The War on Error: Will restricting Nigerian urea stop the threat of fertilizer-based explosives in Africa?

In early March, the Nigerian authorities seized 156 truckloads of urea from Notore Chemical Industries in the southern state of Kogi. The military said it was part of a "routine security operation", and a government official hinted that the detention was in response to new guidance on urea's potential to be used in explosive devices. Urea has long been considered a "safe" fertilizer, so is this a sensible response to a real security threat, or is it an overreaction?

Nigerian situation

The new guidance was issued jointly by Nigeria's Federal Ministry of Agriculture and Rural Development and the office of the National Security Adviser (NSA). Under the new urea regime, every individual, company and transporter must be identified and certified from the point of origin to the final destination. Transporting urea across the country now requires a military escort. The NSA says this is necessary because:

"[urea] can be used to produce urea nitrate; a high explosive material used in IEDs [improvised explosive devices] by simply adding nitric acid"

Nigeria's security issues are well known, from the Boko Haram insurgency in the north, to more widespread unrest in the oil-rich south, so the security threat it faces is very real. IEDs are used extensively by armed groups, and the authorities are right to be concerned about materials that could be used in their manufacture. What makes the Nigerian response unusual is that it singles out urea.

The nitrogen fertilizer dilemma

Nitrogen is the most important of all the plant nutrients, so nitrogen-based fertilizers are essential for food production. Yet a major drawback is that they can either be used as explosives, or as explosive feedstock.

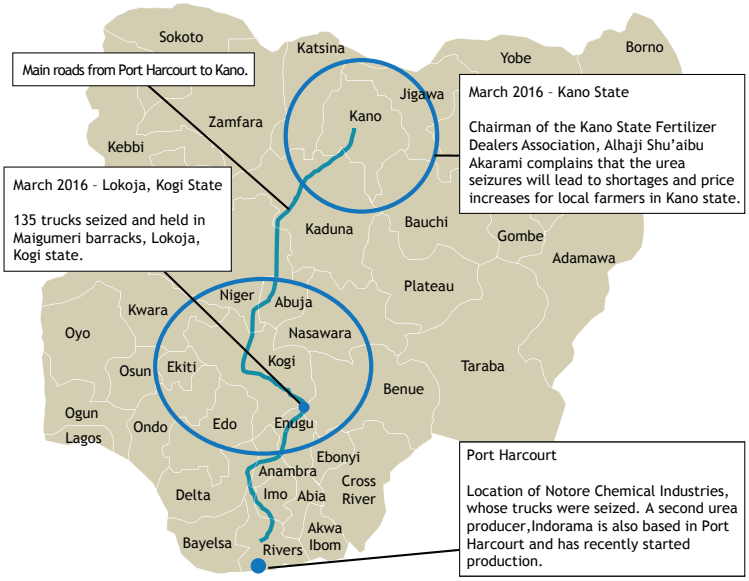
This poses something of a dilemma for governments. Banning their use would be simple, but would also make it impossible to achieve the crop yields necessary to feed the global population. A different approach is necessary.

The greatest security risk comes from those products that can be used as explosives in their own right, such as ammonium nitrate (AN), or those that can be turned into explosives with very little effort. For these types of fertilizers, governments usually have two options — put restrictions on their use or ban them.

Advanced nations usually choose restrictions over bans. They tend to have capable security services that can enforce restrictions on use, while avoiding most of the economic harm caused by an outright ban. The UK is an example of this, where AN is legal, but strictly controlled.

Some countries have no choice but to ban them, normally because they lack the security apparatus that could prevent dangerous fertilizers from falling into the wrong hands. Afghanistan banned AN in 2010 for this reason. Banning was the only realistic way of controlling the supply of AN, and this trumped economic concerns.

The bulk of nitrogen-based fertilizers are considered "safe" because the practical difficulties in weaponising them mean that it becomes effectively impossible for many (but not all) armed or criminal groups to do so. Urea falls squarely into this category.



The difference between the lab and the cave

Rebel groups, by their nature, operate outside the law. They are also much weaker than the states they oppose, so cannot confront them in a conventional military sense. As such, a key concern for these groups is to avoid detection while they are preparing attacks. If detected, not only will the attack be disrupted or stopped, but there is a risk that the security services will be able to inflict further damage on the wider organisation. This places a huge restriction upon an insurgent's freedom of action.

When deciding which explosives to use in IEDs, terrorists have three options — military, commercial or home-made explosives (HMEs). The simplest method is to use the explosives found in conventional weapons, but this option is only available if there is an abundance of military hardware, such as in a conflict zone. Commercial explosives are, unsurprisingly, subject to stringent restrictions and so are difficult to obtain without alerting the authorities.

The difficulty in procuring military or commercial explosives is why HMEs are popular. They are mostly made from household items, so are relatively cheap. As many components can be legally obtained,

the risk of detection is far lower than if one tried to obtain commercial or military explosives from the black market, which is also usually expensive.

The next difficulty comes in making the explosive. Generally speaking, the risk of detection increases with the complexity of the bomb-making process. Complex chemical reactions require more exotic raw materials and equipment. As these will be rarer and more difficult to conceal, the security services will find it easier to trace them.

A bomb-maker will therefore want to keep things as simple as possible. Most bomb-making factories are little more than a room in a house. Armed groups in Northern Ireland would make many of their devices in barns, where the presence of fertilizers would not in itself be suspicious. The main reason to choose a more complex method of HME production is if the raw materials for simpler methods are either unavailable or the risks of obtaining them are too great.

Another reason to prefer simple HMEs is because of the lower skills required to make and deploy them. The simplest devices require only a basic grasp of chemistry, but HMEs that are more difficult to produce can require the bomb-maker to have a university-level education. A complex HME may also be less safe to transport if the chemical is more unstable, which poses a problem if most of the people who plant the bombs are illiterate, as is the case in Afghanistan. Bombers are typically of low rank — it is the bomb-makers who are highly skilled.

Explosive performance is normally secondary to ease of manufacture. The main concerns will be ease of use and reliability. A bomb-maker wants to ensure that the device is safe enough to transport to the desired location, and will explode when he wants it to. HMEs that are simpler to produce, such as AN, tend to do better on this measure. Explosive power also differs between different types of HME, but they are broadly comparable so this is rarely a deciding factor on which process to use.

How this relates to urea

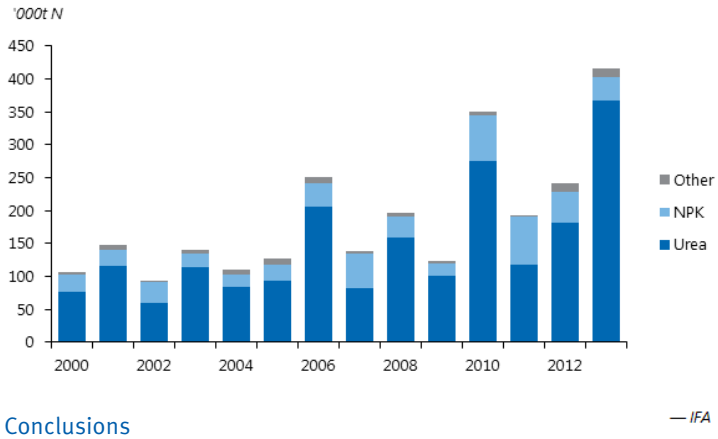
This brings us back to the difficulty in using urea as a feedstock. Urea is chemically stable and so must be nitrated in order to produce an explosive. This is typically achieved with a strong nitric acid, in order to make urea nitrate (UN). The Nigerian guidance says that one can make UN by "simply adding nitric acid", and while this is indeed simple for an industrial user, it is less so for a bomb-maker.

A strong nitric acid is hard to buy without attracting attention (especially if it has to be imported) and is not easy to make outside of a lab. The required strength also makes the acid hazardous to use and difficult to store. The reaction itself requires the use of breathing apparatus and protective clothing. This is not to say that it is beyond the capabilities of armed groups, indeed the chemistry behind it is relatively simple, but it is unlikely to be a preferred option.

In all of this, the most important point to note is the presence of nitric acid. This is the key ingredient in the process, and thus the true villain of the piece. Nitric acid allows a bomb-maker to make a range of HMEs using almost any nitrogen-based fertilizer, not just urea. Restricting urea may stop the production of UN, but an insurgent with strong nitric acid could just as easily make something else.

The logical conclusion to this line of reasoning would be to impose similar restrictions on all nitrogen-based fertilizers, given that they could all theoretically be used as feedstocks in a nitric-acid based nitration. This could slow or reverse the recent growth in nitrogen consumption and would impose significant costs on Nigerian agriculture, lowering crop yields. This seems unnecessary when one could simply target nitric acid.

Nigeria nitrogen fertilizer consumption



— IFA

Conclusions

Governments must always balance security gains against economic losses but in order to do this they must effectively target the correct risk. Speaker cable can be used to make IEDs, but restricting it would not stop bomb-makers using other types of wire. The wire is not the problem. The same is true of urea.

The costs of this policy could be excessive, and urea prices have already risen sharply. The chairman of the Kano State Fertilizer Dealers Association reported that urea prices jumped from 4,700 naira to N5,500 per bag shortly after the seizures, and in July domestic prices stood at N8,000-N9,000 per bag. This is partly the result of the naira losing 30pc of its value against the dollar, but conversely international urea prices have fallen by around $20/t. What is clear is that this policy change has imposed significant costs on farmers.

Nigeria's desire to improve security is understandable, but cracking down on urea is not the answer.