

Modeling the Population Health Impact of introducing a Reduced Risk Product into the Japan market



PMI SCIENCE
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Introduction

Philip Morris International has developed a Population Health Impact Model (PHIM) to estimate the reduction in smoking attributable mortality due to the marketing a Reduced Risk Products (RRPs – the term PMP SA use to refer to products with the potential to reduce individual risk and population harm in comparison to smoking cigarettes.

The PHIM developed for Japan, as the lead market for IQOS, considered the RRP uptake scenario with a 55% of the smoking population switching to heated tobacco products including IQOS after 10 years; 85% exclusively using heated tobacco products and IQOS and 15% dual use as the RRP Business case scenario. All simulations were counterfactual and run for the period 1990–2010.

Methods

The PHIM assesses the population-level health impact of marketing an RRP as a function of the toxicity of the product, and the product use prevalence distribution at the population level. The Prevalence and Epidemiological Risk components use Japan specific data collected for the model and used for hindcasting.

For all Japan modeling applications, PHIM simulated samples of 10,000 hypothetical males and 10,000 hypothetical females aged between 10 and 79*, in 1990 with a Japan representative distribution of smoking prevalence, and no use of IQOS or other heated tobacco products.

Individual tobacco histories are then updated each year until 2010 based on two alternative sets of estimated smoking transition probabilities (STPs) of switching between tobacco groups for two scenarios:

- ① Null scenario (without RRP)
- ② RRP scenario (with IQOS and heated tobacco products).

All RRP scenarios were conducted with testing an IQOS effective dose range (f value = 0.3 or 0.1). Difference in cumulative smoking attributable deaths between null and RRP scenario informed on overall population harm reduction in Japan. For more details and references see the leaflet.

Results

Null scenario and Verification

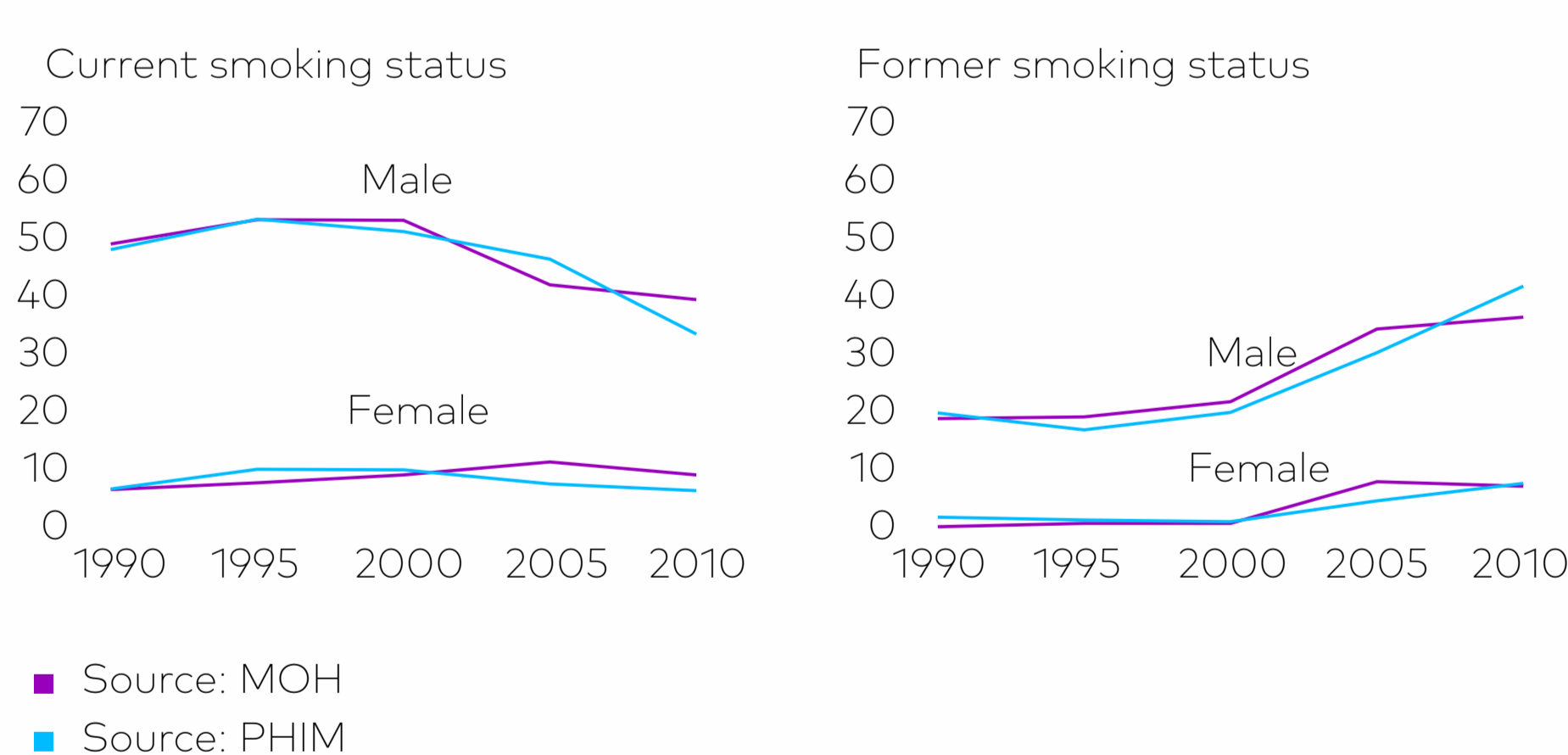
Prevalence component data obtained for Japan was used to develop a null scenario and to estimate smoking transition probabilities (STPs) based on MOH data for Japan. The STPs were developed per sex, for males and females due to large difference in smoking prevalence. Between 2000 and 2010 there was reduction in smoking prevalence largely attributed to the policies and regulations and the STPs developed have been additionally broken to two distinct periods: 1990–2000 and 2000–2010. The model was tested under the null scenario for Japan. The MOH estimates of smoking prevalence (current and former smokers) were compared with the PHIM simulation results.

RRP scenarios

The introduction of IQOS and other heated tobacco products can have a significant positive impact on population harm reduction in Japan over the 20 year period and is estimated as a reduction between 63,534 and 83,495 smoking attributable deaths if the 55% of smoking population move away from cigarettes. For the individuals that switch the reduction in risk is between 70 and 90% depending on IQOS or other heated tobacco products effective dose (f value = 0.3 or 0.1).

The impact on Japan population as a whole is even larger when we consider the RPP uptake as a supplement to the on-going efforts to prevent initiation and increase cessation (the WHO Target). The estimated reduction in smoking attributable deaths in Japan is between 82,398 and 101,845 (f value = 0.3 or 0.1) for WHO 2025 Target with RRP business case and between 72,633 and 92,402 (f value = 0.3 or 0.1) for WHO 2025 Projection with RRP business case.

Smoking prevalence in 50-54 y/o age group. Comparison between Japan MOH data and PMI simulation



Cumulative Impact of THS Introduction on the Disease-Specific Mortalities 20 Years after the Introduction of RRP by Disease, Sex and f-value for all Ages Combined, all diseases (Lung cancer, COPD, Stroke, IHD) simulated for period 1990–2010

Scenario	Reduction in Cumulative Attributable Deaths
No further smoking (all stop smoking after 1 year)	261176
Smoking replaced by RRP (exclusive RRP use after 1 year)	217356 (f=0.1) 141667 (f=0.3)
WHO 2025 Target (smoking prevalence on decline, leading to 30% reduction by 2025)	32849
WHO 2025 Projection (smoking prevalence on decline, leading to 14% reduction by 2025)	13119
RRP business case (RRP uptake of 55% with 85% being exclusive RRP use and 15% dual use after 10 years)	83495 (f=0.1) 63534 (f=0.3)
WHO 2025 Target + RRP Business case	101845 (f=0.1) 82398 (f=0.3)
WHO 2025 Projection + RRP Business case	92402 (f=0.1) 72633 (f=0.3)

Conclusions

Modeling for Japan is important to understand the overall population harm reduction by monitoring the IQOS and other heated tobacco products uptake, through development and testing RRP scenarios outcomes.

The PHIM output was made consistent with MOH data for the same period by using two different sets of STPs broken by two periods 1990–2000 and 2000–2010 to account for a high quitting rates between 2000–2010 related to regulatory interventions on smoking in Japan.

With the RRP uptake similar to this we have a overall population harm decline and a positive impact on population health in Japan, estimated as a smoking attributable deaths reduction between 63,534 and 83,495 after 20 years for the RRP business case, depending on IQOS effective dose (f value = 0.3 or 0.1) in comparison to 99,953 fewer smoking attributable deaths with assumption that all of 55% of smokers would quit.

Overall, based on this and others RRP scenario outcomes described in here, introducing an RRP into the Japan market will lead to a net public health benefit in terms of reduced tobacco related mortality. This benefit will be larger if the rate of uptake for IQOS and other heated tobacco products in Japan is faster or the proportion of the smoking population that switches is larger.

PHIM is a tool appropriate to monitor and assess post market development in Japan and other countries of interest.

For the complete list of conclusions and references please see the leaflet.

* The simulation is based on an age range extending beyond the legal age for smoking in order to capture real life initiation patterns