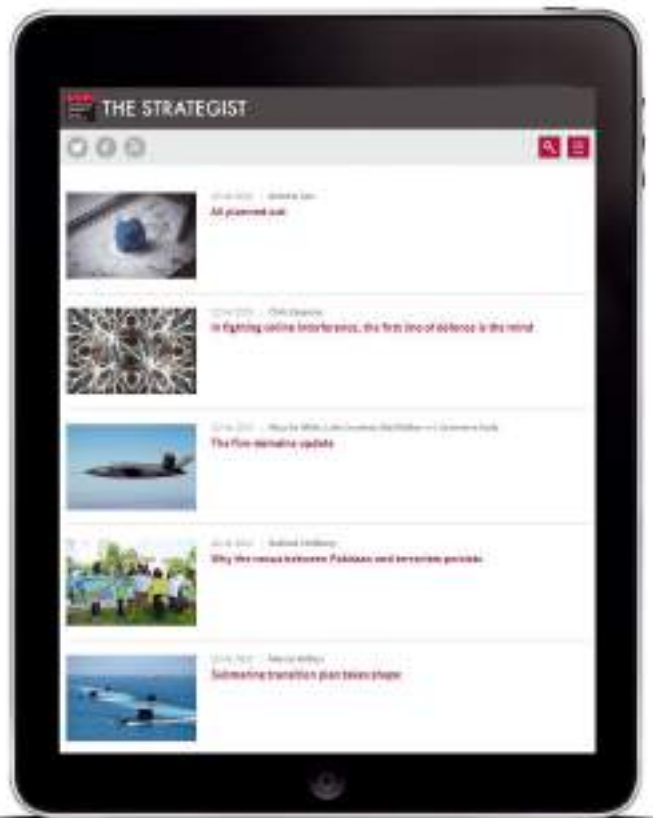


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