Case study

Planning an efficient nationwide vaccination programme

NHS SCW

The Challenge

- Support the NHS with the planning and roll-out of COVID-19 vaccinations

The Benefits

- Effective planning of vaccination roll-out
- Reduced wastage in vaccine supply
- Targeted action to reduce health inequalities
- Confident decision making in NHS planning

When the NHS faced the enormous challenge of vaccinating the entire UK population within an ambitious timescale, geospatial analysis brought clarity to the planning process. NHS South, Central and West (SCW) used ArcGIS to help it locate vaccination sites, allocate the supply of vaccines, avoid vaccine wastage and monitor vaccination up-take

The Challenge

The COVID-19 pandemic was the biggest challenge faced by the NHS in its 70+ year history. Not only did the NHS need to treat high numbers of exceptionally ill patients with a highly infectious disease, but it also had to plan and implement a nationwide vaccination programme on a scale and at a pace never imagined before. The geographic information system (GIS) team at NHS South, Central and West (SCW) initially received a simple request to map potential vaccination sites in the South West, but this led to the realisation that GIS technology could do so much more.

The Solution

In what was its first year of using Esri's ArcGIS system, SCW used ArcGIS Pro to conduct geospatial analyses and build and share sophisticated map-based models, showing the locations of potential vaccination sites, the number of people in the local population by age and travel times to vaccination sites. This analysis activity was quickly expanded to cover three NHS regions – the South West, East and South East – an area with a total population of over 21 million people.

SCW created an ArcGIS web app to allow NHS decision-makers in the three regions to view potential vaccination sites and test possible site combinations to see which options provided the best accessibility for the local population. Easy to use, this web app allowed decision-makers to make well-informed choices themselves, very quickly, without waiting for analyst support. The ArcGIS web app was used in live planning workshops, with multi-disciplinary teams, working at speed together to make key planning decisions based on robust and accurate analysis.

SCW also took advantage of the temporal modelling capabilities of ArcGIS to create demand and supply phasing models to calculate how much vaccine would be needed by each vaccination site, based on the number of people in the local population eligible for a vaccination, in each phase of the vaccination roll-out. The output of this temporal modelling was displayed in ArcGIS Story Maps and Dashboards, giving NHS managers clear visibility of the data they needed to allocate the supply of vaccine appropriately.

The use of ArcGIS expanded very rapidly during the pandemic and, within months, SCW was providing GIS analysis to support the NHS at a national level, as well as support healthcare professionals working locally in specific regions and ICS systems. Now, the organisation is building on its experience to help the NHS leverage geospatial analysis as part of 'business as usual' activities.

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> “Through our use of ArcGIS, we have supported the NHS to deliver a massive, coordinated effort and vaccinate millions of people in the UK in a planned and efficient way.”

Trevor Foster, Associate Director, Geographic Intelligence and Mapping Service, NHS South, Central and West

ArcGIS cloud-based mapping and dashboards help visualise and analyse data to improve biodiversity management and reporting for regulatory compliance

The Benefits

Effective planning of vaccination roll-out

The use of geospatial analysis supported the NHS to plan a vaccination programme on an unprecedented scale. SCW modelled the optimum locations for vaccination sites and adjusted this model iteratively as the Government's roll-out strategy evolved. It also worked at a national level, advising NHS England which people to invite for vaccinations, when and where to send them, based on individuals' locations, ages, travel times to vaccination centres and the availability of vaccine. "Through our use of ArcGIS, we have supported the NHS to deliver a massive, coordinated effort and vaccinate millions of people in the UK in a planned and efficient way," says Trevor Foster, Associate Director, Geographic Intelligence and Mapping Service at SCW.

Reduced wastage in vaccine supply

SCW also modelled the optimum routes for vaccinating housebound people in Somerset, to allow district nurses and GPs to reach as many vulnerable housebound people as possible, as quickly as possible, while ensuring all available vaccines were used. "The use of ArcGIS to plan housebound vaccinations reduced vaccine wastage, but also made the whole process much more efficient, to avoid wasting the time of healthcare professionals," notes Ian Maxfield, Associate Head of Geographic Intelligence and Mapping at SCW.

Targeted action to reduce health inequalities

SCW is currently using ArcGIS to analyse areas where there is low up-take of COVID-19 vaccinations. It shares this information in interactive ArcGIS Story Maps to help NHS decision-makers plan targeted interventions that will encourage more people to get vaccinated and prevent health inequalities. Reissued weekly with up-to-date data, the Story Map displays socio-economic data on areas of deprivation and highlights changes over time, so the NHS can monitor the impact of its interventions. ArcGIS and Story Maps will be used to support other similar health improvement schemes in the future.

Confident decision-making in NHS planning

Beyond the vaccination programme, SCW is using ArcGIS to support decision-making in the introduction of new health initiatives and the management of ongoing NHS services. For example, ArcGIS is being used to plan the logistics for a new saliva-based test for routine, asymptomatic COVID-19 testing at two hospital trusts in Devon and Cornwall. ArcGIS is also being used to help reallocate patients to alternate GP practices, following the closure or merger of practices, based on travel times. SCW has used ArcGIS Survey123 to collect patient preferences and will be introducing new dashboards to help NHS decision-makers make timely, confident decisions.

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