

Webinar series on COVID19: Mexico, Cuba and Costa Rica **Situation in Costa Rica**

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The urgent need for international exchange...

- It is evident that humanity is facing an unexpected and deadly pandemic, as the **Spanish Flue a century ago, that left about 50 million deaths** in 2-3 years.
- Many things have changed since the Spanish Flue: international jet travel today allow **for almost instantaneous dispersal of any new infectious human pathogen.**
- In a century, medical and biological sciences have also taken gigantic steps forward, so that **today any new virus (or any other pathogen) is quickly identified and sequenced**, so that medications and vaccines can be developed in a short time.
- The **health sector in Costa Rica runs under the political leadership of the Minister of Health**, Dr. Daniel Salas, which has successfully faced this difficult challenge (in my opinion), including the loss of his own father to COVID19.



The Costa Rican Health System

- Costa Rica has a mixed public-private system for health services, although the main provider is the public health structure created by law in the 1940s, the **CCSS (*Caja Costarricense del Seguro Social*)**...known as "*la Caja*".
- **CCSS** covers 95% of the population, **with primary care offered by the EBAIS, the communal health clinics** (total >1000), distributed throughout the country. **Secondary level services are provided by 3 main hospitals, 20 regional hospitals y 10 clinics. Tertiary care is offered by 5 specialized hospitals** (pediatrics, psychiatry, maternity, gerontology and rehabilitation).
- CCSS is funded by direct 9% deductions to public and private wages and other public contributions. These deductions also generate a retirement fund and coverage for maternal care and aging. Interestingly, **CCSS holds immense public support**.
- **CCSS purchases medical services from private hospitals and clinics** and has signed an agreement to have access to private beds and UCIs in case the pandemic saturates the capacity of the public health system.

Reference: OECD (2017) *El Sistema de Salud de Costa Rica*.



Health as a Human Right

- The country has supported the notion that **health is a human right, like education**, and commits about 9% of GDP to this sector, with little political opposition.
- Notably, life expectancy doubled in a century, from about 40 years **to 81.2 years for females and 76.4 for males**, today.
- General mortality decreased from **10.1 per thousand**, to **3.4 per thousand**, and child mortality moved from 14 per thousand babies born alive, to **8.8 per thousand**, one of the lowest in the region.
- The CCSS has created an **electronic health registry of each person (EDUS)** with unique health information, potentially useful for tracking cases with COVID19 and other infections.

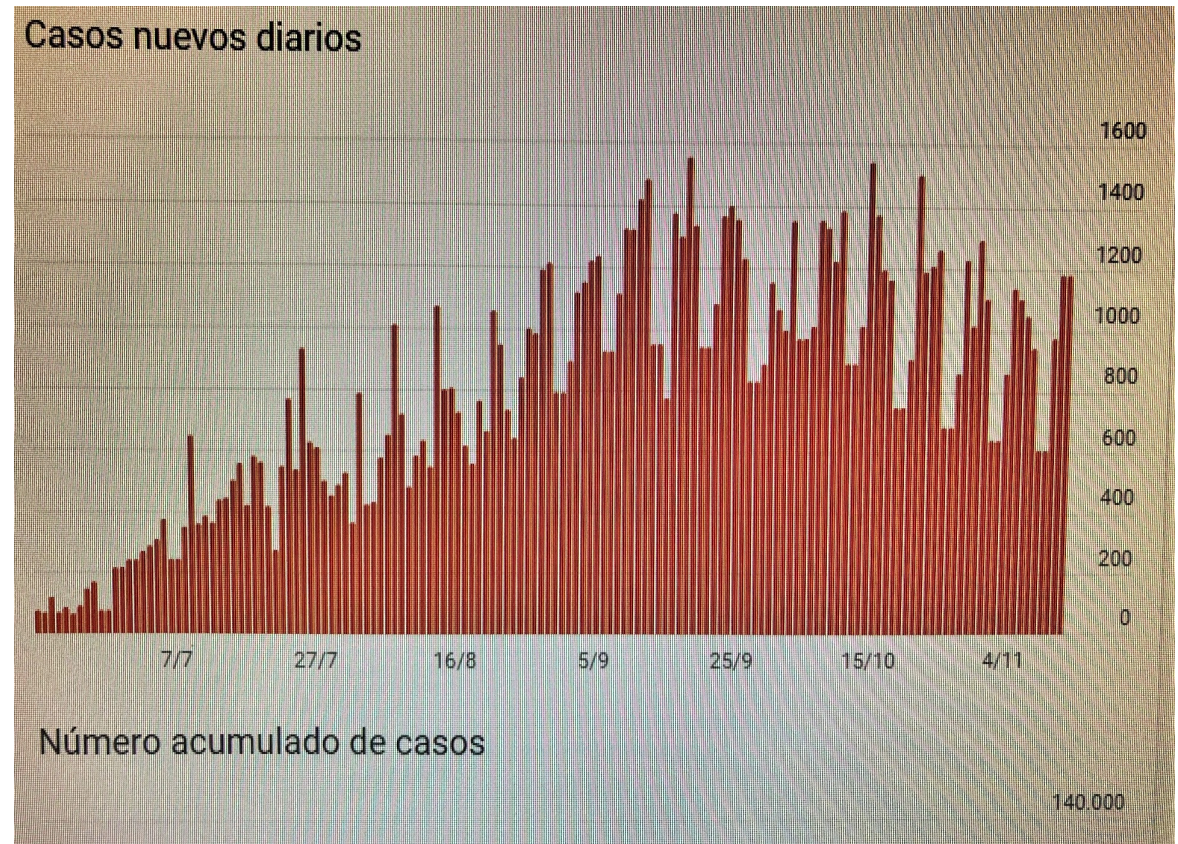


Other local resources...

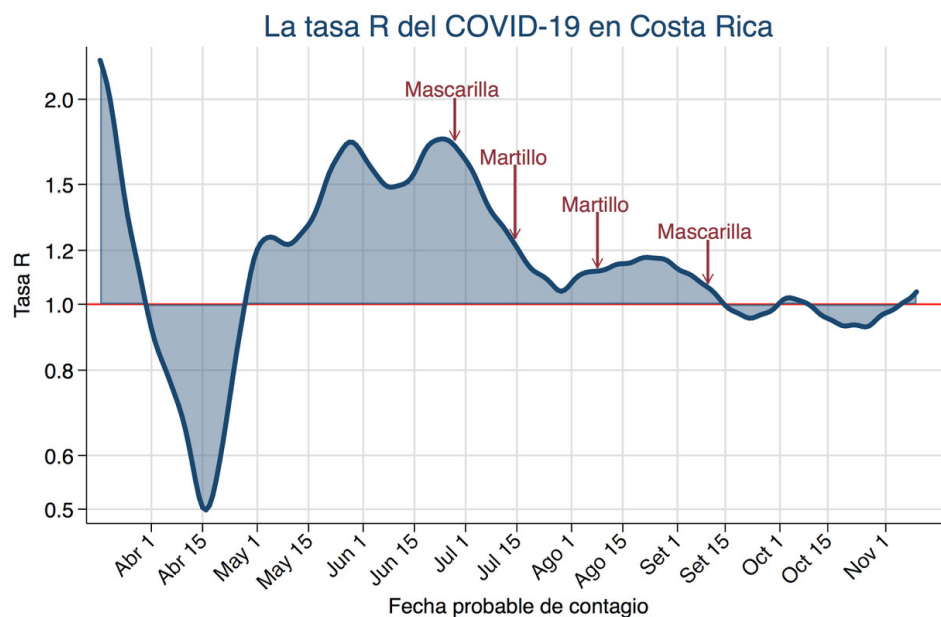
- Include, **INCIENSA** in the Ministry of Health, which plays the role of a **national center for disease diagnosis and control**. They have, so far, sequenced 11 COVID19 circulating mutations and report no significant correlations between viral mutations and disease phenotype.
- INCIENSA has also performs the **PCR-based diagnosis** in real time, for free, with a very modest daily capacity (about 3,500 tests/day), insufficient to track this virus. Private labs now offer immune tests and PCR based diagnosis to the public for about \$100.
- Meanwhile, scientists at the **ICP** (Instituto Clodomiro Picado) at the University of Costa Rica, with certified experience in the production of snake anti-venom, have **immunized horses with purified spike protein or with a mixture of several SARS-COV2 viral proteins**, to treat patients in early phases of infection. The initial trials have provided favorable results, but with small samples; the next trials are proceeding with higher doses on more patients in early phases of infection.
- Several public universities have **developed projects to supply reagents, sample applicators, ventilators and other instruments** in short supply, as well as **data analyses**.

Current situation of COVID19 in Costa Rica

- The **first patients in the country with SARS-COV2 were PCR-diagnosed on March 6th** and since then the virus has spread to infect over **>125,000 people** with over **>1566 deaths**.
- After an initial wave that was largely tracked until end of July, a **second steep increase in new infections followed**, as tracking the virus was lost and **community dispersal ensued** in populated cities and neighborhoods.
- This new peak has produced a long plateau at about **1000 new cases each day** and **between 10-20 covid19-related defunctions**, which seems to be in slow decline, at this time.



Is the behavior of R_0 tied to lockdowns and masks?

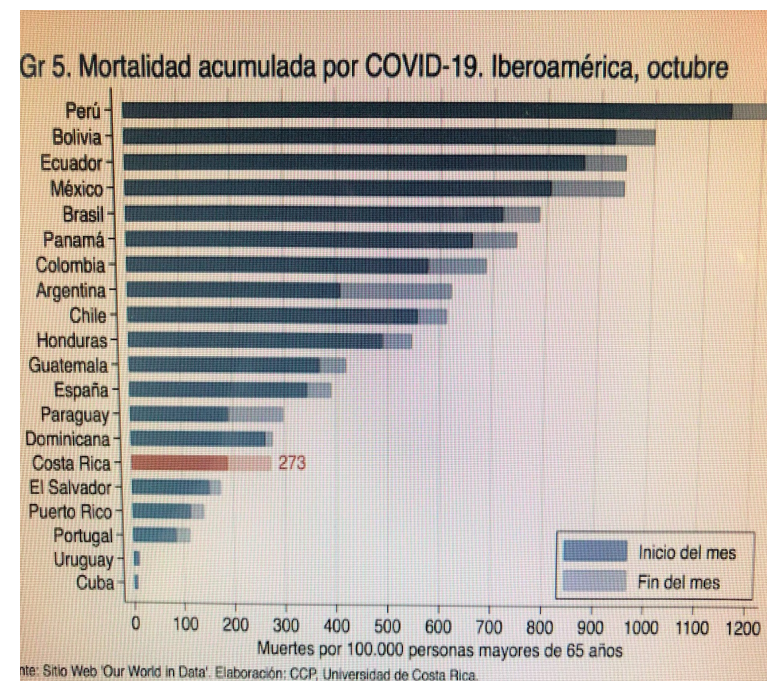


Datos del sitio web del Ministerio de Salud. Elaboración: CCP, Universidad de Costa Rica.

- Dr. Luis Rosero, our population expert, provided this graph **of the behavior of R_0 and the impact of lockdowns (Martillo) and dates when face masks** were first promoted and later, in September, when masks became obligatory in public (Mascarilla). Masks seem to be effective in reducing R .
- The CCSS completed a medical tower in a large hospital in San José (HCG) to **increase the number of intensive care units (UCIs) and the number of hospital beds**.
- It also acquired **personal protection equipment** and developed treatment policies for covid18 patients by specialty.
- The bottom line here is **that so far UCIs and hospital beds have not approached saturation levels (<50%). Thus the tragedy of triage in medical practice is avoided**.
- Nevertheless, we should not lower our guard.

Mortality and deaths per capita for COVID19 (John Hopkins database)

	Deaths/100, 000 personas	Mortality (%)
URUGUAY	1.8	1.7%
CHILE	78.1	2.8%
BRAZIL	78.0	2.8%
MEXICO	76.4	9.8%
CUBA	1.2	1.7%
COSTA RICA	30.3	1.3%
USA	73.9	2.3%
AUSTRALIA	3.6	3.2%



Main health policy actions related to COVID19

- As in other countries, the Costa Rican government emitted a sanitary order for a (voluntary) **shutdown** (*cuarentena*) around Easter week that was repeated in July for another two-week period. **Home confinement was not enforced but largely respected.**
- **Restrictions to vehicle transit based on license plate numbers** limited week-day and weekend movements. Initially, stiff fines were enacted by the Legislative Assembly, so stiff they have since been relaxed.
- **Large crowds of people were prohibited:** in sports, in markets, churches, restaurants, bars and touristic sites. In this case, police enforced the order and broke up meetings.
- **Daily updates on TV** by the Minister of Health and the director of the CCSS, or by other members of the Cabinet became an expectation at 1 PM. Often President Carlos Alvarado also appears. From now on, however, only twice a week, after the onset of COVID19 fatigue.



What has worked well?

- An *ad hoc* committee of academy members of the Costa Rican Academy of Science on COVID19 was **set up to study the literature**, as new information accumulated at an unprecedented rate. This committee includes physicians, microbiologists, virologists, population experts and the President of the Academy, Dr. Walter Fernández.
- After analyzing the information on **mask wearing**, the Committee pressured the Minister, to enforce mask wearing in public, a request that the local press echoed and the Minister complied with a sanitary order, requiring masks in public. We believe **masks are very important for** containment and protection.
- The ANC has sponsored many **Webinars on COVID19 with experts, on its own and with the Academy of Medicine**, directed at both the general public and specialized medical professionals. It also participated in a long **IANAS meeting with most of the National Science Academies in the Americas**.
- Why is mortality lower? Did contact with European colleagues had an impact? Did the fact that all Costa Rican are vaccinated with the BCG vaccine? All these are still open questions.

- Vaccines anti SARS-COV2

Costa Rica's health system has been committed to vaccination. According to press releases, the government has agreements to buy:

AstraZeneca	1 million doses
Pfizer	2 million doses
COVAX	3 million doses

Main social consequences

- The confinement imposed on terminal patients has resulted in the **death of many older family members away from their loved ones** at the end of life, a truly cruel circumstance for any human being.
- The local press reports **increase in family violence and additional suicide cases**.
- Contact through the modern communication technologies (internet, cell phone, zoom, skype, etc.) has become a **saving option to avoid complete personal isolation**.
- While elementary school children (with their parents) struggle with remote schooling through the Internet, **teenagers seem to adapt better to remote learning**, already conversant with the ways of social media.
- The pandemic has disclosed **a digital access gap**, where rural, poor families have limited band width for e-learning.



Main economic impacts

- In 2018, Costa Rica had introduced the IVA tax (*Impuesto al Valor Agregado*) and was hoping to improve its financial situation with new revenues; the covid19 pandemic put a sudden stop to that expectation. **The financial situation is dire!**
- The **covid19 had widespread impact on most private and public affairs**, from schools, churches, restaurants, cinemas, cantinas, markets, public parks, that were all closed; with very negative impact to the tourist industry that **constitutes about 8% of GNP** in Costa Rica, with complete closure of international flights and restricted land travel.
- The government had to allocate **funds for unemployed and poor families**, with *Bono Proteger*, which received 1 million requests from 70% people without a high school diploma and from women heads of family. Other types of tax relief for small businesses (pymes) have also been enacted.
- Significant **increase in poverty level** (about 6.2 %), and **high unemployment** that accounts in part for the increase in poverty, was been recently reported (17/11) by *Program Estado de la Nación*, a think tank at the council of rectors of the public universities, that can be accessed at <https://estadonacion.or.cr>
- **Since November 1st, all international flights have been restored** and slow recovery is expected, although internal opening of the economy started several months ago.

What should be improved?

- Clear and feasible **Opening Protocols** for children, students, people facing the public, office workers, universities, churches, sports, etc. These protocols can be made accessible by Internet to everyone. Fertile exchange of information about re-opening our societies may be an outcome of these series of Webinars (Covidars!), with mutual benefits.
- **Keep face masks requirement until a large portion of the population has been vaccinated** in a few months or a year, under an optimistic scenario.
- **Mental health is a huge concern**, and local psychiatrists and psychologists overworked, like nurses and doctors. CCSS and the school of psychologists (*Colegio de Psicólogos*) are providing remote access to a network of professionals offering support through phones and internet, *pro bono*. Many of those calling involve people that had never received psychologic treatment before.
- **Preparedness for new outbreaks and new pandemics**, carefully understanding this one, and its economic, social and political consequences.



Future steps

- The new **mRNA vaccines could represent a major break through**, since the production of short mRNA sequences from a plasmid for a vaccine is a relatively simple, safe and cheap procedure. Delivery vehicles to get the messenger RNAs into specific cells will be the challenge plus the cold chain required unless we learn how to lyophilize the vaccine.
- **An isothermal amplification test such as LAMP**, or the one recently published by Jennifer Doudna's group (2020) in Berkeley, very sensitive and fast, are urgently required to track infected cases. This would allow rapid escalation in testing in small labs; it does not require thermocyclers and the tests are cheaper than real-time PCR.
- **Strengthen international collaboration in medical sciences**, sharing lessons learned. This has been happening with many Costa Rican physicians educated in Spain, Italy and France, and may explain the rapid adoption of successful therapies.
- Countries face **the urgent need to connect everyone through wide-band internet** that allows for the increase use of this powerful tool in times of Covid19, but also for increased internet employment and education, in post COVID19 times.
- Consider a replica of this Webinar meeting in about a year, after the vaccine becomes available. Hindsight is always 2020!
- Thanks to **Noel Campbell, director of the Australian National Centre for Latin American Studies** and the Center for Mental Health Research at Australian National University, Sydney University Research Community for Latin America and University of NSW, for this invitation.

MUCHAS GRACIAS!!!

*Nada se edifica sobre la piedra,
Todo sobre la arena.*

*Pero es nuestro deber edificar,
Como si fuera piedra la arena.*

J. L. Borges

Sarapiquí, Costa Rica, foto D. Clark, OTS