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The fastest national COVID vaccination in Europe - Malta's strategies

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ABSTRACT

Background: COVID-19 vaccines reduce morbidity and mortality, but mass vaccination faces multiple challenges leading to different vaccination rates in different countries. Malta, a small European country, has achieved a very rapid vaccination rollout. This paper presents a narrative review of Malta's vaccination strategy and its impact on the country's COVID-19 situation.

Methods: Data was obtained through a literature review of Maltese newspapers and from Malta's COVID-19 government dashboard. A comprehensive summary of vaccination operations was provided by Malta's COVID-19 vaccination team.

Results: Malta comprised part of the European Commission joint procurement and obtained the maximum vaccines that were eligible from all manufacturers. Four tier priority population groups were set up, with both vaccine doses (where applicable) allocated and stored for each individual. Multiple hubs were set up to simultaneously administer first and eventually second doses accordingly. To date (August 9, 2021) 398,128 of the population are fully vaccinated and 405,073 received the first dose, with both morbidity and mortality declining progressively as vaccination coverage progressed.

Conclusion: Malta has successfully implemented a COVID-19 strategy that rapidly covered a substantial proportion of the population over a short period of time, with herd immunity reached by end of May 2021. Low population vaccination hesitancy and high vaccine doses availability were two major factors in this success.

1. Introduction

The long term control of COVID-19 is dependent on an effective global vaccination strategy [1]. Mass vaccination is expected to reduce the risk of escape variants [2]. In Europe (to date), four vaccines have been approved by the European Medical Agency (EMA) [3] for population administration. However, different European countries have engaged into different vaccination strategies depending on vaccine access, eligibility and political leadership. Additionally, vaccination rollouts are faced by multiple challenges ranging from logistical obstacles, structural capacities and vaccine hesitancy [4–6]. This has led to different vaccination rates among European countries [7].

The small European country of Malta (total population <500,000) has had a rapid vaccination rollout [7]. Since the onset of the pandemic, Malta has experienced exceptional COVID-19 population containment during the first wave, with an opposite scenario when the second wave

hit the shores [8–10]. The availability of COVID-19 vaccines in Malta, together with a partial lockdown resulted in falling morbidity and mortality. The aim of this paper is to present a narrative review of the vaccination strategy and its uptake and impact on the COVID-19 situation in Malta.

2. Patients, materials and methods

A literature search was conducted using Google Search Engine and by reviewing Maltese newspapers (Times of Malta, Malta today and Malta Independent). A comprehensive summary of the vaccination operations and strategy was provided by the 'COVID-19 Vaccination Logistics' officer. The daily vaccination roll-out data was obtained from the Ministry of Health COVID-19 platform [11].

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Table 1List of vaccination hubs across the islands and their respective opening hours (Updated and expanded from Grech *et al.*)[14]

Vaccination Hub		Opening hours
Mater Dei Hospital	Lecture room 4/5	Daily from 8am to 4pm
	Orthopaedic outpatients	Weekdays 12pm to 2pm
	Ophthalmic outpatients	Weekdays 12pm to 2pm
	Dermatology outpatients	Weekdays 12pm to 2pm
	Dental outpatients	Weekdays 12pm to 2pm
	Pre-Operative Assessment Clinic	Weekdays 12pm to 2pm
Sir Paul Boffa Hospital		Daily 12pm to 2pm
Blood Bank		Monday to Saturday 12pm to 2pm
University of Malta	Gateway Building	Weekdays 8am to 4pm
Schools/Institutes	Malta College of Arts, Science & Technology (Paola)	Weekdays 8am to 2pm
	Maria Regina College (Naxxar)	Weekdays 8am to 2pm
Primary Health Care	8 Health Centres - Malta	Daily -Variable time depending on daily clinics
	Health Centre - Gozo	Daily -Variable time depending on daily clinics
	Peripheral Clinics*	Weekdays 8am to 12pm
Aurora Centre - Gozo		Weekdays 8am to 1pm & Saturday 8am to 3pm

* Peripheral clinics are found in every town that does not have a health centre

3. Results

3.1. Securing vaccines

Early in 2020, Malta was one of the countries that pushed for European Commission joint procurement including funding for the eventual development of COVID-19 vaccine/s [12]. As vaccines become available in the last quarter of 2020, and later approved by the EMA, Malta was able to acquire sufficient vaccines to cover the entire population [13]. Malta also ordered a substantial additional amount of vaccine doses from all approved manufacturers, with 830,000 doses from Pfizer and Moderna combined, one million doses from AstraZeneca (Vaxzevria) and 250,000 doses from Johnson and Johnson [13]. These orders were expected to arrive in Malta in installments. This strategy enabled Malta to secure enough vaccines for the entire eligible population from various sources and overcome any logistic vaccination problems that might have arisen due to production or shipment delays from any single manufacturer.

3.2. Vaccination roll-out strategy

A vaccination team was set up in mid-December 2020 comprising of an information technology (IT) team, a co-ordination team along with the chief operating officer of the only state hospital, Mater Dei Hospital.

A vaccination framework was developed to ensure the efficient distribution of the first and second vaccine doses while following the vaccination priority strategy formulated by the Ministry of Health and the Superintendent of Public Health. It was decided that the manufacturer's recommended dosing schedules would be adhered to, i.e. second doses for Pfizer after 3 weeks, Moderna after 4 weeks and AstraZeneca after 10 weeks.

In the initial period of the vaccination roll-out, designated areas within Mater Dei Hospital were allocated as vaccination hubs [14]. As more vaccines were approved by EMA and more doses arrived in Malta, more vaccination hubs were opened across both islands of Malta and Gozo (Table 1) [14]. This was essential to cope not only with increasing doses of vaccine deliveries but also for on-time second doses (Table 2). Healthcare workers, healthcare students including dental students and other volunteers such as St. John's Ambulance teams have helped to vaccinate [15]. To further ensure continuous rapid vaccination, Malta's private sector general practitioners (GPs) were invited to help out, with around 90 accepting the invitation [16]. Individuals too frail to attend their appointments at the designated hubs are offered vaccination services at their residence [14]. Recently, a new initiative has been set in place, where the vaccination team are physically visiting factories (>200 employees) to inoculate the employees. Furthermore, as of 21st July a mobile vaccination clinic was set up in different prime locations across the islands to accommodate walk-ins. These walk-ins did not require a

Table 2

Malta COVID-19 vaccination priority strategy and the onset of vaccination invitations per priority group [19, 34–41]

Priority Groups	Onset of Vaccine Invitation
1 Healthcare workers and long-term care facility workers (public and private sector)	27 th December 2020
Persons living in long-term care facilities – elderly and mental health	11 th January 2020
Persons aged 85 and over	11 th January 2020
2 All other frontliners;	1 st February 2021
Persons 80-85 years of age	1 st February 2021
3 Vulnerable population*	8 th February 2021
Staff at schools and child-care centers	24 th February 2021
Persons 70-80 years of age	1 st March 2021
4 Persons over 60 years of age	6 th March 2021
Persons over 50 years of age	10 th April 2021
Persons over 40 years of age	23 rd April 2021
Persons over 30 years of age	5 th May 2021

* insulin-dependent diabetics; immunosuppressed; cancer patients undergoing chemotherapy; people treated for cancer in the last six month; patients on dialysis; those admitted to hospital for respiratory problems; patients suffering from cardiac disease or who attend the heart failure clinic; people with Down's syndrome; people who use a BiPap machine.

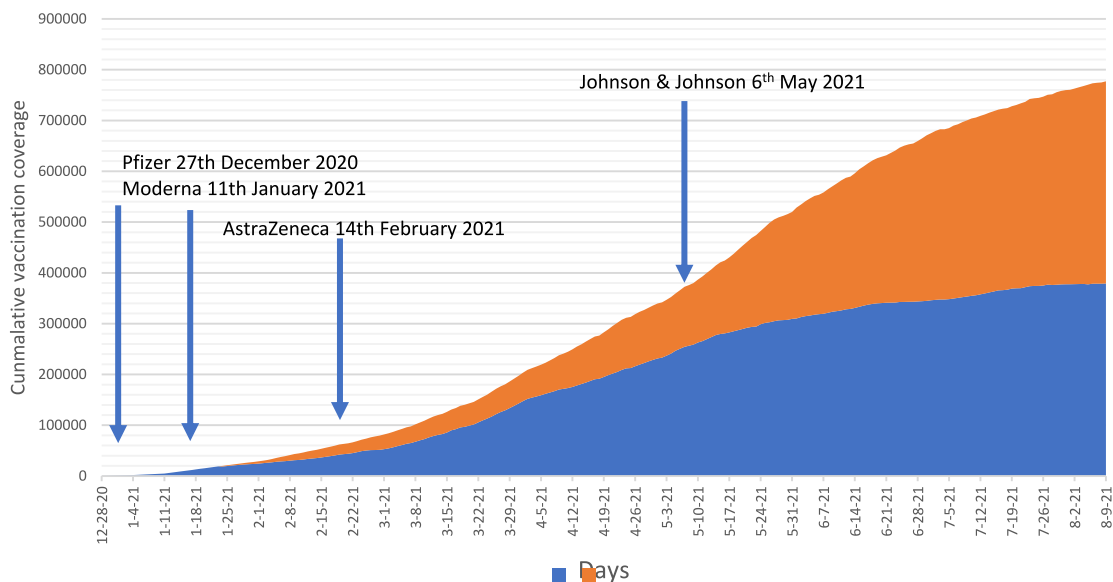
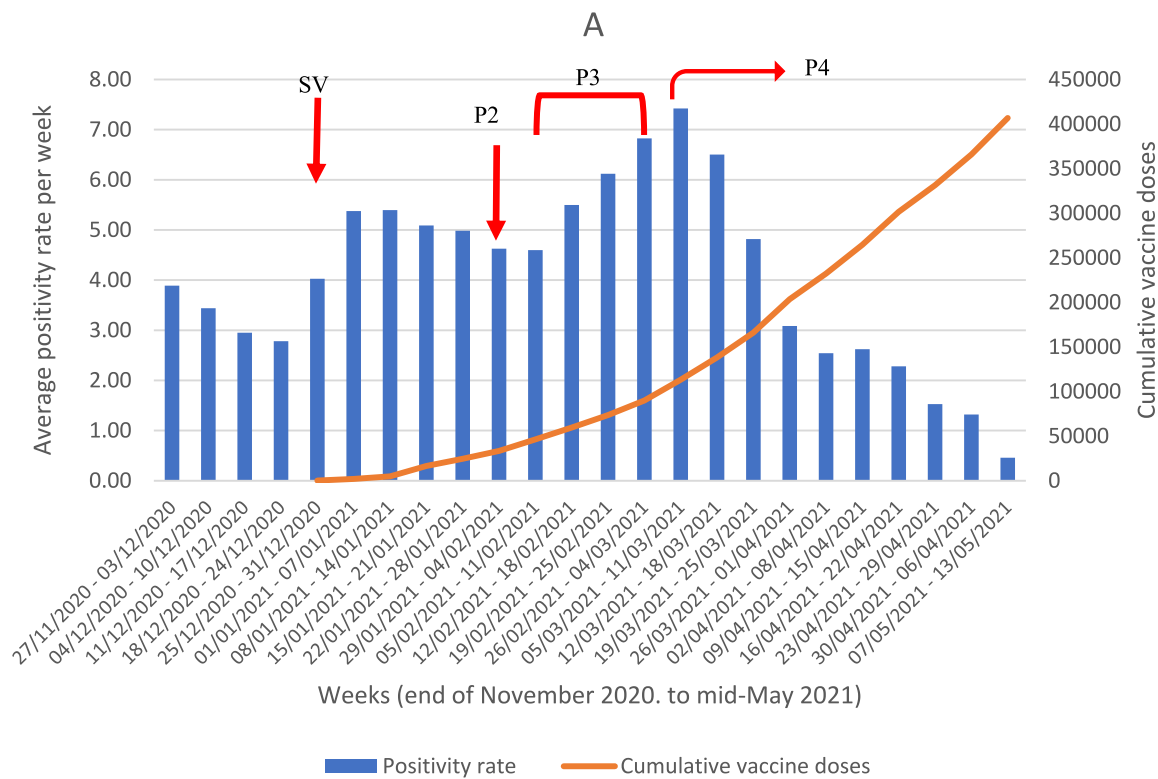


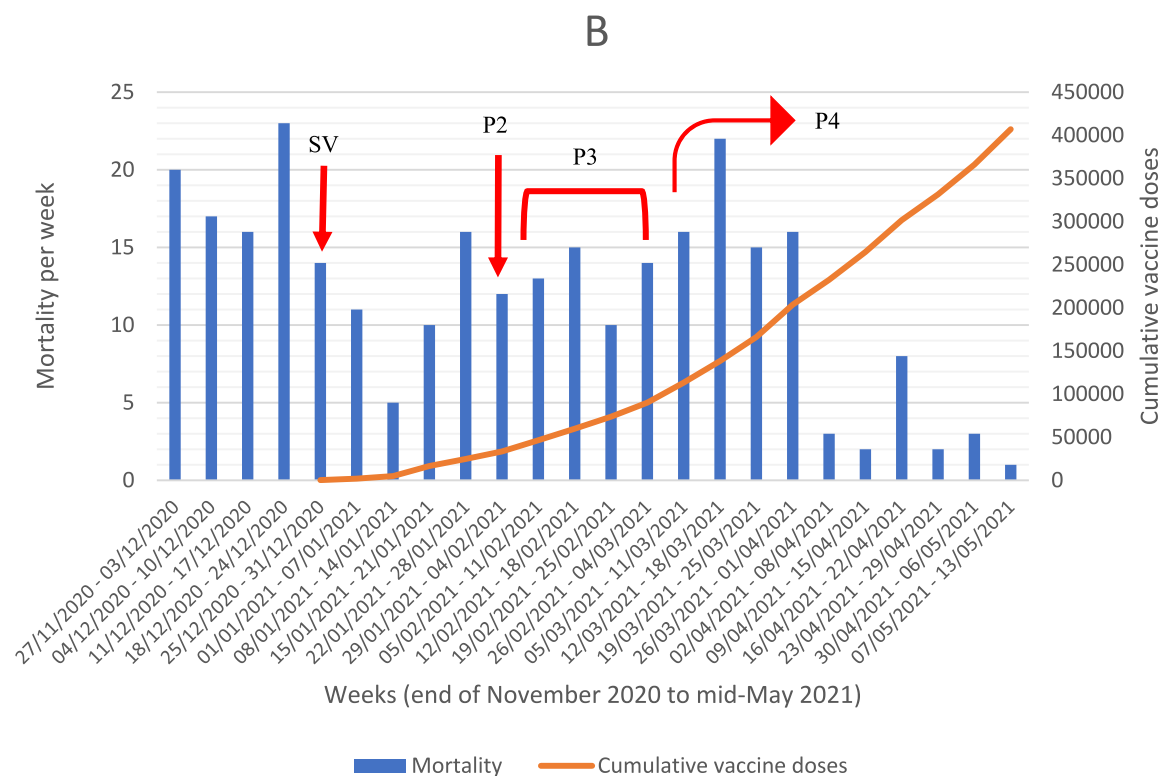
Fig. 1. Cumulative vaccination coverage and start date of the different vaccines in Malta

- SV- Start of vaccination of Priority 1 group
- P2 – Vaccination of Priority 2 group
- P3 - Vaccination of Priority 3 group
- P4 - Vaccination of Priority 4 group



- SV- Start of vaccination of Priority 1 group
- P2 – Vaccination of Priority 2 group
- P3 - Vaccination of Priority 3 group
- P4 - Vaccination of Priority 4 group

Fig. 2. Comparative analyses between (A) average positivity rate, (B) mortality, (C) admissions and cumulative vaccination coverage in Malta



SV- Start of vaccination of Priority 1 group

P2 – Vaccination of Priority 2 group

P3 - Vaccination of Priority 3 group

P4 - Vaccination of Priority 4 group

Fig. 2. Continued

pre-set appointment. Additionally, to continue enhancing the vaccination roll-out, two of the vaccination hubs (Gateway Hall at University of Malta) and the other in Gozo (Conference & Expo Centre), were converted to walk-in clinics [17].

Two vaccination setbacks occurred: (i) delayed vaccine arrival led to short periods of slow administration of first doses; (ii) the international reporting of thromboembolic events associated with the AstraZeneca vaccine and resulting media exposure also led to a short period of hesitancy, with some individuals expressing concern. However, Malta, unlike other European countries, did not halt the vaccination roll-out following the reports of the AstraZeneca rare side effects, continually following EMA's advice [13, 18].

Invitation letters with vaccination appointments for the first and second doses were sent out through postal mail to all those individuals falling within the first, second and third priority groups (Table 2) and 60+ years of age, in a staggered manner. A different appointment system was implemented for the 50+ years and the younger age groups. The latter cohort were invited to register their interest to get the COVID-19 vaccination through an online or mobile SMS system [19]. After registering, a mobile SMS appointment was sent to the sender for both doses at the location and time of their choice.

Malta reach herd immunity (70% of the population inoculated with at least a single dose) through a single dose on the 19th of May 2021 [20]. From mid-June 2021, children from the age of 12 years onwards were invited to get vaccinated [21].

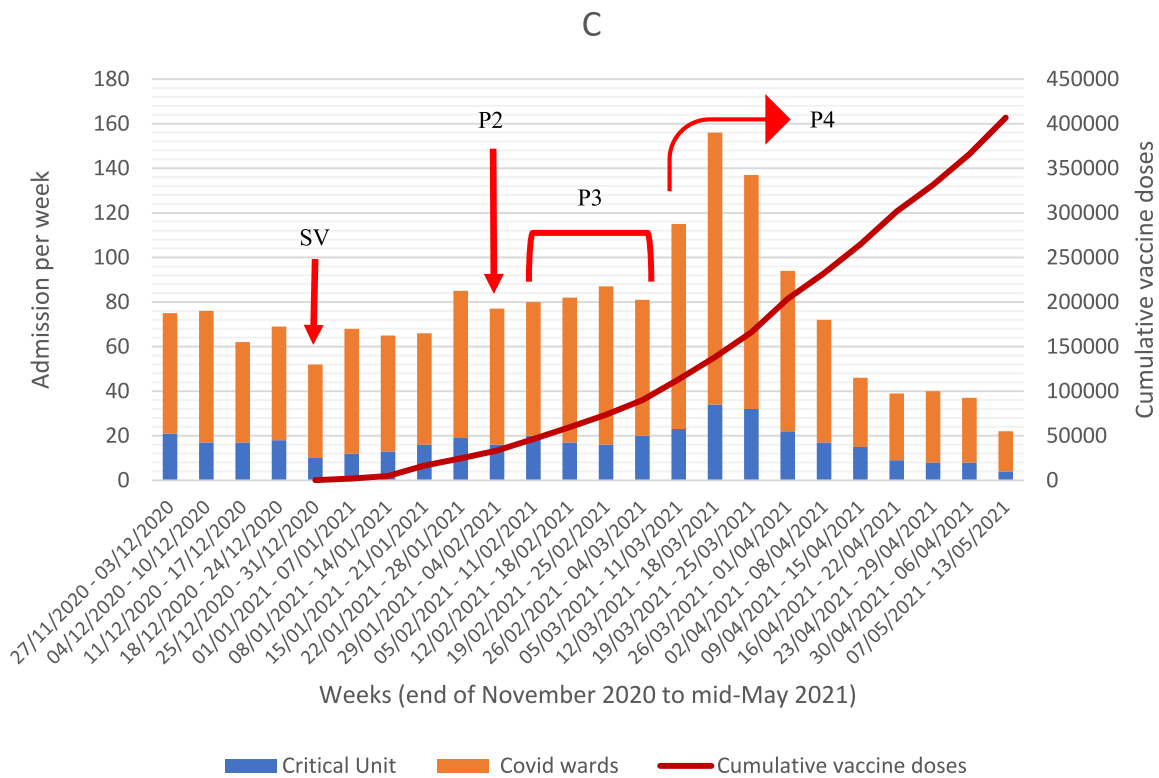
3.3. Vaccinated population and outcome

A total of 777,181 doses have been administered up till the time of writing (9th August 2021), with 398,128 individuals fully vaccinated and 405,073 individuals had the first dose. Figure 1 exhibits the cumulative population vaccination coverage in relation to the different vaccines available in Malta. Table 3 compares the vaccine doses and percentage vaccinated population across European countries [22].

The positivity and mortality rates were substantially high during the end of 2020 and the first three months of 2021. However, with the institution of a partial lockdown on the 10th of March 2021 and rapid vaccination rates, a drop in morbidity, mortality and hospital admissions were observed within two of weeks (Figure 2) [11, 23]. Indeed, as vaccination coverage increased and the elderly population was inoculated, both positivity and the mortality rates declined.

4. Discussion

The vaccination roll-out has thus far been a resounding success with high population uptake across all ages, placing Malta as the leading European country in COVID-19 vaccination [24]. This is in contrast to other countries with similarly high acceptance of vaccination among the elderly and the vulnerable groups but high vaccine hesitancy in the younger age groups [25, 26]. Even healthcare workers appear display hesitancy, notably in France and Belgium, unlike in Malta [27–29]. Furthermore, even the news of the rare thromboembolic events following



SV- Start of vaccination of Priority 1 group

P2 – Vaccination of Priority 2 group

P3 - Vaccination of Priority 3 group

P4 - Vaccination of Priority 4 group

Fig. 2. Continued

the AstraZeneca vaccine did not hinder the vaccination drive in Malta as much as in other countries [13]. Indeed, herd immunity have long been reached since mid-May 2021 [30]. Since the duration of vaccine induced immunity remains uncertain, especially if new variants continue to emerge, Malta has already placed orders for booster doses for the entire population [30].

Several factors have played a part in the success of Malta’s COVID-19 vaccination. The small population size allowed efficient planning and this was observed in other small islands such as Gibraltar, the Falkland Islands and the Cayman Islands [13]. Continuous opening of new vaccination hubs to maintain rapid vaccination of both the first and second doses simultaneously, was another successful strategy as was the maximization of vaccination orders from all manufacturers.

Although Malta has a rapid and high vaccination coverage, with achievement of herd immunity on the horizon, this does not preclude another COVID-19 wave. Increased population mobility decreased adherence to mitigations measures such as social distancing and mask wearing as well as wanning of vaccination protection are all potential contributors to such an occurrence. This is supported by a number of modeling studies that have concluded that an increase in population contact rates may counteract the benefits of a successful vaccination programme [31–33]. It is therefore important that continuous communication strategies to encourage population vigilance to physical distancing behaviour is set in place along with public health surveillance to monitor the COVID-19 situation and implement timely restrictions should the need arise.

5. Conclusion

The Island of Malta has successfully implemented a COVID-19 strategy that rapidly covered a substantial proportion of the population over a short period of time, with herd immunity reached by mid-May 2021. Low population vaccination hesitancy and high vaccine doses availability were two major factors resulted to this success.

Declaration of Competing Interest

None.

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Ethical consideration

N/A.

Informed consent

N/A.

Table 3Comparative assessment of COVID-19 vaccination doses and percentage population vaccinated (1st and 2nd dose) for each European country up till the 30th week of 2021 [22]

	Population of country	Cumulative Number of 1st doses distributed	% adult population vaccinated with one dose	Cumulative Number of second doses distributed (including JJ doses)	% adult population fully vaccinated
Austria	8,901,064	4,960,420	70.10%	4569714	62.10%
Belgium	11522440	7381505	83.70%	682687	74.10%
Bulgaria	6951482	1025955	19.20%	999328	17.30%
Croatia	4058165	1587713	48.80%	1485718	44.20%
Cyprus	1216271	510174	73.60%	467215	65.10%
Czech republic	10693939	5364440	63.30%	4840277	55.70%
Denmark	5822763	397948	82.00%	3169506	67.90%
Estonia	1328976	579145	57.40%	555433	51.70%
Finland	5,525,292	3624360	81.00%	1960919	43.80%
France	67,320,216	41820389	80.90%	32404220	61.40%
Germany	83,783,945	49039876	74.10%	43612309	62.80%
Greece	1527519	5305425	63.60%	5151066	58.10%
Hungary	9769526	5253333	66.70%	5161635	64.00%
Iceland	364134	204823	91.20%	244481	86.50%
Ireland	4980000	3088693	67.90%	2789862	74.10%
Italy	59,641,488	36113310	74.60%	31146008	62.00%
Latvia	1,907,675	608210	45.50%	660380	42.70%
Liechtenstein	38747	19897	62.40%	17090	53.50%
Lithuania	2794090	1332971	50.60%	1246124	44.60%
Luxembourg	626108	350284	61.20%	339425	54.2
Malta	514564	411851	83.00%	397225	77.20%
Netherlands	17,173,099	11036782	67.80%	9288197	53.40%
Norway	5367580	3520479	65.60%	1665877	31.00%
Poland	37,958,138	16332291	46.70%	16986313	44.80%
Portugal	10295909	6410696	68.90%	5906406	57.40%
Romania	19328838	4590520	26.10%	4875474	25.20%
Slovakia	5457873	2199525	41.00%	2050930	37.60%
Slovenia	2095861	843758	43.70%	810927	38.70%
Spain	47332614	30375187	68.00%	26317520	55.60%
Sweden	1834821	6402560	63.80%	4286922	49.00%

% population from 18 years above

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