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# Transformation of the tobacco product market in Japan, 2011–2023

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## ABSTRACT

**Objective** This study updates a previous paper that examined trends in the sale of cigarettes and heated tobacco products (HTPs) in Japan between 2011 and part way through 2019. The current study includes complete unit sales data through 2023.

**Methods** Data on cigarette and HTP sales were obtained from public sources available from the websites and stockholder reports for the Tobacco Institute of Japan, Philip Morris International and Japan Tobacco. We used joinpoint regression using the parametric method to test for trends in both per capita and total sales for the three outcome variables assessed between 2011 and 2023: (1) cigarette sales, (2) HTP sales and (3) combined cigarette and HTP sales. Joinpoint regression identifies changes in trends and estimates the annual per cent change (APC) for each trend segment.

**Results** Between 2011 and 2023, per capita and total cigarette sales declined by 52.6% and 52.7%, respectively. From 2011 to 2015, per capita cigarette sales in Japan decreased –1.5% APC; from 2015 to 2018, the decline accelerated to –10.5% APC and continued to fall –7.3% APC between 2018 and 2023. Between 2016 and 2018, per capita HTP sales increased by 149.0% APC, and since 2018, they have increased by 8.1% APC.

**Conclusion** While many factors may account for the decreased sale of cigarettes in Japan over the past 12 years, the increased sale of HTPs appears to be a factor.

## INTRODUCTION

As the harms of cigarette smoking have become better understood and smoking control measures have been put in place in many countries, cigarette sales have started to drop, especially in high-income countries.<sup>1</sup> Cigarette makers have started diversifying their product lines to include various non-combustible nicotine products such as heated tobacco products (HTPs), electronic cigarettes and oral tobacco products.<sup>2</sup>

In 2019, Japan was among the 10 countries with the largest number of tobacco smokers worldwide.<sup>3</sup> Japan was a testing ground for HTPs when IQOS was first launched by Philip Morris International (PMI) in Nagoya, Japan, in 2014, with national expansion in 2016.<sup>4–12</sup> After PMI introduced IQOS, other cigarette companies, including Japan Tobacco (JT), British American Tobacco (BAT) and Imperial Tobacco (IT), also introduced HTPs in Japan. PMIs IQOS, JT's Ploom X, BAT's glo and IT Pulze HTPs

## WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ This study updates a previous paper that examined covariation in trends in the sale of cigarettes and heated tobacco products (HTPs) in Japan between 2011 and part way through 2019.

## WHAT THIS STUDY ADDS

⇒ This paper updates the prior analysis to include trends in the sale of cigarettes and HTPs from 2019 to 2023 and shows that between 2011 and 2023, per capita and total cigarette sales in Japan declined by over 50%. The decline in cigarette sales was minimal from 2011 to 2015 but increased markedly after 2015 following the introduction of HTPs.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Halving the cigarette market in Japan in just over a decade is a remarkable achievement and figuring out how to replicate this type of change elsewhere should be a priority for public health research. Clinical trials are needed to test if HTPs can help addicted cigarette smokers transition away from smoking.

all work essentially the same way. Each of these products uses a heated tobacco stick inserted into a battery-powered heating device that, when sucked on, causes the temperature in a heating chamber around the tobacco stick to heat the tobacco. The resulting aerosol contains nicotine and flavourings but lower levels of toxins than those found in conventional cigarettes.<sup>13 14</sup> One heated tobacco stick is roughly equivalent to a single cigarette. JT's Ploom Tech product is a hybrid system that uses tobacco-infused capsules and liquid cartridges inserted into a heating device with roughly four heated tobacco sticks, equivalent to a single capsule.

In a previously published paper, we reported that the decline in cigarette sales in Japan was associated with an increase in heated tobacco stick or equivalent sales up to part of 2019.<sup>15</sup> This paper updates the prior analysis to include trends in the sale of cigarettes and HTPs from 2019 to 2023.

## METHODS

Data on cigarette and HTP sales used for this study were obtained from various public data sources



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**Table 1** Total and per capita ( $\geq 18$  years) sales of cigarettes and heated tobacco products\* in Japan from 2011 to 2023

Year	Total cigarette sales (billions)	Per capita cigarette sales	Total heated tobacco sticks or equivalent sales (billions)	Per capita heated tobacco stick or equivalent sales	Total combined cigarette and heated tobacco stick or equivalent sales (billions)	Per capita combined cigarette and heated tobacco stick or equivalent sales
2011	195.3	1817	0	0	195.3	1817
2012	196.6	1831	0	0	196.6	1831
2013	192.6	1794	0	0	192.6	1794
2014	186.2	1736	0	0	186.2	1736
2015	182.3	1695	0	0	182.3	1695
2016	173.8	1614	5.1	47	178.9	1662
2017	146.5	1360	20.3	188	166.8	1548
2018	133.6	1239	34.6	321	168.2	1560
2019	125	1163	37.3	347	162.3	1510
2020	114.9	1066	40.3	374	155.2	1439
2021	105.2	979	45.1	419	150.3	1398
2022	97.7	911	50.3	469	148	1380
2023	92.2	862	56.5	529	148.7	1390

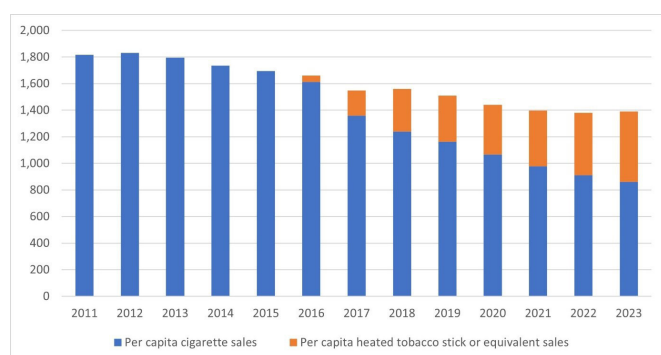
\*Each HTP heated tobacco stick is consider equivalent to one cigarette. For tobacco capsule systems such as JTI's Ploom Tech, we counted five tobacco capsules equivalent to a single cigarette.  
HTP, heated tobacco product.

available from websites and shareholder reports from the Tobacco Institute of Japan, PMI and JT. **Table 1** shows total sales of cigarettes (billions of units), heated tobacco sticks or their equivalents (in billions) and per capita sales of both expressed as products divided by the Japanese population  $\geq 18$  years of age each year.

We used joinpoint regression using the parametric method to test for trends in both per capita and total sales for the three outcome variables assessed between 2011 and 2023: (1) cigarette sales, (2) HTP sales and (3) combined cigarette and HTP sales. Joinpoint regression identifies changes in trends and estimates the annual per cent change (APC) for each trend segment.<sup>16–18</sup> We report the identified trend segments and the corresponding APCs and 95% CIs for each tobacco product group.

## RESULTS

**Table 1** shows that between 2011 and 2023, per capita and total cigarette sales declined by essentially identical amounts, 52.6% and 52.7%, respectively. Our analytical results for per capita sales and total sales were comparable, so we only report findings based on per capita sales. Online supplemental materials provide the same analyses based on total sales. **Figure 1** displays the trends in the per capita cigarette and HTP sales measures from 2011 to 2023.



**Figure 1** Per capita cigarette and heated tobacco stick or equivalent sales in Japan, 2011–2023.

**Table 2** and **figure 2** summarise the joinpoint regression results for per capita cigarette sales, HTPs and combined cigarettes and HTPs. As shown in **table 2**, from 2011 to 2015, per capita cigarette sales in Japan decreased slightly at a  $-1.5\%$  APC (95% CI  $-3.0\%$  to  $0.0\%$ ). From 2015 to 2018, the decline in per capita cigarette sales accelerated to  $-10.5\%$  APC (95% CI  $-14.6\%$  to  $-6.1\%$ ), and it continued to fall at a rate of  $-7.3\%$  APC (95% CI  $-8.2\%$  to  $-6.3\%$ ) between 2018 and 2023. Between 2016 and 2018, per capita HTP sales increased by  $149.0\%$  APC (95% CI  $132.3\%$  to  $166.8\%$ ). Since 2018, it has increased at an  $8.1\%$  APC (95% CI  $6.4\%$  to  $9.8\%$ ). Combined sales decreased from 2011 to 2023 at  $-2.6\%$  APC (95% CI  $-2.9$  to  $-2.3$ ).

## DISCUSSION

Between 2011 and 2023, per capita and total cigarette sales in Japan declined by 52.6% and 52.7%, respectively. During the same time period in the USA, per capita cigarette sales dropped by about 45%.<sup>19</sup> In both the USA and Japan, the cigarette market is declining at least partially in response to a more diverse marketplace of nicotine and tobacco products. In Japan, HTPs are the primary legal competition for cigarettes, whereas in the USA, the decline in cigarette consumption is associated with the increased use of electronic cigarettes and oral tobacco products.<sup>4 20</sup>

**Table 2** Joinpoint regressions testing for trends in per capita cigarette, heated tobacco stick or equivalent and combined cigarette and heated tobacco stick or equivalent sales in Japan 2011–2023

Outcome variables	Years	APC, %	95% CI
Per capita cigarette sales	2011–2015	-1.5	-3.0 to 0.0
	2015–2018	-10.5	-14.6 to -6.1
	2018–2023	-7.3	-8.2 to -6.3
Per capita heated tobacco stick or equivalent sales	2016–2018	149.0	132.3 to 166.8
	2018–2023	8.1	6.4 to 9.8
Per capita cigarette and heated tobacco stick or equivalent sales	2011–2023	-2.6	-2.9 to -2.3

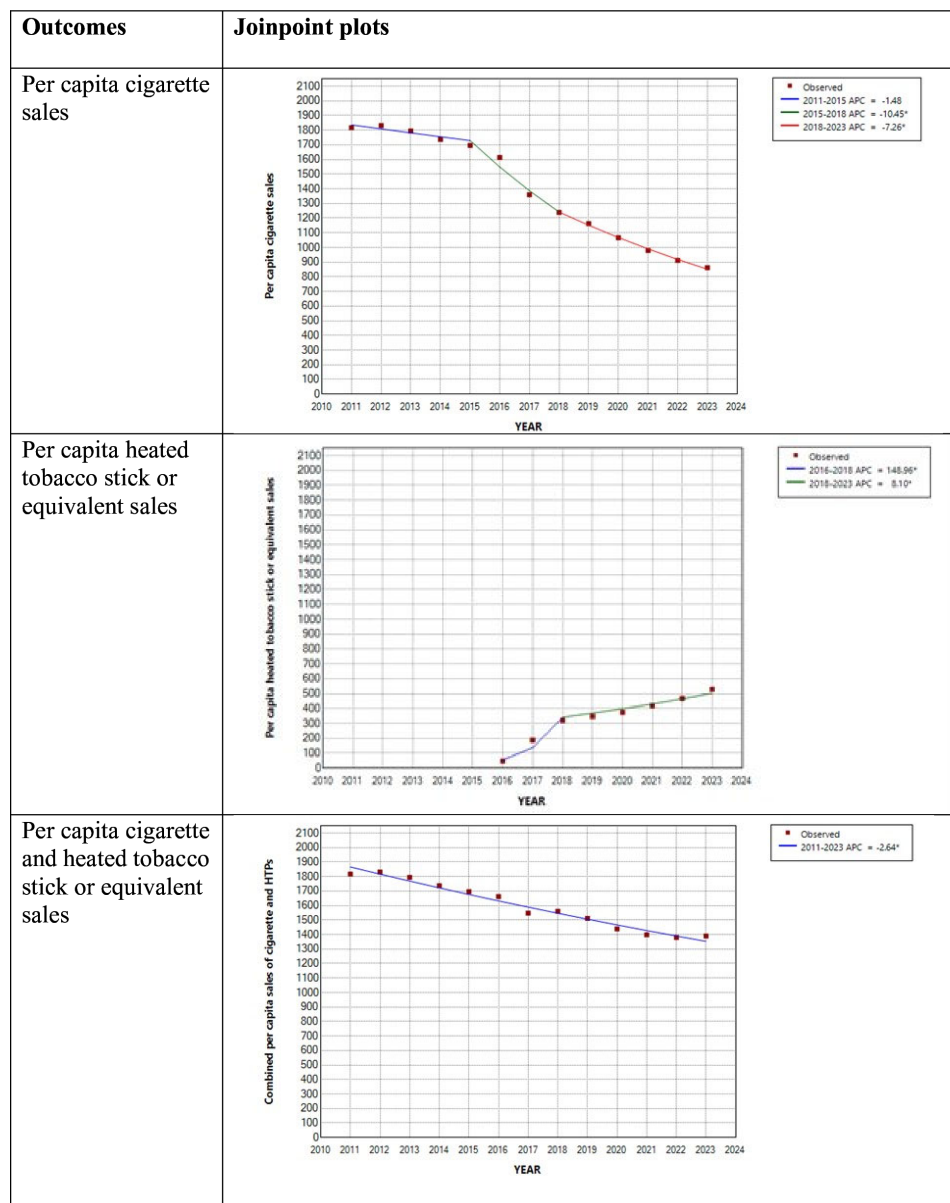
APC, annual per cent change.

The downward shift in cigarette sales in Japan after 2015 is remarkable since Japan has been slow in adopting tobacco control policies consistent with the WHO's Framework Convention on Tobacco Control and its guidelines.<sup>21</sup> This is especially true for tobacco advertising and sponsorship, in which the JT Association self-regulates its members. Thus, both cigarettes and HTPs are widely marketed with few restrictions. Also, while Japan prohibits the sale of nicotine-containing electronic cigarettes, there are likely illicit sales of e-cigarettes happening which, if prevalent, could be accounting for some of the decline in cigarette sales.<sup>22</sup>

In Japan, per capita cigarette sales declined sharply between 2016 and 2018, right after HTPs were introduced into the marketplace. From 2018 to 2023, per capita cigarette sales continued to decrease while HTP sales continued to increase, but both at a slower pace, corresponding to tax increases on both cigarettes and HTPs and the introduction of non-tax tobacco control measures such as smoke-free laws and larger text-only health warnings.<sup>23 24</sup>

Because this study relies on aggregate sales data, we cannot address the extent to which individual cigarette smokers are substituting HTPs, either partially or completely, for conventional cigarettes or their reasons for doing so. Recent studies of HTP users in Japan report that most HTP users also smoke cigarettes, which would reduce the potential harm reduction benefit of the growing sales and use of HTPs.<sup>7-11</sup> Also, HTPs are used more often by younger age groups, whereas older adults are more likely to smoke cigarettes.<sup>7 12</sup>

Other factors may account for the fall in cigarette sales in Japan including the increase in tobacco prices although inexpensive by international standards.<sup>12 21 22</sup> However, the introduction and competitive marketing of HTPs beginning in 2016 in Japan does correspond to declining cigarette sales which is also consistent with prevalence trends reflected in Japan's National Health and Nutrition Surveys covering a similar period.<sup>12 15</sup> Nicotine products are known substitutes for cigarettes and can aid



**Figure 2** Joinpoint regression plots for per capita cigarette, heated tobacco stick or equivalent, and combined cigarette and heated tobacco stick or equivalent sales in Japan, 2011-2023.

smoking cessation, so there is a plausible causal mechanism.<sup>25 26</sup> Developing a better understanding of the mechanisms involved in halving the cigarette market in Japan in just over a decade and working out how best to replicate such changes elsewhere should be a priority for public health research.

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