



## Cacao and its Potential for Colon Cancer Prevention: Policy Opportunities Beyond Nutrition



S&T in Behavioral & Social Sciences

**Ronel T. Pacubat, PhD**

College of Teacher Education, Cagayan State University, Lasam Campus, Lasam, Philippines

Corresponding Author: [ronelpacubatcsu@csu.edu.ph](mailto:ronelpacubatcsu@csu.edu.ph)

### Background

The impact of modern medicine, with different treatment modalities such as surgery, chemotherapy, and all other advanced therapies, sometimes presents great difficulties. Patients undergo severe side effects, and treatment options differ in their impact and effectiveness on different patients. These disquieting features underline a compelling reason to seek simple and potentially less harmful methods of avoiding or ameliorating cancer.

Globally, and right here at home, there's growing excitement about natural approaches to health. Many plant-based foods contain special compounds that can be beneficial. Cacao, the bean from which

chocolate is made, is one such example. It's rich in natural substances known for their antioxidant properties (meaning they protect our bodies from damage) and their ability to fight cancer cells.

Given the increasing number of colon cancer cases and the limitations of current treatments, it's vital for us in the Philippines to look into accessible and potentially safer options. Locally sourced cacao could offer a promising, natural path forward in our fight against this disease.

## Research Objectives

This study explored the potential health benefits of UF-18 cacao powder. Specifically, the study:

- a. checked the powder's safety by making sure it doesn't contain harmful heavy metals;
- b. measured its antioxidant power to see how well it can protect the body's cells from damage; and
- c. tested its cancer-fighting ability to determine how effectively it can stop the growth of human colon cancer cells.

## Methodology

### 1. Safety Profile Test

**Goal:** Ensure UF-18 cacao is safe for use

**Method:**

- Powder tested with X-ray Fluorescence (XRF)
- Identified and measured all elements, including heavy metals

**Why it matters:** Confirms cacao is free from dangerous levels of heavy metals

### 2. Antioxidant Power Test

**Goal:** Measure how well cacao fights harmful molecules

**Test Used:**

- DPPH Radical Scavenging Assay
- Determined how much cacao is needed to neutralize free radicals

**Why it matters:** Helps protect cells from damage caused by oxidative stress

### 3. Anticancer Activity Test

**Goal:** See how cacao affects colon cancer cells (HCT-116)

**Test Used:**

- Cancer cells grown in lab dishes
- Cacao powder applied in varied amounts
- Left for 72 hours
- Compared to Doxorubicin, a cancer drug
- Cell survival was measured

**Why it matters:** Shows potential for future cancer research

## Key Findings

### 1. Safety & Mineral Composition

- **Low Cadmium Content:**
  - Only 0.48% - Well below safety thresholds
- **Rich in Essential Minerals:**
  - Potassium - 40.83%
  - Calcium - 33.11%
  - Iron -10.46%
  - Phosphorus - 6.16%
  - Silicon - 4.55%
  - Trace amounts: Nickel, Manganese, Titanium

### 2. Antioxidant Activity

- DPPH Radical Scavenging Assay
- IC50 = 17.60 µg/mL
- Classified as a "Very Strong" Antioxidant
- Helps neutralize free radicals

### 3. Anticancer Potential

- MTT Assay vs. HCT-116 (Colorectal Cancer Cells)
- IC50 = 15.81 µg/mL
- Indicates Moderate to Strong Cytotoxic Activity

## Conclusion

This study provides exciting evidence that UF-18 cacao powder from Lasam, Cagayan, Philippines is not only safe but also a powerful source of antioxidants and shows promising ability to fight colon cancer cells in lab tests.

These discoveries highlight the immense value of our own local cacao varieties as a natural resource that can improve both public health and our economy here in the Philippines.

To truly benefit from these promising results, it's crucial that we continue this research. Strong government policies and close teamwork among different agencies are essential to turn these laboratory findings into real health improvements for Filipinos and create lasting economic opportunities for our communities.

## Policy Recommendations

Based on these compelling findings, the following key recommendations are propose:

- Promote local cacao's health benefits, including its antioxidant and anti-cancer properties, through public campaigns and support human clinical trials to confirm its effectiveness and safety.
- Invest in sustainable cultivation and product development for UF-18 cacao to boost its value and rural economies. Also, fund further research to identify the specific compounds responsible for its health benefits.
- Prioritize human clinical trials and interdisciplinary collaborations to fully understand cacao's therapeutic potential and optimal use.
- Establish clear regulations for cacao-derived health products to ensure their safety and effectiveness for consumers.

## Target Policy Actors and Beneficiaries



## References

**Ahmad, N., & Mukhtar, H.** (2013). The potential of cocoa polyphenols in cancer prevention. *Biofactors*, 39(4), 303–310. <https://doi.org/10.1002/biof.1144>

**Alzahrani, A., & Al-Khalaf, M.** (2016). Anticancer activity of cocoa extracts and their constituents against human breast and colon cancer cell lines. *Journal of Medicinal Food*, 19(12), 1494–1500.

**Arozarena, I. E., & Gamboa, A.** (2015). Evaluation of the antioxidant capacity and the in vitro anticancer activity of cocoa bean (*Theobroma cacao* L.) extracts. *Food and Bioprocess Technology*, 8(5), 844–852.

**Anand, U., Dey, A., Chandel, A. K. S., Sanyal, R., Mishra, A., Pandey, D. K., De Falco, V., Upadhyay, A., Kandimalla, R., Chaudhary, A., Dhanjal, J. K., Dewanjee, S., Vallamkondu, J., & De La Lastra, J. M. P.** (2022). Cancer chemotherapy and beyond: Current status, drug candidates, associated risks and progress in targeted therapeutics. *Genes & Diseases*, 10(4), 1367–1401. <https://doi.org/10.1016/j.gendis.2022.02.007>

**Balti, A., Han, J., & Van de Wouw, M.** (2014). Cocoa polyphenols and their potential health benefits. *Current Opinion in Food Science*, 3, 42–51.

**Bakar, S. A. A., Ali, A. M., & Ahmad, N. H.** (2019). Differential Antiproliferative Activity of Goniotalamin Against Selected Human Cancer Cell Lines. *Malaysian Journal of Medicine & Health Sciences*, 15.

## Editor's Note

This policy brief is based on results of the CSU-funded project "Cacao's flair against colorectal despair: Elemental analysis, in vitro antioxidant and anticancer property of UF-18, *Theobroma cacao* powder against human colorectal cancer cells (HCT-116 Cells)" This project was implemented by the Cagayan State University - Lasam Campus. The CSU - Lasam Campus project team is composed of Billy S. Javier, Jesty S. Agoto, and James Karl A. Agpalza.



## About CSU Policy Brief

Our policy brief offers an in-depth analysis of contemporary challenges and opportunities within higher education, with a special focus on the unique context of Cagayan State University. Through rigorous research and stakeholder engagement, we examine key areas such as academic innovation, research advancement, community engagement, and administrative excellence. Each recommendation is carefully developed to foster an environment of growth, equity, and sustainability. **This policy brief is published bi-annually.**

Our approach is built on transparency and inclusiveness. By integrating comprehensive data analysis with practical insights from experts and the broader university community, we ensure that our policy recommendations are not only academically robust but also practically implementable. This process underscores our commitment to creating a positive and lasting impact on the university's future.

The policy brief also serves as a platform for translating research outputs into practical policy insights across six strategic thematic areas including Science and Technology in Agriculture, Natural Resources, Education, Food Science and Chemistry, Public Health and Medicine, and Behavioral and Social Sciences. These areas reflect the university's research priorities and address emerging concerns related to agriculture and livestock, environmental management, teaching and learning, food innovation, clinical diagnostics, and community resilience.

While these publications provide science-based interventions for regional and national development, the analyses and recommendations are those of the authors and do not necessarily represent the official positions of Cagayan State University. Any reproduction, distribution, or citation of this work must acknowledge the author and the CSU Policy Brief.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means without prior permission from Cagayan State University. This Policy Brief is part of the CSU Policy Brief.

### Get in touch with us via:

-  [facebook.com/csuktmpo](https://facebook.com/csuktmpo)
-  [csu\\_ktmoffice@csu.edu.ph](mailto:csu_ktmoffice@csu.edu.ph)
-  [csu.org.ph/policybrief](https://csu.org.ph/policybrief)



**Cagayan State University**

Knowledge & Technology Management and Publication Office

RDE Bldg., CSU- Andrews Campus Caritan Sur, Tuguegarao City, Cagayan

## Editorial Board

**Gilbert C. Magulod Jr., PhD**  
Editor-in-Chief

**Patrianne M. Padua, PhD**  
Associate Editor-in-Chief

## Peer Reviewers

**Audy R. Quebral, DPA**

**Josie Y. Bas-Ong, PhD**

**Anderson G. Gonzales, PhD**

**Charmie S. Calvo, DIT**

## Editorial Staff

**Jamaica C. Pedro**  
Managing Editor

**Marcel W. Visitacion**  
Layout Artist

## Technical Staff

**Christian Dave E. Columna**  
IT Technician

## Interagency Local Advisory Board

Cagayan State University

University of the Philippines Diliman

University of Santo Tomas

Bureau of Fisheries and Aquatic Resources

Department of Agriculture

Department of Education

Department of Trade Industry

Department of Economy, Planning, and Development



**POLICY BRIEF**

Cagayan State University  
Knowledge & Technology Management and Publication Office



[csu.org.ph/policybrief](http://csu.org.ph/policybrief)