

## Cash and Crises financial literacy series

'Cash and Crises' is a series of financial literacy audiographics brought to you by CashEssentials, a private sector initiative with a social mission to support the relief and development community in understanding how cash is managed for society in times of crisis.

### Episode VI Cash & Disease Transmission

Let's start with a short reality check and look at the role of banknotes and coins in the transmission of communicable diseases such as Ebola and Coronavirus.

In June 2014, just as the West Africa Ebola epidemic was gathering momentum, the hospital at the epicentre of the disease at Kenema in Sierra Leone was attacked by an angry mob. Their fear of the disease had been stoked by rumours that banknotes were infected with the virus<sup>1</sup>. Happily, the riot was controlled before those inside were killed. But, within hours, stallholders, taxi drivers and guest-house owners started refusing to handle any form of money, even when wearing rubber gloves, and a barter economy took over. Within days, market stalls shut up shop across the country and it was many months before normal economic activity resumed (OECD, 2014)<sup>i</sup>.

Fast forward to earlier this year when the Global Health Cluster put out a guidance note to international health agencies advocating that "where possible, contactless electronic or mobile payments should be the preferred payment option<sup>2</sup>."

Both responses were clearly linked by a single perception: That cash is dirty and presents a risk to public health by acting as a vector<sup>3</sup> for the transmission of deadly diseases.

But is this true? Were either of these actions based on science? Can banknotes spread disease?

The short answer in both cases is, 'No'. But there is a longer answer which makes it worthwhile to look at the evidence – or lack of it – that banknotes harbour and transmit viruses and bacteria, and the potential risk they pose to public health.

**“You cannot contract Ebola by handling money.”**  
European Health Commission, 2014

A travel advisory at the time of the Ebola outbreak in West Africa from the European Commission's Health Committee in 2014 couldn't have made it any clearer: "You cannot contract Ebola by handling money."<sup>ii</sup> This statement was based on a broad range of scientific evidence which overwhelmingly confirms that banknotes do not constitute a specific vector for disease transmission. "If they did," says René Gottschalk, head of infectious diseases at the Robert Koch Institute in Germany, "the number of cases (in any outbreak) would be much higher than they are."

This is not to suggest that banknotes and coins don't harbour infectious pathogens such as viruses and bacteria; they do.

<sup>1</sup> In a survey of knowledge, attitudes and practices about transmission routes for EVD conducted in Senegal in 2017, nearly half (47%) of respondents thought that banknotes were one of the main modes of transmission (Lakhe, 2018).

<sup>2</sup> World Health Organisation and Global Health Cluster Cash Task Team: Guidance Note on the role of cash and voucher assistance to reduce financial barriers in the response to the Covid-19 pandemic, April 2020

<sup>3</sup> Actually a 'fomite' – an object that may be contaminated with an infectious agent and contribute to its transmission – rather than a 'vector', which involves an intermediary organism.

“  
*The risk posed by handling a banknote is no greater than touching any other common surface.*  
”  
Bank of England, 2020

“  
*We know that cash carries bacteria and viruses but there is no evidence that it is transmitting Covid-19.*  
”  
Margaret Harris, WHO Geneva, 22 March 2020

The Bank of International Settlements clarified what this means in public health terms when it pointed out in a statement in March 2020 that “It’s not that there is zero risk of disease transmission by banknotes, but that the probability of becoming infected is no higher than with other frequently touched objects such as debit cards, ATM PIN-pads and hand rails.”<sup>iii</sup>

The World Health Organisation was even more specific when it came out with a similar statement about the ongoing Coronavirus pandemic, saying “We know that cash carries bacteria and viruses but there is no evidence that it is transmitting Covid-19.”

So, it seems clear that the problem is not the contaminated surface but the chain of transmission and what actions we take to disrupt it. In this sense, then, how long pathogens can survive on surfaces, including the surface of a banknote or debit card, is largely irrelevant as this is not the main mode of transmission for droplet-borne diseases<sup>4</sup>.

## Persistence

Yet, with viruses being the causative agent of an estimated 60% of human infections worldwide, it’s clear that contaminated surfaces play a role, if only passively, in transmission (Taylor, 2007)<sup>iv</sup>.

Multiple studies have demonstrated that viruses, bacteria, fungi and parasites can persist for anything between hours and weeks on a banknote under laboratory conditions. The majority of viruses can also persist for up to 6 days longer on non-porous surfaces such as stainless steel and plastic than on porous ones such as cardboard and cotton (Boone & Gerba, 2007). Some, including influenza viruses, can persist for hours or days on banknotes, particularly when diluted in mucus (Thomas et al. 2008).

At the start of the Covid-19 pandemic, the European Central Bank began working closely with European laboratories to assess the behaviour of coronaviruses on different surfaces<sup>v</sup>. Early results indicated that they can survive more easily on stainless steel surfaces (e.g. door handles) than on cotton banknotes such as the Euro, “with survival rates approximately 10 to 100 times higher in the first few hours after contamination.” Other analyses indicate that it is much more difficult for a virus to be transferred from porous surfaces such as cotton banknotes than from smooth surfaces like plastic.

“  
*It is much more difficult for a virus to be transferred from a porous surface such as a cotton banknote than from a smooth surface like plastic.*  
”  
Fabio Panetta, European Central Bank, 28 April 2020

## Conditions

Meanwhile, WHO made it clear that viruses “may persist on surfaces for a few hours or up to several days, but this will vary under different conditions<sup>5</sup>.”

These conditions are determined not just by the environment but by the behavioural, biological, physical and chemical factors involved, all of which affect the survivability and transfer efficiency – the persistence – of the pathogen.

<sup>4</sup> According to the US Centres for Disease Control (CDC), people can contract droplet-borne diseases such as Covid-19 by touching contaminated surfaces and then touching their own mouth, nose, or eyes. But this is not the main mode of transmission.

<sup>5</sup> It appears that Covid-19 can persist for three hours in the air, 24 hours on paper and up to 3 days on plastic and stainless-steel surfaces (Van Doremalen et al, 2020). Shigella, various Mycobacteria and Clostridium difficile can survive for months on a banknote’s surface in dried form, while Coronavirus, Rhinovirus, and Cholera vibrio persist only for a few days (Kramer, 2006). touching their own mouth, nose, or eyes. But this is not the main mode of transmission.

## PHYSICAL

- **Absorptive capacity of the surface:** Most cotton-based substrates now use pre- or post-print protective varnishes which act as surfactants. These extend banknote life and make it difficult for contaminants – including disease pathogens – to remain viable on the surface for long<sup>vi</sup>. Adoption of polymer and hybrid<sup>6</sup> notes have also fundamentally altered surface characteristics. It must be assumed that the longer the note is in circulation, the higher the absorptive capacity.
- **Exposure to ultraviolet radiation (sunlight):** Ultraviolet radiation is considered a very efficient virucidal process, although resistance to UV exposure varies according to the type of pathogen.
- **Temperature and Humidity:** According to a meta-study conducted this year in Germany coronaviruses tend to persist on contaminated surfaces for shorter times at higher temperatures and lower humidities<sup>vii</sup>.

## CHEMICAL

- **Acidity:** The presence of salts and ions within the substrate and on the surface change over time and can alter the pH beyond that which is optimal for pathogen survival.
- **Presence of anti-microbials:** Most banknotes are manufactured using metallic and/or magnetic inks. In coins, some metals exhibit antimicrobial properties. Others, such as Russian roubles, are also treated after printing with anti-microbial<sup>7</sup> fungicides and biocides to prevent the proliferation of mould, bacteria and viruses<sup>viii</sup>.

## BIOLOGICAL

- **Presence of other micro-organisms:** Interaction between different microorganisms may inhibit the potency of different types of pathogen.
- **Organic and inorganic content:** The longer cash remains in circulation, the dirtier it becomes. The greater the presence of organic matter – accumulated soil, sweat, and dead skin – the greater the likelihood of a given pathogen persisting<sup>ix</sup>. Lower-denomination notes, being the most often handled in developing countries, are the most contaminated<sup>x</sup>.
- **Quantity and Density of the pathogen:** The higher the viral load, the greater their chance to survive and infect a new host organism.

## BEHAVIOURAL

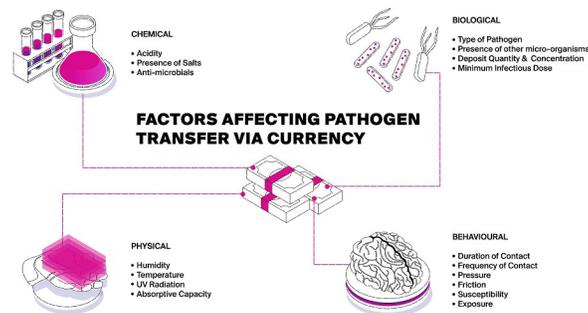
- **Handling frequency (including time, pressure, friction):** The ability of pathogens to remain viable on banknotes depends on how they were deposited<sup>xi</sup>.
- **Exposure:** Cash is typically not publicly displayed and is stored in a pocket, purse, or cash box where it is much less likely to be exposed to settling respiratory droplets when people sneeze or cough.
- **Transmission:** Whether the recipient becomes infected or not from touching a banknote depends on the infective dose transferred – which is different for each type of pathogen – the hand-hygiene measures taken to disrupt the chain of transmission, and susceptibility<sup>8</sup>.

<sup>6</sup> Hybrid notes – such as the Swiss currency – are made of multiple layers, some of which are polymer.

<sup>7</sup> Two distinct types of chemical treatment have been developed for banknotes – fungicides for preventing fungi and mould growth, and biocides for the prevention of bacteria and viruses.

<sup>8</sup> Likelihood of an individual to develop ill-effects from an external agent.

## KEY POINTS



- Banknotes pose no more risk of disease transmission than other everyday objects such as debit cards, ATM PIN-pads and handrails.
- A combination of modern banknote manufacture and improved bulk cash management practices maintain the highest possible quality of currency in circulation.
- The sooner the Cash Cycle is restored after a catastrophe, the sooner economic recovery can begin.
- Loss of confidence in cash driven by unfounded fears that banknotes act as vectors of disease can foster financial exclusion and slow economic recovery following a pandemic. • Cash adds value to society by generating profit for the issuer.
- Policies driven by ideology rather than epidemiology will do further harm by forcing cash payments to be made via electronic means which either don't exist or are not disaster resilient. Alternative payment options are rarely contact-free and the majority of digital transfers made in low-and-middle-income economies today involve cashing out somewhere in the cycle.

## References

<sup>i</sup> [Ten facts about Ebola, OECD](#)

<sup>ii</sup> [Ebola virus disease - Information for travellers](#)

<sup>iii</sup> [Auer et al: Covid-19 Cash, and the Future of Payments; Bank of International Settlements, Bulletin No.3, 3 April 2020](#)

<sup>iv</sup> [Taylor et al: The Persistence of Flood-borne Pathogens on building surfaces; International Journal of Hygiene and Environmental Health, Vol.216 \(1\) 2007](#)

<sup>v</sup> [The ECB Blog: Beyond monetary policy – protecting the continuity and safety of payments during the coronavirus crisis; Fabio Panetta, 28 April 2020](#)

<sup>vi</sup> [Vriesekoop et al: Dirty Money- an investigation into the hygiene status of some of the world's currencies as obtained from food outlets; Journal of Foodborne Pathological Disease, Vol.7 \(12\) 2010](#)

<sup>vii</sup> [Kampf et al: 22 Study Meta-analysis; Greifswald University Hospital, Germany, 2020](#)

<sup>viii</sup> [Currency News: Protecting Cash, Safeguarding the Public Against COVID-19; Special Supplement No.1, May 2020](#)

<sup>ix</sup> [Varusha and Gowri: Paper Money and Coins as Potential Vectors in Transmissible Diseases – A Review; Journal of Pharmaceutical Sciences and Research, Vol.9 \(2\) 2017](#)

<sup>x</sup> [ibid](#)

<sup>xi</sup> [Thomas et al: Survival of Influenza Virus on Banknotes; Journal of Applied and Environmental Microbiology, Vol. 74 \(10\) 2008](#)

## Recent press releases and articles on the topic

[Possible impact of euro banknotes on the spread of the coronavirus](#), Banque Centrale du Luxembourg, 17 March 2020

[Cash poses no particular risk of infection for public](#) Deutsche Bundesbank, 18 March 2020

[Banknotes carry no particular coronavirus risk - German disease expert Reuters](#), citing Robert Koch Institute expert, 11 March 2020

[China zieht wegen COVID-19 Geldscheine ein](#) Tagesspiegel, 28 February 2020

[From banknotes to handrails: 10 objects that help spread coronavirus](#) The Guardian, 03 March 2020

[No, coronavirus is not a good argument for quitting cash](#) MIT Technology Review, 12 March 2020

[The WHO has clarified that they aren't warning people against using paper money due to coronavirus](#) Fullfact, 13 March 2020

[The SARB warns the public that it is NOT withdrawing banknotes and coin because of COVID-19](#) South African Reserve Bank, 16 March 2020

[Bank of Canada asks retailers to continue accepting cash](#) Bank of Canada, 18 March 2020

[The use of cash during the coronavirus pandemic \(in Finnish\)](#) Bank of Finland, 25 March 2020

[No evidence that the coronavirus spreads via banknotes](#) Sveriges Riksbank, 26 March 2020

[Coronavirus and cash: Why consumers should be cautious, but not fearful of handling dollars](#) Bankrate, 27 March 2020

[Coronavirus: billets de banque et contamination, la réponse de Bank Al-Maghrib](#) La360, 02 April 2020

[Covid-19, cash, and the future of payments](#) Bank for International Settlements, BIS Bulletin No 3, 03 April 2020

[ICA Information on Cash and Pandemic](#) International Currency Association, 15 April 2020

[Beyond monetary policy – protecting the continuity of payments during the coronavirus crisis](#) European Central Bank, 28 April 2020

---

For feedback, please contact [james@shepherd-barron.com](mailto:james@shepherd-barron.com)