

## **Royal Statistical Society COVID-19 Taskforce: Statement on the need for transparency about information on secondary pupils' uptake of Lateral Flow Testing, PCR-corroboration, cycle-threshold-values (proxy for viral load) & genomic analyses.**

5 March 2021

During 8-19 March, England's policy for secondary schools is that, on or near school premises, returning secondary school pupils should be offered three Lateral Flow Tests (LFTs), to be taken three to five days apart. Test uptake is voluntary and pupils who decline the tests-offers attend school without redress.

After 19 March, secondary school pupils are asked to self-test twice weekly at home using LFTs and report each test result (void, negative, positive) to NHS Test and Trace. Adult supervision of self-testing and reporting is advised for pupils aged 12-17 years. Confirmation by Polymerase Chain Reaction (PCR) is required for positive LFT-results obtained by home-testing [see p29-32 in [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/964351/Schools\\_coronavirus\\_operational\\_guidance.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/964351/Schools_coronavirus_operational_guidance.pdf)].

### **The Royal Statistical Society's COVID-19 Taskforce stresses:**

- **Transparency about rollout:** detailed data on secondary pupils' voluntary compliance with and results from twice-weekly asymptomatic screening should be made public
- **Risk of inaccurate test results:** while the usual concern with LFTs is false negatives, when infection-prevalence is low there is also a risk that the majority of 'positive' tests could be false positives.
- **Embedded experimentation:** there is a golden opportunity to evaluate the performance and impact of the strategy by conducting experiments within the rollout
- **Need for background data:** background information, held within Test and Trace, about PCR-tested primary and secondary-age children's viral load should be made public.

### **Accordingly, the Royal Statistical Society's COVID-19 Taskforce recommends:**

- **First**, during the second week of LFT testing at secondary schools, pupils could be self-service randomized (eg by test-supervisor's tossing a die) so that one-third of pupils is offered PCR as their first test in week 2 rather than LFT. Thereby, new intelligence can be gathered on LFT versus PCR test-performance for secondary school pupils without adding to pupils' test-burden.
- **Second**, celebrate pupils and schools by affording – for them - genomic analysis of all secondary pupils' PCR-positive tests; and provide schools with learning materials based on the infection control insights gained from genomic analysis of pupils' PCR-confirmed home-test LFT-positives.

The **ANNEX** briefly summarizes background information to our strictures and recommendations; and provides further explanation.

## **ANNEX on the need for transparency about information, weekly, on secondary pupils' uptake of Lateral Flow Testing, PCR-corroboration, cycle-threshold-values (proxy for viral load) & genomic analyses.**

**Background:** Secondary school pupils in England are being asked, at home, to perform twice weekly asymptomatic screening for SARS-CoV-2 infection by use of lateral flow tests, probably the INNOVA lateral flow test (LFT).

The credentials of INNOVA LFTs in the context of mainly adult asymptomatic screening were evaluated in Liverpool in November/early December 2020 when twice weekly screening was offered to the citizens of Liverpool. Uptake was modest: around a quarter of Liverpool's citizens attended at least once for screening; around 0.5% were LFT-positive. The proportion who attended for a second LFT within 1 week after the first has not been reported.

Liverpool's evaluation included by dual swabbing – for LFT and PCR testing - of some 6,000 consented citizens. For these citizens, INNOVA LFTs detected only 28, or **40%**, (95% CI: 28% to 52%) out of **70** PCR-positives, see <https://www.liverpool.ac.uk/media/livacuk/coronavirus/Liverpool,Community,Testing,Pilot,Interim,Evaluation.pdf> (p18+19). However, LFTs detected **67%** (95% CI: 50% to 81%) of the **39** PCR-positives with low cycle-threshold-value (ct-value). Low ct-value is a proxy for viral load, which in turn is a proxy for infectiousness. Hence, LFTs are credited with detection of two-thirds of adults' asymptomatic, low ct-value PCRs.

Corresponding LFT credentials for children are lacking. Children have a lower tolerance than adults for dual testing as shown by pupils' low participation rate when staff and pupils at appropriately sampled schools were invited to take part in the Schools Infection Survey designed by the Office for National Statistics (ONS). Only 15% of 50,000 eligible pupils (secondary or primary) and 43% of 22,000 eligible staff provided at least one of two requested samples (for antigen and antibody testing respectively), see <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/covid19/schoolsinfectionsurveyround2england/december2020>.

### **RSS alert on twice-weekly uptake by secondary school pupils of asymptomatic LFT-screening:**

Twice-weekly asymptomatic self-testing at home using LFTs is more onerous for secondary school pupils than the monthly request made of them by the ONS Schools Infection Survey: only 15% of pupils consented.

The Royal Statistical Society **warns** that parents' and pupils' initial willingness to take part in asymptomatic LFT-based screening for SARS-CoV-2 infection - out of interest, curiosity and concern about infection control - is likely to wane across the six weeks of any school-term.

Twice weekly self-screening at home of asymptomatic secondary school pupils asks too much of children; and sets them up to fail. However, the failure is not theirs. Failure is by policy-makers who ignore clear evidence on the unsustainability of twice-weekly asymptomatic screening – whether by adults or children.

***The RSS expects weekly public reporting on uptake of at-home asymptomatic screening by eligible pupils so that, if observed, low adherence to the twice-weekly self-test request can be quickly acknowledged and policy revised accordingly.***

In Liverpool, citizens' uptake of asymptomatic screening was twice as high in the least deprived as in the most deprived quintile of the population. Uptake by secondary school pupils is likely to vary by the deprivation of their school's catchment area.

### **RSS alert that interpretation of LFT-results depends on how prevalent SARS-CoV-2 infections are:**

SARS-CoV-2 infection incidence varies sharply in time and by place. During November (3-19) and early December (2-10), the proportion of asymptomatic pupils (primary and secondary) who tested positive in ONS's Schools Infection Survey in December was around 1% (uncertainty: 0.6% to 1.6%).

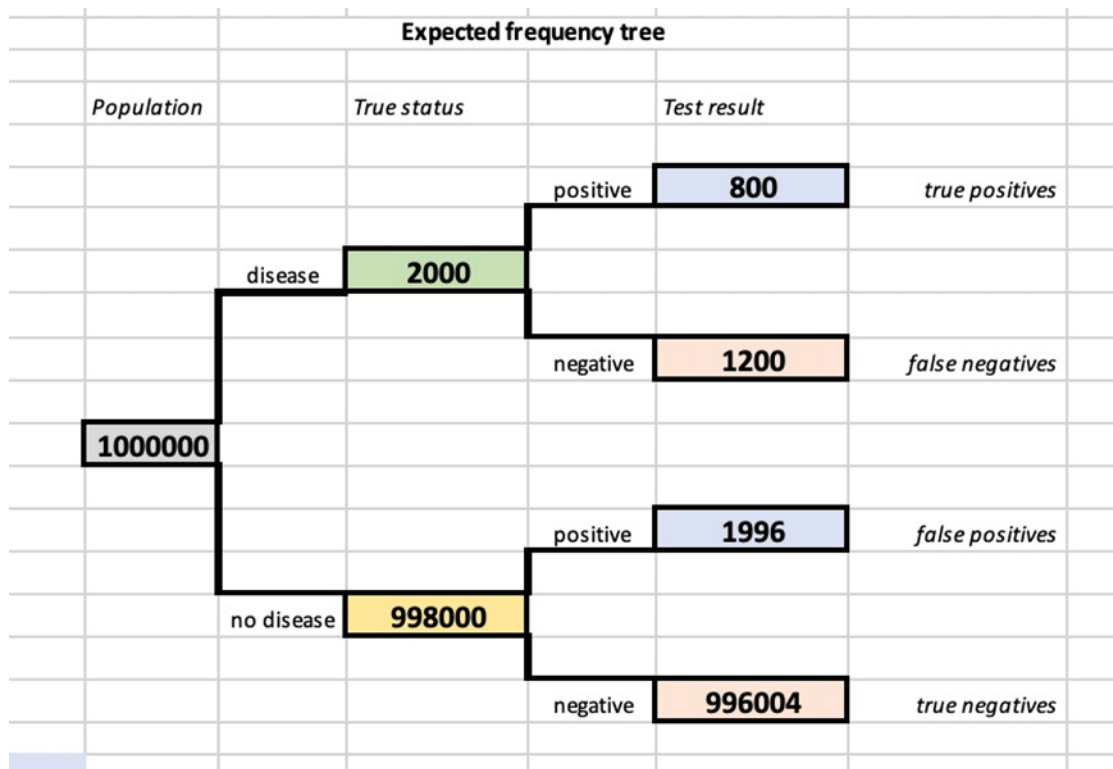
Since early December, the overall proportion of secondary-age persons who tested positive in England's ONS Community Infection Survey has decreased markedly from **2.3%** (95% CI: 2.0% to 2.7%) in early December to **0.7%** (95% CI: 0.5% to 0.9%) in February (13-19); and is likely to be **0.5%** or lower by the time schools return in March 2021.



The INNOVA LFT test is highly specific, at least 99.8%, so that at most 2 false positives are expected per 1,000 pupils tested. However, if the true infection rate reduces from 5 to 2 per 1,000 LFT-pupils before Easter, then more LFT-positives will be false-positives than true positives [1]. Please see [https://www.gov.uk/government/publications/nhs-test-and-trace-england-statistics-18-february-to-24-february-2021?utm\\_medium=email&utm\\_campaign=govuk-notifications&utm\\_source=f29a927e-a1f9-4280-9c54-38781ca5c70e&utm\\_content=immediately](https://www.gov.uk/government/publications/nhs-test-and-trace-england-statistics-18-february-to-24-february-2021?utm_medium=email&utm_campaign=govuk-notifications&utm_source=f29a927e-a1f9-4280-9c54-38781ca5c70e&utm_content=immediately).

For example, suppose that 1,000,000 secondary pupils per week agree to an LFT-test, of whom only 2 per 1000 are infected.

Then, of these 2,000 infected secondary school pupils, LFTs may signal positive in only 40%, or 800. The 1,200 missed true-positives are just that – **missed**. Meanwhile, of 998,000 LFT-tested secondary pupils who are uninfected, 2 \* 998 or 1,996 pupils may receive a false-positive LFT-signal which a corroborative PCR-test will have to sort out.



### Expected breakdown of 1,000,000 LFTs, given following assumptions

<b>Prevalence:</b> proportion of the population with the disease	0.2	%
<b>Sensitivity:</b> of those with the disease, the proportion who test positive	40	%
<b>Specificity:</b> of those who do not have the disease, the proportion who test negative	99.8	%

### RSS alert on transparency about prior information on children from Test and Trace:

Parents, pupils, teachers, grandparents, press and parliament, doctors and scientists should know – before twice-weekly LFTs begin in secondary schools in England on 8 March 2020 - about the statistical information held by Test and Trace on ct-values (as proxy for viral load) for primary versus secondary-age children who are PCR-positive index cases (or are infected child-contacts). For example, does the ct-value distribution differ by: i) laboratory; ii) pandemic-era (September to November versus December and January); iii) primary versus secondary-age; iv) prior LFT-positive; v) interval from symptom-onset-date to PCR swab-date.

Important also is how the void-rate for secondary school pupils' PCR-swabs differs by i) to v).

**The RSS expects NHS Test & Trace urgently to put into the public domain a comprehensive compendium of the evidence that NHS Test & Trace holds about primary versus secondary-age children's PCR swab-testing and LFT-use.**



## **RSS alert 4 on transparency about prior information from school-based SARS-CoV-2 screening studies in England and prior assumptions about LFT-performance:**

Her Majesty's Government has commissioned a number of pilot studies on asymptomatic screening in primary or secondary schools.

*The RSS expects that data from these pilot studies on asymptomatic screening in primary or secondary schools have been analysed already to statistical reporting standards. The intelligence gleaned from these studies, whose data should have been thoroughly marshalled and reviewed prior to children's return to school, should be in the public domain together with the prior assumptions that Her Majesty's Government has made about LFT-performance in the context of home-use by secondary-age pupils.*

### **Reference**

1. Sudlow C, Diggle P, Warlow O, Seymour D, Gordon B, Walker R, Warlow C. Testing for coronavirus (SARS-CoV-2) infection in populations with low infection prevalence: the largely ignored problem of false positives and the value of repeat testing. Please see <https://www.medrxiv.org/content/10.1101/2020.08.19.20178137v1>.

