



# Building scientific literacy in China: achievements and prospects

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Scientific literacy is an important part of a population's comprehensive quality. The improvement in citizens' scientific literacy is not only an intrinsic demand in the construction of an innovation-driven country, but also a foundation project to create the innovative environment and to cultivate innovative talents. Citizens' scientific literacy surveys have been carried out in the United States since 1957 [1]. The first survey in China was conducted in 1992, followed by eight consecutive surveys. In 2006, the *Outline of the National Scheme for Scientific Literacy (2006–2010–2020)* was promulgated to guide the construction of citizen scientific literacy. The current essay summarizes main conclusions from the surveys conducted in the past decade. By clarifying the developmental trend of Chinese citizens' scientific literacy, we expect to provide a better understanding of the target in the "Thirteenth Five-Year Plan" period, and offer more information for government decision-making.

## 1 Improved scientific literacy of Chinese citizen during 2005–2015

According to the most recent data issued by the China Association for Science and Technology in October, 2015,

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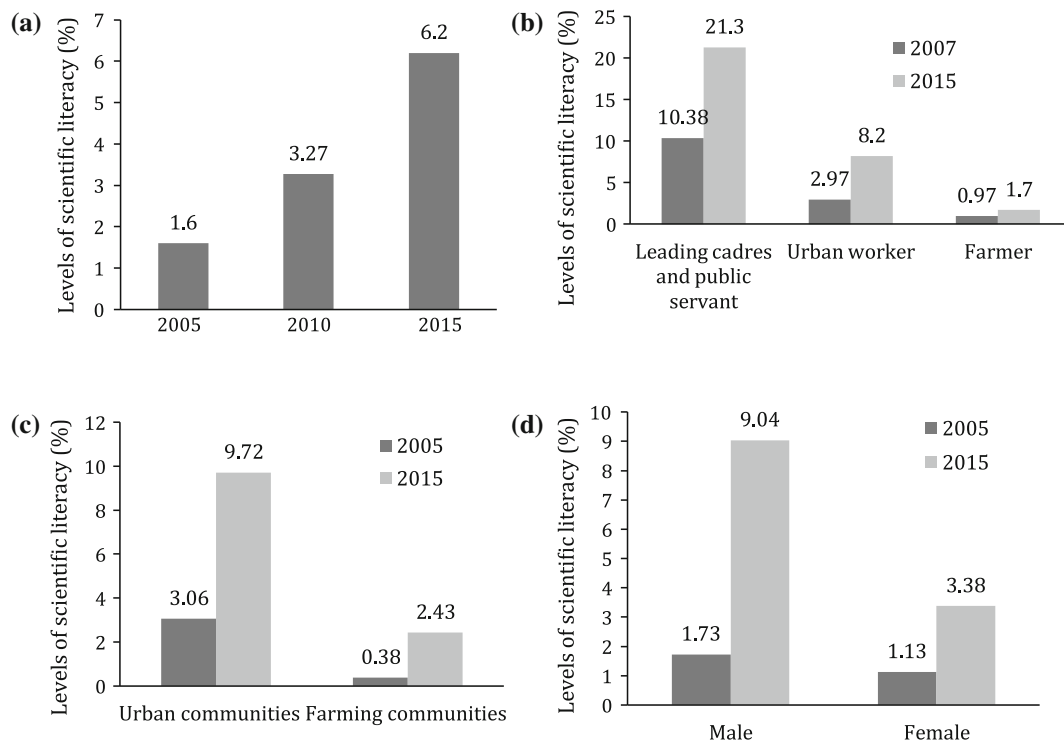
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6.20 % of Chinese citizens demonstrated scientific literacy, with an increase of 4.7 %, comparing with 1.50 % in 2005 (Fig. 1a). This result suggests a significant improvement of the citizens' scientific literacy (Fig. 1a).

## 2 Variations of citizens' scientific literacy levels in different regions, populations, and genders

Not surprisingly, the citizens' scientific literacy of Shanghai, Beijing, and Tianjin ranked top three in China. The levels of Shanghai and Beijing in 2015 were comparable to that of the United States at the end of the twentieth century (17.3 % in 1999), higher than that of the European Union in 2005 (13.8 %). Meanwhile, the level of citizen scientific literacy in Tianjin in 2015 was similar to that of the United States in 1995 (12.0 %). However, unbalanced development exists within different regions. Besides the provinces mentioned above, four provinces (Jiangsu, Zhejiang, Guangdong, and Shandong) demonstrated a better than average performance in the survey. The levels of citizen scientific literacy in other 13 provinces (including Fujian, Jilin, Anhui, etc., as shown in Fig. S1) were between 5 % and 6.2 %. Meanwhile, 11 provinces were lower than 5 %, some of them even below 2 % (Fig. S1).

We also observed unbalanced development of citizens' scientific literacy among different populations. Those of the leading cadres and civil servants improved from 10.38 % in 2007 to 21.3 % in 2015, ranked top in all of the key populations, maintaining a leading trend of rapid growth. The levels of urban workers improved from 2.97 % in 2007 to 8.2 % in 2015, leading this group to a fast growth channel. The levels of the farming communities improved from 0.97 % in 2007 to 1.7 % in 2015 (Fig. 1b). As viewed from the residence classification, the levels of



**Fig. 1** Improved levels of Chinese citizens' scientific literacy in different years and populations. **a** The overall levels of Chinese citizen scientific literacy in 2005, 2010 and 2015; **b** The levels of citizen scientific literacy for different populations in 2007 and 2015; **c** The levels of urban and rural citizen scientific literacy in 2005 and 2015; **d** The levels of citizen scientific literacy for different genders in 2005 and 2015

the urban residents improved from 3.06 % in 2005, to 9.72 % in 2015 (Fig. 1c). From a gender perspective, the levels of the citizen scientific literacy in males improved from 1.73 % in 2005, to 9.04 % in 2015, and both the amplitude and the rate of growth were significantly higher than those of the female population (Fig. 1d).

While demonstrating a rapid improvement of the citizens' scientific literacy, the above data also reflects great differences existing within the regions, genders, and populations. In particular, the slow improvement of scientific literacy in farmers indicates the necessity to invest more efforts in the future.

### 3 Significant achievements made in improving citizens' scientific literacy

In 2006, the *Outline of the National Scheme for Scientific Literacy (2006–2010–2020)* was promulgated by the Chinese government in order to comprehensively increase the citizens' scientific literacy, which became an action plan for the Chinese Science Popularization Program. Ten years of implementation made significant achievements.

#### 3.1 Massive themed popular science activities accomplished

To take full advantage of the social publicity platform, the National Science Popularization Day and the Sci-tech (S&T) Week which focuses on the themes of “energy conservation, eco-environment protection, safety-health guarantees, and service innovation” were carried out. Nearly 200 million distinctive S&T activities were conducted across the nation. More than 40,000 key science popularization activities launched for the National Science Popularization Day with over 700 million people participated.

#### 3.2 Significant achievements and rapid improvements in the scientific literacy action

- (1) Policies, guidance, and planning documents had been issued to guide and lead the execution of the scientific literacy movement in the key populations. With regards to minority population, the science curriculum standards of compulsory education were revised, and child learning and family education plans were formulated. The *Farmer Scientific Literacy Action*

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