Mental health, smoking and poverty in the UK

A report commissioned by
Action on Smoking and Health and Public Health England

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Key findings

- Smoking exacerbates poverty for a large proportion of adults with a mental disorder.
- The analysis estimates that smoking prevalence is very high in poor adults with a mental disorder compared with adults with a mental disorder overall.
- Based on data from the 2007 Adult Psychiatric Morbidity Survey and the 2013 Health Survey for England, 46% of poor adults with a common mental disorder, 46% of those currently taking psychoactive medication, and 52% of those with a longstanding mental disorder are current smokers.
- An estimated 900,000-1,200,000 people with a common mental disorder are living in poverty and are current smokers.
- A significant number of adults with a mental disorder are officially above the poverty line, but would be defined as living in poverty if their income were assessed after their expenditure on tobacco, including an estimated 135,000 adults with CMD in the UK.
- The average annual expenditure by poor smokers with a mental disorder is estimated to be in the region of £1220; sensitivity analysis which takes into account likely underreporting of cigarette consumption suggests that this figure may be closer to £2200.
- Smokers who have a mental disorder who smoke cheaper types of tobacco, such as hand rolling tobacco, are likely to spend over £700 per year.

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Introduction

People with a mental disorder are more likely to be unemployed, receive benefits and be living in relative poverty than those without mental health problems.[1 2] There is also extensive UK and international evidence that smoking prevalence is substantially higher among people with mental disorders than in the general population.[3] Smoking is associated with financial deprivation, and it is therefore likely that smoking prevalence in poor adults with mental disorders is higher still.

Smoking is a significant cause of morbidity and mortality in smoking, and is also a direct contributor to financial deprivation. In 2014 the weighted average price of 20 cigarettes in the Most Popular Price Category (MPPC) was £8.47.[4] While low income smokers can reduce the cost of smoking by smoking budget brands or hand-rolling tobacco (HRT), smoking places an additional burden on an already deprived population.

This report has been commissioned by Action on Smoking and Health (ASH) to quantify the extent to which smoking exacerbates poverty in adults with mental disorders in the UK. The objectives of the project are to:

- estimate the number adults in the UK with mental disorders who are recognised as living in poverty and who currently smoke
- estimate the expenditure of these smokers on tobacco
- estimate the number of adults with a mental disorder who are not formally classified as being in poverty, but who are smokers and would be classified as living in poverty if their expenditure on tobacco were subtracted from their household income

Methods

Overview

The report takes a similar approach to recent studies on smoking and poverty in the UK by combining information from a variety of existing reports and datasets.[5 6] It first estimates the prevalence of smoking in people with different types of mental disorder, both overall and among those who are classed as living in poor households. It extrapolates those estimates to data on population size to estimate the total population numbers of adults with a mental disorder who are both living in a poor household and are current smokers. It also estimates expenditure on tobacco in this group by combining data on the amount, price, and type of tobacco smoked. Finally, it applies the estimates of smoking prevalence and expenditure on tobacco to estimate the total number of adults with a mental disorder who are just above the poverty threshold but fall below it when their expenditure on tobacco is taken into account. Where existing reports and datasets do not provide data broken down into the required level of detail, or the accuracy of the data is uncertain, conservative assumptions have been used to generate estimates.

Smoking prevalence by mental disorder and poverty status

Datasets

Two English survey datasets collect data on mental health, smoking behaviour and income: The Adult Psychiatric Morbidity Survey (APMS) and the Health Survey for England (HSE). Estimates on the prevalence of mental disorder, poverty and smoking were obtained from these datasets and extrapolated to the full UK population.

Adult Psychiatric Morbidity Survey

The APMS collects data on the prevalence of a wide range of treated and untreated mental disorders in adults (16+ years of age) in England.[7] The most recent survey was conducted in 2007, using a stratified multi-stage probability sample of private households (n=7393).

The types of mental disorder measured in the APMS which are included in this report are:

- *The presence of a common mental disorder (CMD)*: This includes depressive episodes, phobias, generalised anxiety disorder, obsessive-compulsive disorder, panic disorder and mixed anxiety and depression. In the APMS this is measured using the revised Clinical Interview Schedule (CIS-R),[8] and in this report CMD is indicated by a CIS-R score of 12 or more.

- *Patients prescribed one or more psychoactive medications*: Includes antipsychotic, antidepressant, hypnotic, anxiolytic or ADHD medication.

- *Probable psychosis*: A subsample of interviewees was screened to detect probable psychosis.

The APMS collects data on smoking prevalence which have been reported in existing publications.[1 2] Current smokers are identified using the question 'do you smoke at all nowadays?' The small number of smokers who report smoking an average of fewer than seven cigarettes per week are excluded from estimates.

The APMS obtains gross household income data by means of a show card on which banded incomes are presented.[9] The income data used in this report are the annual household gross income data, adjusted for the number of people in the household using the McClements equivalence score.[10]

Health Survey for England

The HSE is a survey which monitors trends in the prevalence of and risk factors for health conditions in England.[11] The most recent available data are from the 2013 survey, which was conducted in 8755 adults and 2185 children. For this report only data on participants aged 16 years or older were analysed. The survey adopts a multi-stage probability sampling design and includes a representative sample of the population living in households in England.[12] This report uses HSE data on longstanding mental illness, defined as lasting 12 months or more.

Like the APMS, the HSE collects data on smoking prevalence using the question 'Do you smoke cigarettes at all nowadays?' All smokers, include those reporting that they smoke fewer than seven cigarettes per week are included in the HSE prevalence estimates.

Household income is established and equivalised using the same methodology as the APMS, although the wording of the question differs slightly.[12]

Defining the poverty threshold for APMS and HSE

The income data collected in the APMS and HSE differ from those in the Family Resources Survey (FRS), the data source for official measures on poverty in the UK, which uses a more detailed methodology and establishes net, as opposed to gross, household income.[13]

The official measures on poverty based on the FRS are published annually in the Households Below Average Income (HBAI) report.[13] In this report, (relative) poverty is defined as living in a household with an equivalised net household income before housing costs (BHC) below 60% of the median equivalised net household income, i.e. after deduction of income tax, employee self-employed national insurance contributions and council tax for all household members, rescaled to allow for household composition. These data are equivalised using the modified OECD equivalence scale.[14] In 2013/14 the median equivalised household income per week was £427 BHC. Poverty was therefore defined as an equivalised income of £256 or less.[13] Based on this threshold, 15% of the total UK population were defined as living in relative low income, i.e. as living in relative poverty.[13]

As explained above, income data for the APMS and HSE are obtained using a showcard on which banded incomes are presented. They are gross income data and are equivalised using the McClements score (this score uses slightly different weights than the OECD equivalence scale). Because of the differences in the methodologies, it was decided that it would be inappropriate to apply the same relative poverty thresholds as the HBAI to the APMS and HSE. Instead, two different definitions were adopted for this report.

i) Poverty defined as equivalised gross household income below 60% of the median equivalised gross household income as estimated within the APMS and HSE

The advantage of this method is that it is based on actual survey data; however, it is unlikely to identify exactly the same individuals as being in poverty as the FRS/HBAI methodology would. This is due the differences in data collection methods and type of income (gross as opposed to net) assessed. Analysis of the APMS and HSE shows that the proportion of population defined as being in poverty when adopting this method is much higher than that reported in HBAI.

ii) Definition of poverty based on HBAI poverty rate

This method takes the poverty rate from method i) and weights it according to the extent to which method i) appears to overestimate poverty, based on HBAI estimates for the same survey year. For example, HBAI 2013/14 defined 15% of the whole population as being in poverty, whereas in the HSE 2013 method i) defines 25% as being in poverty i.e. a 66% overestimate. To obtain the poverty rate in those with mental disorder, HSE

estimates from i) were reduced by 66%. The same method was applied to the APMS data. HBAI data from 2007/08 were applied for the APMS, and HBAI data from 2013/14 for the HSE.

Analysis

Prevalence of mental disorder, poverty and smoking

The analysis estimated:

- the prevalence of each mental disorder
- smoking prevalence overall and in those with each mental disorder
- the proportion of the sample in poverty (based on the two definitions above), and
- smoking prevalence in those in poverty (based on the two definitions above)

Survey weights as defined in the survey user guides were used. Analyses for probable psychosis were restricted to prevalence of the disorder and prevalence of smoking among individuals with the disorder, due to a very small sample size in this subgroup (n=32).

Appendix 1 gives estimates for the prevalence of mental disorder and smoking prevalence for the lowest income quintile and for individuals in routine and manual occupations.

Expenditure on cigarettes

Neither the APMS nor the HSE collect data on expenditure on tobacco or the type of tobacco product smoked. Average weekly expenditure on tobacco was therefore estimated by combining:

- The median number of cigarettes smoked per week by individuals with each mental disorder, based on the APMS and HSE

- The price of packeted cigarettes and HRT products, based on www.mysupermarket .co.uk

- The proportion of smokers who use packeted cigarettes and HRT based on estimates from the 2013 Opinions and Lifestyle Survey (OLS)[15]

- Estimates from HMRC on the proportion of packeted cigarettes and HRT which are illicit[16]

Our estimates of expenditure are conservative, as they assume that this group of smokers smoke budget brands, and account for the purchase of illicit tobacco. The Tobacco Manufacturers Association publishes estimates of the prices for packs of 20 cigarettes in the Most Popular Price Category (£8.47 in 2014) and 50g of premium HRT (£17.59 in 2014).[4 17] However, because it is unlikely that low income smokers tend to smoke premium brands, the price of the cheapest pack of 20 cigarettes (Marlboro Gold Touch - £6.69) and 50g of HRT (Players Gold Leaf - £15.07) as reported on www.mysupermarket.co.uk on 4th December 2015 were used for this report. Evidence suggests that the price of illicit tobacco is around 50% of that of licit tobacco, so we

assumed that an illicit pack of packeted cigarettes cost £3.35 and an illicit 50g pack of HRT £7.54.[18-20] Table 1 reports the estimated prices for 20 cigarettes of each kind (packeted and HRT, and licit and illicit). The estimate for HRT smokers includes an assumption that 50g of HRT makes approximately 100 cigarettes.[21]

In the UK it is estimated that 64% of smokers smoke only packeted or mainly packeted cigarettes, while 35% smoke only or mainly HRT.[15] To make calculations more straightforward, smokers that smoked both packeted cigarettes and HRT were added on to the category they mostly smoked. HMRC estimates that in 2013/14 10% of packeted cigarettes and 39% of HRT were illicit.[16] We estimated the number of packets of 20 cigarettes purchased by these smokers by dividing the weekly estimate of cigarettes smoked by 20. We then estimated the weekly expenditure a smoker using each type of tobacco (licit packeted, licit HRT, illicit packeted and illicit HRT), and hence the overall average weekly and annual spend on tobacco products.

Previous research suggests that expenditure on tobacco in UK surveys may be underestimated by nearly half, with expenditure based on HMRC duty receipts 1.92 higher than that estimates in the Living Costs and Food Survey.[6] A sensitivity analysis was conducted to estimate expenditure following adjustment for this underreporting (Appendix 2).

Table 1. Tobacco prices and proportions used to estimate expenditure on tobacco (December 2015 prices)

	Price per pack (£)	Price for 20 cigarettes (£) *	% of all cigarettes**
Packeted licit (20 sticks)	6.69	6.69	57.7
Packeted illicit (20 sticks)	3.35	3.35	6.4
HRT licit (50g)	15.07	3.01	21.35
HRT illicit (50g)	7.54	1.51	13.65

*Assumes 50g HRT makes 100 cigarettes[21]
**Do not add up to 100 due to rounding

Population estimates

Adults with mental disorder who are in poverty and currently smoke

Estimates of the number of people with a mental disorder who are living in poverty and who smoke were derived by combining mid-year UK population estimates for 2014 with the estimates of the prevalence of mental disorders, poverty (using both definitions of poverty) and smoking from the HSE and APMS.[22] The HSE and APMS collect data in England only; however, the prevalence measures were applied to population estimates for the UK overall and England, Scotland, Northern Ireland and Wales individually.

Adults with mental disorder drawn into poverty by smoking

Estimates of the number of adults with a mental disorder who are not formally classified as being in poverty, but who are smokers and would be classified as living in poverty if their expenditure on tobacco were subtracted from their household income, were derived by subtracting the average annual expenditure on tobacco from the unequivalised estimate of gross income to obtain a 'post-tobacco expenditure' measure of income. This measure was then equivalised using the McClements score. The proportion of adults with a mental disorder who were not classified as being in poverty in the previous analysis, but who fell below the poverty threshold (based on method i) above) after adjustment for tobacco expenditure, were identified.

These proportions and the previously obtained estimated of smoking prevalence with poor adults with a mental disorder, were applied to the population estimates as per the previous step.

Results

Smoking prevalence

Table 2 shows smoking prevalence in the total adult population, by mental disorder and poverty status. Smoking prevalence is highest in those with severe mental disorder (probable psychosis, 49%); however the small sample size prevented further analysis in poor adults with probable psychosis. The APMS and HSE overestimate poverty rates compared with the HBAI; however, both methods of defining poverty provide similar estimates of smoking prevalence. For example, smoking prevalence in adults with CMD or who are currently taking psychoactive medication is 34%; in those in poverty smoking prevalence is well over 40%. Similarly, smoking prevalence is higher in poor adults with a mental disorder than in the overall adult population living in poverty.

Table 2. Smoking prevalence according to mental health disorder and poverty status

	Prevalence of disorder in population (%)	**Smoking prevalence (%)**	**% in poverty (based on 60% median gross income within survey)**	**Smoking prevalence in poverty (based on 60% median gross income within survey)**	**% in poverty (based on HBAI poverty threshold)**	**Smoking prevalence in those in poverty (based on HBAI poverty threshold)**
General population (APMS 2007)	N/A	22	26	30	18	33
General population (HSE 2013)	N/A	21	25	33	15	35
Type of mental disorder reported						
Common Mental Disorder (CIS-R score > 12, APMS)	15	34	36	43	25	46
Currently taking psychoactive medications* (APMS)	6	34	40	44	28	46
Probable psychosis (APMS)	0.4	49	-	-	-	-
Longstanding mental disorder (HSE)	6	40	43	53	26	52

Notes: Estimates are unadjusted for age. Appendix 1 gives estimates for the prevalence of mental disorder and smoking prevalence for the lowest income quintile and for individuals in routine and manual occupations. Smoking prevalence for APMS excludes adults who smoke <7 cigarettes per week.

Expenditure on tobacco

Table 3 reports the median number of cigarettes smoked per week according to mental disorder and poverty status. Estimates from both the APMS and HSE suggest that smokers with a mental disorder smoke more than smokers in the general population. There is no clear pattern in terms of the amount smoked by poor smokers compared with the general population.

Table 4 shows estimates of the level of expenditure on tobacco in poor smokers with a mental disorder. Expenditure is highest for those smoking licit packeted cigarettes, at over £30 per week. Those smoking illicit HRT spend the least, at around £7. The average estimated annual expenditure is in the region of £1200.

Appendix 2 reports the results of the sensitivity analysis in which expenditure is adjusted for potential underreporting. This analysis implies an average annual expenditure of well over £2000 among poor smokers with a mental disorder.

Table 3. Median number of cigarettes smoked according to mental health disorder and poverty status (packs of 20 per week in brackets)

	All regular smokers	**Regular smokers in poverty (based on 60% median gross income within survey)**	**Regular smokers in poverty (based on HBAI poverty threshold)**
Total sample (APMS)	84 (4.2)	84 (4.2)	90 (4.5)
Total sample (HSE)	70 (3.5)	80 (4)	77 (3.85)
Type of mental disorder			
Common mental disorder (CIS-R score > 12, APMS)	95 (4.75)	95 (4.75)	105 (5.25)
Currently taking psychoactive medications (APMS)	105 (5.25)	90 (4.5)	92.5 (4.63)
Longstanding mental disorder (HSE)	82 (4.1)	90 (4.5)	90 (4.5)

Note: Unweighted estimates.

Table 4. Expenditure on tobacco in poor smokers* with a mental disorder

		Weekly expenditure by type of tobacco product					
	Packs of 20 per week	**Licit packeted (£6.69 for 20)**	**Illicit packeted (£3.35 for 20)**	**Licit HRT (£3.01 for 20)**	**Illicit HRT (£1.51 for 20)**	**Weekly (£)**	**Annual (weekly*52.2, £)**
Common mental disorder (CIS-R score > 12, APMS)	4.75	31.78	15.91	14.30	7.17	23.38	1220.80
Currently taking psychoactive medications (AMPS)	4.5	30.11	15.08	13.55	6.80	22.16	1156.74
Longstanding mental disorder (HSE)	4.5	30.11	15.08	13.55	6.80	22.16	1156.74

*Poverty threshold used: 60% median income based on gross income within APMS/HSE survey – this is the more conservative estimate of cigarette consumption.

Population estimates

Table 5 presents population estimates of the total number of UK adults with different mental disorders who are in poverty and are smokers, and the number who are drawn into poverty by their expenditure on tobacco. More detailed tables for these estimates are presented in Appendices 3 and 4. The more conservative estimates (based on the HBAI poverty threshold) suggest that there are over 900,000 adults with a common mental disorder in the UK who are living in poverty and who are also current smokers. A further 135,000 adults with CMD are drawn into poverty by their expenditure on tobacco. There are over 400,000 adults who are currently taking psychoactive medication who are current smokers and living in relative poverty. The estimates are similar for those with a longstanding mental disorder, and a further 100,000 are estimated to be drawn into poverty when their expenditure on smoking is taken into account.

Table 5. Population estimates of the number of UK adults with a mental disorder who are in poverty and who smoke, and who are drawn into poverty by their expenditure on smoking

	Common mental disorder (CIS-R score > 12)			Currently taking psychoactive medications			Longstanding mental disorder		
	Smokers with disorder who are in poverty *	Smokers with disorder who are in poverty**	Numbers with disorder drawn into poverty by smoking*	Smokers with disorder who are in poverty *	Smokers with disorder who are in poverty**	Numbers with disorder drawn into poverty by smoking*	Smokers with disorder who are in poverty *	Smokers with disorder who are in poverty**	Numbers with disorder drawn into poverty by smoking*
UK	1,217,733	904,647	135,304	553,801	405,282	55,380	717,110	425,420	100,062
England	1,021,983	759,225	113,554	464,778	340,133	46,478	601,835	357,034	83,977
Scotland	103,011	76,527	11,446	46,848	34,284	4,685	60,662	35,987	8,464
Wales	58,913	43,767	6,546	26,793	19,607	2,679	34,694	20,582	4,841
Northern Ireland	33,825	25,128	3,758	15,383	11,257	1,538	19,919	11,817	2,779

* Poverty based on 60% median gross income within survey

**Poverty based on HBAI poverty threshold

Note: Numbers drawn into poverty assumes annual weekly expenditure as presented in Table 4 above.

Discussion

Summary of findings

This analysis shows that smoking prevalence is very high in poor adults with a mental disorder. An estimated 900,000-1,200,000 people with a common mental disorder are living in poverty and are current smokers. The population numbers for individuals with longstanding mental illness are lower; however, the numbers are still significant.

Our findings are in line with the existing evidence which shows that people with mental disorders and with low incomes are more likely to smoke than the general population.[1 2 15] Our analysis shows that smoking prevalence is highest in poor adults with a mental disorder: Almost half of poor adults with a CMD or currently taking psychoactive medication are estimated to be smokers; the estimate for poor adults overall is around one third.

In addition to those with a mental disorder who are in poverty and who smoke, a significant number are officially above the poverty line, but would be defined as living in poverty if their income were assessed after their expenditure on tobacco, including an estimated 135,000 adults with CMD in the UK. Approximately 10% of the estimated 1.3 million poor smokers with CMD – when taking into account those officially in poverty and those drawn into poverty by their expenditure – would be lifted out of poverty if they were to quit smoking.

The estimates in this report suggest that the average annual expenditure by poor smokers with a mental disorder is around £1220; sensitivity analysis which takes into account likely underreporting of cigarette consumption suggests that this figure may be closer to £2200. While smokers who have a mental disorder and are in poverty may be more likely to smoke cheaper types of tobacco, even those smoking exclusively HRT are likely to spend over £700 per year. This report underlines the significant financial burden that smoking places on poor adults with a mental disorder.

Study strengths and limitations

The key strength of the analysis is that it has used two nationally representative datasets. However, it has several important limitations and further research is needed to provide more accurate estimates of the burden of smoking among poor adults with mental disorder and its implications. In particular, the APMS data are from 2007 and these estimates should be updated when newer data are available.

The analysis is predominantly based on self-reported data; information on mental disorder, income and smoking status may have been incorrectly reported by participants. Furthermore, income data is missing for approximately 20% or participants in both the APMS and the HSE. However, there is clear consistency between the findings from both surveys, which increases confidence in the results.

The income data are not based on a rigorous methodology, and in particular, are not comparable those collected in the Family Resources Survey, the data source for official measures on poverty in the UK. The analyses which use 60% of the median gross income as collected in the APMS and HSE overestimate poverty rates compared with the

FRS. For this reason, an alternative methodology based on the FRS/HBAI poverty rates has also been used, and underlines that even using more conservative estimates, the number of UK adults who have a mental disorder and are living in poverty and who smoke is significant.

The sample size of the surveys is very small when analysing subgroups such as individuals with psychosis. However, smoking prevalence is extremely high in this group, and individuals with psychosis are also more likely to be living in a low income household; it is therefore likely that the burden of smoking in poor adults with psychosis is extremely high.

The analysis required some assumptions, such as on the cost of the tobacco products type of tobacco smoked by this group; however, conservative assumptions have been used throughout.

Conclusions and future research

The analysis demonstrates that smoking creates a significant financial burden for an already deprived group. It does not allow any conclusions to be drawn as to the direction of any causal association between mental disorders, smoking and poverty. However, it is possible that the additional financial strain of nicotine addiction worsens or prolongs mental illness. Future research should investigate causal associations and the wider impact of expenditure on tobacco in this group, such as the effect it has on children or family members.

References

1. RCP. Smoking and mental health. London: The Royal College of Physicians, 2013.
2. McManus S, Meltzer H, Campion J. Cigarette Smoking and Mental Health in England: Data from the Adult Psychiatric Morbidity Survey 2007: National Centre for Social Research, 2010.
3. OECD. *Mental Health and Work: United Kingdom*: OECD Publishing, 2014.
4. TMA. UK Cigarette Prices. Tobacco Manufacturers' Association. Available from http://www.the-tma.org.uk/tma-publications-research/facts-figures/uk-cigarette-prices/ Accessed 14/12/15.
5. Belvin C, Britton J, Holmes J, et al. Parental smoking and child poverty in the UK: An analysis of national survey data. BMC Public Health 2015;**15**.
6. Reed H. Estimates of poverty in the UK adjusted for expenditure on smoking: ASH, 2015.
7. Adult Psychiatric Morbidity Survey: NHS Health and Social Care Information Centre, 2007.
8. Lewis G, Pelosi A, Araya R, et al. Measuring psychiatric disorder in the community; a standardised assessment for use by lay interviewers. Psychological Medicine 1992;**22**:465-86.
9. Adult Psychiatric Morbidity Survey 2007: Appendices and Glossary: The Information Centre for Health and Social Care, 2009.
10. Households Below Average Income (HBAI) Quality and Methodology Information Report 2013/14: Department for Work and Pensions, 2015.
11. HSCIC. Health Survey for England 2013. Health and Social Care Information Centre. 2014.
12. HSCIC. Health Survey for England 2013: Volume 2 - Methods and documentation: Health and Social Care Information Centre, 2014.
13. Households Below Average Income 2013: Department for Work and Pensions, 2013.
14. OECD. What are equivalence scales? OECD. Available from http://www.oecd.org/eco/growth/OECD-Note-EquivalenceScales.pdf Accessed 21/12/15: OECD.
15. ONS. Opinions and Lifestyle Survey, Adult Smoking Habits in Great Britain, 2013: Office for National Statistics, 2014.
16. HMRC. Tackling illicit tobacco: From leaf to light. Her Majesty's Revenue and Customs. 2015. Available from https://www.gov.uk/government/publications/tackling-illicit-tobacco-from-leaf-to-light Accessed 11/12/15.
17. Tobacco Manufacturers' Association. EU Hand Rolling Prices. Available from http://www.the-tma.org.uk/tma-publications-research/facts-figures/eu-handrolling-price-map/ Accessed 11/12/15.
18. Cambridgeshire County Council. Illegal tobacco. 2014. Available from http://www.cambridgeshire.gov.uk/info/20110/illegal_tobacco Accessed 03/09/14 [
19. Power G. Illicit Tobacco in South East London: A Survey of Smokers: South East London Illicit Tobacco Cluster, 2013.
20. HMRC & UKBA. Tackling Tobacco Smuggling - building on our success. HM Revenue & Customs and UK Border Agency. 2011.
21. Darrall K, Figgins J. Roll-your-own smoke yields: theoretical and practical aspects. Tobacco Control 1998;**7**:168-75.
22. ONS. Annual Mid-year Population Estimates, 2014. Office for National Statistics. 2014. Available from http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-uk--england-and-wales--scotland-and-northern-ireland/mid-2014/stb---mid-2014-uk-population-estimates.html. Accessed 15/12/15.

Appendices

Appendix 1. Smoking prevalence by mental disorder and income quintile and occupation

	Prevalence in population	Prevalence of mental disorder in lowest income quintile	Prevalence of mental disorder in routine occupations	Smoking prevalence	Smoking prevalence in lowest income quintile	Smoking prevalence in routine occupations
Total sample (APMS)	N/A	N/A	N/A	22	33	33
Total sample (HSE)	N/A	N/A	N/A	21	34	29
Type of mental disorder						
Common Mental Disorders (CIS-R score > 12)	15	23	16	34	45	42
Currently taking psychoactive medications	6	11	4	34	44	41
Probable psychosis	0.4	0.8	0.3	49	-	-
Longstanding mental disorder (HSE)	6	12	7	40	55	50

Appendix 2. Sensitivity analysis – weekly expenditure adjusted for underreporting

		Weekly expenditure by type of tobacco product					
	Packs of 20 per week	**Licit packeted (£6.69 for 20)**	**Illicit packeted (£3.35 for 20)**	**Licit HRT (£3.01 for 20)**	**Illicit HRT (£1.51 for 20)**	**Weekly (£)**	**Annual (weekly*52.2, £)**
Common mental disorder (CIS-R score > 12, APMS)	9.12	61.02	30.55	27.46	13.77	44.89	2343.94
Currently taking psychoactive medications (AMPS)	8.64	57.81	28.95	26.02	13.06	42.55	2220.94
Longstanding mental disorder (HSE)	8.64	57.81	28.95	26.02	13.06	42.55	2220.94

Appendix 3. Population estimates of the number of UK adults with a mental disorder who are in poverty and who smoke

Appendix 3a: Common mental disorder (CIS-R score > 12)				Poverty based on 60% median gross income within survey		Poverty based on HBAI poverty threshold	
	Total population 16+	Number with disorder	Smokers with disorder	Number with disorder who are in poverty	Smokers with disorder who are in poverty	Number with disorder who are in poverty	Smokers with disorder who are in poverty
UK	52,443,290	7,866,494	2,674,608	2,831,938	1,217,733	1,966,624	904,647
England	44,013,062	6,601,959	2,244,666	2,376,705	1,021,983	1,650,490	759,225
Scotland	4,436,318	665,448	226,252	239,561	103,011	166,362	76,527
Wales	2,537,195	380,579	129,397	137,008	58,913	95,145	43,767
Northern Ireland	1,456,715	218,507	74,292	78,663	33,825	54,627	25,128

Appendix 3b: Currently taking psychoactive medications				Poverty based on 60% median gross income within survey		Poverty based on HBAI poverty threshold	
	Total population 16+	Number with disorder	Smokers with disorder	Number with disorder who are in poverty	Smokers with disorder who are in poverty	Number with disorder who are in poverty	Smokers with disorder who are in poverty
UK	52,443,290	3,146,597	1,069,843	1,258,639	553,801	881,047	405,282
England	44,013,062	2,640,784	897,867	1,056,314	464,778	739,420	340,133
Scotland	4,436,318	266,179	90,501	106,472	46,848	74,530	34,284
Wales	2,537,195	152,232	51,759	60,893	26,793	42,625	19,607

Northern Ireland	1,456,715	87,402	27,717	34,961	15,383	24,473	11,257

Appendix 3c: Longstanding mental disorder				Poverty based on 60% median gross income within survey		Poverty based on HBAI poverty threshold	
	Total population 16+	Number with disorder	Smokers with disorder	Number with disorder who are in poverty	Smokers with disorder who are in poverty	Number with disorder who are in poverty	Smokers with disorder who are in poverty
UK	52,443,290	3,146,597	1,258,639	1,353,037	717,110	818,115	425,420
England	44,013,062	2,640,784	1,056,313	1,135,537	601,835	686,604	357,034
Scotland	4,436,318	266,179	106,472	1,144,57	60,662	69,207	35,987
Wales	2,537,195	152,232	60,892	65,460	34,694	39,580	20,582
Northern Ireland	1,456,715	87,402	34,961	375,823	19,919	22,725	11,817

Appendix 4. Population estimates of UK adults with mental disorder drawn into poverty by expenditure on tobacco

	CMD (4% within tobacco spend of poverty line, 43% smoking prevalence)			Medication (4% within tobacco spend of poverty line, 44% smoking prevalence)			Longstanding mental disorder (6% within tobacco spend of poverty line, 53% smoking prevalence)		
	Number with disorder	Number within tobacco spend of poverty line*	Numbers with disorder drawn into poverty by smoking	Number with disorder	Number within tobacco spend of poverty line*	Numbers with disorder drawn into poverty by smoking	Number with disorder	Number within tobacco spend of poverty line*	Numbers with disorder drawn into poverty by smoking
UK	7,866,494	314,660	135,304	3,146,597	125,864	55,380	3,146,597	188,796	100,062
England	6,601,959	264,078	113,554	2,640,784	105,631	46,478	2,640,784	158,447	83,977
Scotland	665,448	26,618	11,446	266,179	10,647	4,685	266,179	15,971	8,464
Wales	380,579	15,223	6,546	152,232	6,089	2,679	152,232	9,134	4,841
Northern Ireland	218,507	8,740	3,758	87,402	3,496	1,538	87,402	5,244	2,779

*Including non-smokers

Note: Uses poverty threshold based on APMS/HSE survey median incomes