

# THE JOURNEY TO CREATING A LIFE-SAVING VACCINE

Long before he knew he wanted to be a scientist, **Dr Mustapha Bittaye** (Biomedical Sciences BSc, 2012) always knew he wanted to find a way to help his community in The Gambia, where he grew up.

This early driver, alongside a desire to excel in everything he does, has taken centre stage throughout his studies and his career. And creating vaccines seems to be a pretty good way to do both of these things. "Apart from clean drinking water, which is a human right, vaccines are the most effective public health intervention that we have ever had.

"We don't see people dying from measles in the UK," Dr Bittaye says. "We don't see people dying from all the diseases that are killing people in other parts of the world – because of vaccination. As they say, anything that's out of sight tends to be out of mind, so we don't seem to put into context or put into perspective the importance that vaccines have."

As one of the key scientists involved in the development of the Oxford-AstraZeneca vaccine, Dr Bittaye has helped remind us all precisely how transformational vaccines can be. At the time of speaking in early July, the UK was preparing for a reopening that would not have been made possible without the AstraZeneca and other COVID-19 vaccines.

The vision outside the developed world is less positive. Dr Bittaye's home continent of Africa saw a 43 per cent week-on-week rise in COVID-19 deaths in the same month, due to a lack of health resources and a slower vaccine rollout. Addressing this kind of disparity between the developed and developing world has been a central concern for Dr Bittaye throughout his career. The University of Oxford's Jenner Institute made it a condition of their partnership with AstraZeneca that the vaccine would be available at cost throughout the pandemic. Unlike Pfizer, AstraZeneca can also be stored at any temperature, making it easier to use in poorer countries with less developed infrastructure and limited storage capacity. Poorer countries including The Gambia – where Dr Bittaye's own family received the vaccine he helped to create. The day his mother was vaccinated was "amazing", he says.

"I'm proud of the team that has developed a vaccine that is not just for the developed world," Dr Bittaye says. "When we were developing the technology that we're using, we had

in mind people in other parts of the world – in lower and middle-income countries – because they are the people who, most of the time, suffer most from disease and also, mostly, they are the people who are left behind when it comes to benefiting from the vaccines that science and technology give us."

Of course, not everybody sees things this way. Vaccine hesitancy, combined – on occasion – with outright disinformation, have posed a huge obstacle to getting shots in arms, in the UK and elsewhere. The anti-vaxxer movement is not new, and is here to stay, Dr Bittaye says, particularly now it has social media to spread and amplify its message. "To be honest, I am surprised, and I'm not surprised," Dr Bittaye says of the backlash against the Oxford and other vaccines.

The risk of blood clots connected with AstraZeneca is, as he points out, incredibly rare, particularly when balanced against the risk of getting blood clots from the disease itself ("You would have to be very very unlucky to fall into that category of people"). He does, however,



understand and sympathise with some of the concerns people have. Unethical medical research in the past – much of it directly affecting ethnic minorities – plays a part, having severely undermined some people's trust in medical science. Even today, when strong ethics policies are firmly in place, scientists sometimes need to do more to reach out and address people's concerns, Dr Bittaye says.

"Even if the science is real, do you trust the person telling you the information?" he says. "This is something I realise as a scientist, but also as a human. As a community, in general, it's something we need to work on. It's not just about what the science can offer – it's also about engaging with communities."

He has seen a real improvement during the pandemic in the way scientists communicate and deal with people's concerns. He also feels the vaccines have, to some extent, done the talking for them – as people can see with their own eyes how effective they truly are.

"For me – to be honest – I'm just interested in the science and the benefit the science brings to people," he adds. "I'm not interested in the politics; I'm not interested in the marketing."

When Dr Bittaye graduated from high school, his profound desire to help his community was combined with a "passion for learning" and a strong work ethic, which he inherited from his family.

"They're really hard-working people and they instilled a lot of good values in me and my brothers and everybody else to be good people and to do things that will benefit society, not just yourself."

It was difficult though, he says, due to the lack of career guidance available when he was growing up, and the lack of role models available. The real turning point in his life came when he joined the Medical Research Council (MRC) as a Laboratory Technician. It



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was here, he says, that he really “fell in love with science”.

“I realised the potential that science can give you to unlock your dreams.”

He enrolled in the University of Westminster’s Diploma in Biomedical Science in 2007 – a programme Westminster offered remotely, in collaboration with the MRC. After finishing top of the course, Dr Bittaye won a scholarship for Westminster’s Biomedical Sciences BSc – and so he arrived in London in 2009.

“I thank the University of Westminster for giving me that opportunity,” Dr Bittaye says. “I always say without the opportunity that Westminster gave me, without the potential that they saw in me, giving me that scholarship to come to the UK to follow my career – you know – things would have been different.”

Relocating thousands of miles to live and study in a completely different culture is no small feat, but Dr Bittaye says Westminster’s entire personality as a university helped considerably.

“The environment there was the perfect environment for any student coming from abroad to thrive,” he says. “The diversity in the campus, the friendliness of the tutors, you know, the lecturers, the openness of the University – the support they offer to students – it was wonderful.”

His experience at Westminster helped build his confidence and self-belief, Dr Bittaye says. He believes this is often half the battle for Black

Africans, like himself, pursuing big dreams.

“This is very part and parcel of a life of somebody from my culture, from my background – that, you know, sometimes you lack self-confidence and then you always have this fear at the back of your mind, that you are not good enough,” he says. “When you look around and you don’t see people like you being certain things that you want to be, you just start to automatically think – you know – ‘is this something I can be?’”

To this end, Dr Bittaye’s desire to help his home community extends beyond his scientific work to mentoring – something he has committed himself to, throughout his career.

“I think a lot of things could have been a lot easier if I’d had somebody to put me through the path and tell me ‘this is what you need to do’ or ‘this is what you need to avoid’,” he says.

Dr Bittaye has taken part in Westminster mentoring schemes. He also co-founded Health and Science for Gambia, a non-profit that aims to encourage young Gambians to pursue careers in biomedical science, through career coaching and mentoring.

“We’ve been trying to give back to the community there,” he says. “And – you know – just be a role model to young people there to make them believe in what they can do and also to realise that in life you can achieve anything, as long as you have the passion for it.”

After graduating top in his BSc at Westminster in 2012, Dr Bittaye returned to the MRC Gambia as a Scientific Officer, where he worked on the 2013 malaria drug trial. He completed his PhD at Aberdeen University in 2018 and joined The Jenner Institute soon afterwards. As a world-leading vaccine research institute, it was his ultimate goal to work there, Dr Bittaye says. Its humanitarian focus was also very important to him.

Upon joining, he worked on the world-leading SARS vaccine clinical trials. And then, 2019 arrived, bringing with it a brand new coronavirus.

“To be honest, I think we are lucky, as a world,” Dr Bittaye says. “The pandemic happens to have been caused by a virus that we knew something about. It’s a coronavirus – we knew something about this family of viruses. I think, for the science community, that gave us an opportunity that is very rare.”

So, given that we are apparently entering an age of global pandemics, next time we may not be so lucky?

“That would be the worse case scenario; if you have a pandemic caused by a virus you know nothing about.”

Scientists in his field need to “prepare for the unknown”, Dr Bittaye says. And while developing a vaccine of this kind within a year may have been unprecedented, it could be a considerably shorter timescale next time around.

“A year now seems to be too long – given what we have gone through,” he says. “How do we cut that number down to three months, to 90 days, or less than that – these are the types of discussions people are having now.”

“This is the advantage of scientific innovation,” he adds. “When you bring people together, when challenges push you to your limits, when challenges push the frontiers of impossibility.”