



# Virus can be transmitted in a number of ways

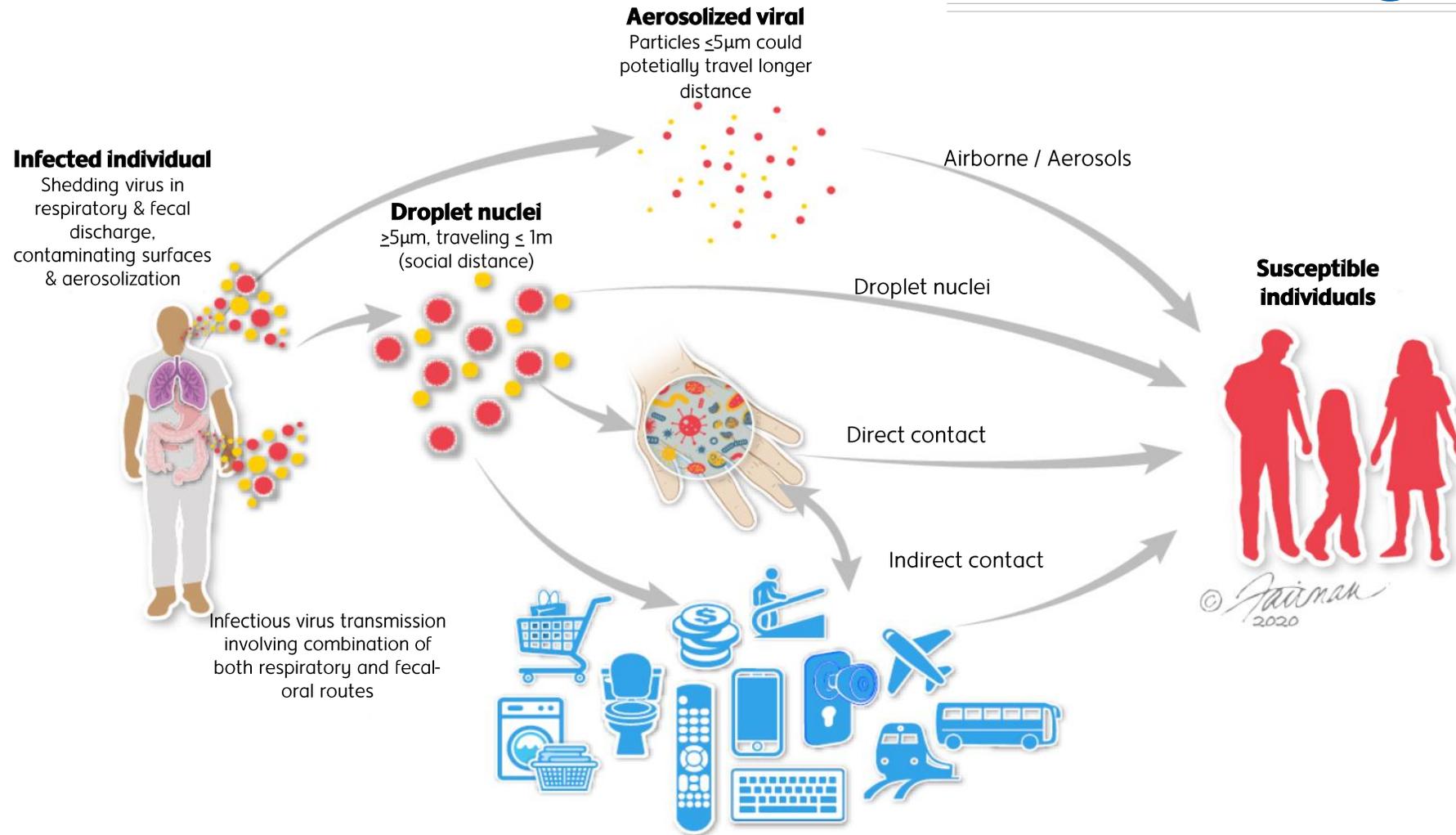


Figure 1. Modes of transmission of viruses, emphasizing respiratory infections such as SARS-CoV, MERS-CoV, and presumably SARS-CoV-2 (modified from Otter et al., 18).

# Bacteria

is a single-cell organism that has cell walls but lack organelles and an organized nucleus



Some bacteria fall somewhere in the middle



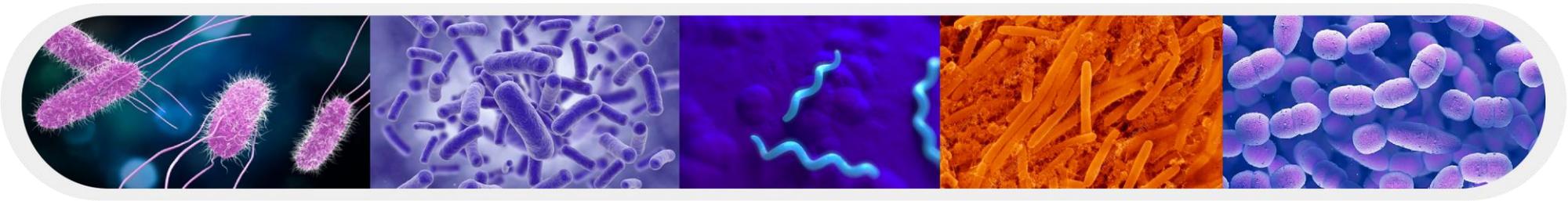
Evolved to exist almost everywhere; High level of species variability



Some bacteria need oxygen to survive



Some bacteria don't need oxygen to survive



Some bacteria love the heat



Some bacteria love the cold



Ability to grow or survive in wide ranges of pH

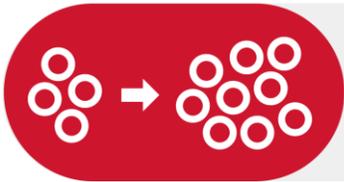


# Even a small fraction of Bacteria can be very dangerous

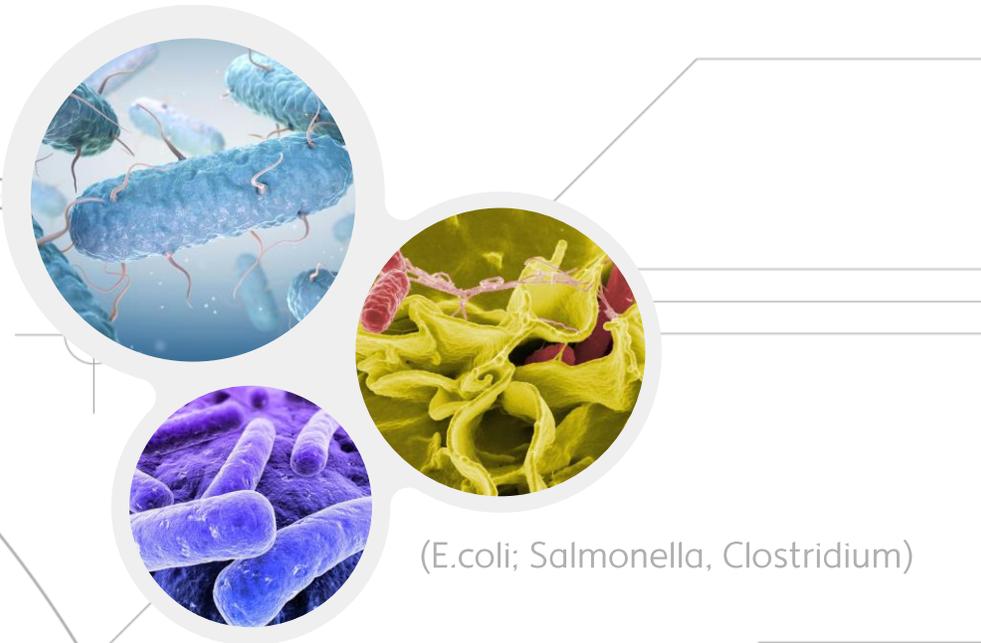
## Bacterial Growth Phases



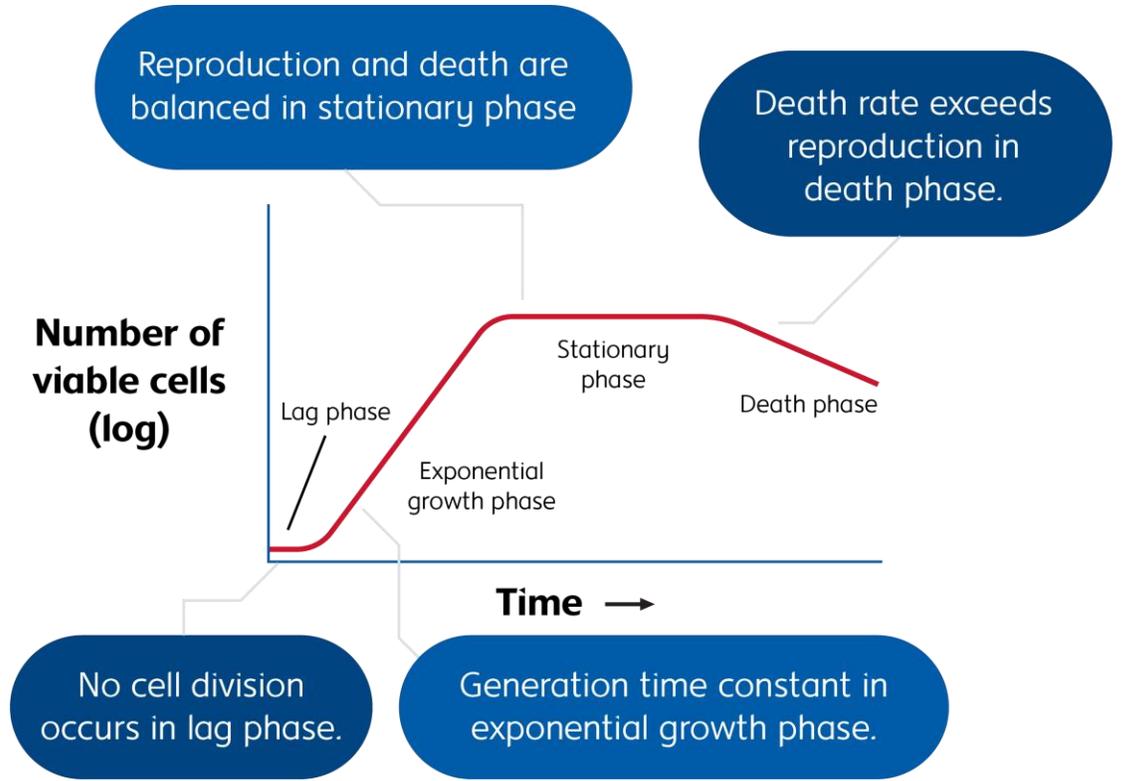
Less than 1% of all bacteria are responsible for diseases



Capable of doubling (Replicating) every 20 minutes



(E.coli; Salmonella, Clostridium)



# Germs at home

When it comes to germs spread inside a home, they may spread to almost any corner within a short period of time



## How do Germs Spread?

80% of all infectious diseases are transmitted via contaminated hand-to-hand or surface-to-hand contact

It may take just 4 hours for germs to spread one person's hands to 50% of surfaces<sup>(2)</sup>



Kitchen Surfaces



Floors



Contact



Air



Contaminated food / water



Hands



Fabrics

## How the germs spread?



Needles



Transfusion

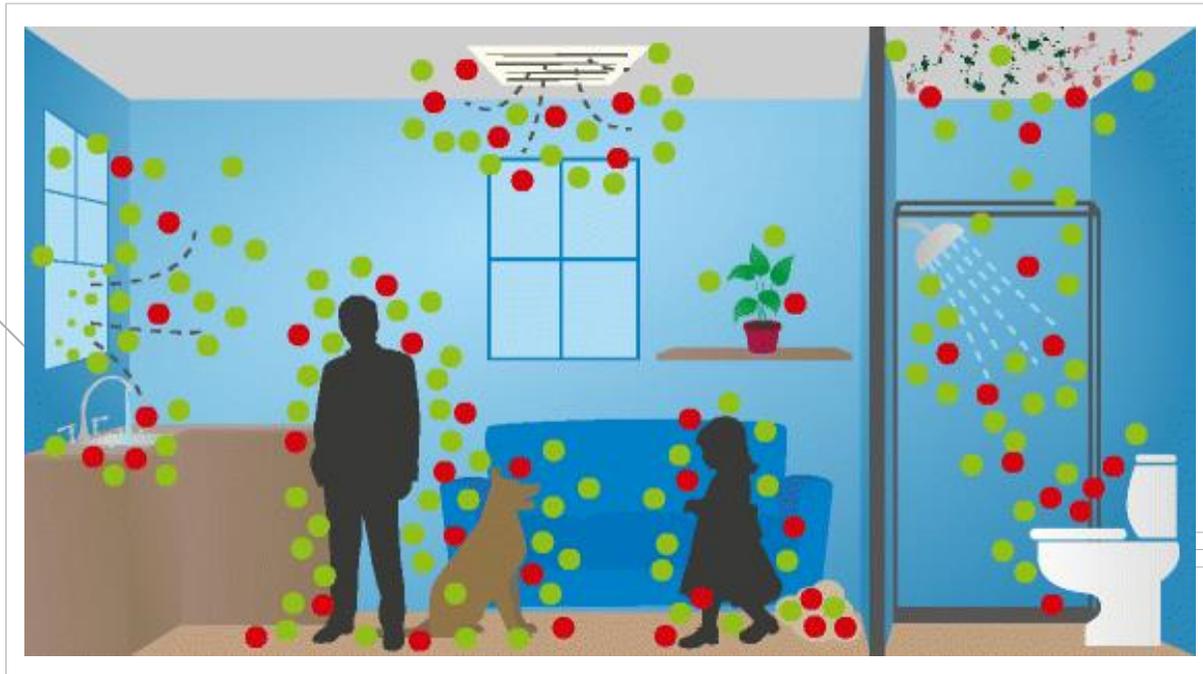


Insects

Germs spread rapidly between hands, surfaces and clothes. Multiple people in any "community" can be infected by this chain.

# Germ Hotspots in the home

- ▶ Exist in the air, on surfaces and on building materials,
- ▶ Primarily dispersed by humans, animals, and outdoor sources.



Prussin, A.J., Marr, L.C. Sources of airborne microorganisms in the built environment. *Microbiome* 3, 78 (2015). <https://doi.org/10.1186/s40168-015-0144-z>



[https://d2evkimvhatqav.cloudfront.net/documents/2011\\_NSF\\_Household\\_Germ\\_Study\\_exec-summary.pdf](https://d2evkimvhatqav.cloudfront.net/documents/2011_NSF_Household_Germ_Study_exec-summary.pdf)

# Germ Hotspots in the home



Location	Average Normalized Microorganisms	
Dish Sponge/Rag	362,631,038	Per g
Kitchen Sink	11,381,285	Per 10 sq. cm
Toothbrush Holder	2,465,876	Per 10 sq. cm
Pet Bowl	1,476,612	Per 10 sq. cm
Coffee Machine Reservoir	548,270	Per 10 sq. cm
Bathroom Faucet Handle	17,976	Per 10 sq. cm
Pet Toy Tennis Ball	14,121	Per 10 sq. cm
Countertop	4,590	Per 10 sq. cm
Stove Knobs	992	Per 10 sq. cm
Cutting Board	713	Per 10 sq. cm
Toilet Seat	515	Per 10 sq. cm
Pens	306	Per 10 sq. cm
Bathroom Doorknob	257	Per 10 sq. cm
Bathroom Light Switch	219	Per 10 sq. cm
Microwave Handle	202	Per 10 sq. cm
Keys	200	Per 10 sq. cm
Cellular Phone	178	Per 10 sq. cm
Gear Shift	123	Per 10 sq. cm
Toilet Handle	107	Per 10 sq. cm
Car Door Handle	97	Per 10 sq. cm
Refrigerator Handle	97	Per 10 sq. cm
iPod	86	Per 10 sq. cm
Lunch Box	75	Per 10 sq. cm
Video Game Controller	60	Per 10 sq. cm
Remote Control	57	Per 10 sq. cm
Bottom of Purse	45	Per 10 sq. cm
Wallet	37	Per 10 sq. cm
Keyboard	37	Per 10 sq. cm
Money	11	Per 10 sq. cm
Car Steering Wheel	4	Per 10 sq. cm

**Kitchen actually has the most germs...Not the bathroom**

**Sponges and coffee reservoirs, were in the top 10 germiest places in the home.**

**Warm and moist environments are breeding grounds for germs.**

**Smooth, cold surfaces tend to harbor less germs.**

**Keys, money, computer keyboards, and game controllers did not have a lot of germs.**



# Germs specifics around home

## The Kitchen is the germiest place in the home

**4 OUT OF 6 GERMIEST PLACES ARE IN THE KITCHEN**

**A KITCHEN HAS UP TO 2 BILLION BACTERIA**



**#1 SPONGE**  
468,000 Germs/Sq. Inch

**#2 DRAIN**  
360,000 Germs/Sq. Inch

**#3**

**#4 FAUCET**  
1,360 Germs/Sq. Inch

**#5**

**#6 KITCH. FLOOR**  
930 Germs/Sq. Inch

# In the bathroom, the toilet is not the germiest



# of bacteria / sq. in. in the bathroom



Source: Josephson, Rubino, and Pepper called "Characterization and quantification of bacterial pathogens and indicator organisms in household kitchens with and without the use of a disinfectant cleaner." *Journal of Applied Microbiology* 1997, 8 -750

# Germs are not on hard surfaces only – soft surfaces can be much germier



**A CARPET HAS  
UP TO 200,000  
BACTERIA**

**A PILLOWCASE  
HAS UP TO  
12 MILLION  
BACTERIA**



**100x more than a  
bathroom sink**

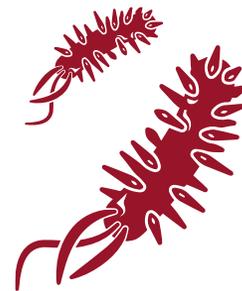
**3x more than the  
AVG toilet bowl**



# Washing Machines are not any better



A washing machine contains on average **100,000,000 E.Coli** in the water



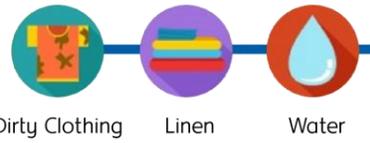
→ **SAME AS A DIRTY TOILET**



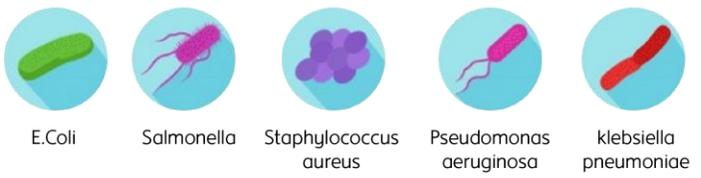
# Germs factsheet for laundry

## Key facts...

Bacteria enters washing machines through



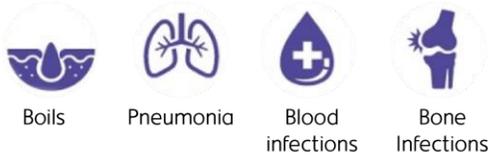
These bacteria include



**Staphylococcus aureus** and **S.epidermidis** can survive laundry programs at **50°C**



Staph can cause:



**100 Washers** were swabbed and **10%** found strains of **E.coli**

Salmonella has been found on washed clothes at **55°C**



To kill all Pathogenic Bacteria, **60°C** is Advised

An infected individual carries 10 -100 billion enteric viruses in feces and these microbes are potentially present on undergarments before and after laundering?

An average pair of underwear contains 0.1 g of feces and about 1 billion viruses that cause gastroenteritis and diarrhea?

During laundry, pathogens get transferred from contaminated to uncontaminated clothes?

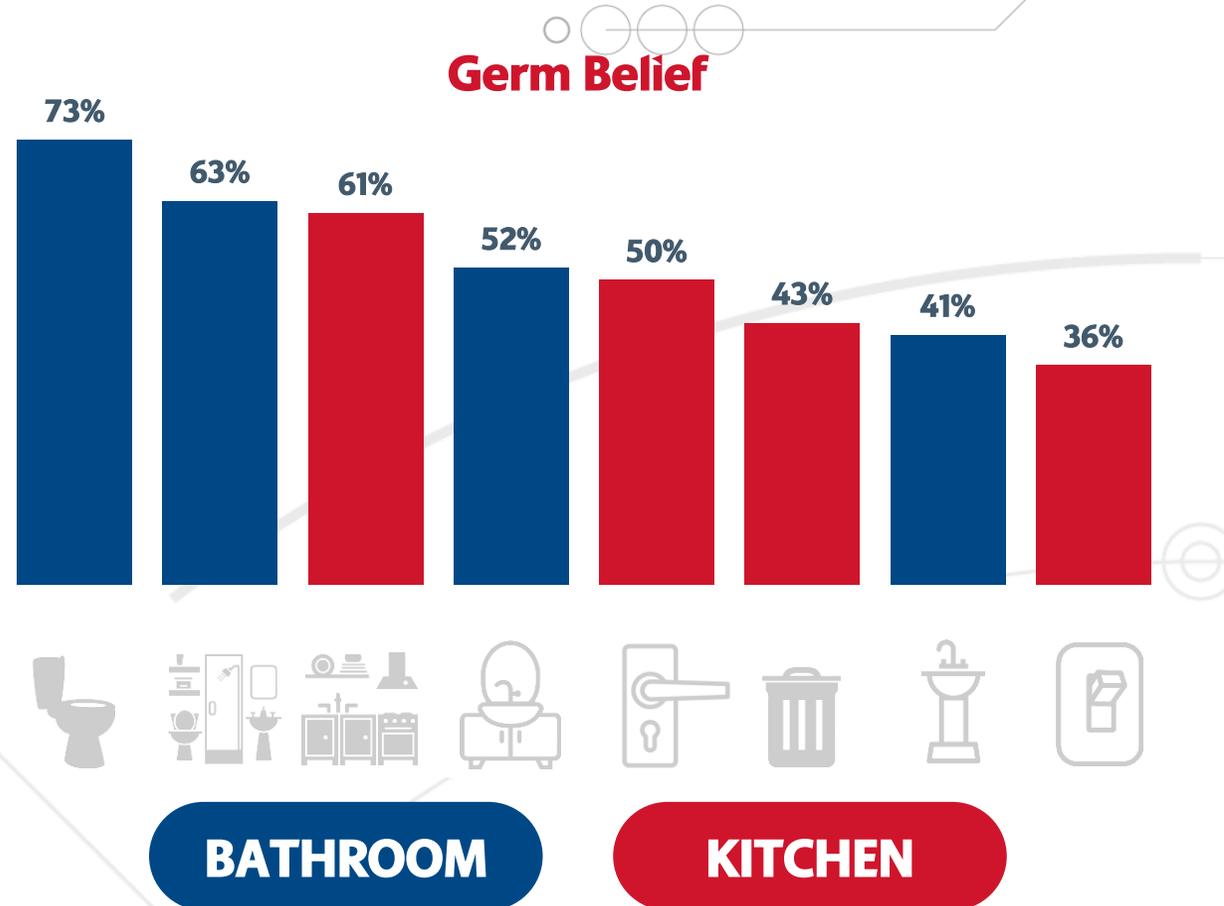
Detergent does not remove all germs from your clothes  
Additionally, tumble drying is not very effective at reducing virus in textiles

There is a risk of infection from viruses that cause gastroenteritis and diarrhea from laundering

<https://helpwiththewashing.co.uk/blog/clean-washing-machine/>



# Generally, people do not know what locations are the most dangerous



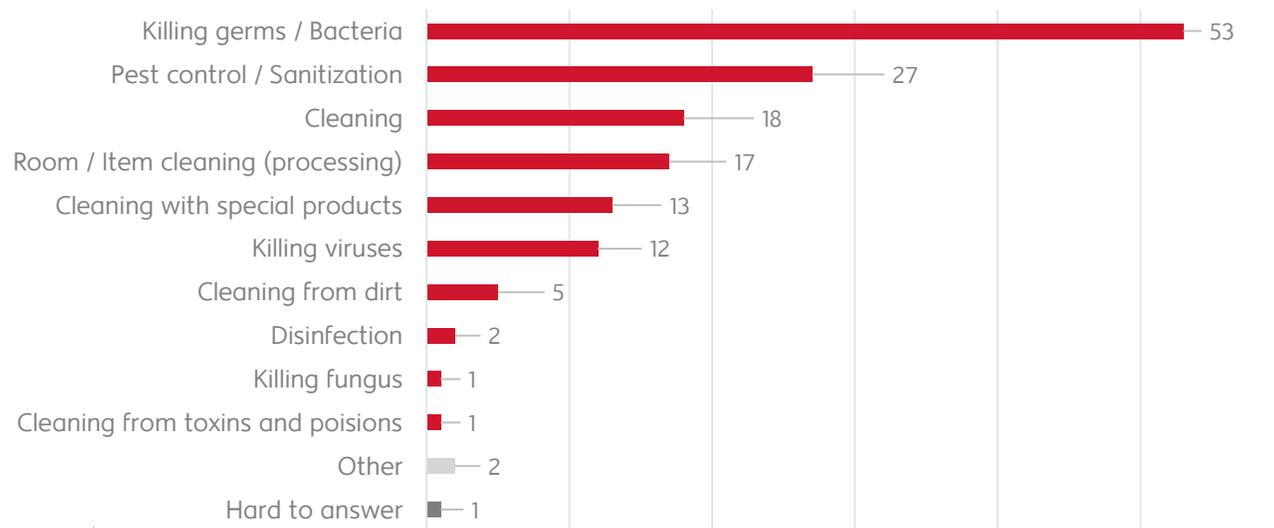
# After outbreak 9/10 people claim to be disinfecting their home, but this doesn't mean they are actually using disinfection products



**People don't have common and clear idea about disinfection.**

Nevertheless, people understand that germs / viruses / bacteria can cause illnesses but significant part of them consider their home being free from germs / viruses / bacteria.

**Disinfection definition**



	Can cause health problems	Can be at my home
Viruses	99%	34%
Germs	92%	66%
Bacteria	92%	57%
Fungus	89%	27%
Mold	80%	33%
Dust	66%	90%
Dirt	63%	45%

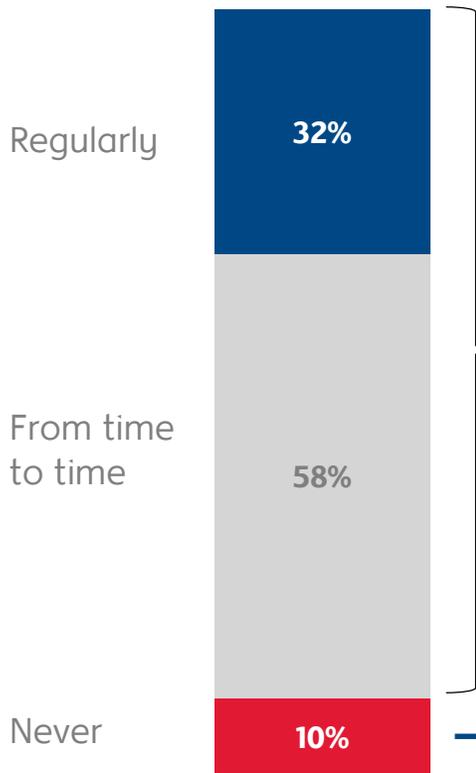
**There is still a lot of confusion and misconception on what disinfection is and which products actually disinfect**

# Which is proven by the gap between claimed disinfection occasions vs disinfection products usage



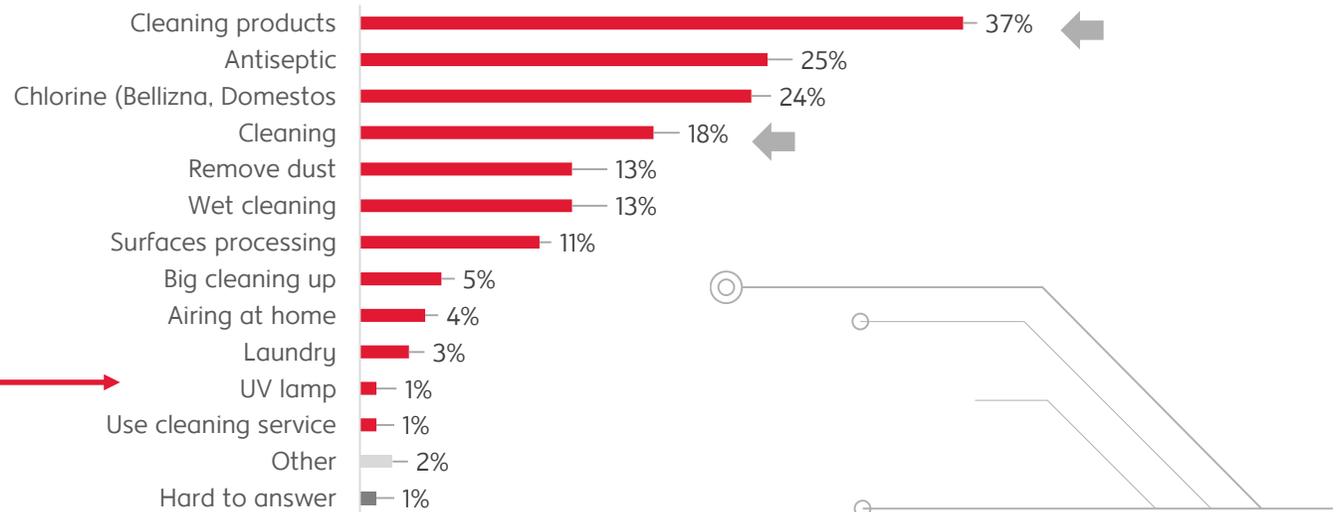
9 / 10 people claim that they disinfect their home but most of them confuse it with ordinary cleaning

## Home disinfecting



90%

## How do you disinfect your home?



## Why you don't disinfect your home?

