



Making Every Peso Count

UNESCO proposes that each country should allocate 4% of its GDP to education. Using this metric, an ideal budget for each region could be determined and each of them could then be measured in how underfunded they were. This project aims to determine if the appropriations in the national budget were truly appropriate, considering each region's demands, with a primary focus on the Department of Education.

[SDG 10 Reduced Inequality ↗](#)[I wanna learn more!](#)

Unequal budget distribution across regions in the Philippines dampens regional growth

The disparities in regional budget allocation in the Philippines have widened over the years leading to an increasing imbalance in resources. This steady growth of inequality has resulted in significant gaps in funding, with some regions receiving substantially less support despite having greater needs.

Budget allocation across regions in the Philippines remains highly unequal. In 2018, the Davao Region saw an increase in funding during President Duterte's Term, while two other regions suffered budget cuts[1]. This pattern of disparity continued in 2024, with CPBDRD reporting that some of the poorest regions such as Zamboanga, Bangsamoro, and parts of Mindanao received less than 1% of the DOTR's P 181 million budget, while 85% was concentrated in Metro Manila (NCR)[2].

Evidently, for over three decades, underinvestment as reported by EDCOM in 1991 has contributed to a steady decline in education quality here in the Philippines. Although Senator Gatchalian noted that DepED consistently receives the highest budget allocation, distribution remains uneven[3].

Research Questions

In this project, we will use data science to analyze the budget allocation of various government departments in the Philippines. Through this, we aim to find potential inequalities or potential biases in the said budget at the regional level. In addition, we aim to establish correlations, should they exist, between the allocations and several key indicators such as population, poverty, and GDP.

RESEARCH QUESTION 1

Is there a significant disparity in the Department of Education's budget allocation per region when adjusted for population size and the number of schools?

RESEARCH QUESTION 2

How does budget allocation vary across government departments at the regional level when adjusted for their respective needs?

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Hypotheses

- Ⓛ The Department of Education provides equitable budget allocation across all regions in the Philippines.
- Ⓜ The Department of Education is not providing equitable budget allocation across all regions in the Philippines.

RESEARCH QUESTION 2

How does budget allocation vary across government departments at the regional level when adjusted for their respective needs?

Hypotheses

- Ⓛ Each government department in the Philippines provides equitable budget allocation across all regions in the country.
- Ⓜ Not all government departments in the Philippines provide equitable budget allocation across all regions in the country.

Data

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The data set is a mix of different data sheets all grouped per region or province including but not limited to the budget allocations per department, crop and fishery production, enrollment data, population, poverty incidence, etc.

All regional and provincial offices' budgets were collected apart from the BARMM. This is because of the relatively new Bangsamoro Organic Law which provides fiscal autonomy to the region. The law provides BARMM with the powers to allocate their own budgets and limitedly tax people within their own territory. Hence it is hard to measure the inequality with the budget of BARMM in relation with the other executive departments.

For each department, their budget allocations will be grouped by Region (excluding BARMM). Given a time span of 2020–2024, we have a total of 1360 Observations.



The [main dataset](#) includes the budget allocations of the 17 departments listed below.





 Click on each of them to know how the data will be pre-processed!

DATA COLLECTION

Where did we get our data?

Data regarding the budget allocations and specific projects of the DPWH was gathered from the documents and files publicly released by the Department of Budget and Management. Only the years 2020–2024 were collected as they were the only ones with available Excel files of the General Appropriations Act, the law passed by Congress each year which provided specific details on the budgets of each government agency for that year.

Data regarding crops, fisheries, and farmland, which was gathered to correlate with the Department of Agriculture and Department of Agrarian Reform, was gathered from OpenStat PSA website.

Data regarding the enrollment data of DepED was found from a multitude of sources. Certain years were provided by DepED itself in its website, meanwhile others were taken from images DepED provided to news outlets, and others were taken from posts made by the official DepED account on Facebook.

Data regarding population was gathered from the Projected Mid-Year Population from the PSA website.

Data regarding the annual per capita poverty threshold and poverty incidence was gathered from the 2023 Full Year Official Poverty Statistics Tables from the PSA website. Only the years 2018, 2021, and 2023 were collected as they were the only ones available in the Excel file.

Data regarding GDP was gathered from the PSA and OpenStat PSA websites. For the Regional Data, only the years 2020–2023 are available. For the Province/HUC breakdown, only the years 2021–2023 are available.



Exploratory Data Analysis

RESEARCH QUESTION 1

Is there a significant disparity in the Department of Education's budget allocation per region when adjusted for population size and the number of schools?

Data Visualization

To understand our data better, we plotted the budget allotted by the Department of Education when adjusted to the number of schools and enrollees.

DepEd's Allocation Adjusted to the Number of Enrollees



DepEd's Allocation Adjusted to the Number of Schools



When adjusted for the number of enrollees, we can see that throughout 2020 to 2023, the region with the most budget allocation per enrollee has been the Cordillera Administrative Region (CAR). However, by 2024, MIMAROPA will have taken this lead. On the other side of the spectrum, Calabarzon consistently had the lowest per-enrollee budget allocation throughout 2020 to 2024.

An increase in the budget allocation of DepEd can be observed in the latter years, but the disparity between the regional allocations also becomes more apparent because of a wider range of colors present in the map.

Looking at the per-school budget allocation of DepEd, the National Capital Region received the most budget from 2020 to 2024. NCR is seen to have this bias since it has a relatively high budget despite having the lowest number of schools compared to the other regions, which can also be observed through the colors of the map, with NCR being the only region receiving the upper range of the budget.

This bias is not seen when taking into account the number of enrollees, as NCR has a proportionate amount of enrollees with respect to its budget. CAR, on the other hand, has had the least amount of budget allocation per school throughout 2020–2024, despite having a relatively high budget allocation per enrollee throughout the entirety of 2020–2024.

Hypothesis Testing

Recall:

- (H_0) The Department of Education provides equitable budget allocation across all regions in the Philippines.
- (H_A) The Department of Education is not providing equitable budget allocation across all regions in the Philippines.

To test our hypothesis we applied the [Kruskal-Wallis H Test](#) to assess if there exists a statistically significant difference between regions in terms of the allocated budget for DepED, after adjusting for the number of enrollees and the number of schools.

For the budget adjusted to the number of enrollees, a p-value of **0.00934** was produced by the test.

For the budget adjusted to the number of schools, a p-value of **1.78304×10^{-9}** was produced by the test.

Given that both tests produced a p-value less than **0.05**, the Null Hypothesis is rejected, suggesting that

There is a significant disparity in DepEd's regional budget allocation when adjusted for the number of students and schools.



RESEARCH QUESTION 2

How does budget allocation vary across government departments at the regional level when adjusted for their respective needs?

Data Visualization

To understand our data better, we plotted the budget allotted by each department per region when adjusted for their respective needs.

DA's Allocation per Metric Ton of Agri Production



DAR's Allocation per Hectare of Agri Land



DENR's Allocation per GRDP



DHSUD's Allocation per Person



DICT's Allocation per GRDP



DILG's Allocation per Person



DOF's Allocation per GRDP



DOH's Allocation per Person



DOJ's Allocation per Person



DOLE's Allocation per Person



DOST's Allocation per GRDP



DOTr's Allocation per Person



DPWH's Allocation per Person



DSWD's Allocation per Person in Poverty



DTI's Allocation per GRDP



NEDA's Allocation per GRDP



Across all departments, the spending varied wildly when related to each department's respective demands. In terms of agriculture, Regions in Luzon saw a greater allocation per hectare or metric ton of production, particularly in the Cordillera Region. Mindanao saw consistently less allocation despite its large agricultural land and high production of agricultural resources. In terms of social services such as housing, ICT, and employment assistance, certain regions with high populations saw significant underfunding compared to other regions with smaller populations. These regions include NCR, CALABARZON, Central Luzon, Central Visayas, and Western Visayas. However, that could be because these regions could be compensated by the national programs to be enacted by the Department's Central offices. Furthermore, funding towards housing, ICT, urban development, and employment programs could have been prioritized by the government towards less populated or less developed regions.

In other social services, particularly those related to the law, such as judicial and public safety, there was a great inequality in the funding between the regions, where the National Capital Region received a considerably larger allocation compared to the other regions. In particular, the DOJ and DILG had the NCR receive a larger portion compared to the other regions, as their maps show such a great disparity. This imbalance in funding just reflects the centralization of the judicial and police forces within the Philippines, where most of our funding towards jails and law enforcement is centered in the capital.

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In social welfare and ayuda programs, the poor in NCR saw higher allocation compared to other regions. This reflects the greater concentration of social welfare programs for the urban poor, especially in the NCR.

For transportation and public works, certain regions are funded less. These regions typically include regions within the south of Luzon, Visayas, and Mindanao. The CAR saw that it was consistently funded well as its population and GRDP are quite low, and yet their funding has not been that far from the funding of other regions.

For health, the NCR, CAR, and Davao regions saw consistently higher funding compared to the other regions as which could reflect the lower population count for the case of CAR and the higher number of public hospitals and medical services in NCR and Davao compared to other regions.

For finance, trade, and economic development, certain regions in the North, and Mindanao and Visayas, saw higher funding, especially when compared to richer regions such as the NCR, CALABARZON, Central Luzon, Central Visayas, and Davao. This goes to show that despite certain regions having a greater contribution to the country's GDP, the funding in the departments remains relatively equal throughout all the regions. Interestingly, MIMAROPA remained constantly less funded in the DOF.

Despite our initial guesses of over-concentration of funds in the National Capital Region, when excluding the budgets of the Central Offices, we found that numerous departments underfunded the NCR, especially when considering its large population and GDP. These departments include: DHSUD, DICT, DOLE, DOST, DPWH, DTI, and NEDA.



Hypothesis Testing

Recall:

- (O) Each government department in the Philippines provides equitable budget allocation across all regions in the country.
- (H) Not all government departments in the Philippines provide equitable budget allocation across all regions in the country.

To test our hypothesis we applied the [Kruskal-Wallis H Test](#) to assess if there exists a statistically significant difference between regions in terms of the allocated budget for each department, after adjusting for demand.

The summary of the results of the test for each department and their corresponding demands can be seen in the table below.

Department	Demand	p-value
DA	Volume of Agri-Fish Production	5.18339e-6
DAR	Hectare of Land	1.25720e-9
DENR	GRDP	5.02694e-10
DHSUD	Population	0.04960
DICT	GRDP	1.96159e-7
DILG	Population	1.51195e-9
DOF	GRDP	4.24245e-10
DOH	Population	1.20957e-8
DOJ	Population	3.17324e-10
DOLE	Population	0.01326



DENR	GRDP	3.02694e-10
DHSUD	Population	0.04960
DICT	GRDP	1.96159e-7
DILG	Population	1.51195e-9
DOF	GRDP	4.24245e-10
DOH	Population	1.20957e-8
DOJ	Population	3.17324e-10
DOLE	Population	0.01326
DOST	GRDP	7.40774e-10
DOTr	Population	5.06934e-8
DPWH	Population	1.48457e-8
DSWD	Population in Poverty	1.86210e-7
DTI	GRDP	0.00016
NEDA	GRDP	2.57199e-10

Since all the tests produced a p-value less than **0.05**, the Null Hypothesis is rejected, suggesting that

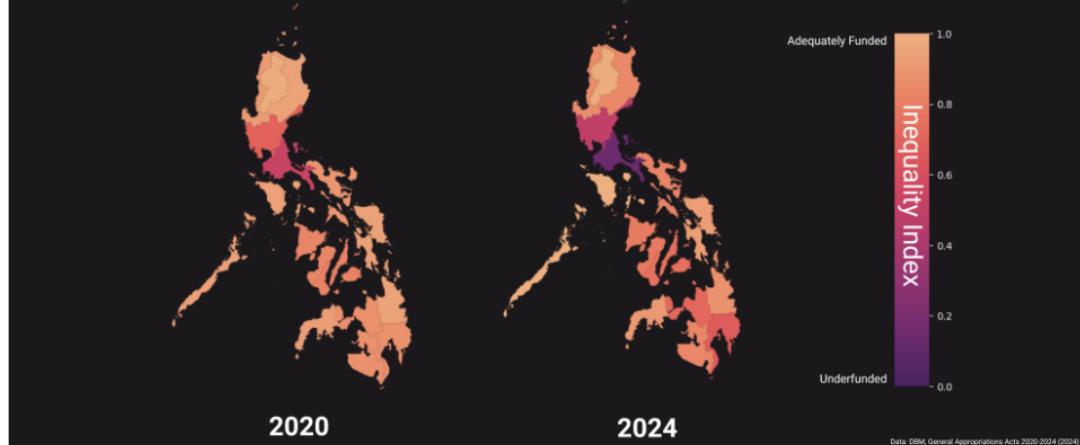
Not all government departments in the Philippines are providing equitable budget allocation across all regions in the country.



IN A NUTSHELL...

Highlighting Regional Inequality in Education

Regional Educational Budget Inequality over a 5 Year Period



Data: DBM, General Appropriations Act 2020-2024 (2024)
DepEd, Historical Enrollment Data (2024)
PSA, Philippine GPD (2022)

Chart: G. B. Coronel, J. B. Seda, N. J. Reyes, C. D. Villegas PILPINUTS 2024

Excluding allocations that could possibly originate from the DepEd Central office, certain regions are found to be significantly underfunded compared to others in terms of funding for schools and regional offices. In particular, CALABARZON, with its large student population, falls way behind other regions in terms of funding. Sadly, only 1 region in 2024, MIMAROPA, ever got sufficient funding across all the regions and the 5-year period. Regions with larger student populations such as NCR, CALABARZON, and Central Luzon noticeably are underfunded more than other regions.

Hi, We are Calyphe Yakult! (◦•_•◦)

**Gav**

Gavril Benedict Coronel

 @gbpursuit LinkedIn

Hello there! I'm Gav, a BS Computer Science student at the University of the Philippines Diliman. I'm interested in playing video games, singing, and programming — and I recently discovered my passion for full-stack web development. 😊

**Nick**

Nicholas John Reyes

 @Njlr41 LinkedIn

Hello! I am Nick 🤓, a Computer Science student at the University of the Philippines, Diliman.

I spend my free time (and not-so-free time) reading manhwa and playing games. As for my aspirations, I am never quite sure, but I always try to be the best version of myself 😊.



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**Bopie**

Jopeth Bryan Seda

 @pingu204 LinkedIn

Hello! I'm Bopie, a sleep-deprived penguin 🐧 with occasional back pains, BLACKPINK's first line of defense, and a bit of a Computer Science junior at the University of the Philippines-Diliman 🌟.

My mother wanted me to become a doctor, but I hated biology. I ended up becoming someone who loves bringing software and design ideas into life, so I guess that still counts!

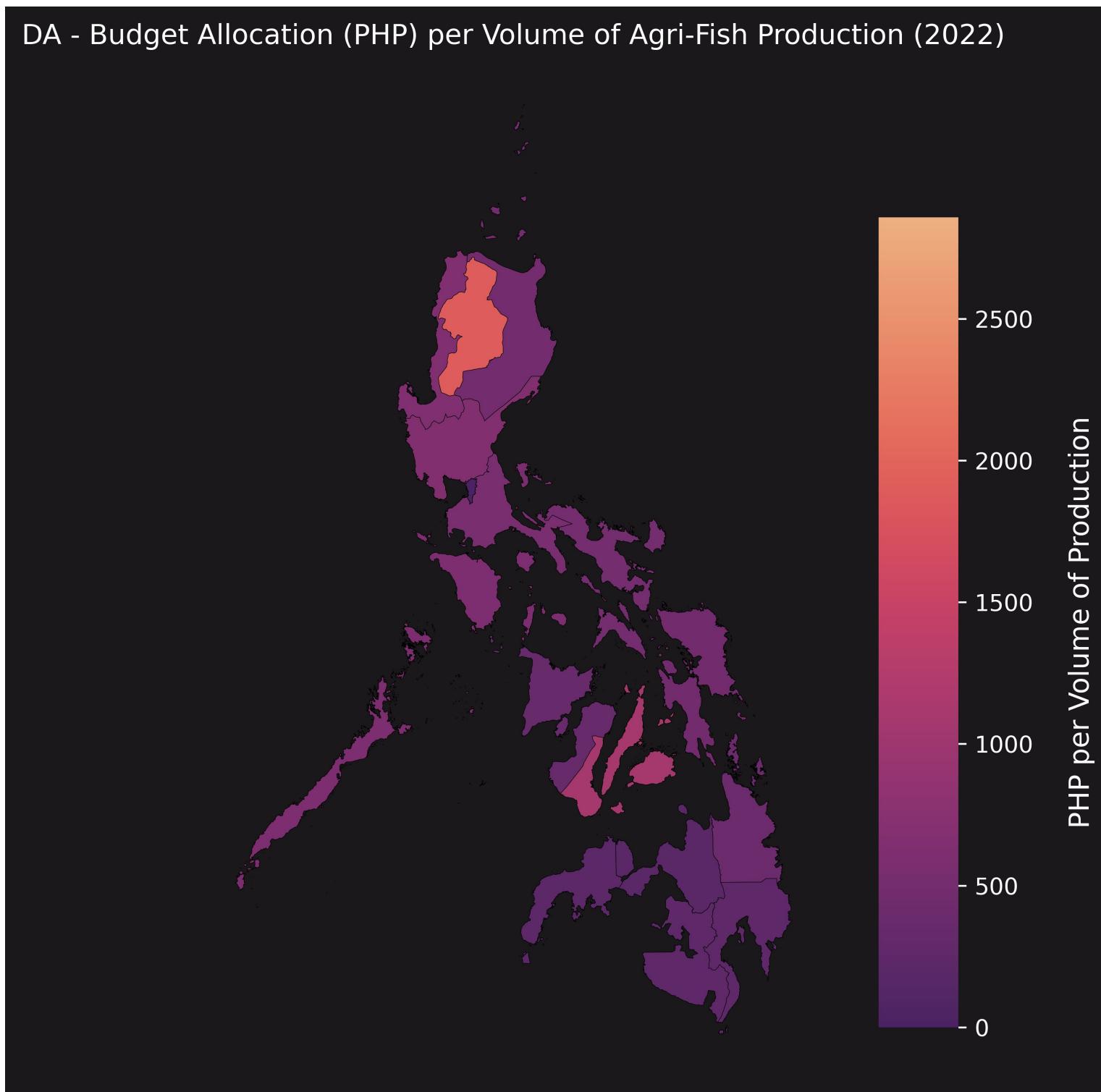
**GV**

Carl Geevee Vitug

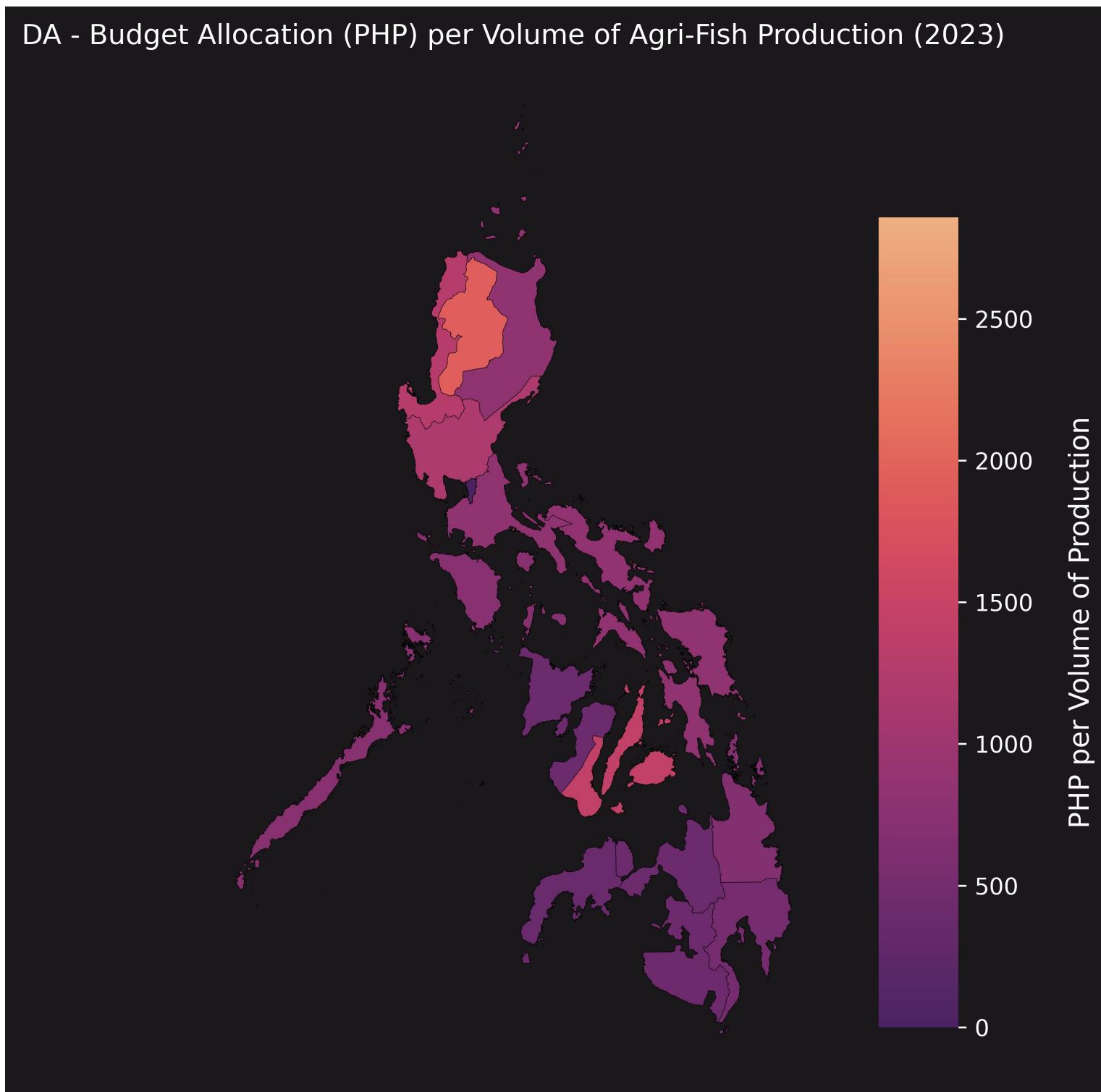
 @good-vibe LinkedIn

Hello! I'm GV, a BS Computer Science Student, studying in the University of the Philippines Diliman. I have a great interest in history, economics, finances and programming. I love to play video games, watch animes and K-Dramas and read mangas and light novels in my spare time. 😊

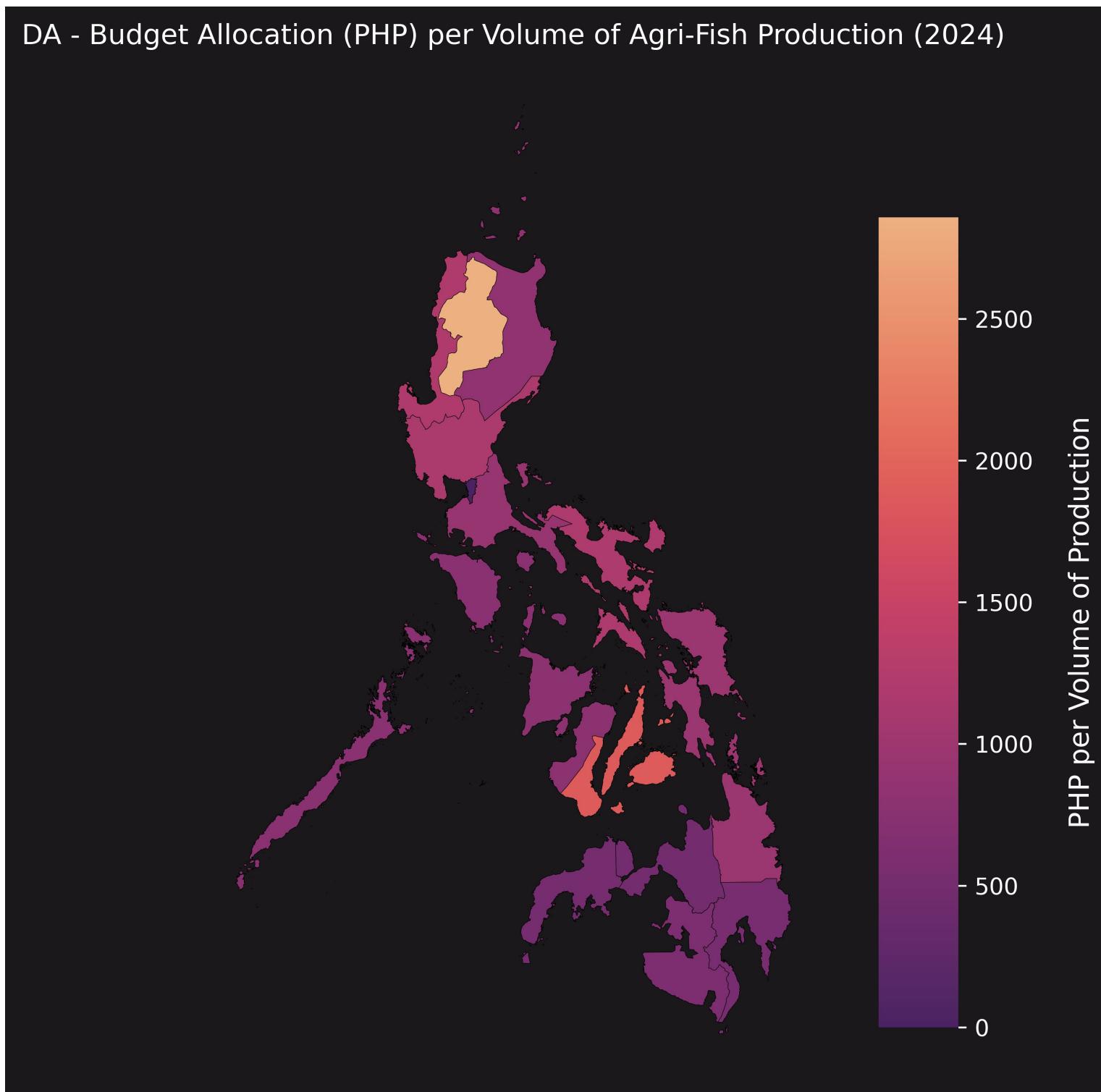
DA - Budget Allocation (PHP) per Volume of Agri-Fish Production (2022)



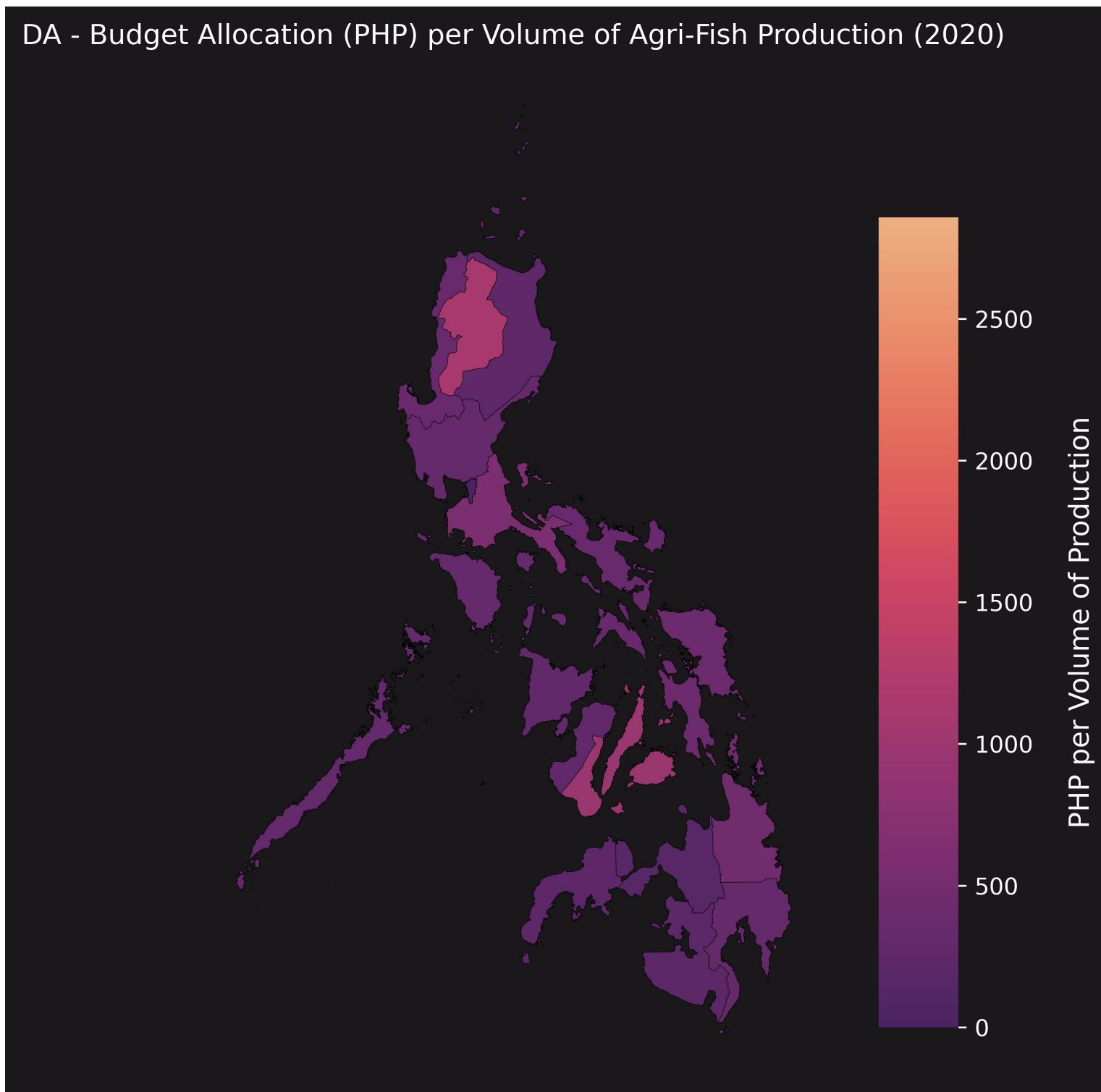
DA - Budget Allocation (PHP) per Volume of Agri-Fish Production (2023)



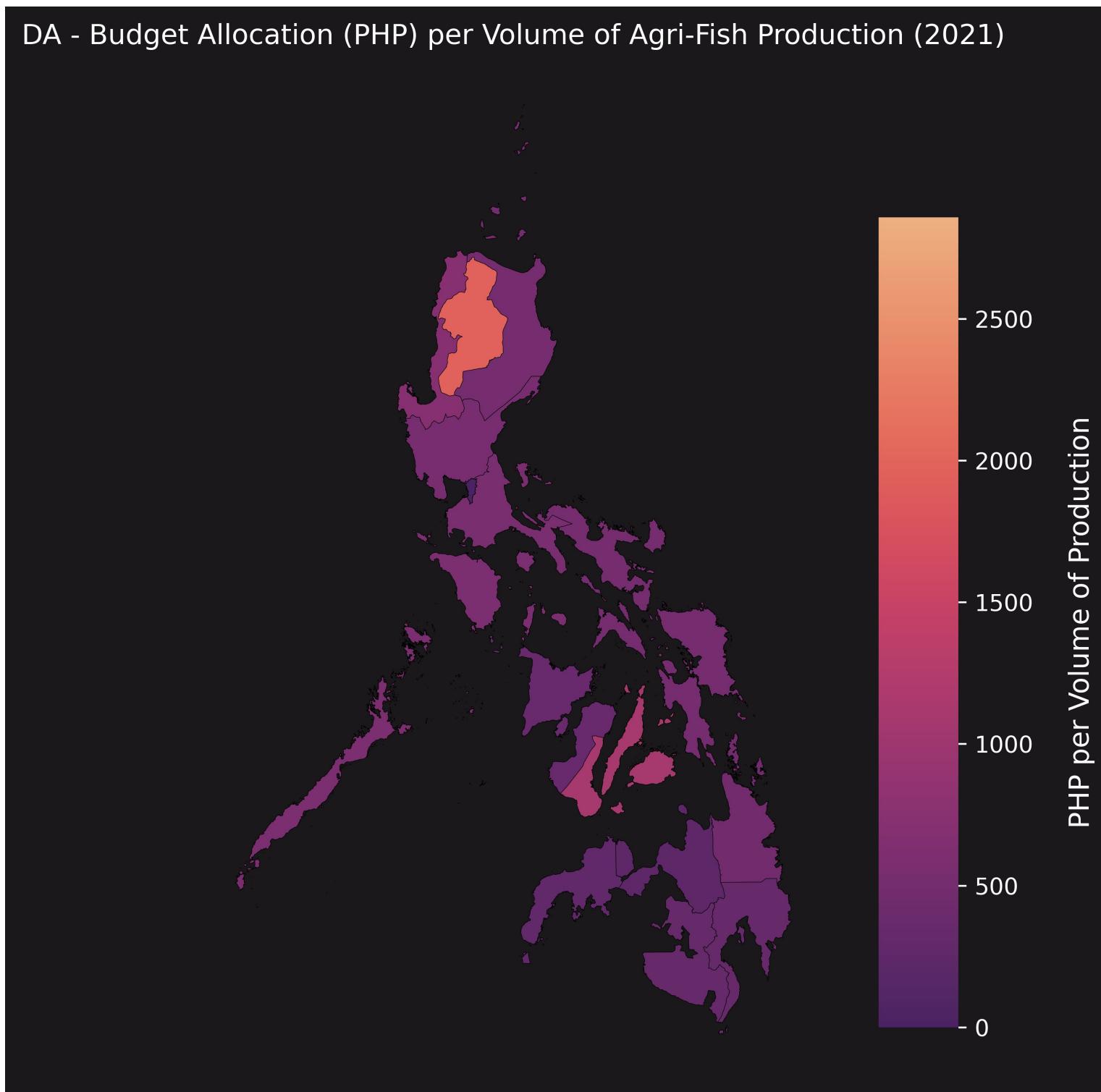
DA - Budget Allocation (PHP) per Volume of Agri-Fish Production (2024)



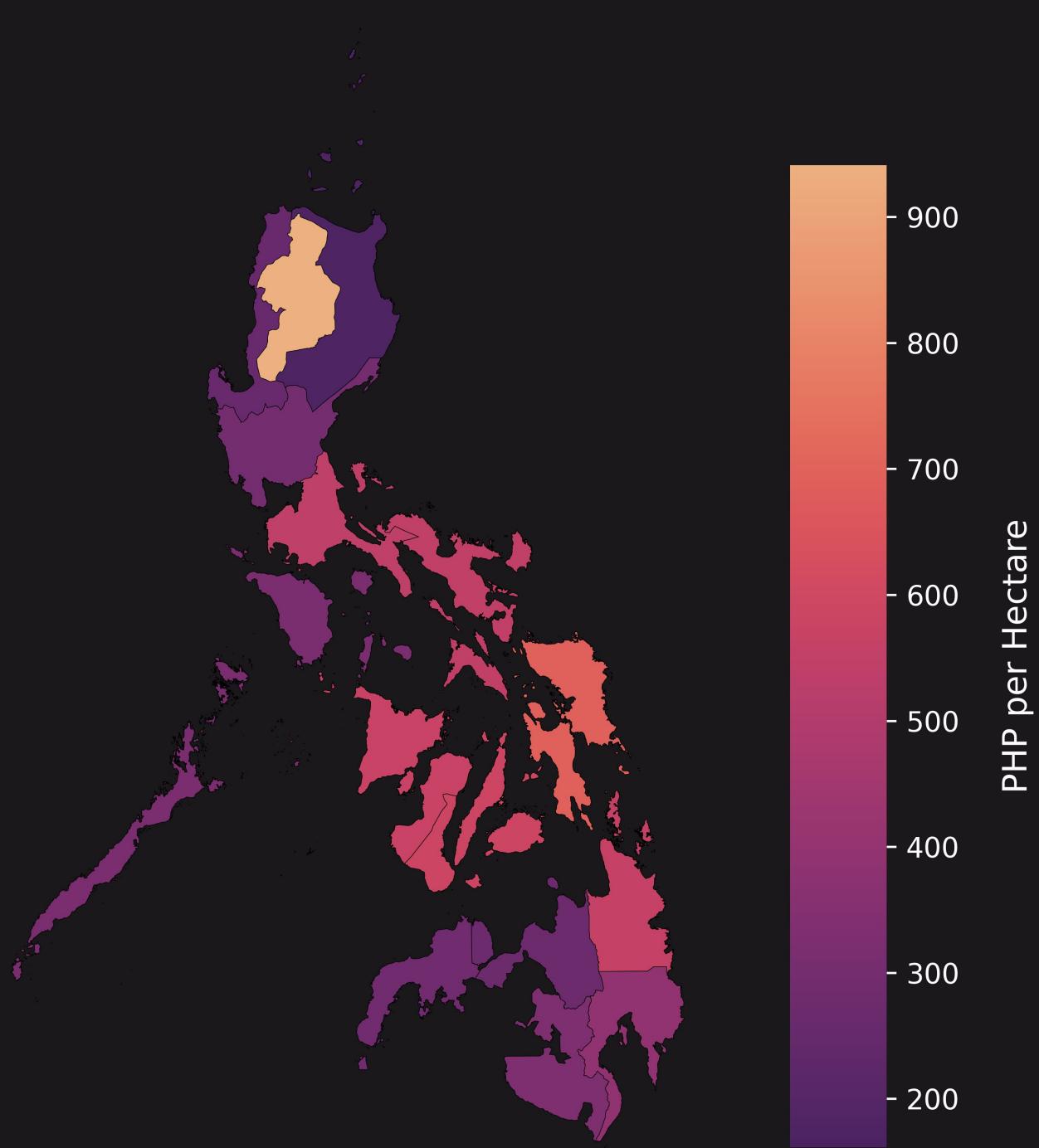
DA - Budget Allocation (PHP) per Volume of Agri-Fish Production (2020)



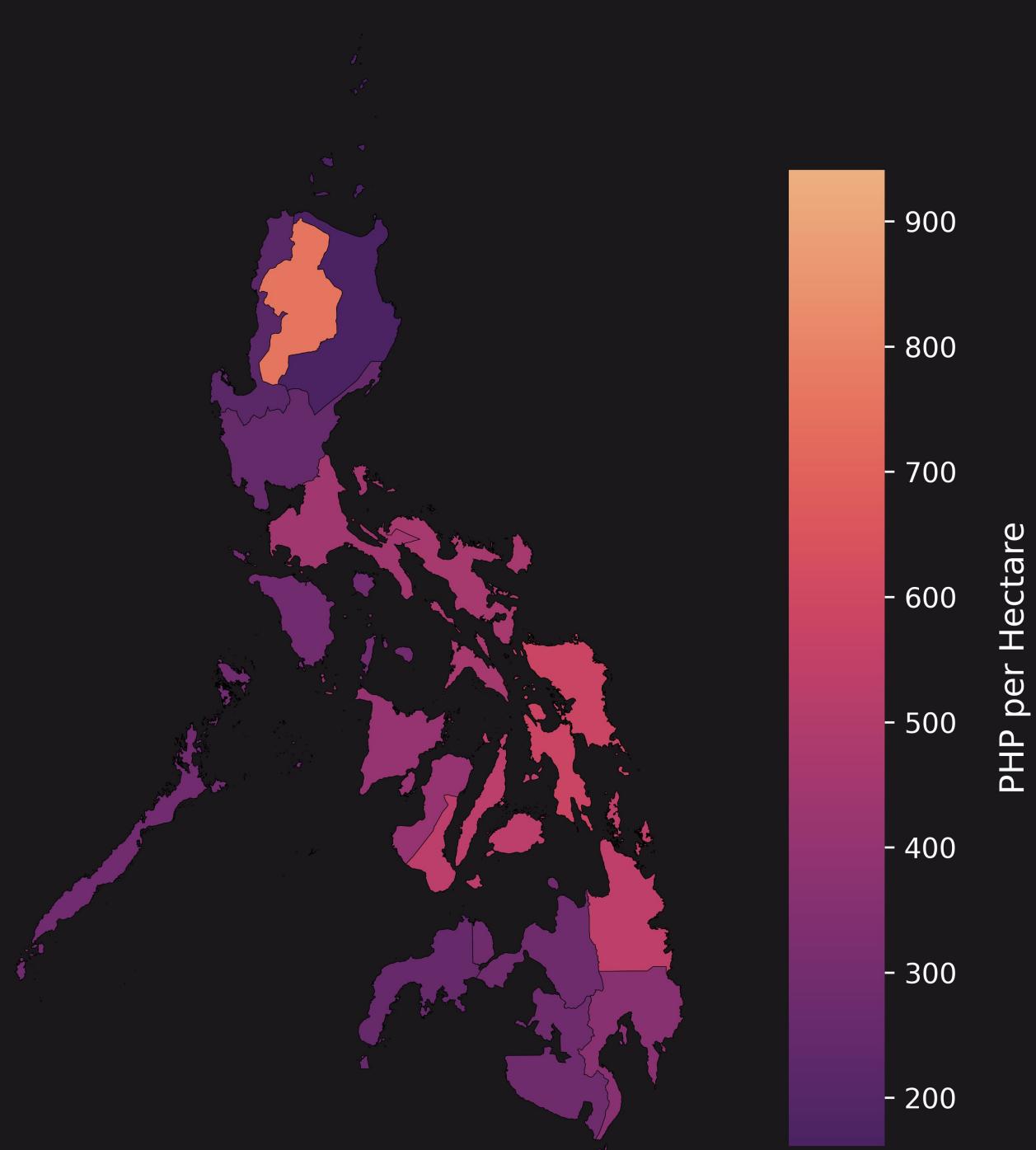
DA - Budget Allocation (PHP) per Volume of Agri-Fish Production (2021)



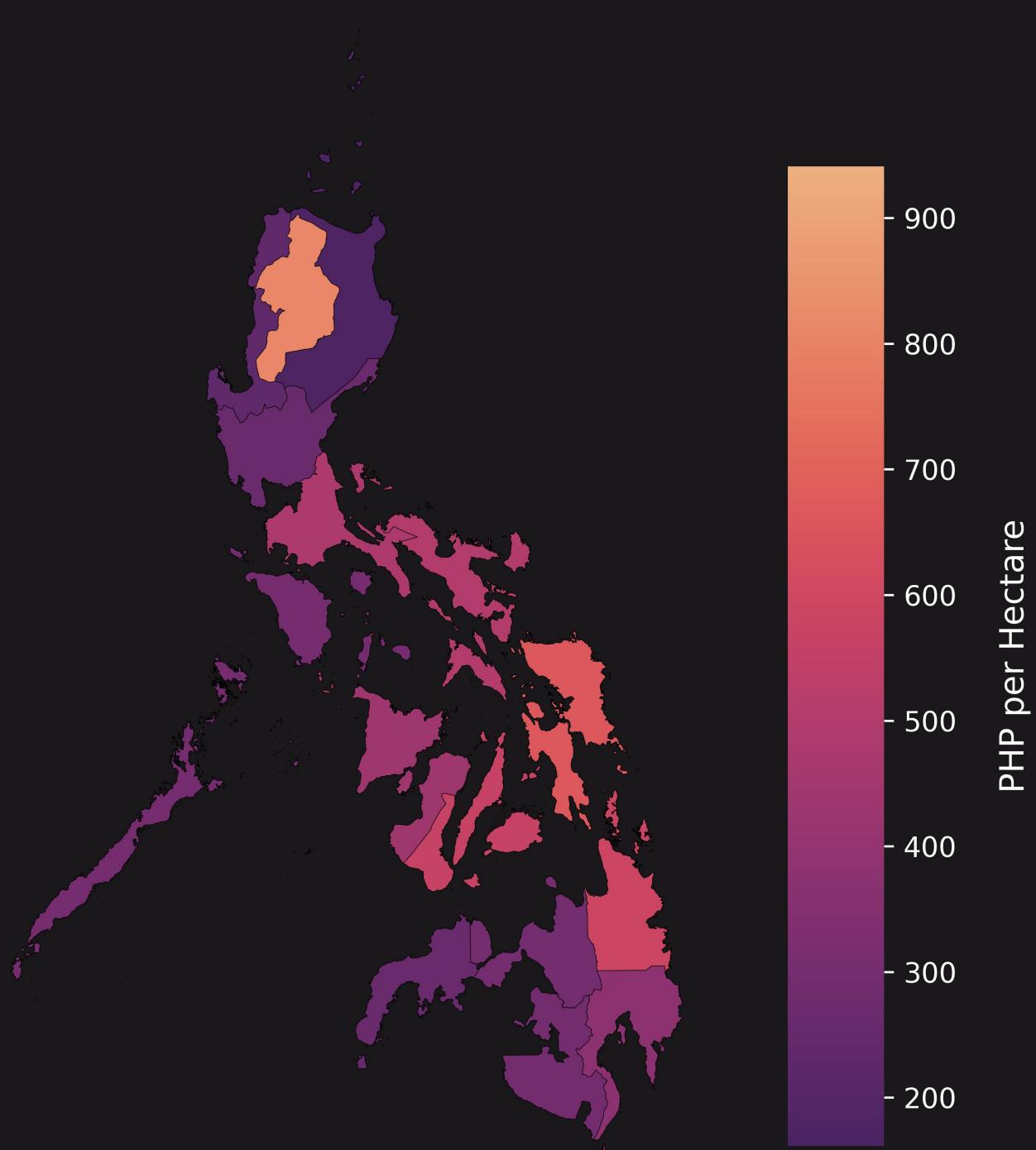
DAR - Budget Allocation (PHP) per Hectare of Agri Land (2024)



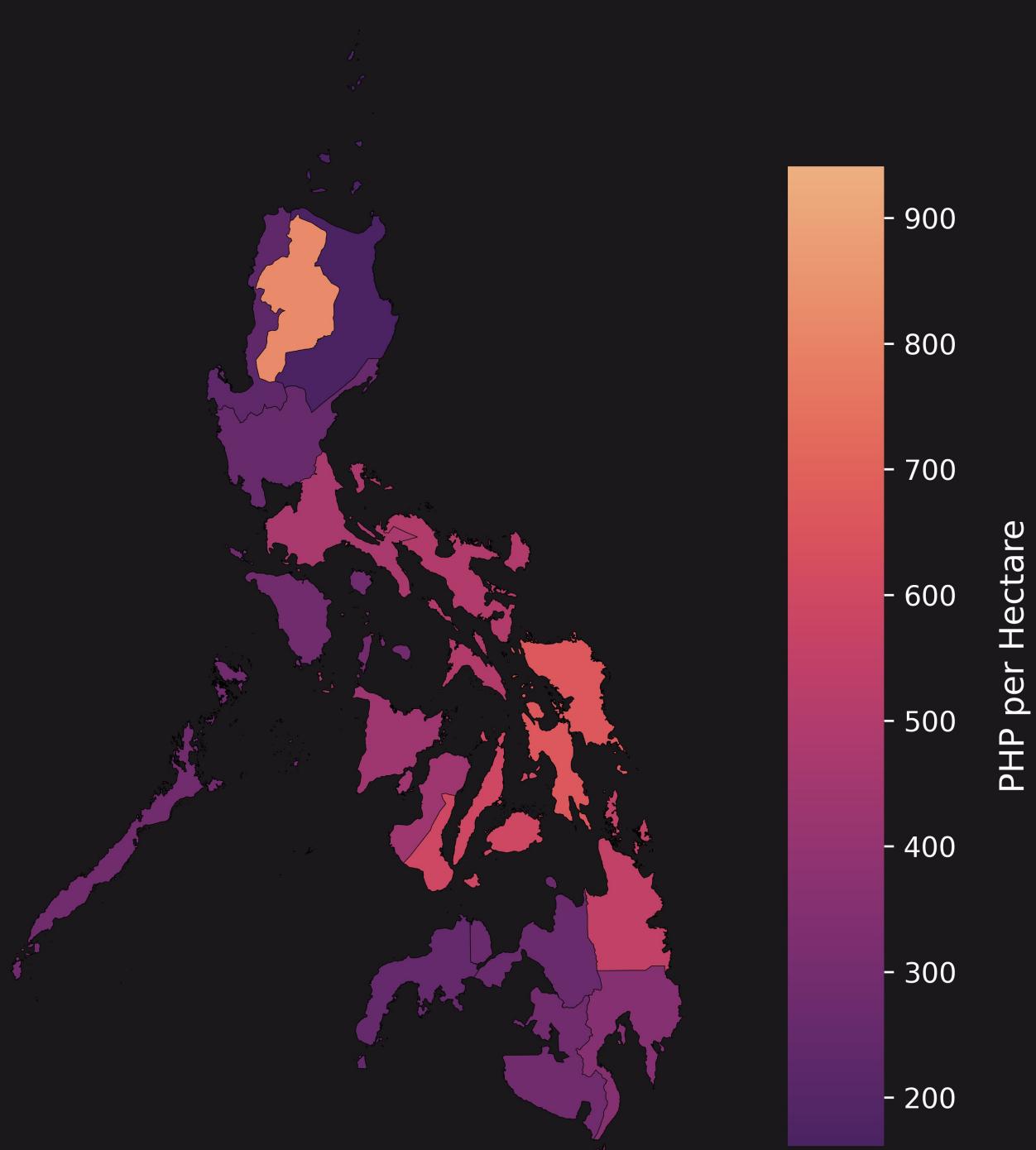
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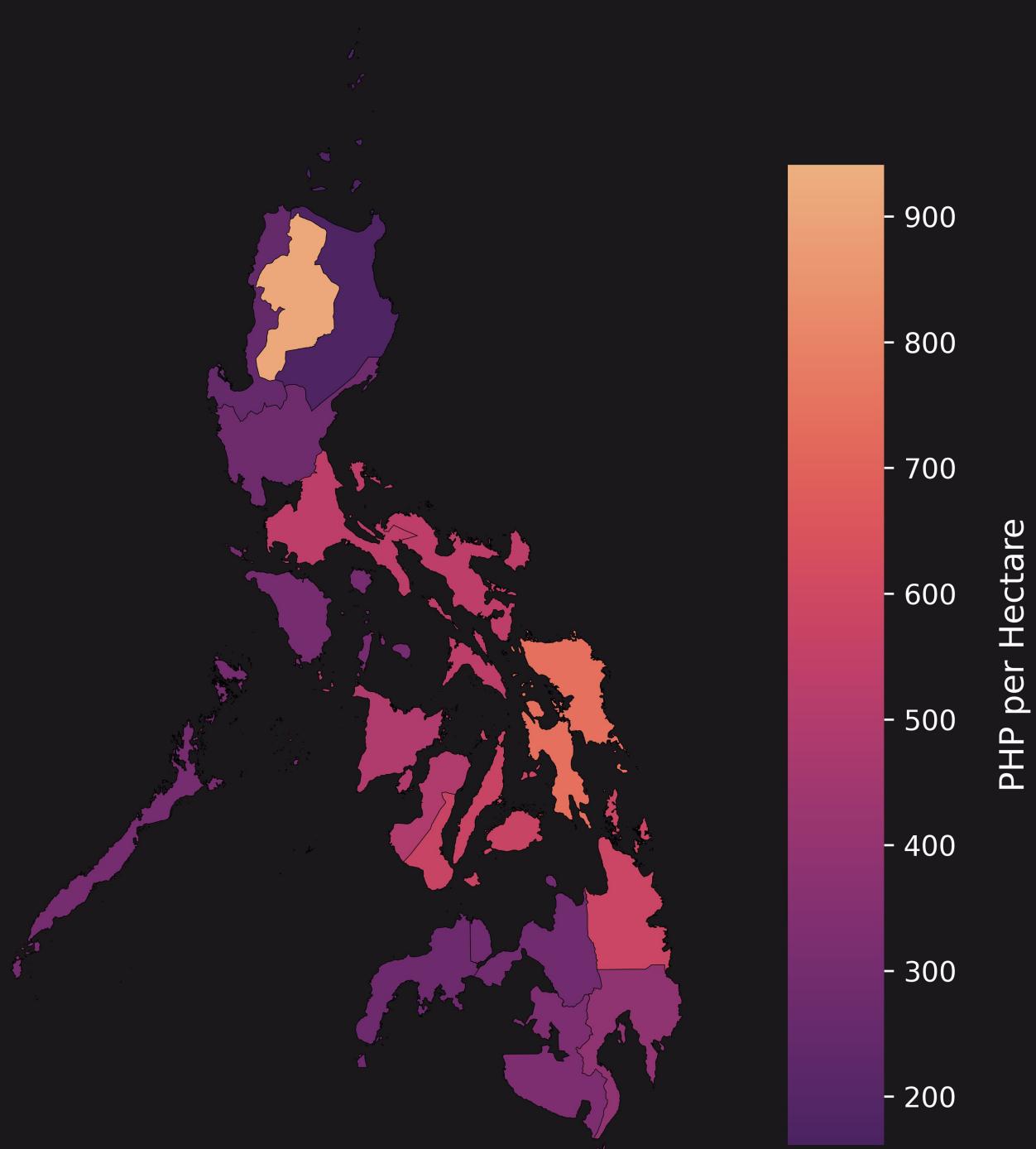
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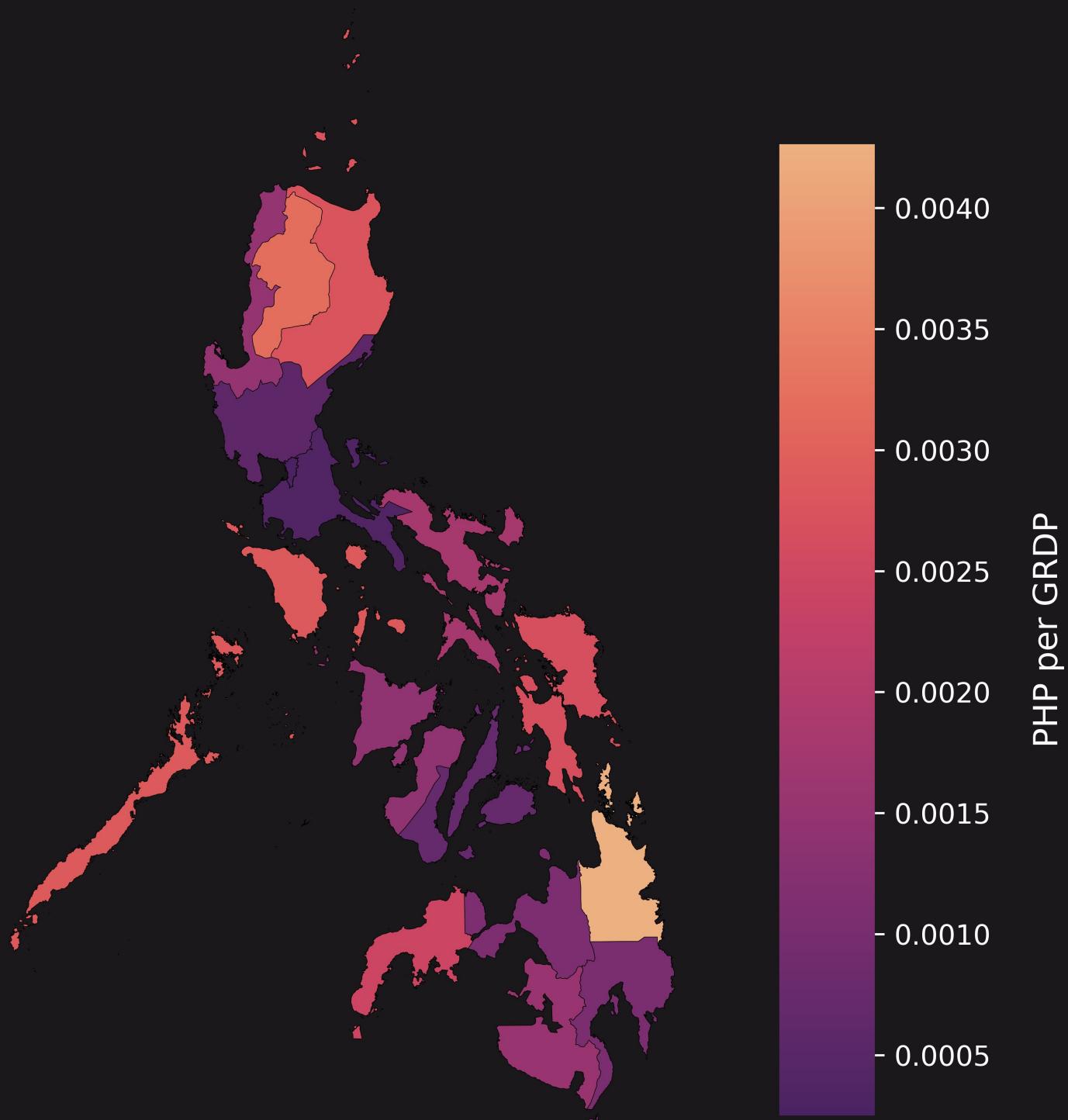
DAR - Budget Allocation (PHP) per Hectare of Agri Land (2022)



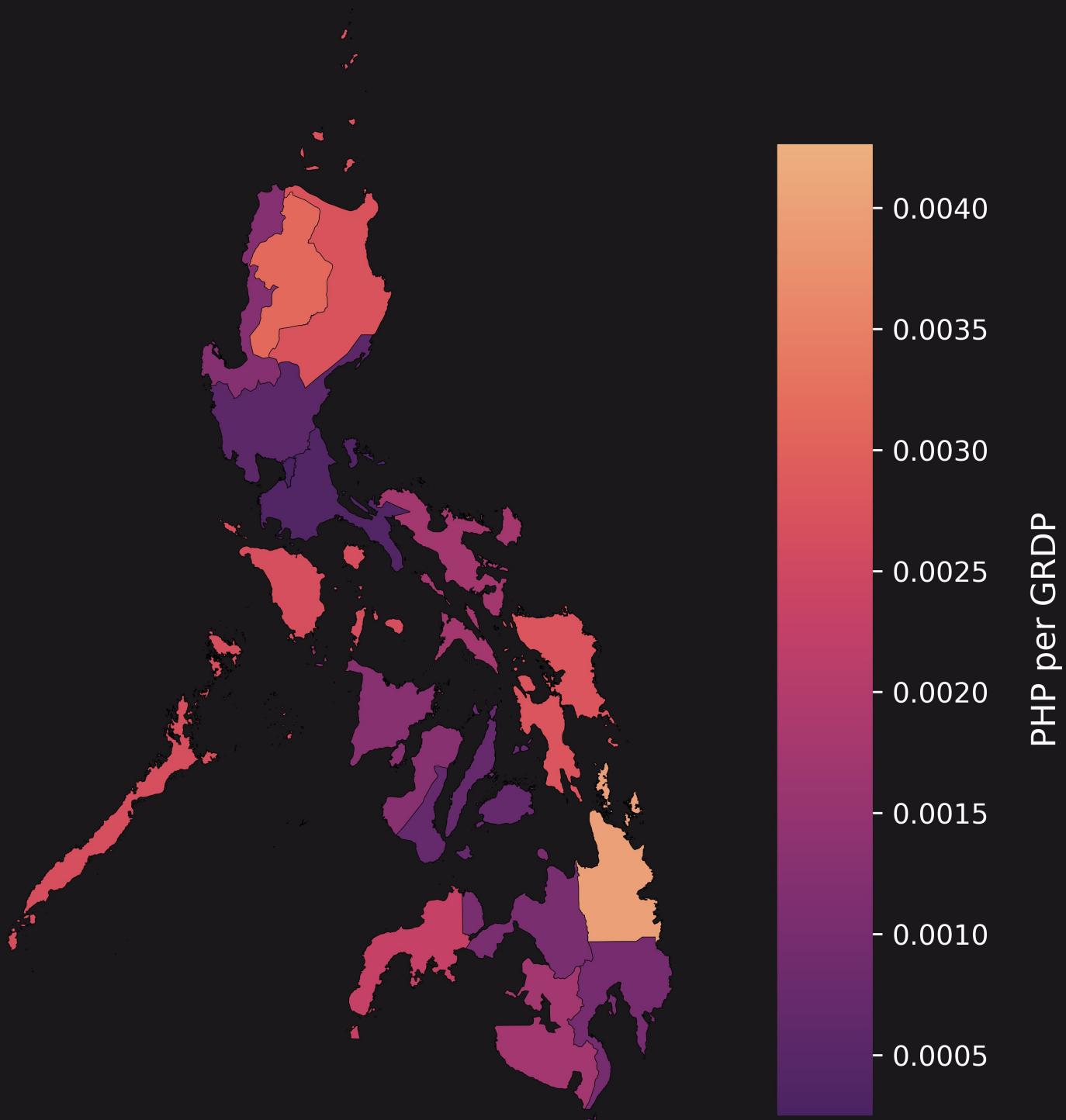
DAR - Budget Allocation (PHP) per Hectare of Agri Land (2023)



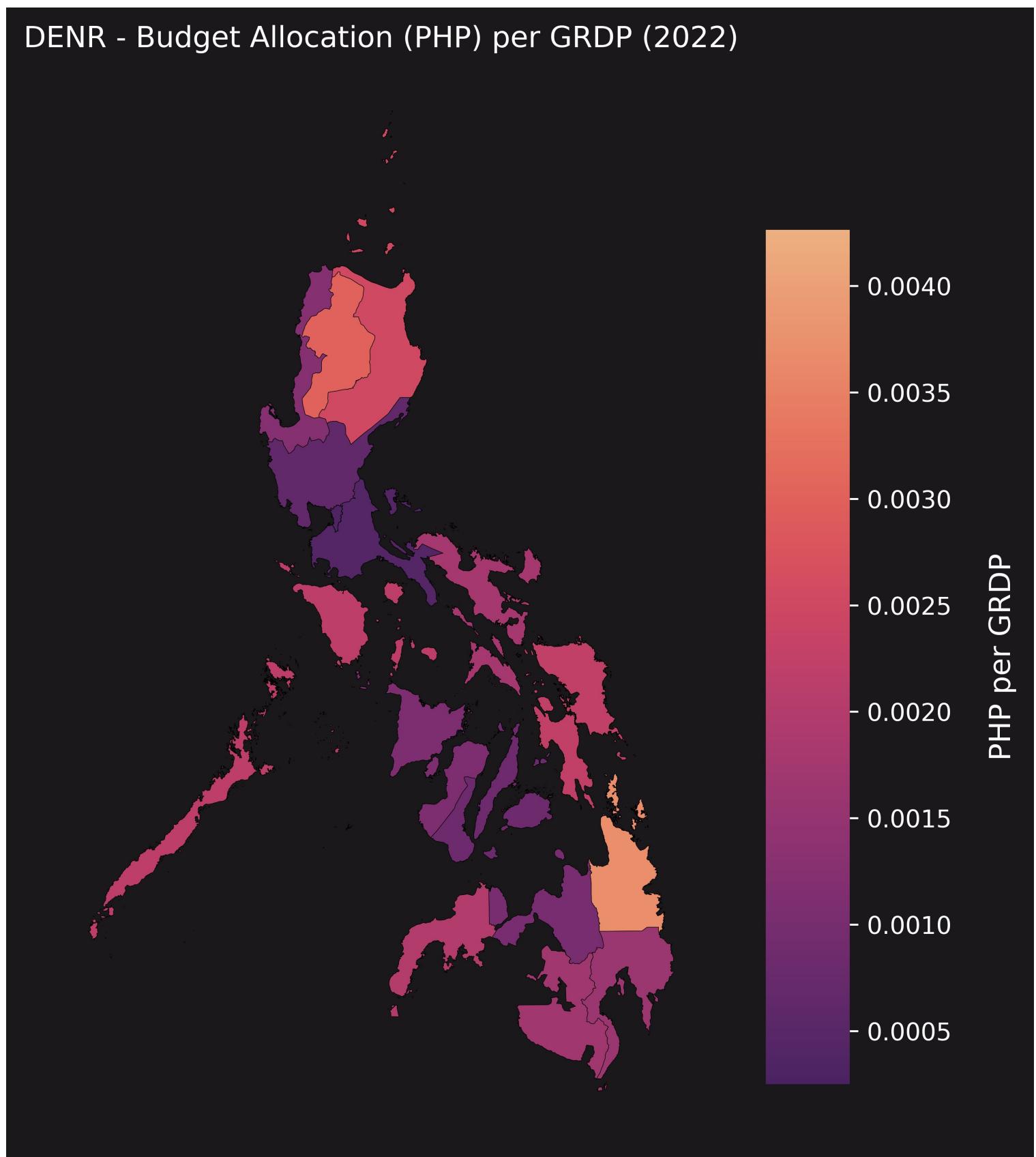
DENR - Budget Allocation (PHP) per GRDP (2020)



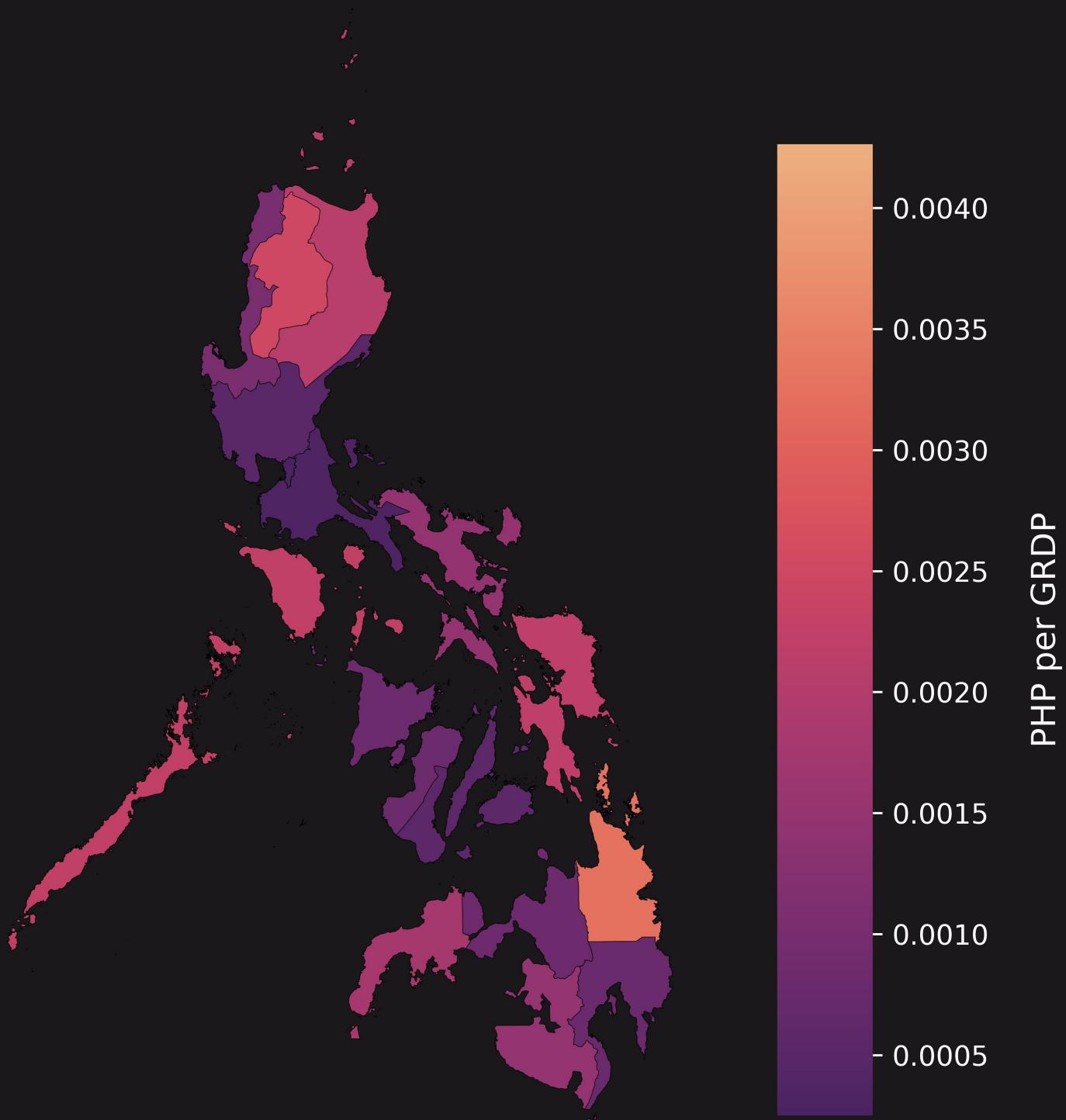
DENR - Budget Allocation (PHP) per GRDP (2021)



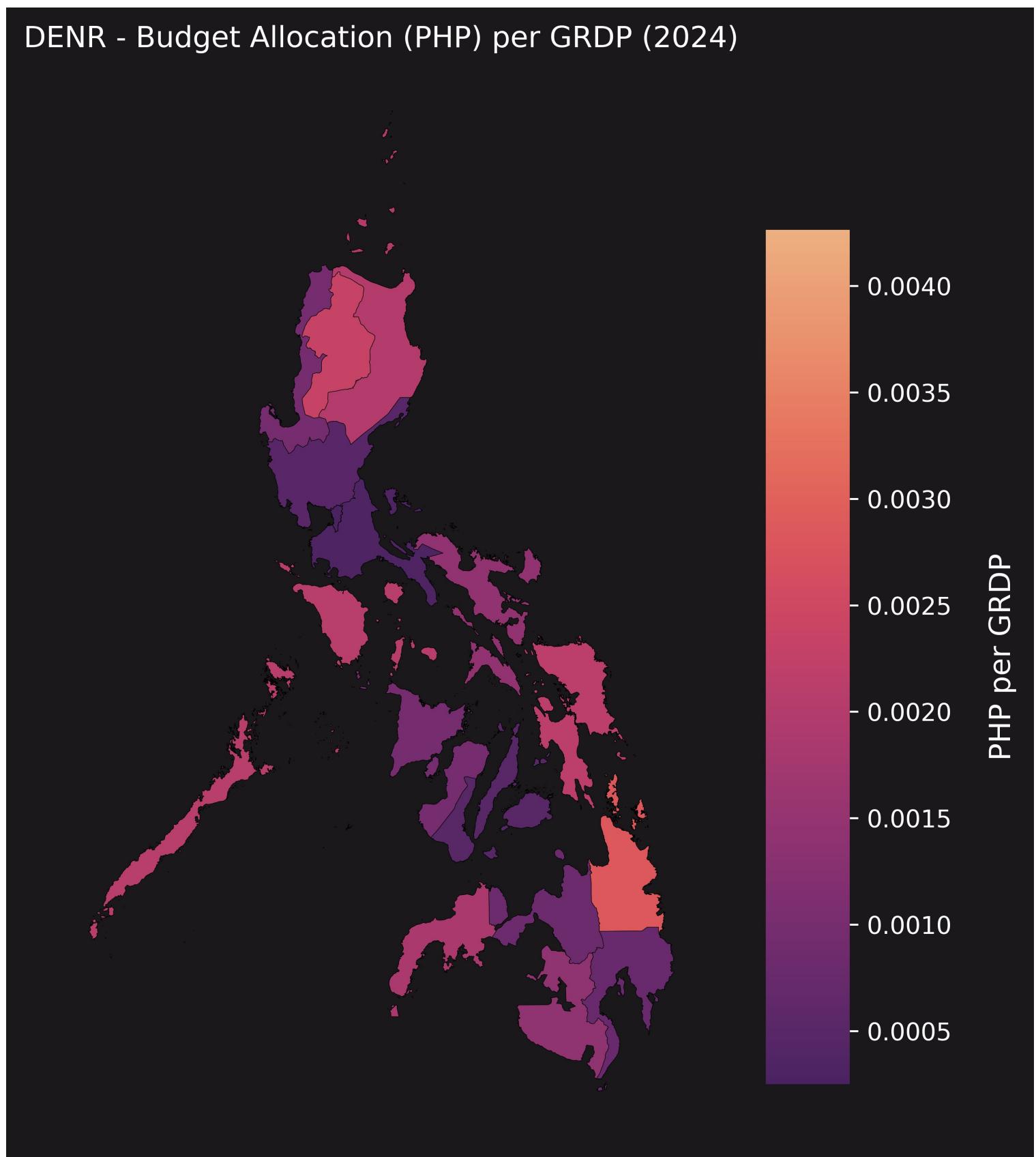
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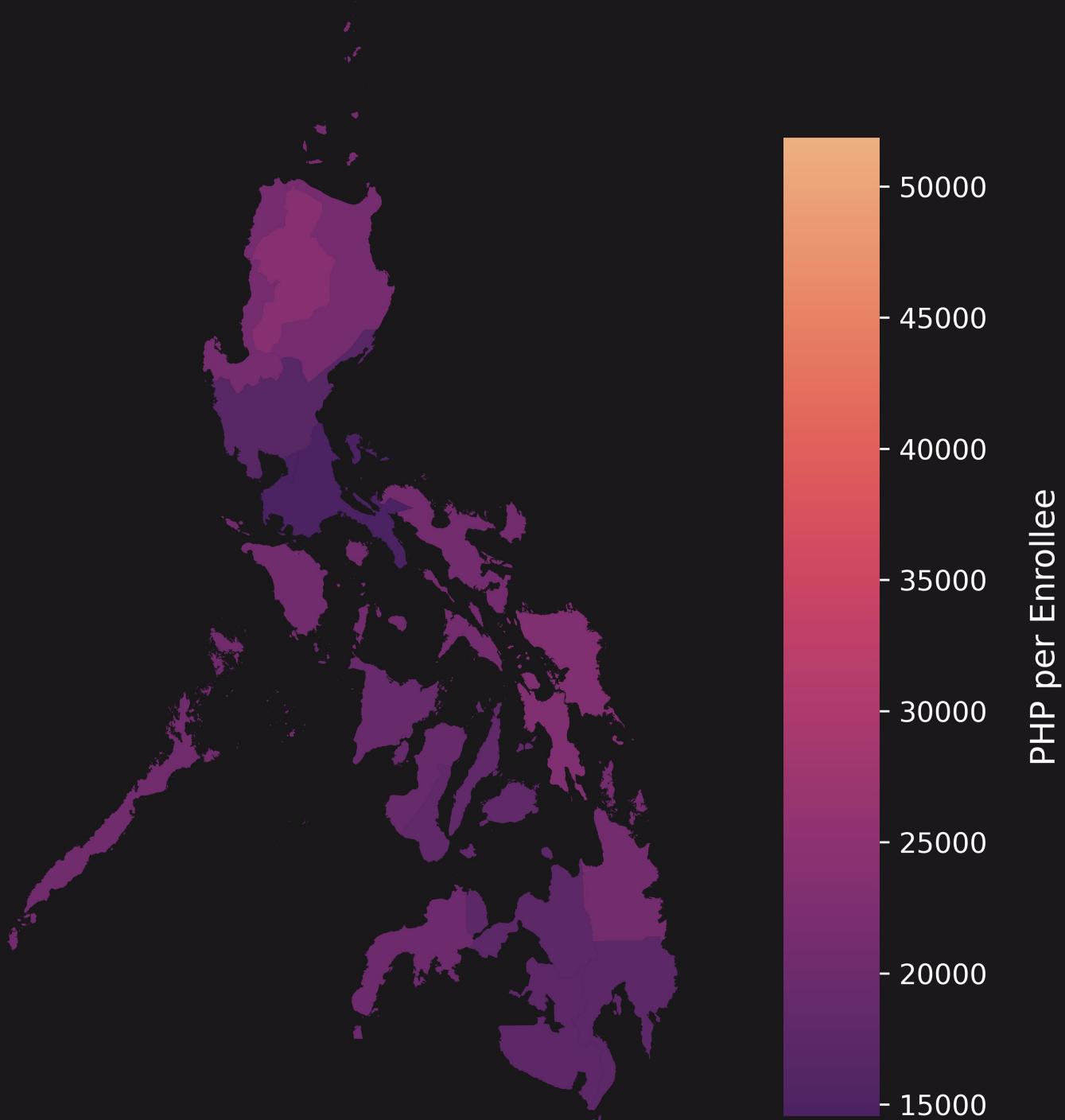
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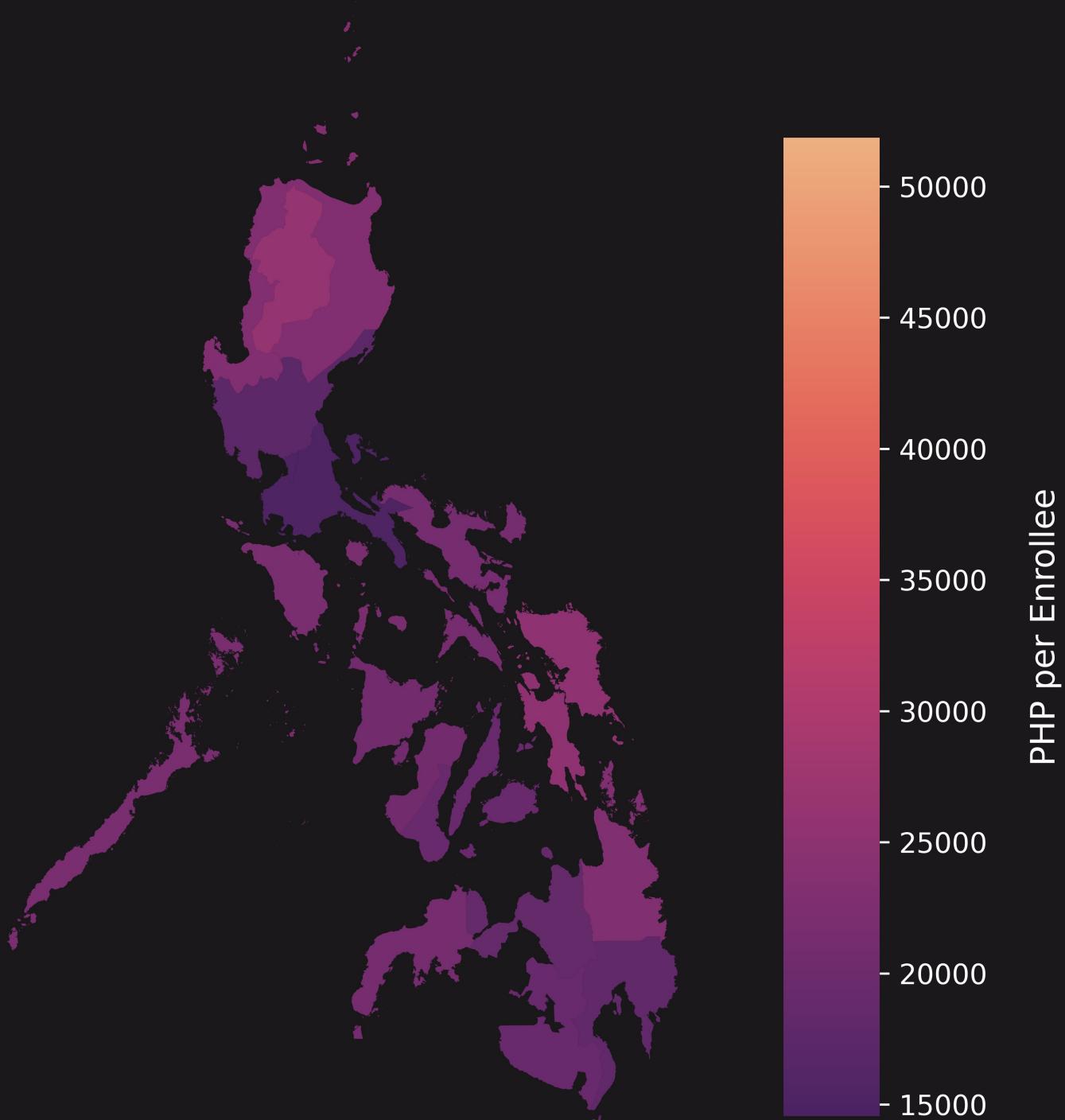
DENR - Budget Allocation (PHP) per GRDP (2024)



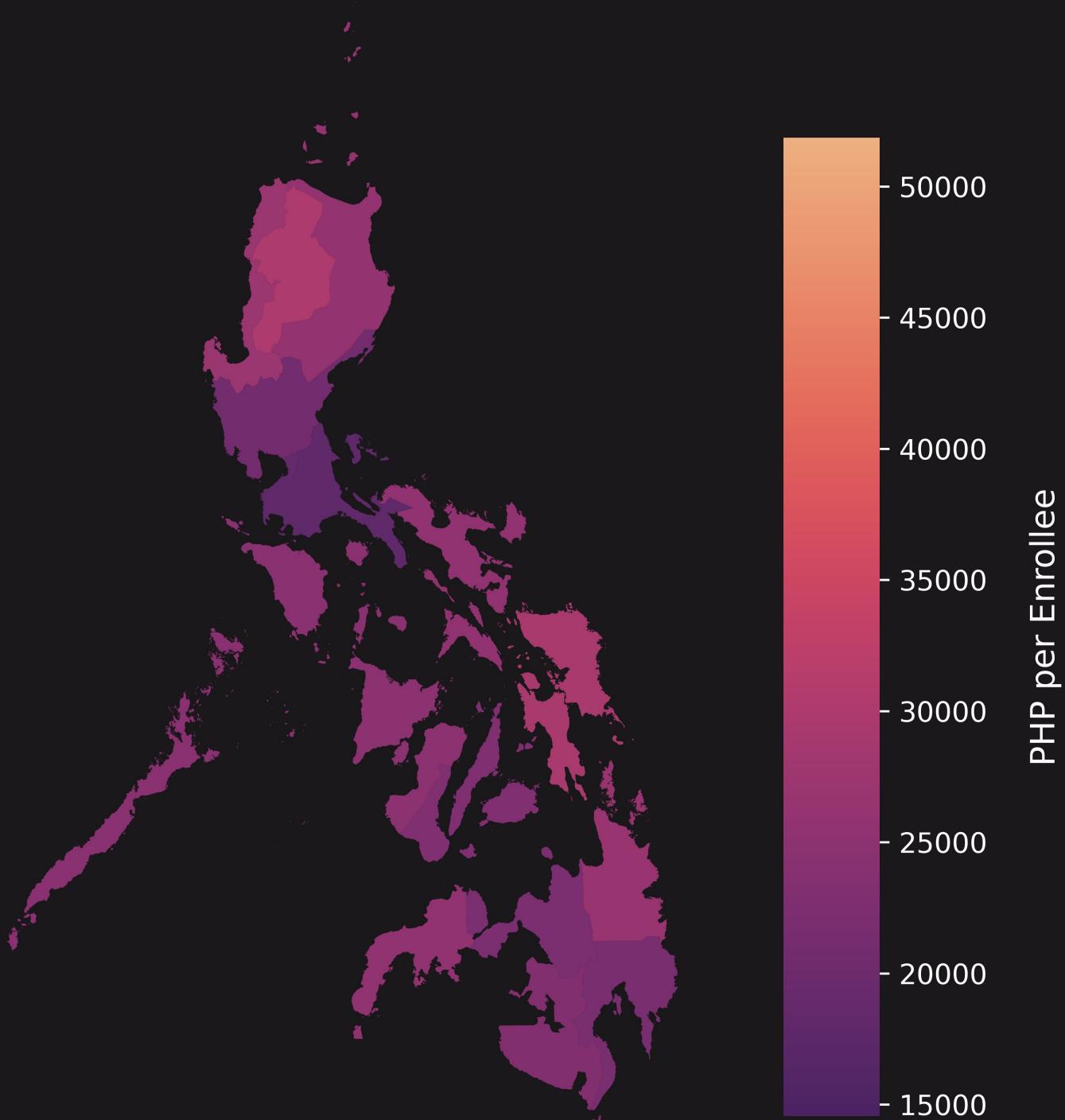
DepED - Budget Allocation (PHP) per Enrollee (2020)



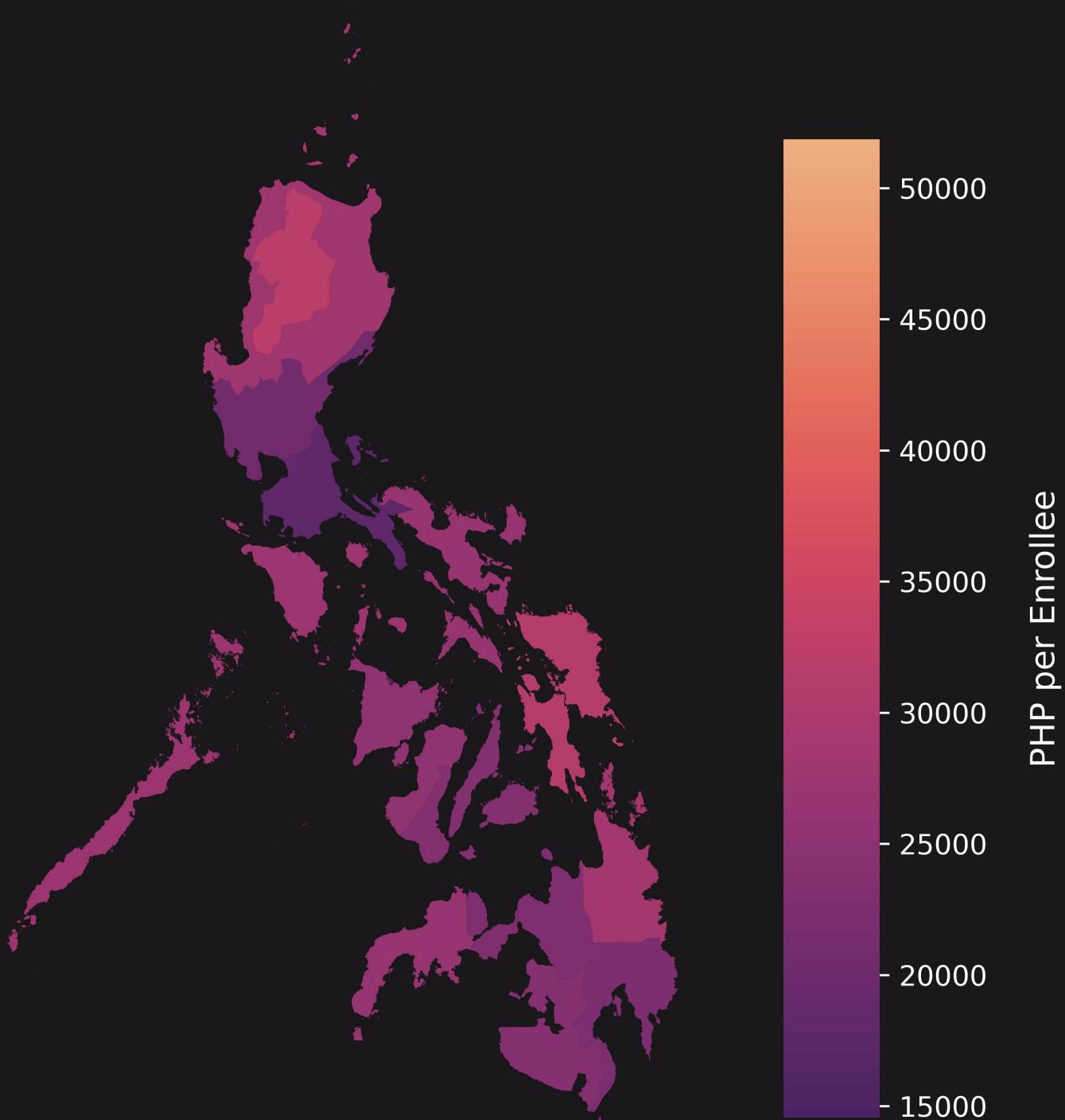
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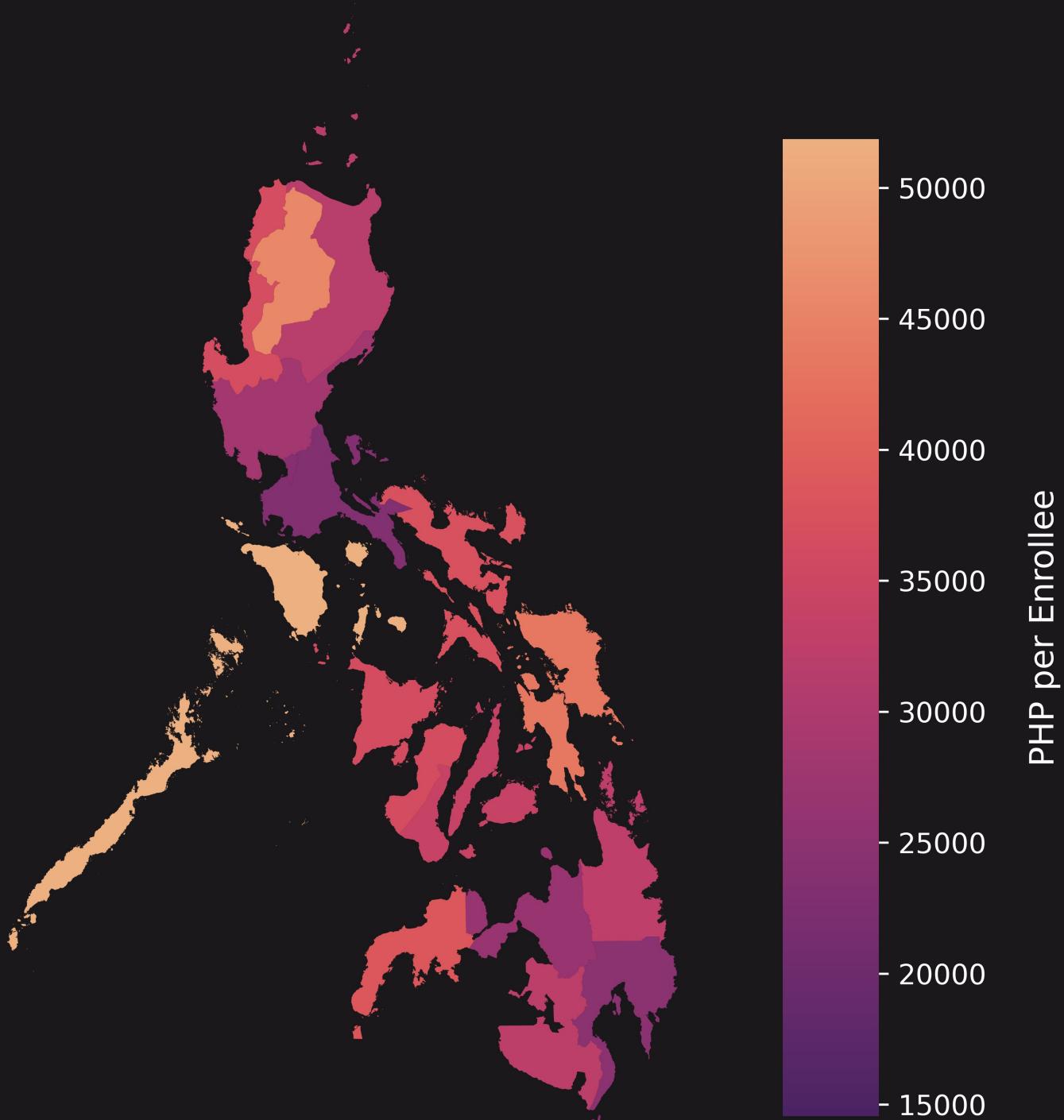
DepED - Budget Allocation (PHP) per Enrollee (2022)



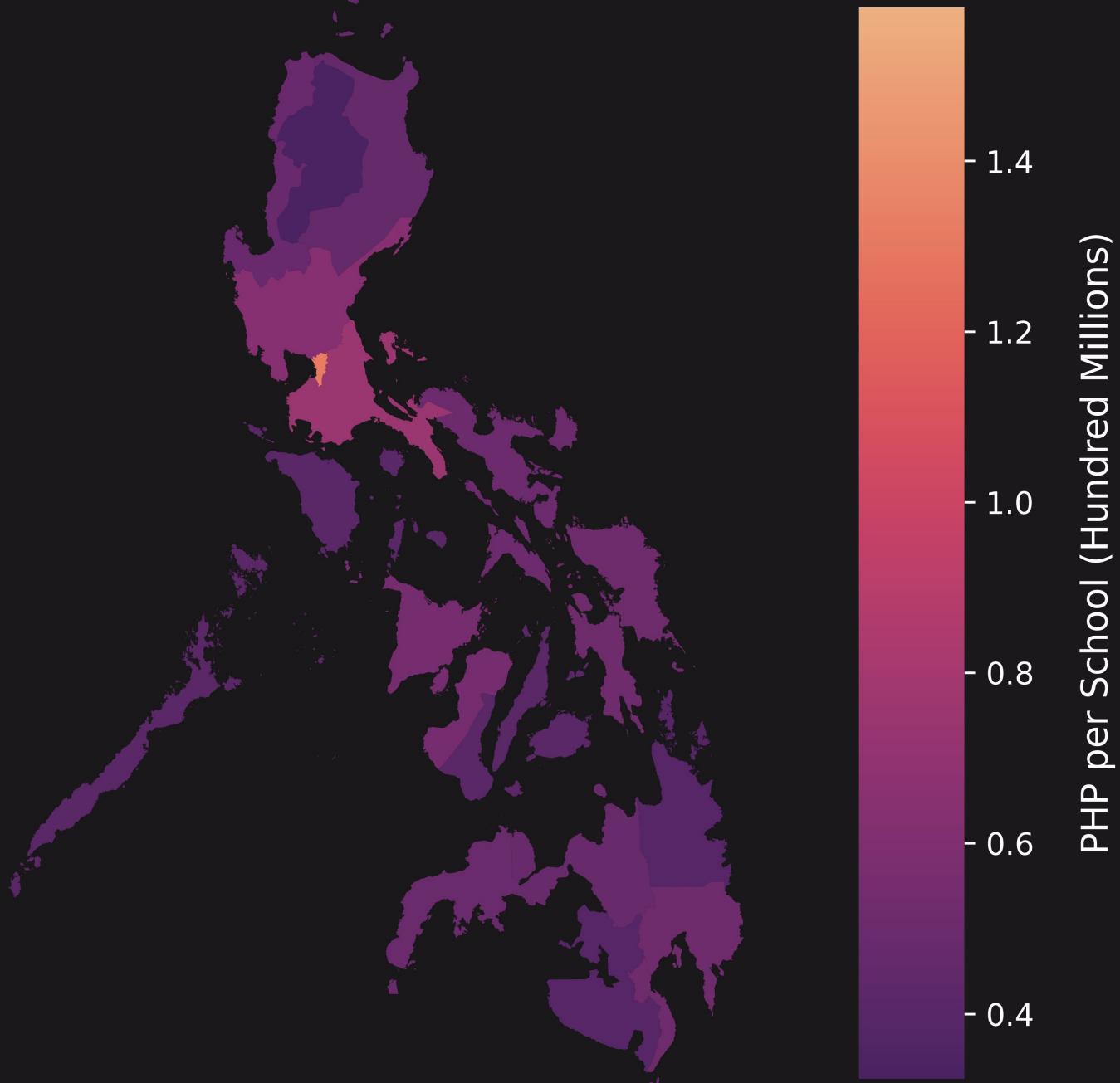
DepED - Budget Allocation (PHP) per Enrollee (2023)



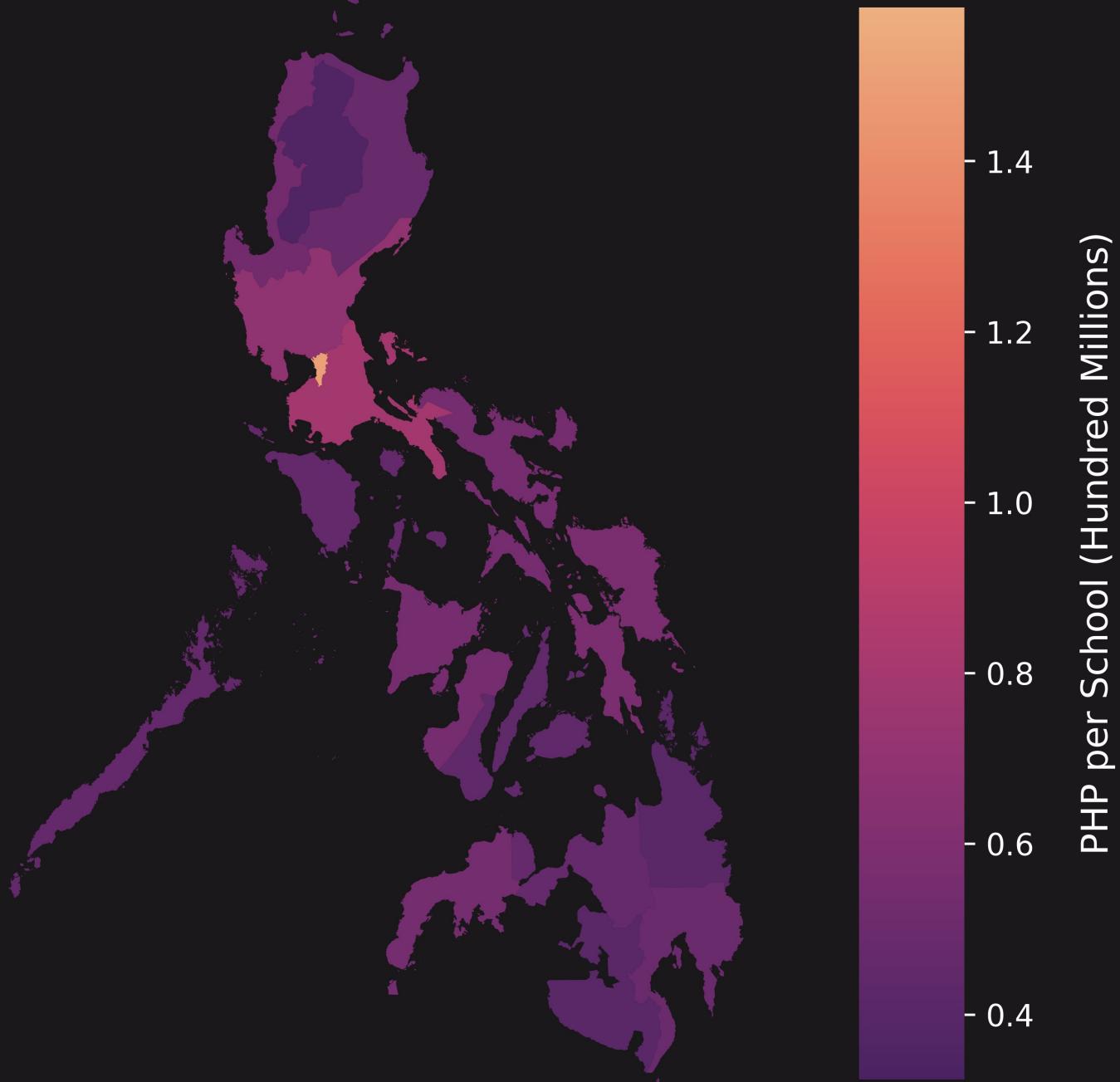
DepED - Budget Allocation (PHP) per Enrollee (2024)



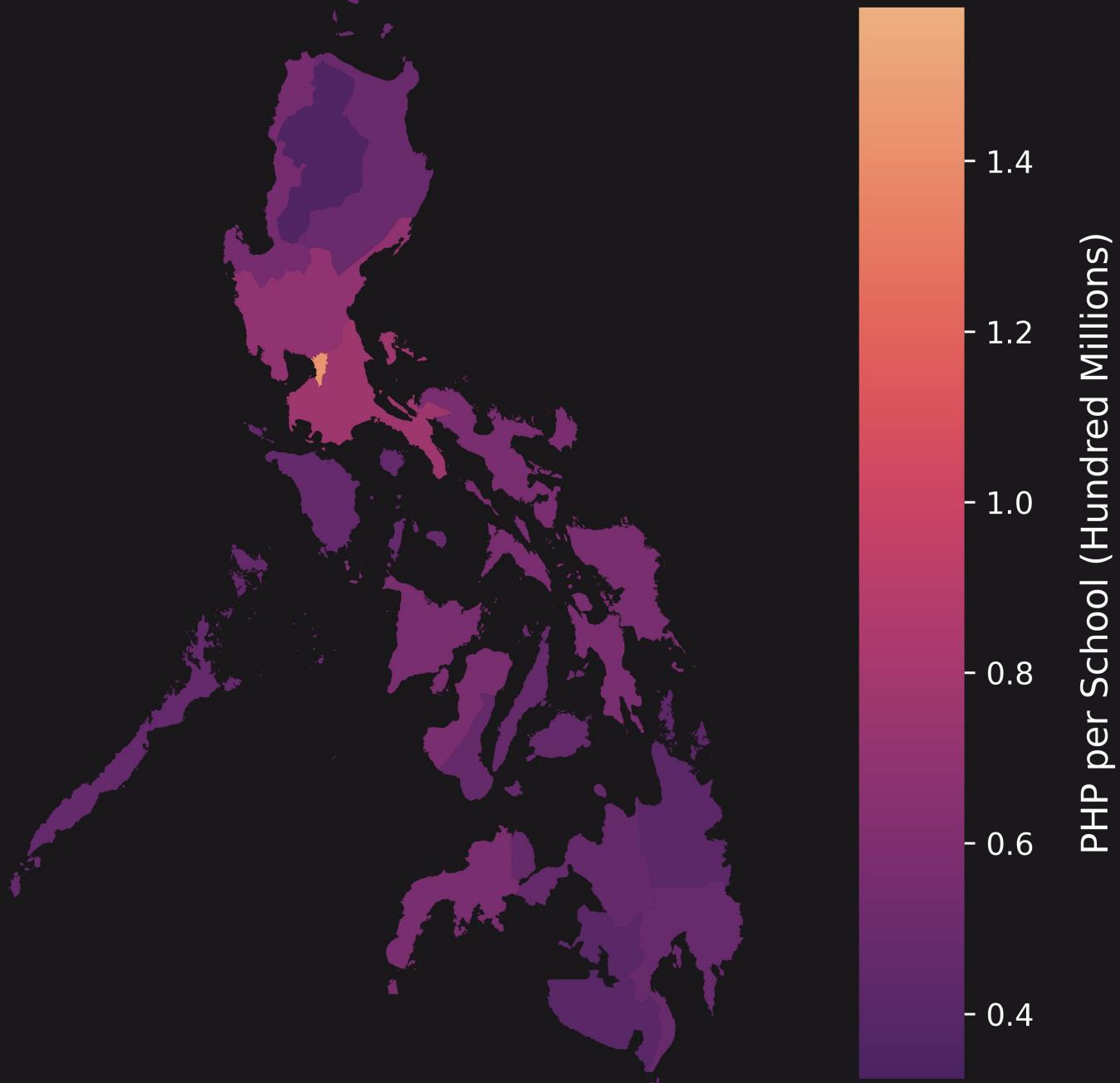
DepED - Budget Allocation (PHP) per School (2020)



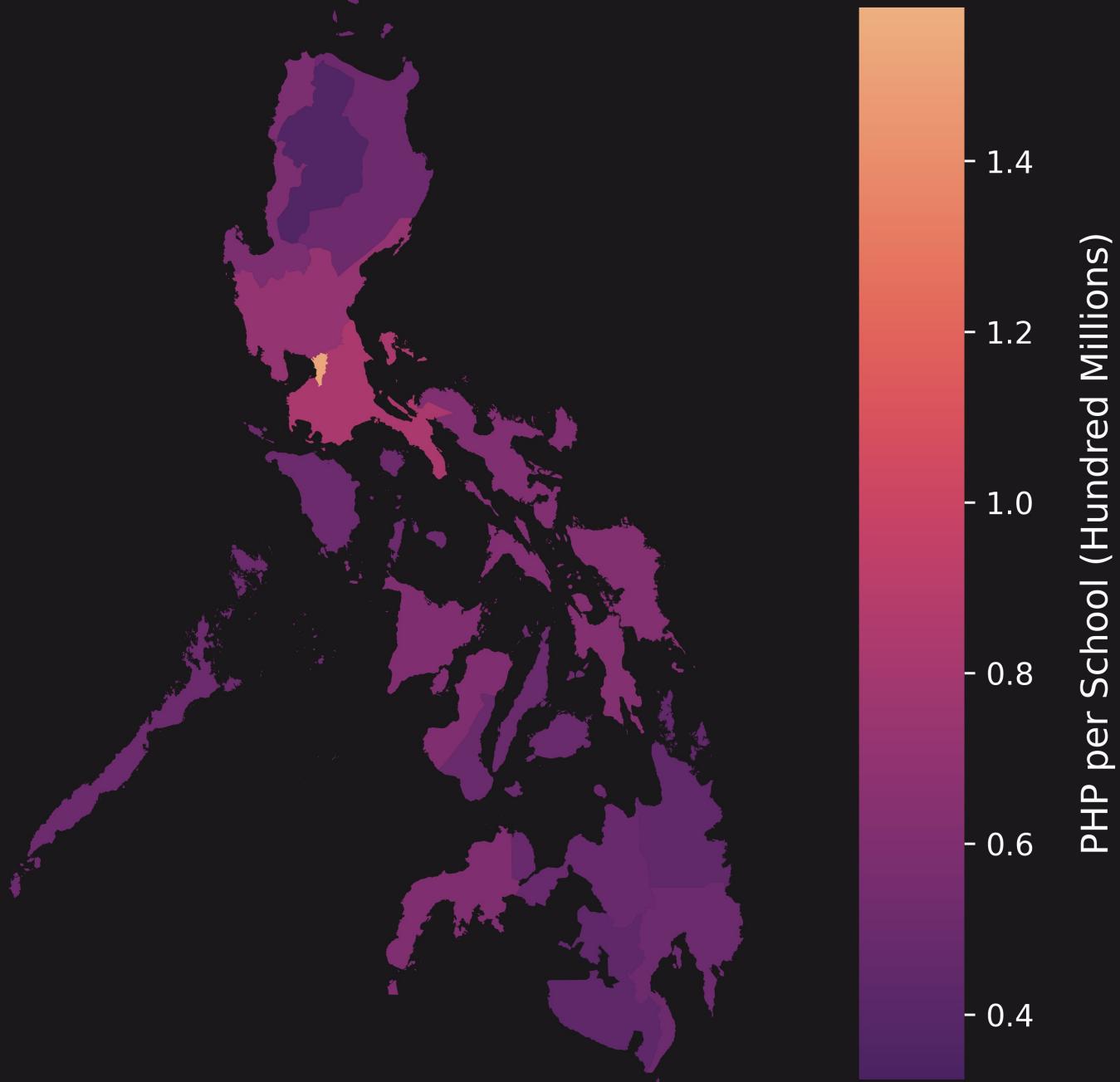
DepED - Budget Allocation (PHP) per School (2021)



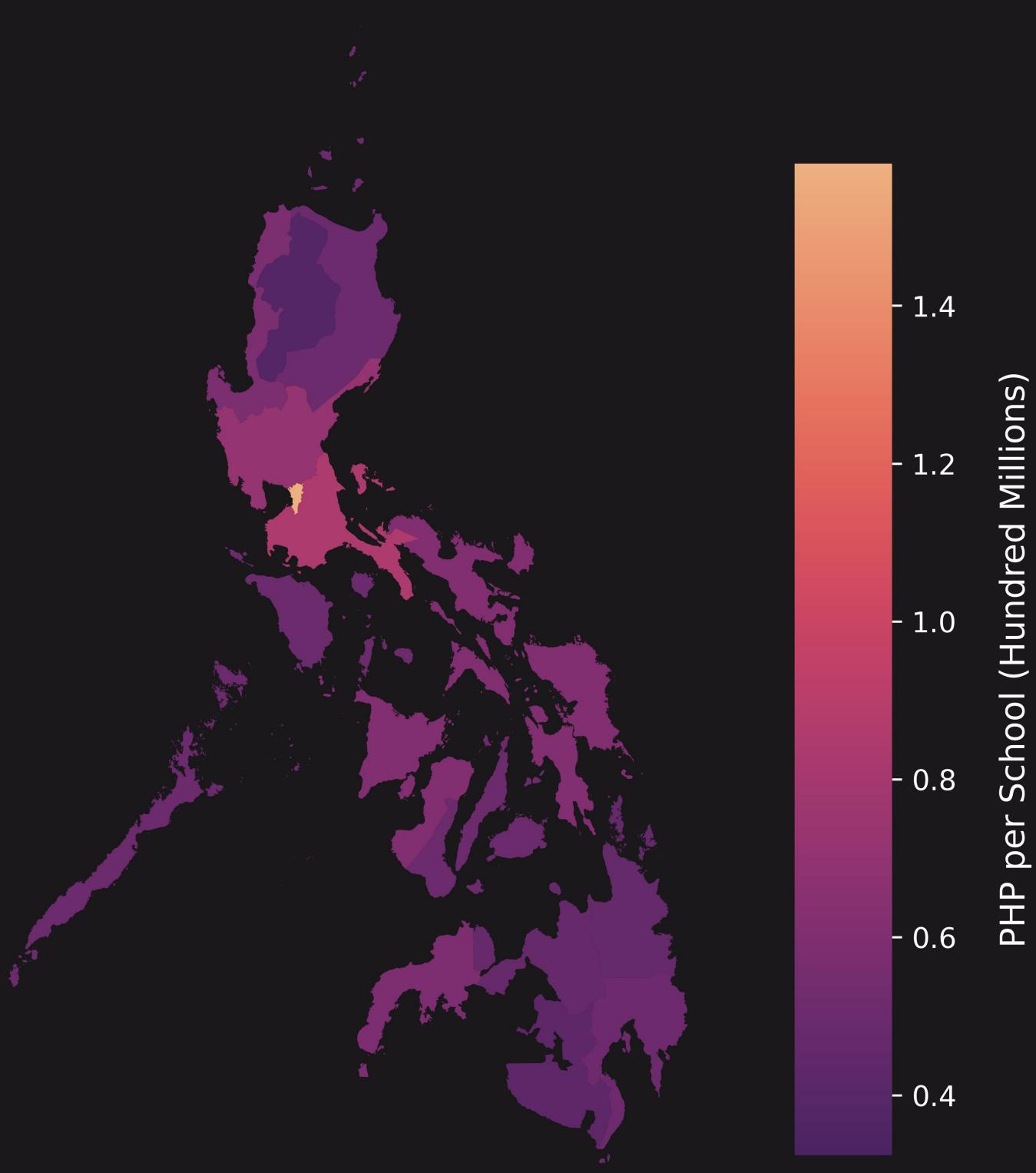
DepED - Budget Allocation (PHP) per School (2022)



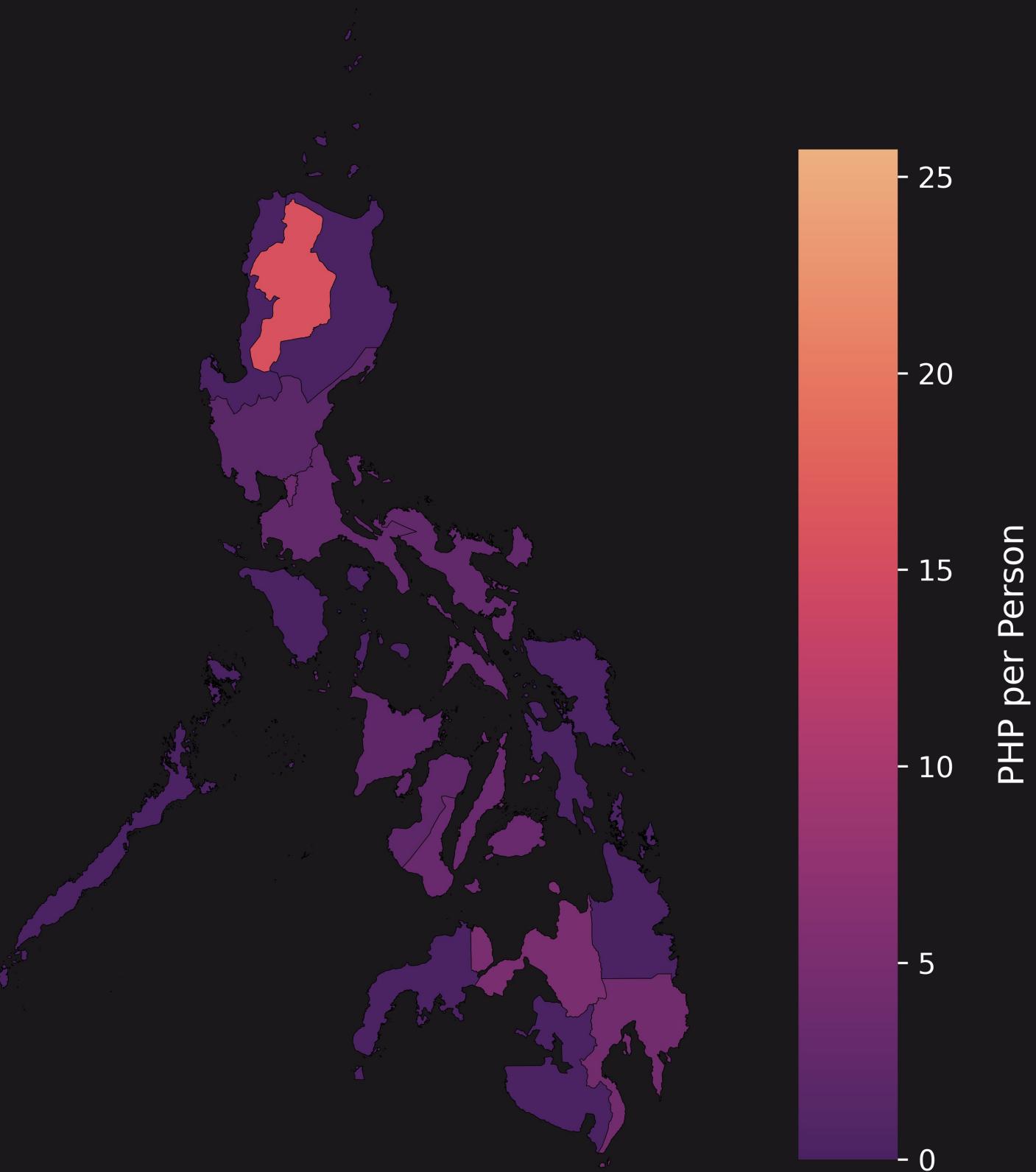
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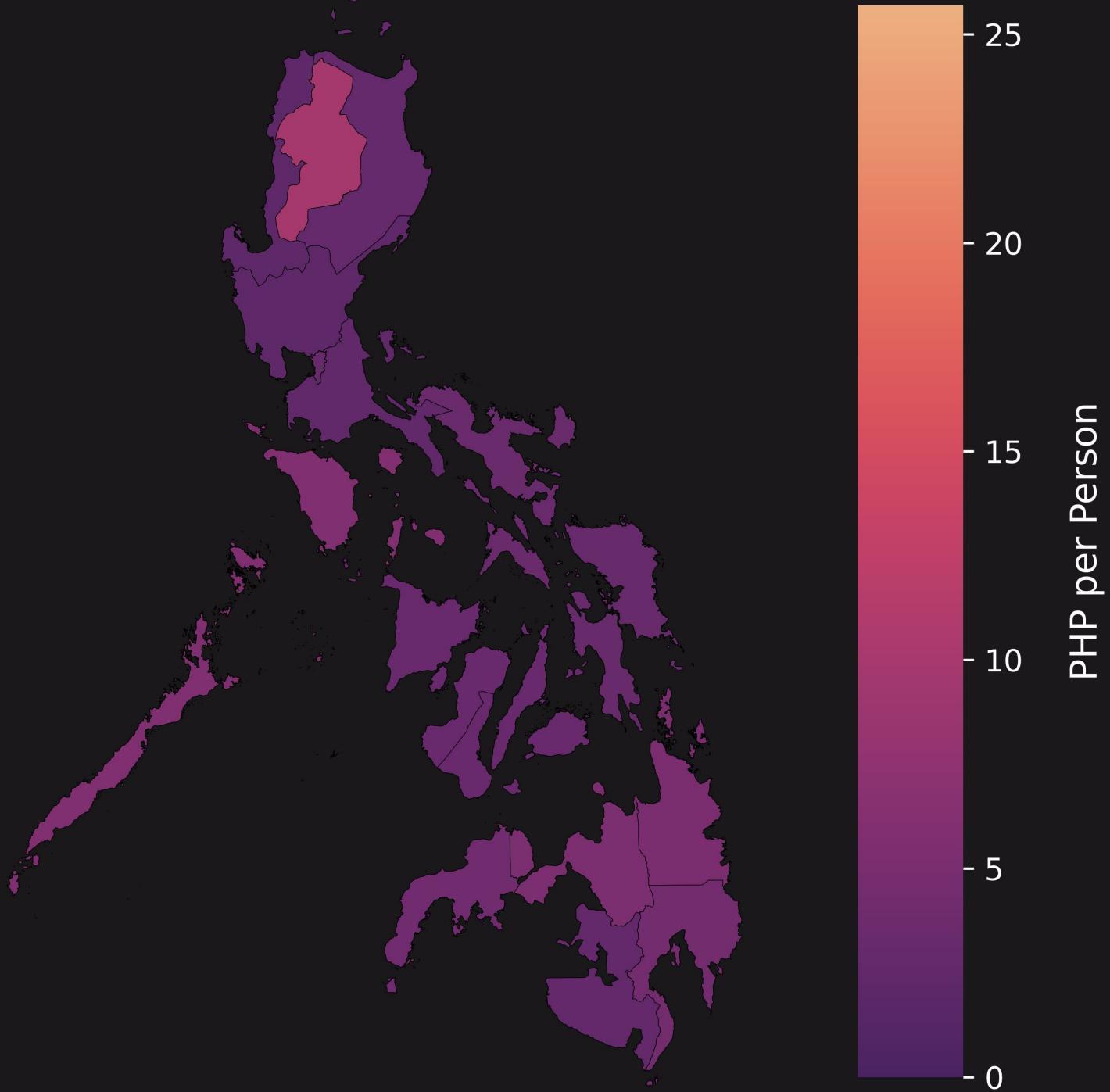
DepED - Budget Allocation (PHP) per School (2024)



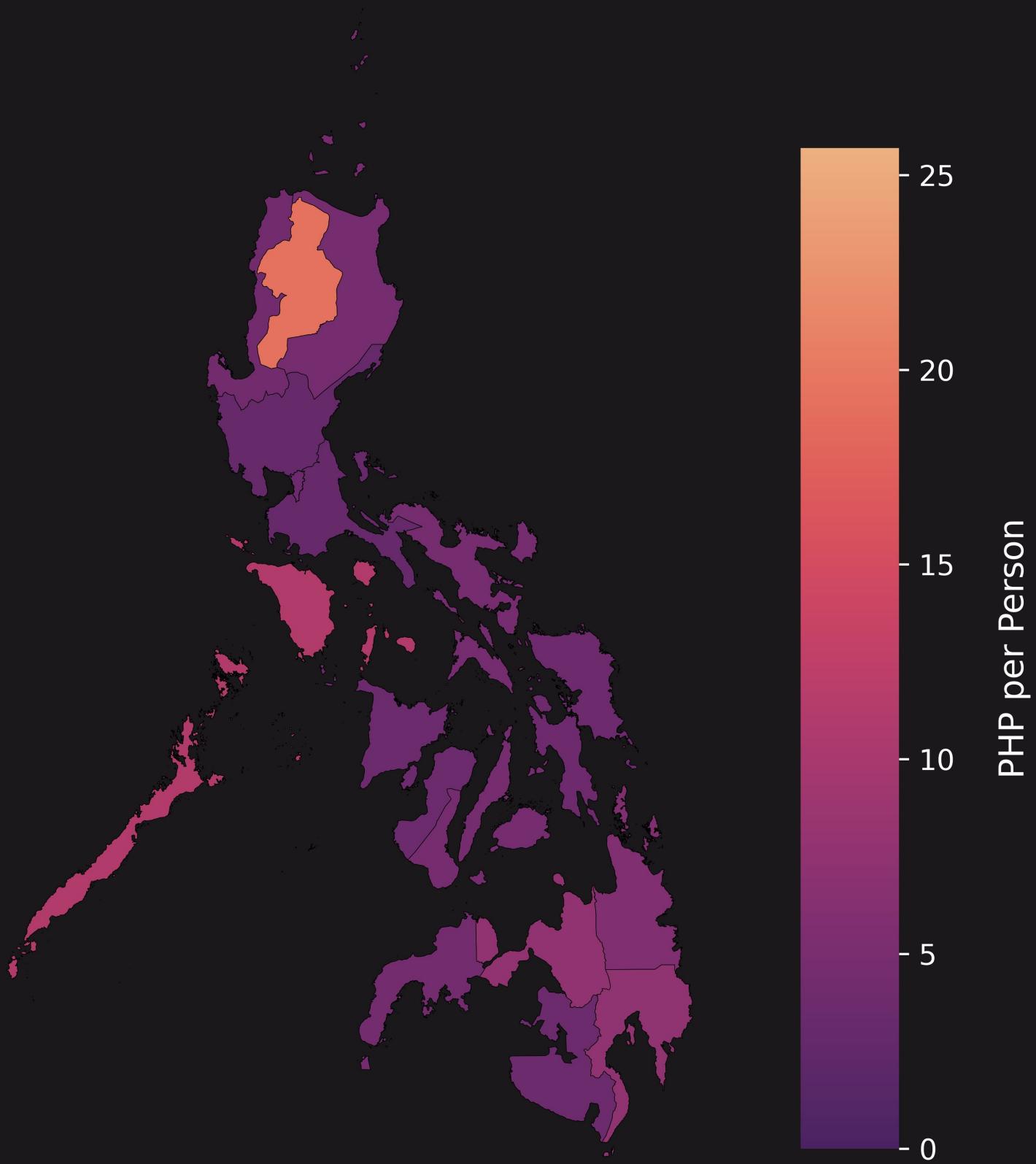
DHSUD - Pesos per Person (2020)



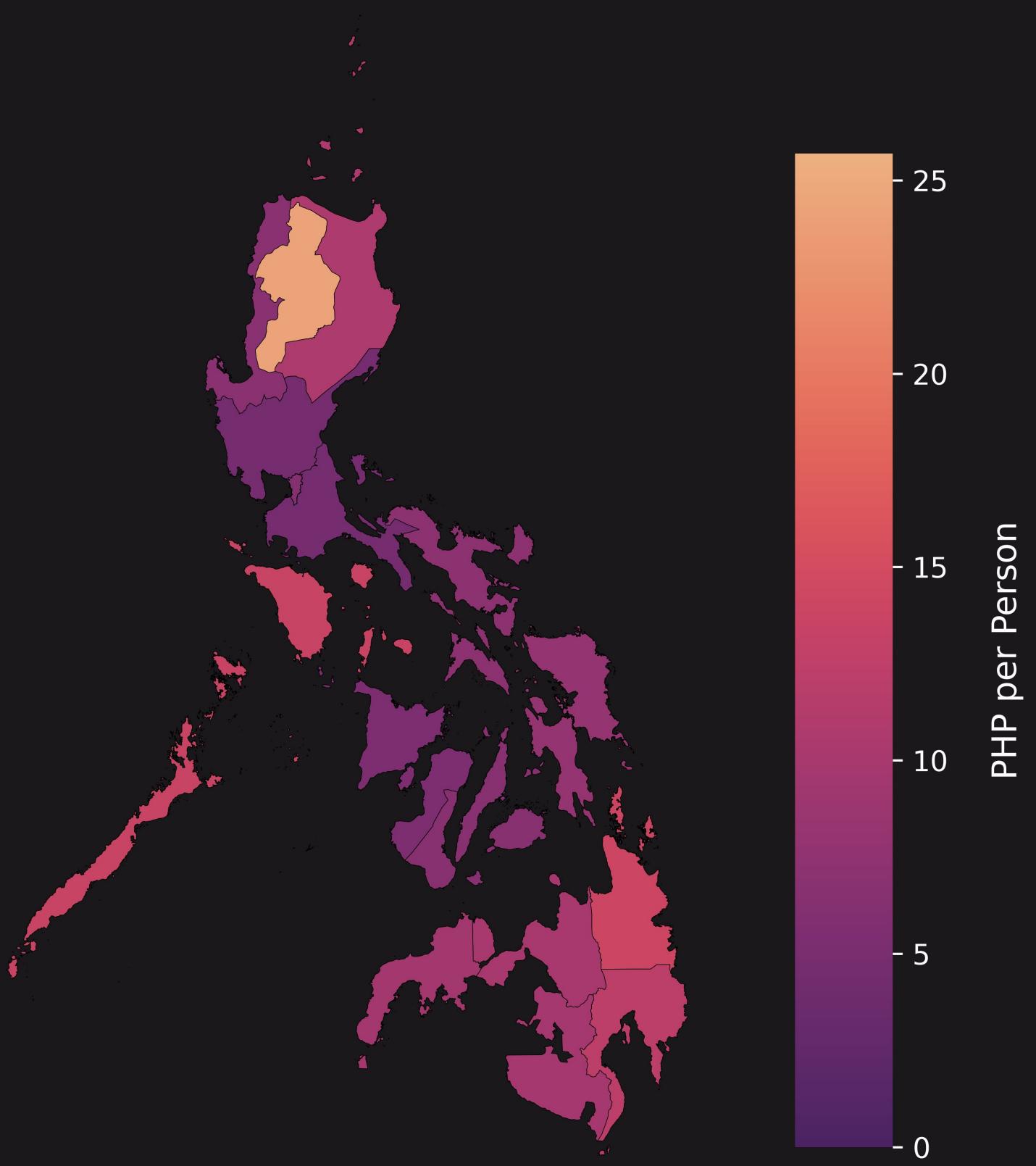
DHSUD - Pesos per Person (2021)



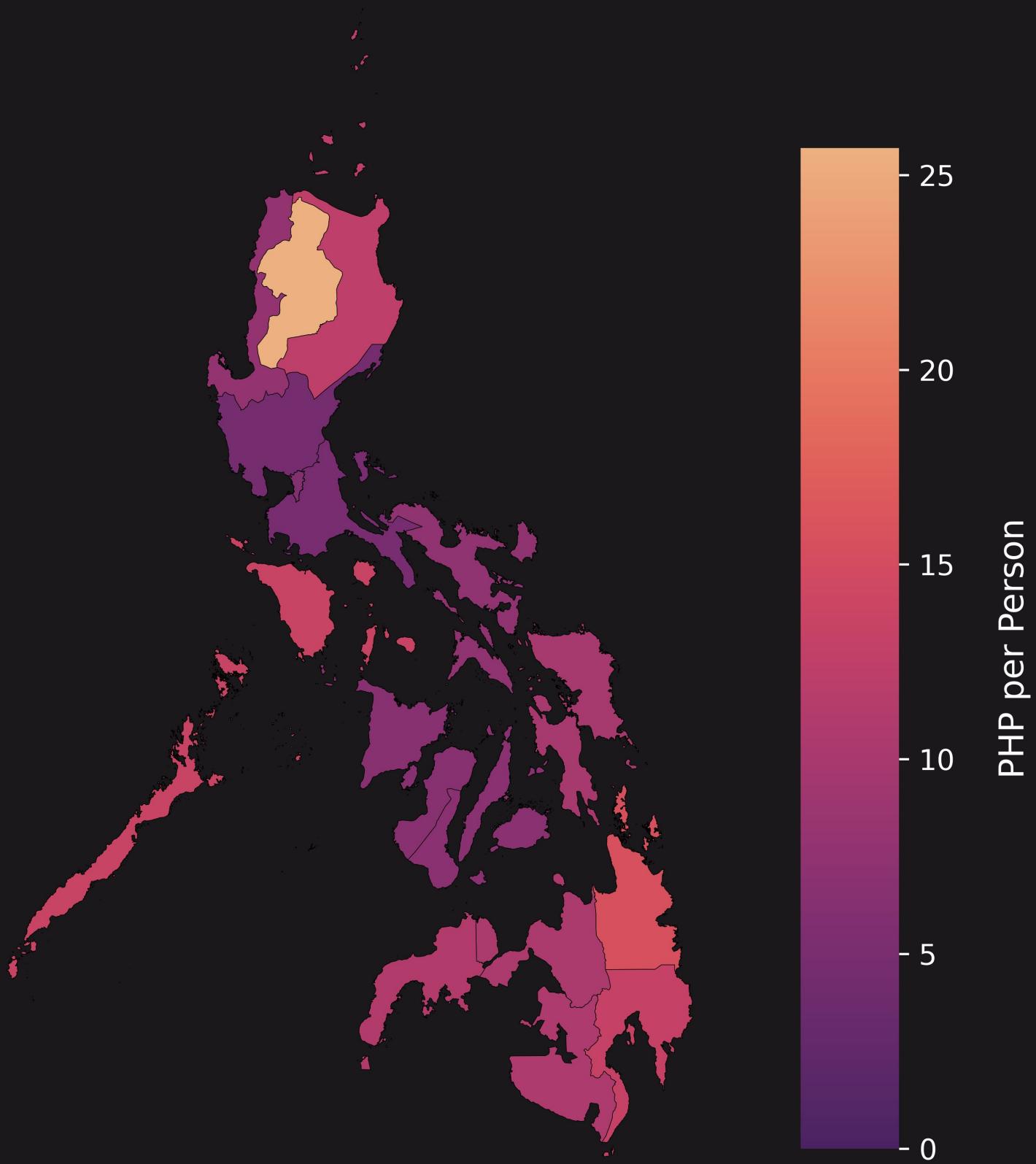
DHSUD - Pesos per Person (2022)



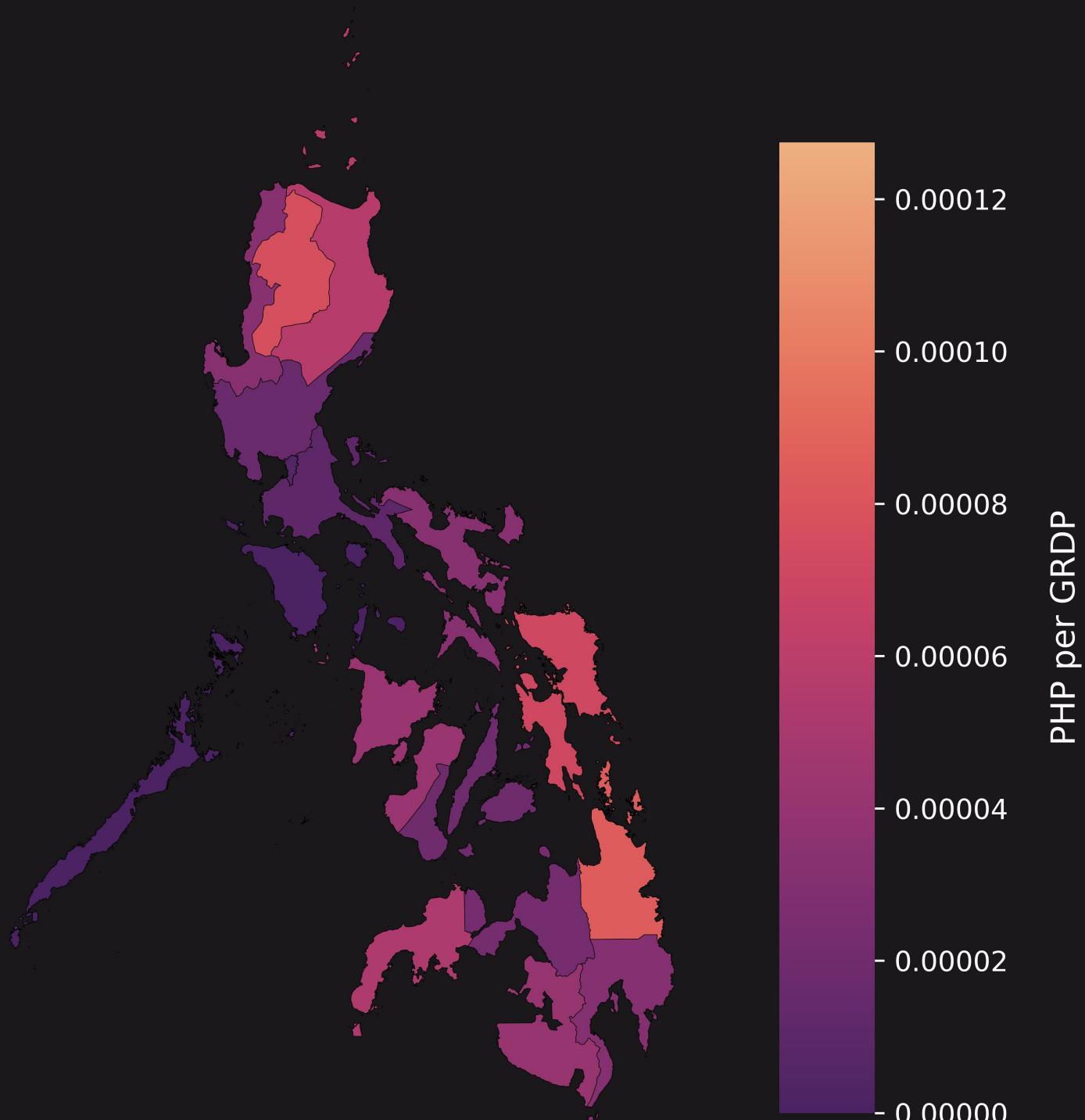
DHSUD - Pesos per Person (2023)



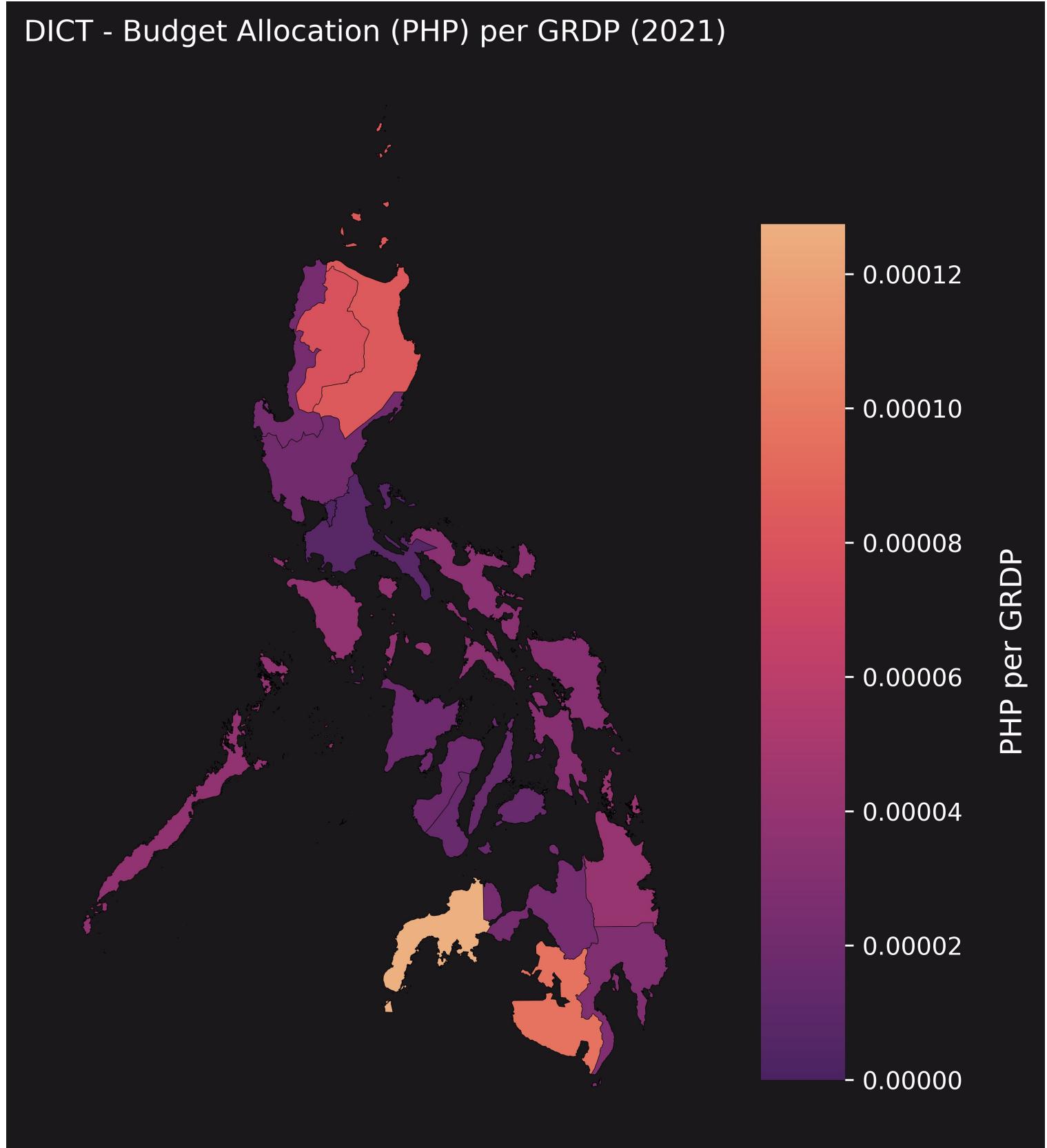
DHSUD - Pesos per Person (2024)



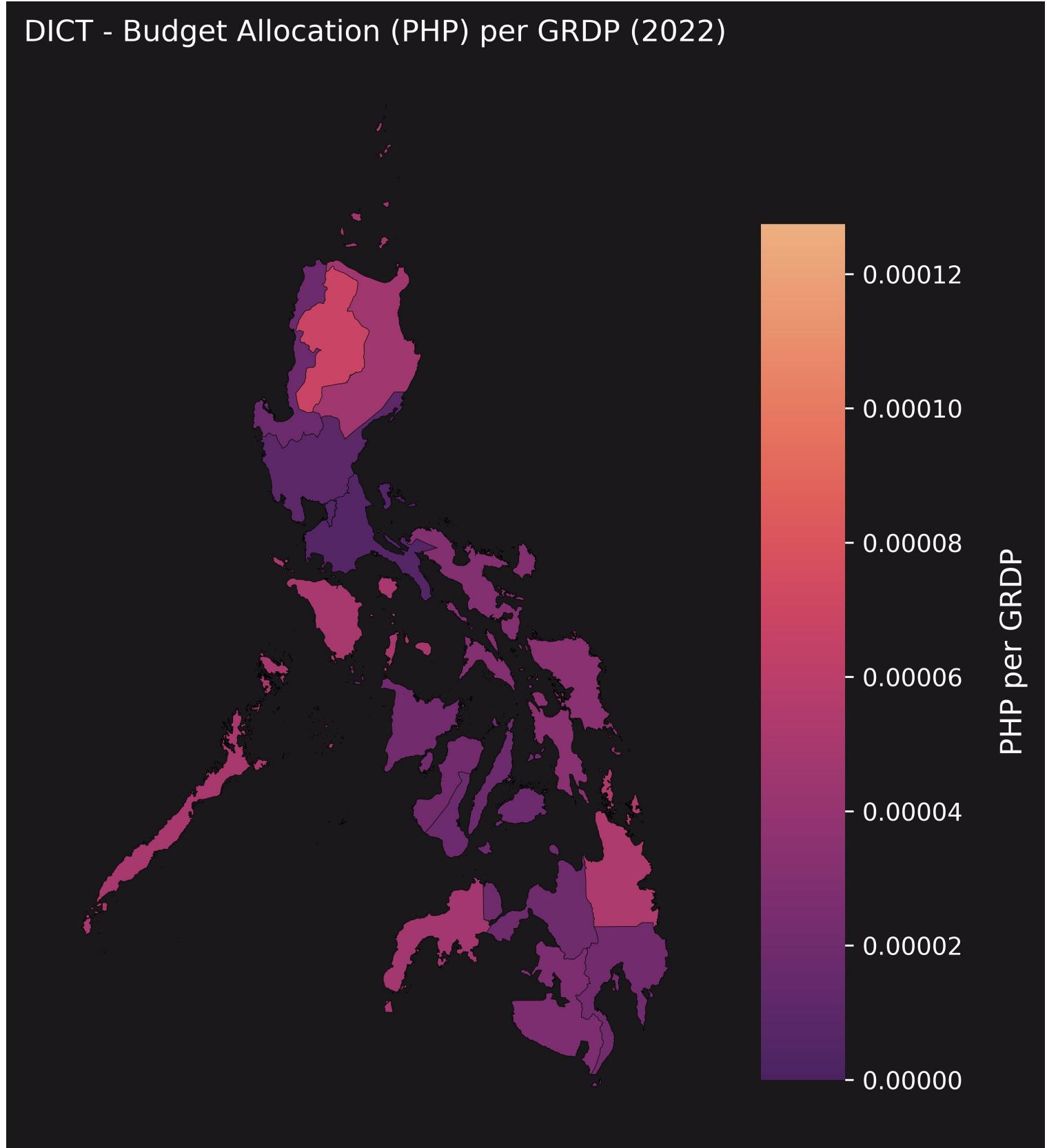
DICT - Budget Allocation (PHP) per GRDP (2020)



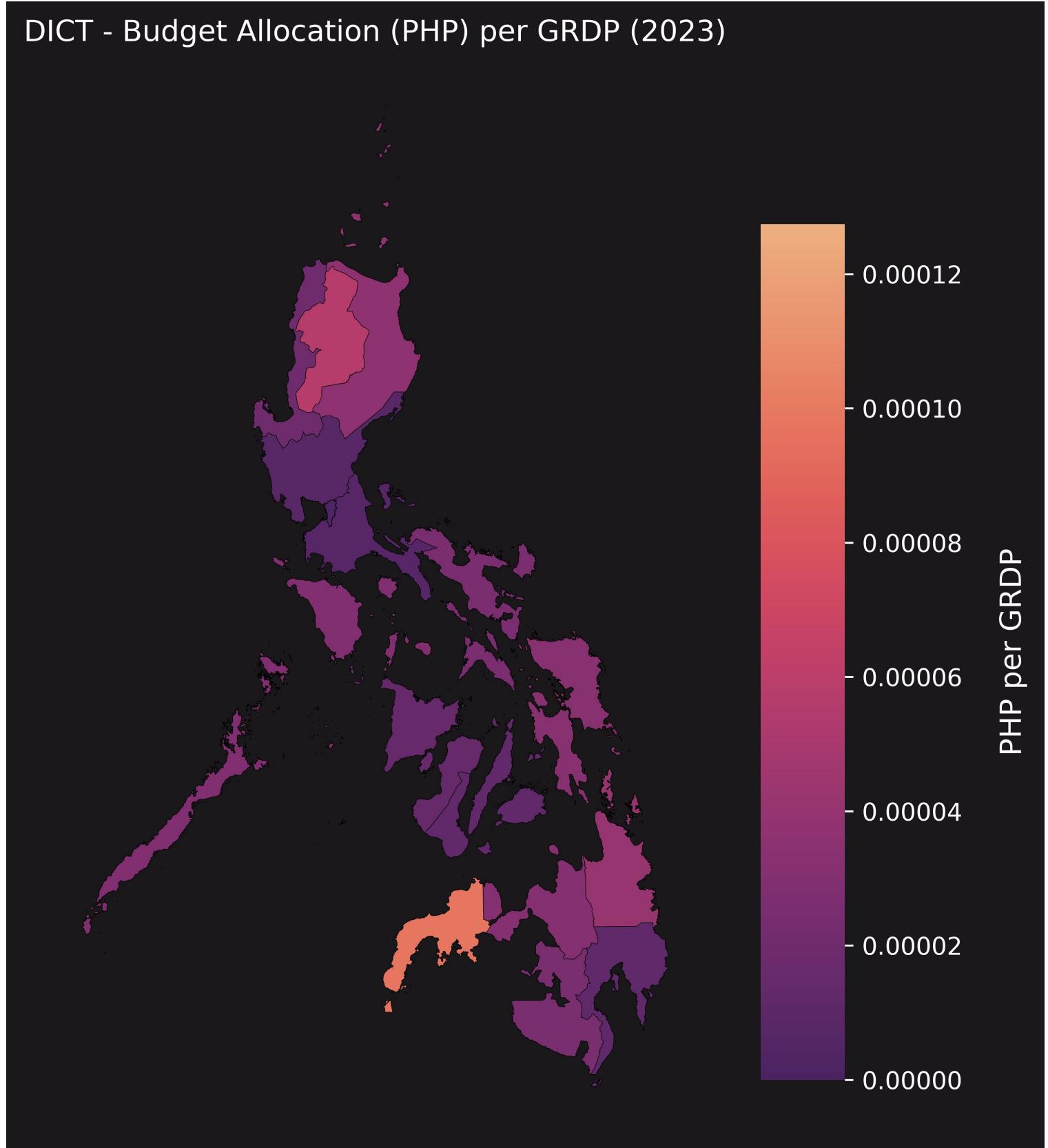
DICT - Budget Allocation (PHP) per GRDP (2021)



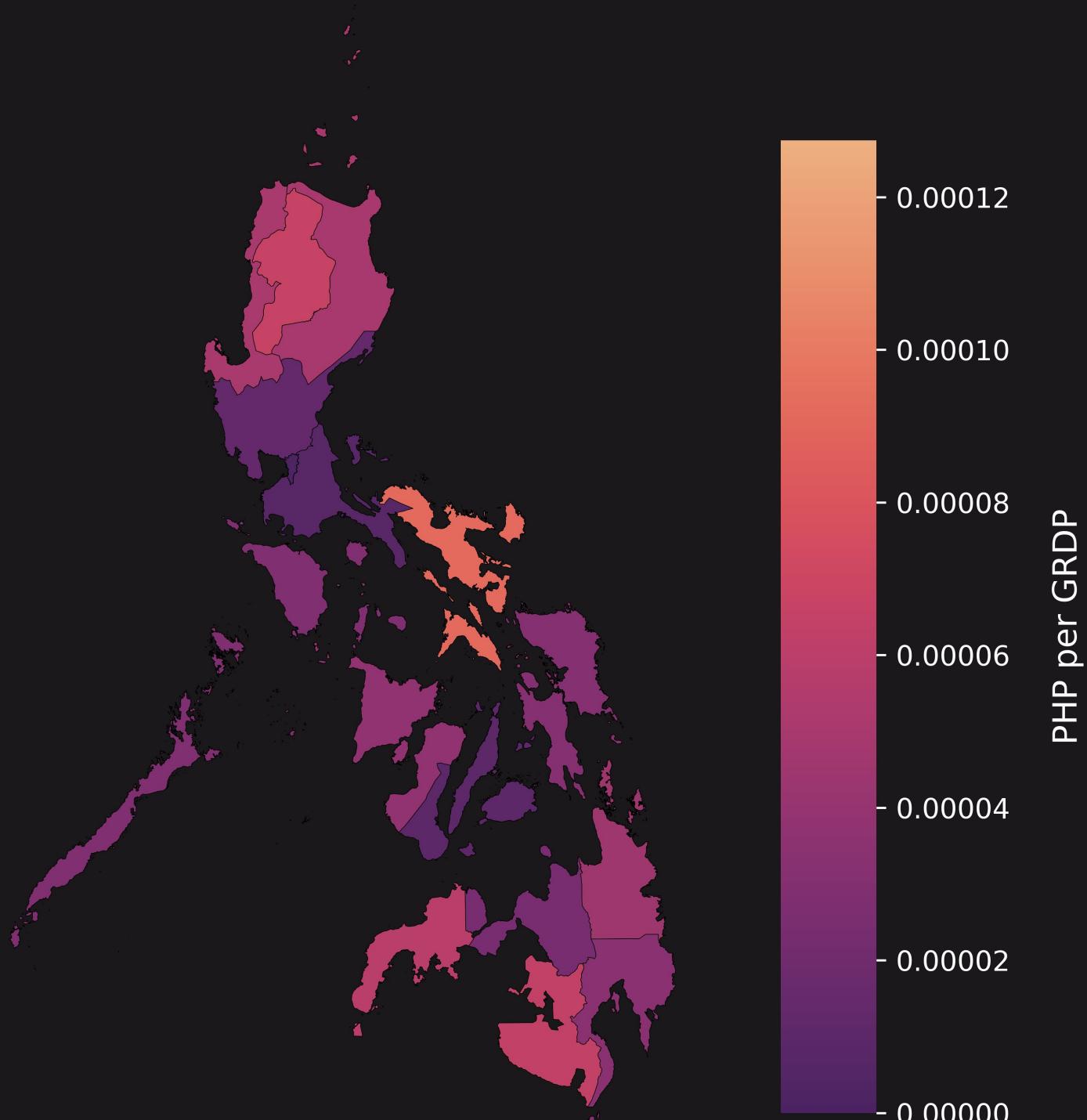
DICT - Budget Allocation (PHP) per GRDP (2022)



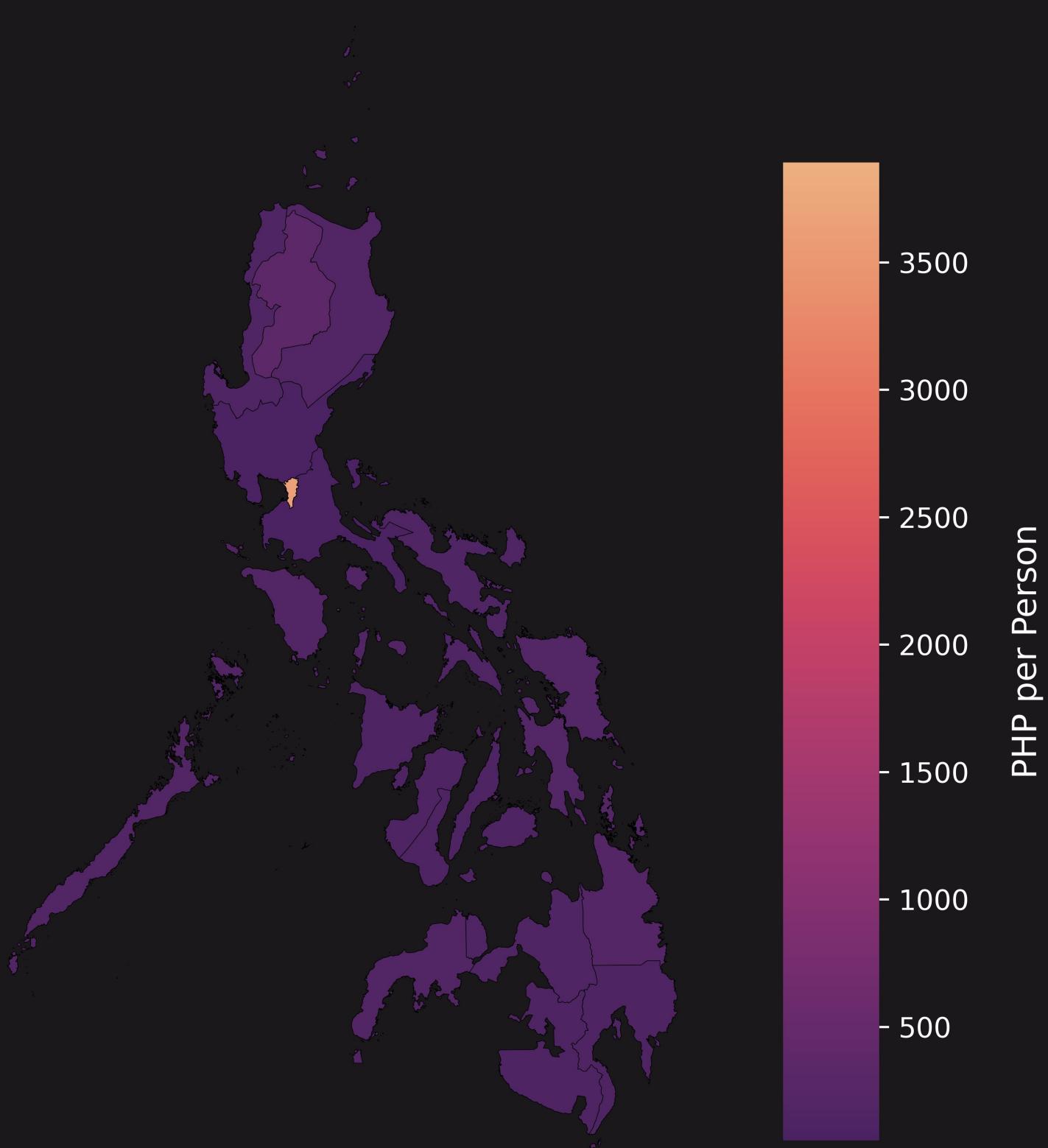
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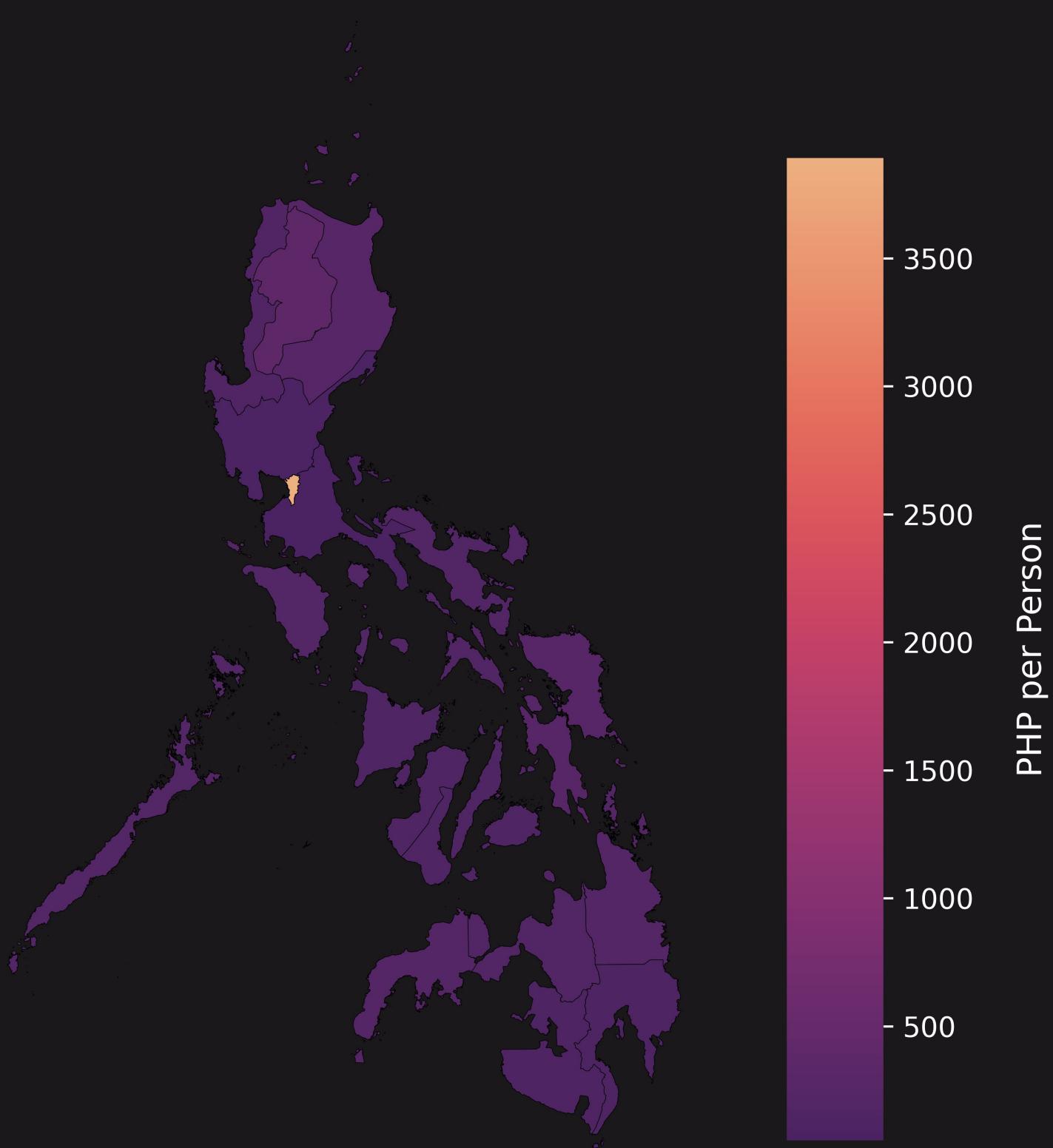
DICT - Budget Allocation (PHP) per GRDP (2024)



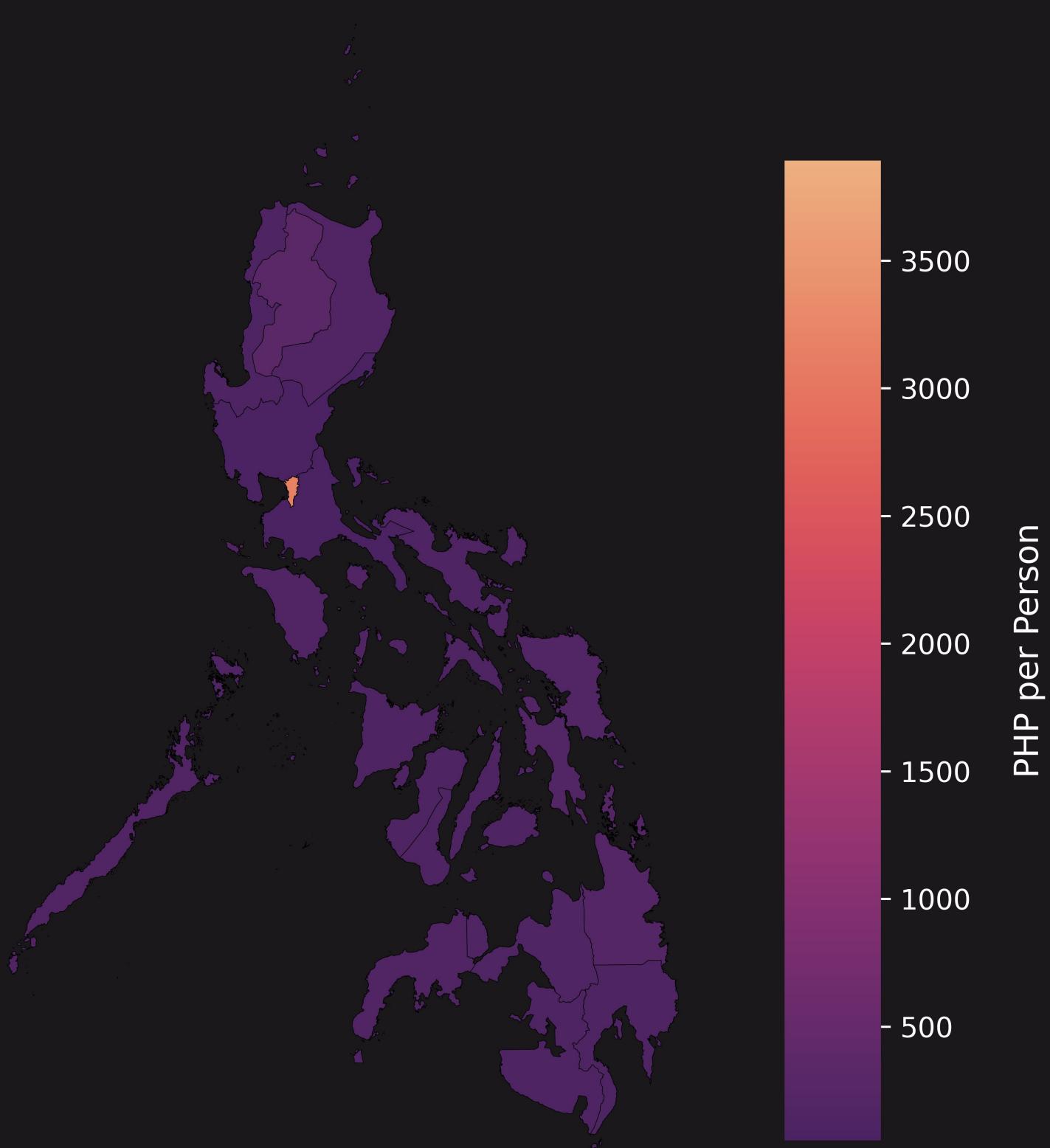
DILG - Pesos per Person (2023)



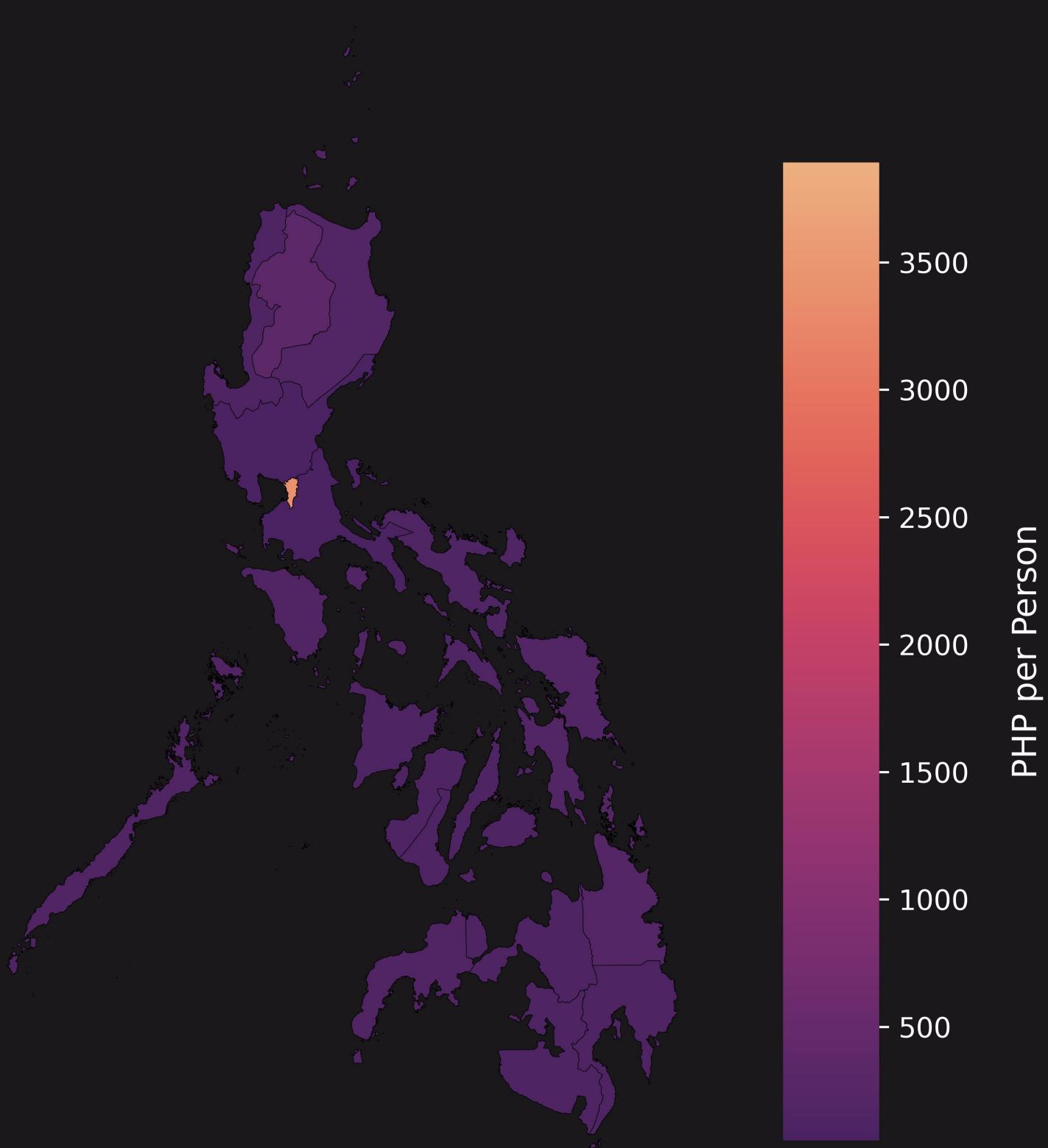
DILG - Pesos per Person (2024)



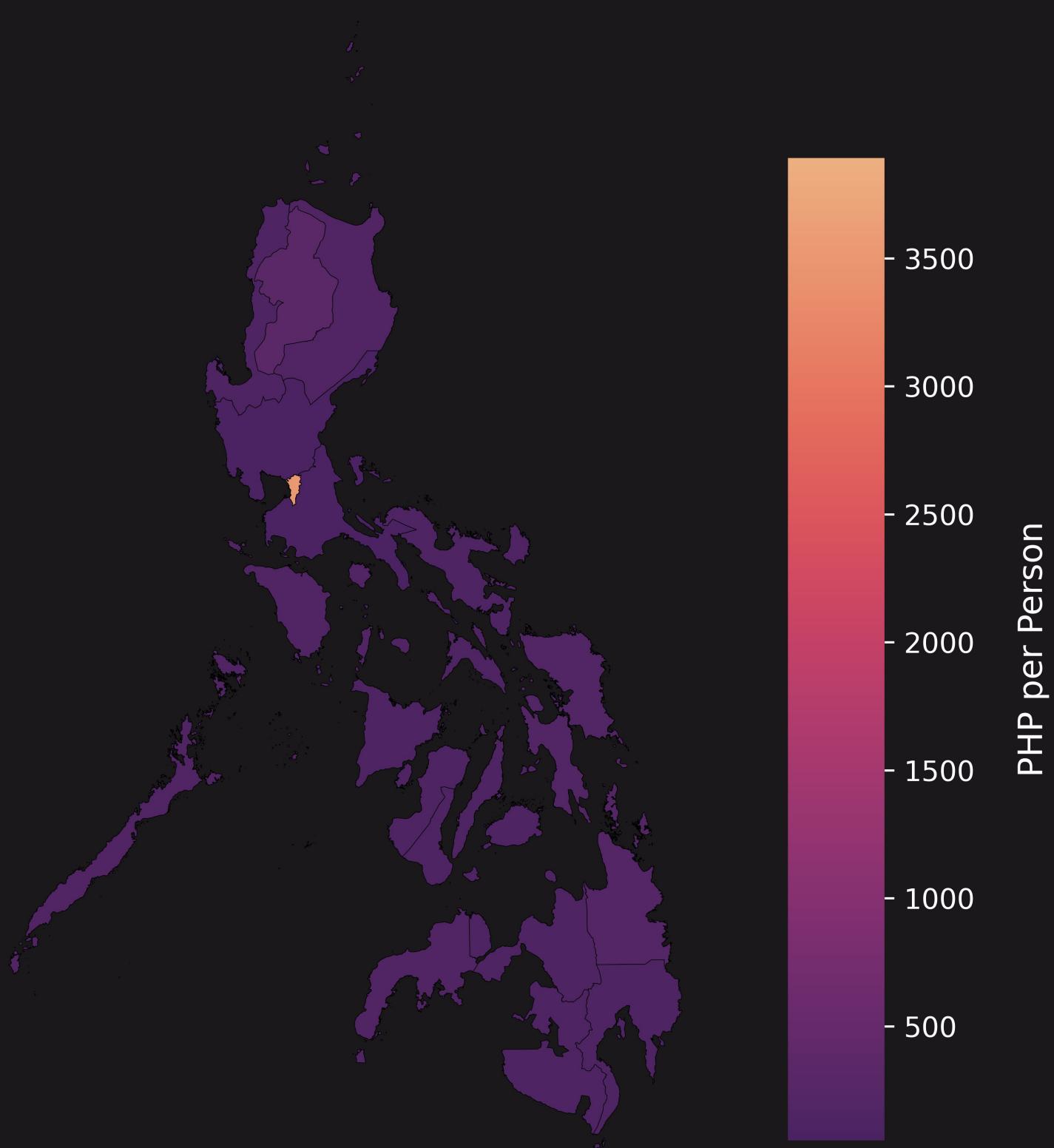
DILG - Pesos per Person (2020)



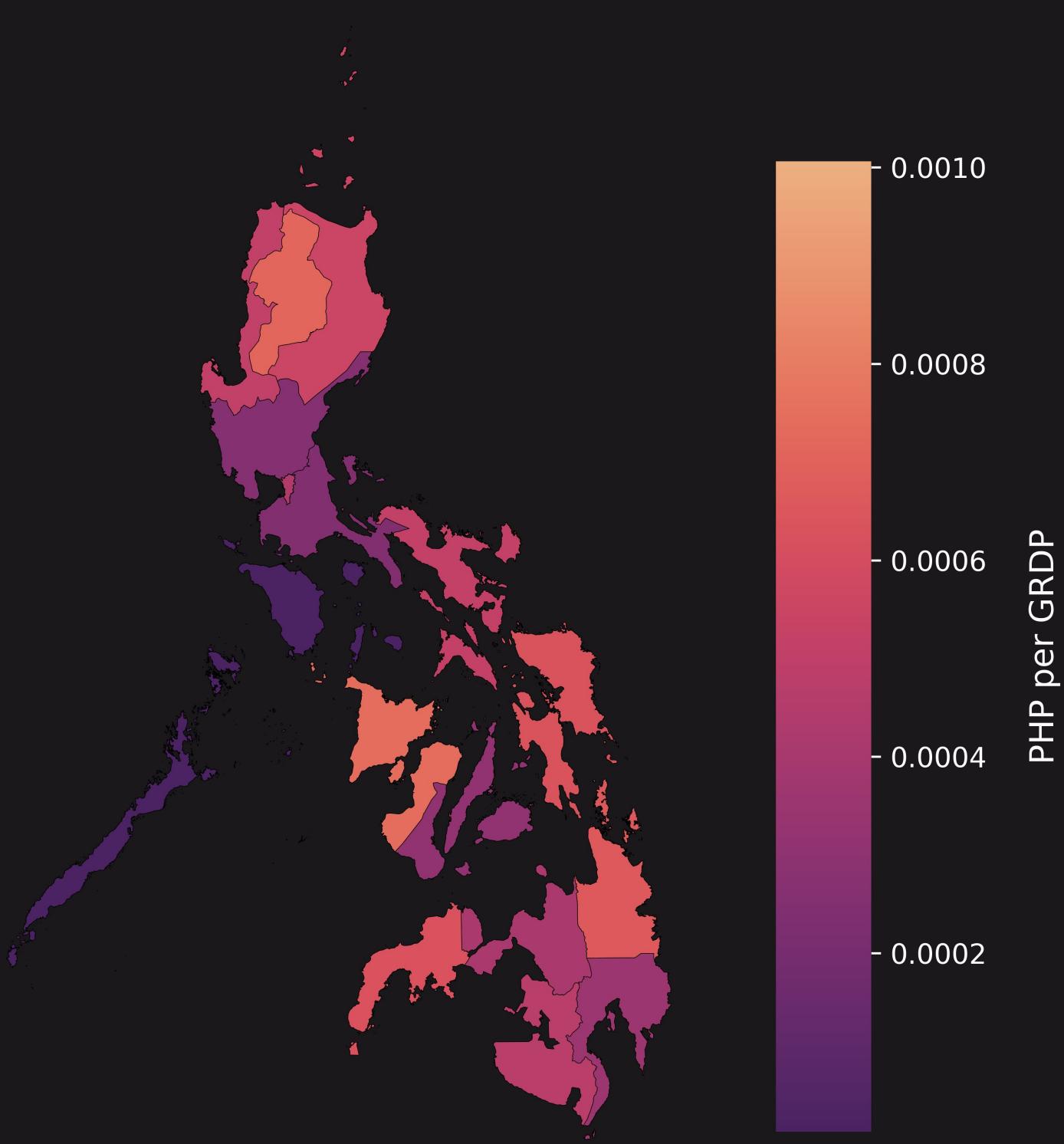
DILG - Pesos per Person (2021)



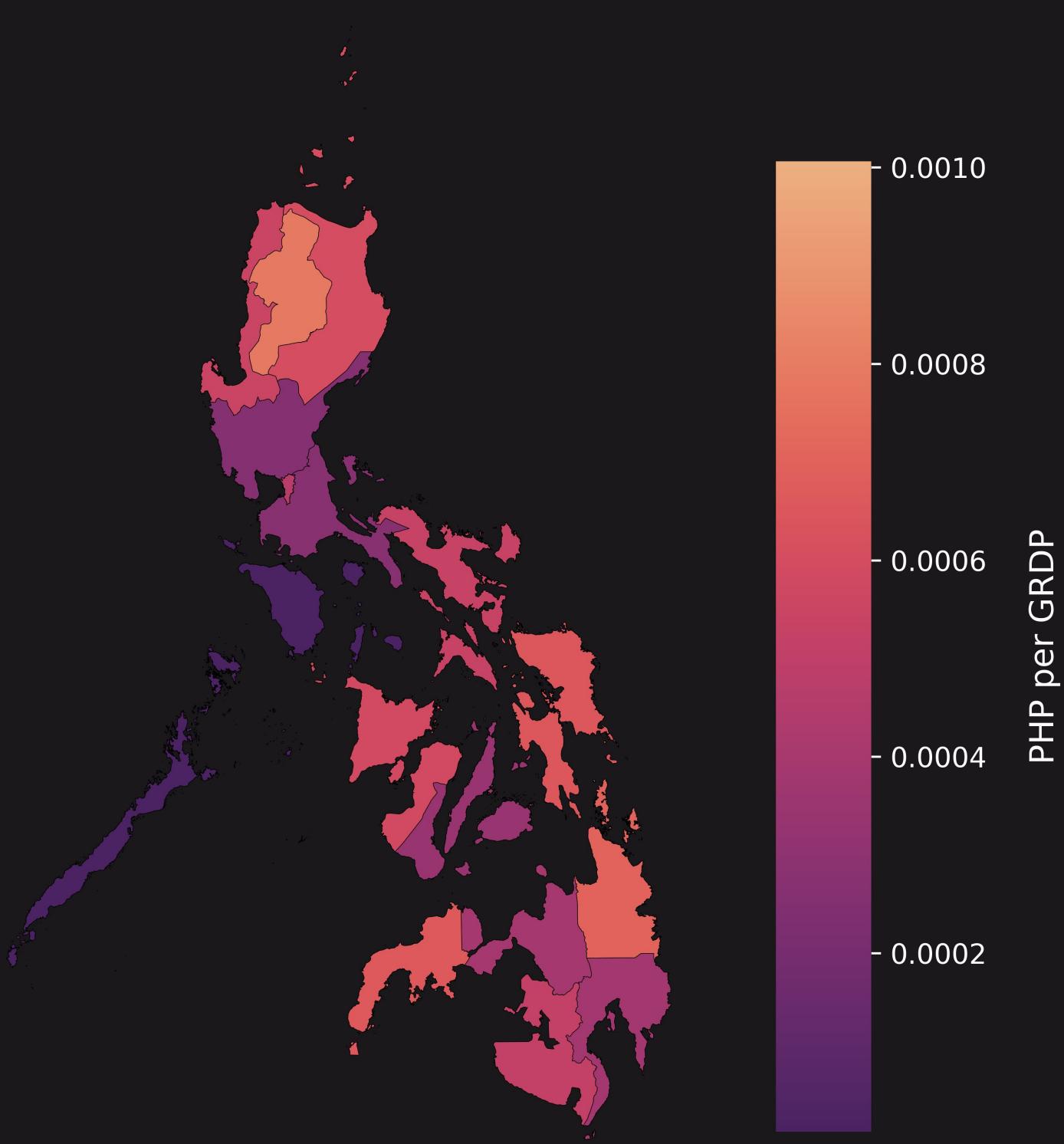
DILG - Pesos per Person (2022)



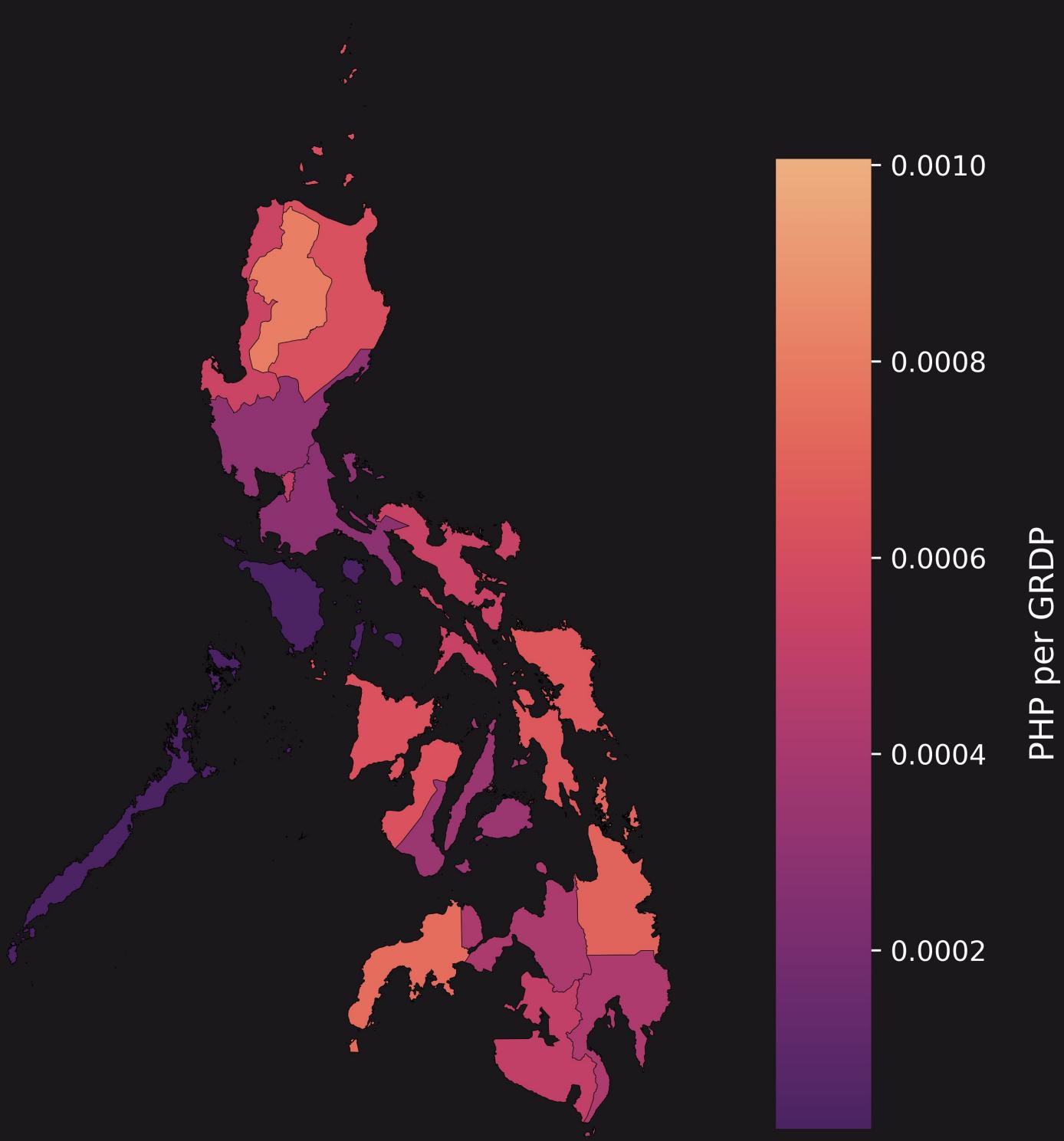
DOF - Budget Allocation (PHP) per GRDP (2020)



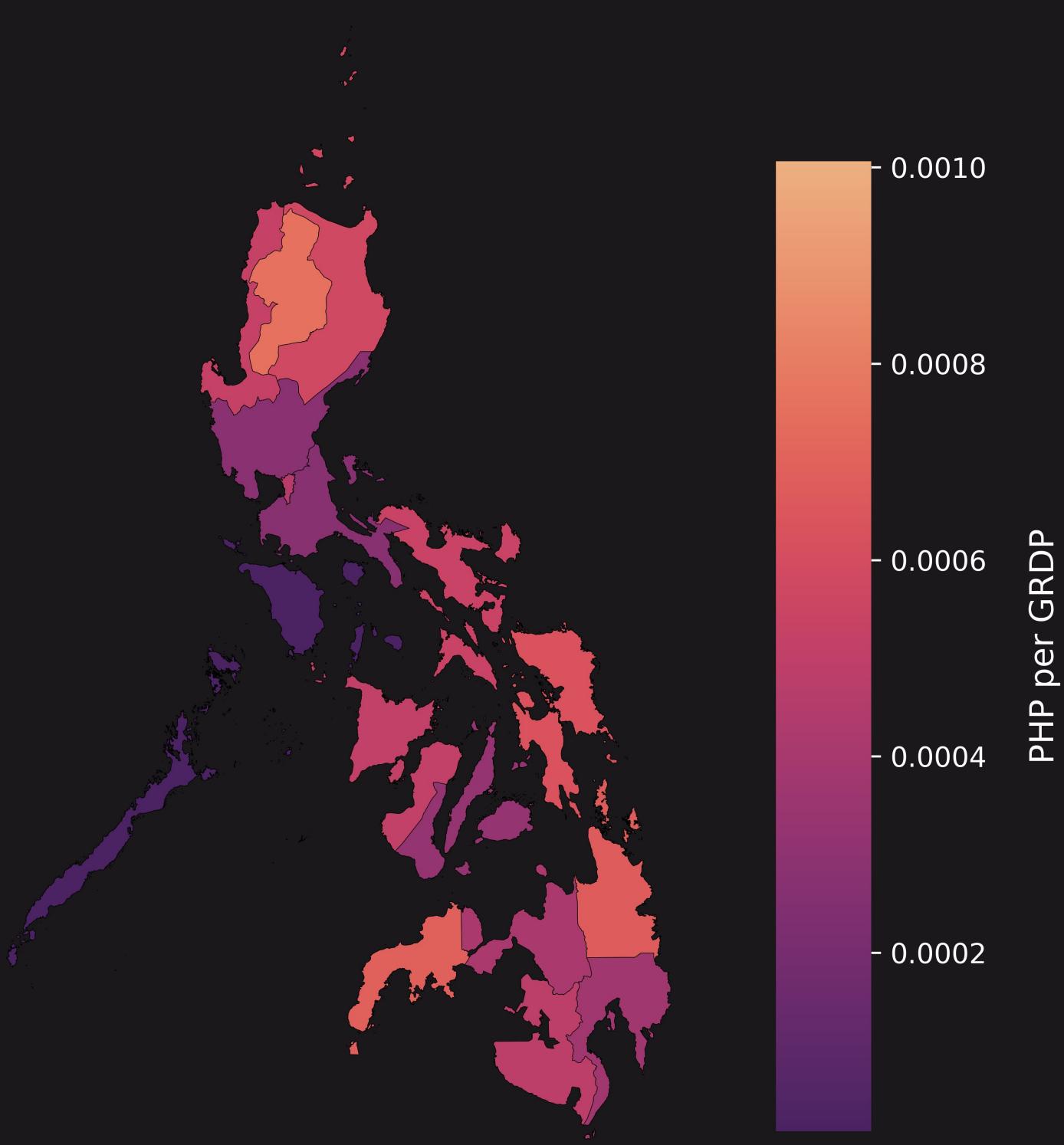
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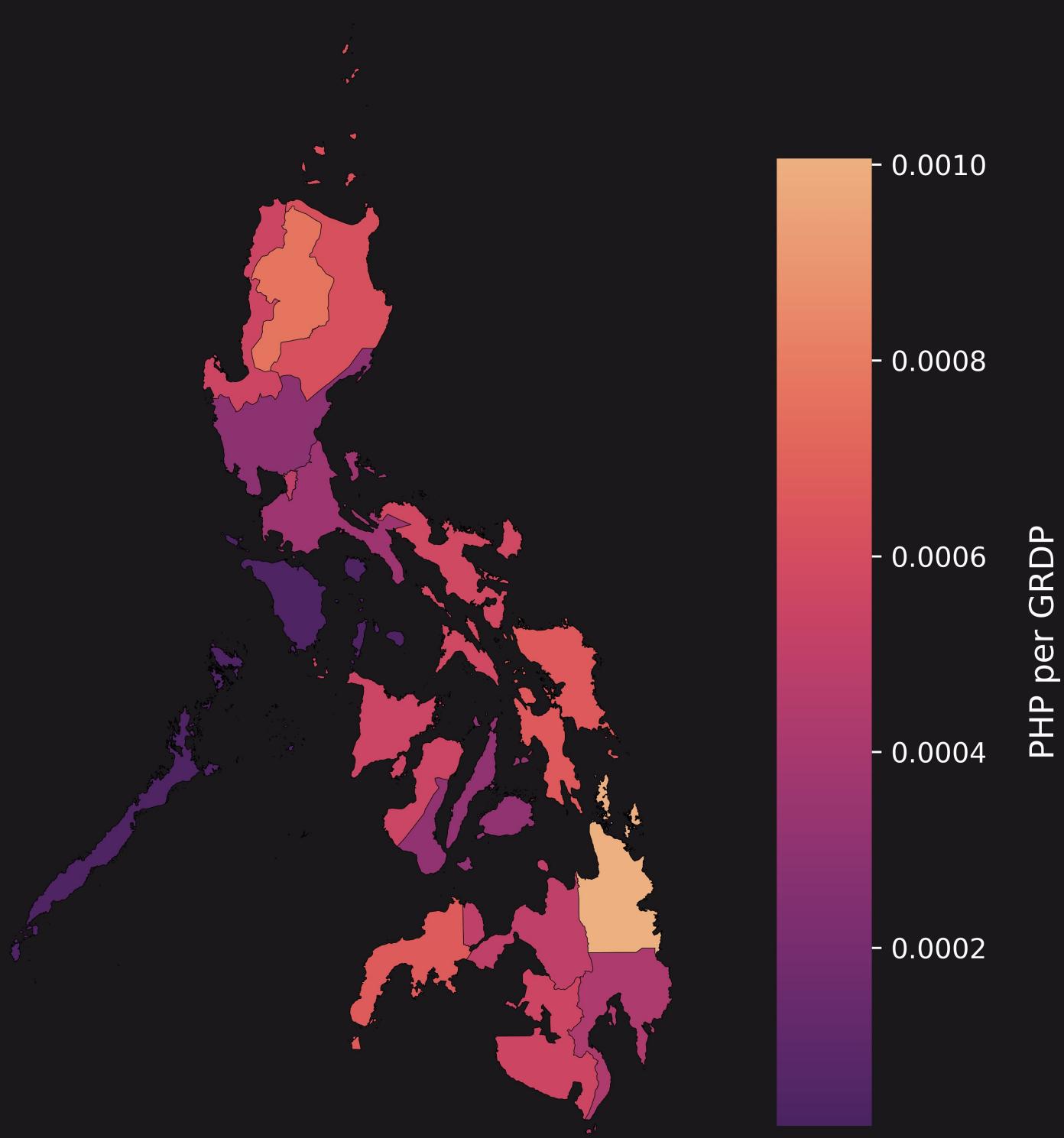
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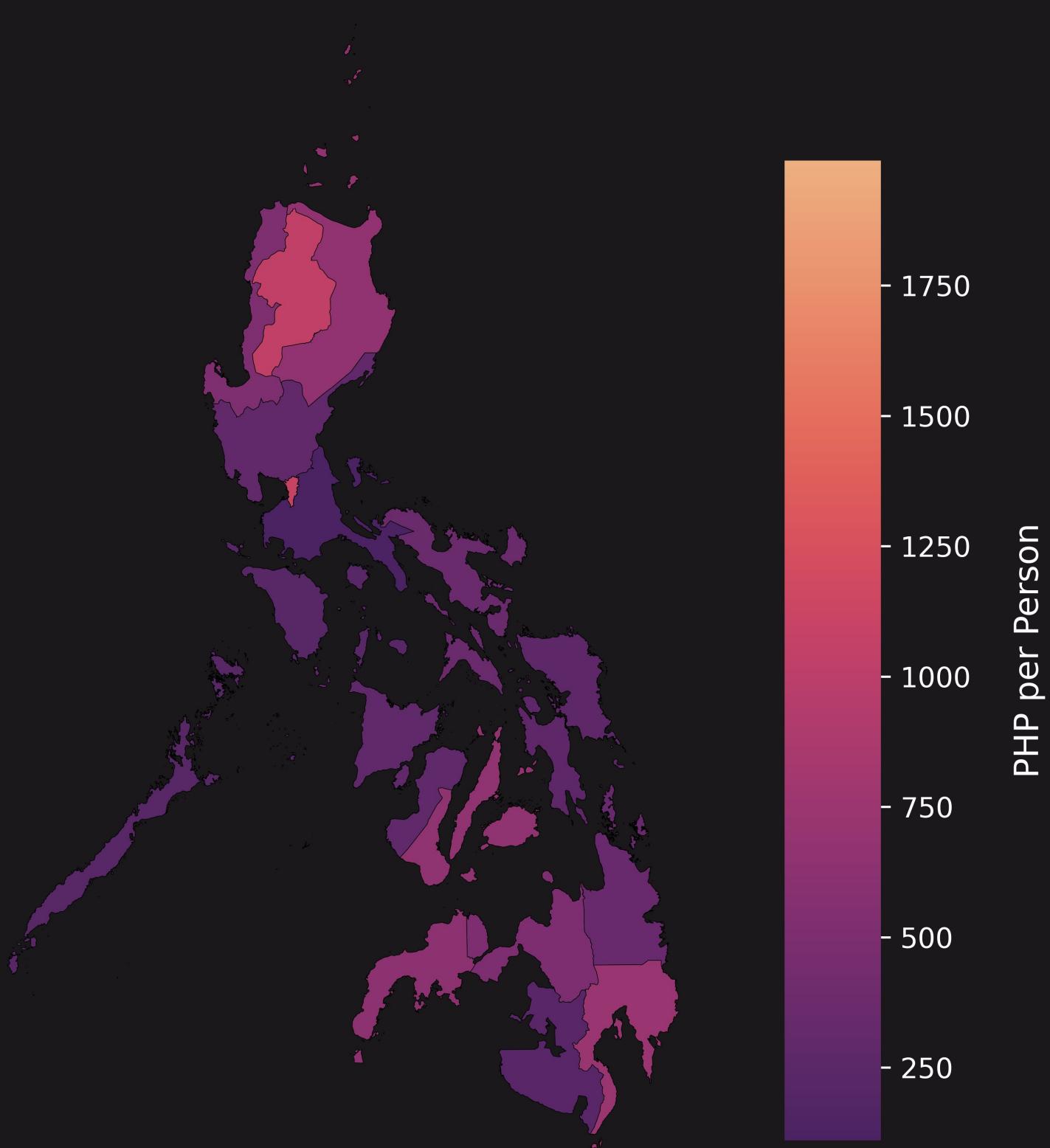
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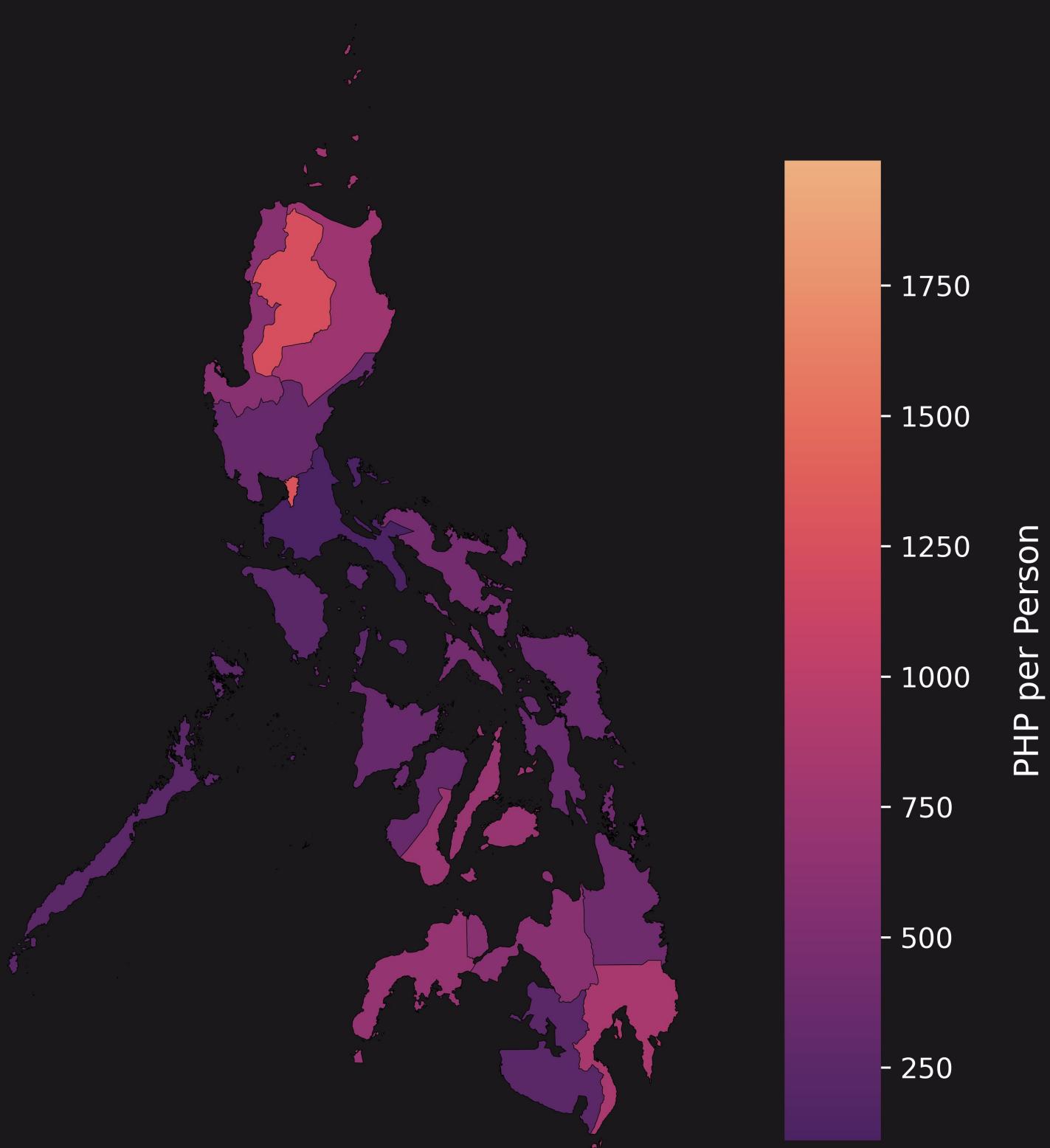
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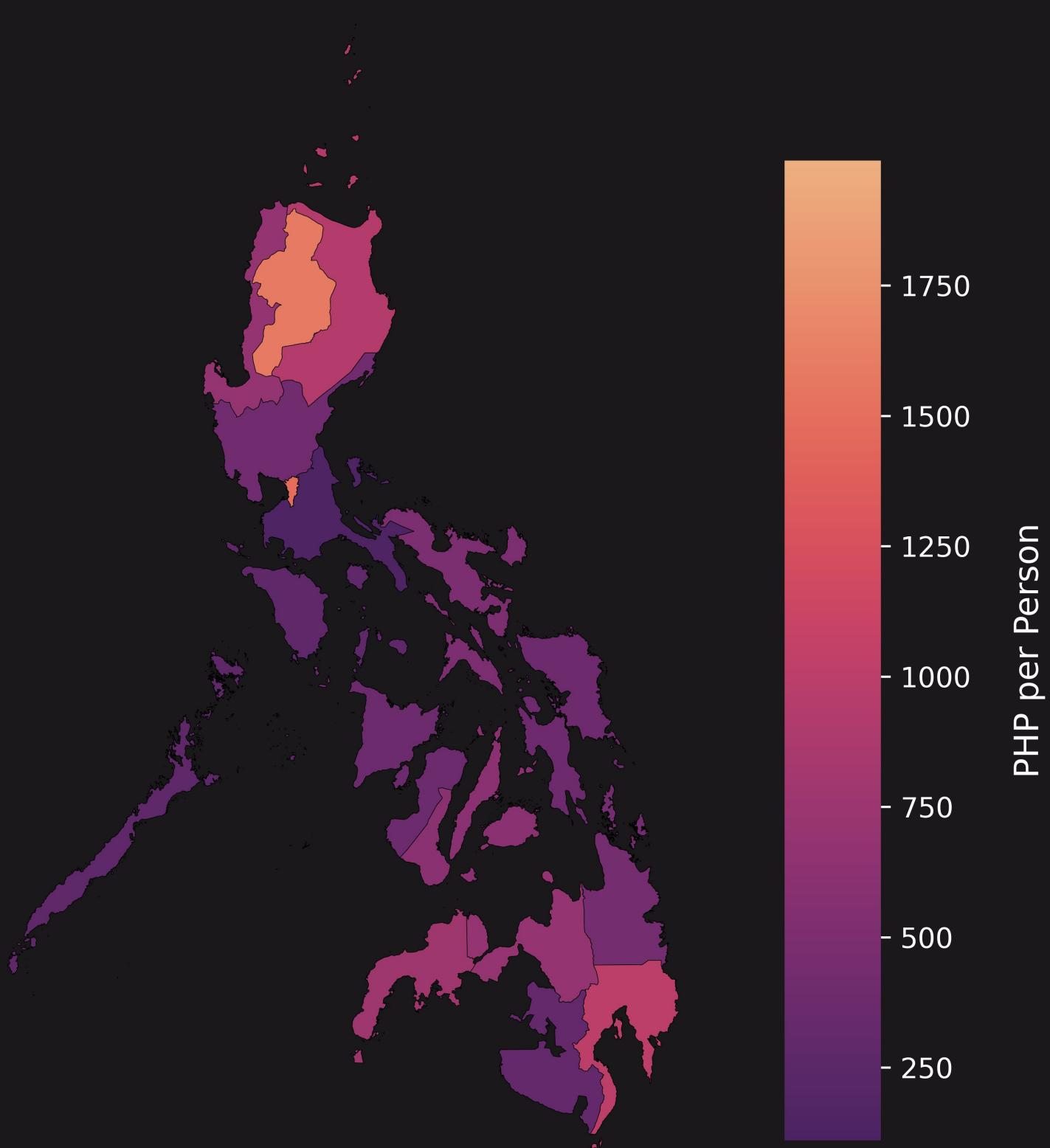
DOH - Pesos per Person (2020)



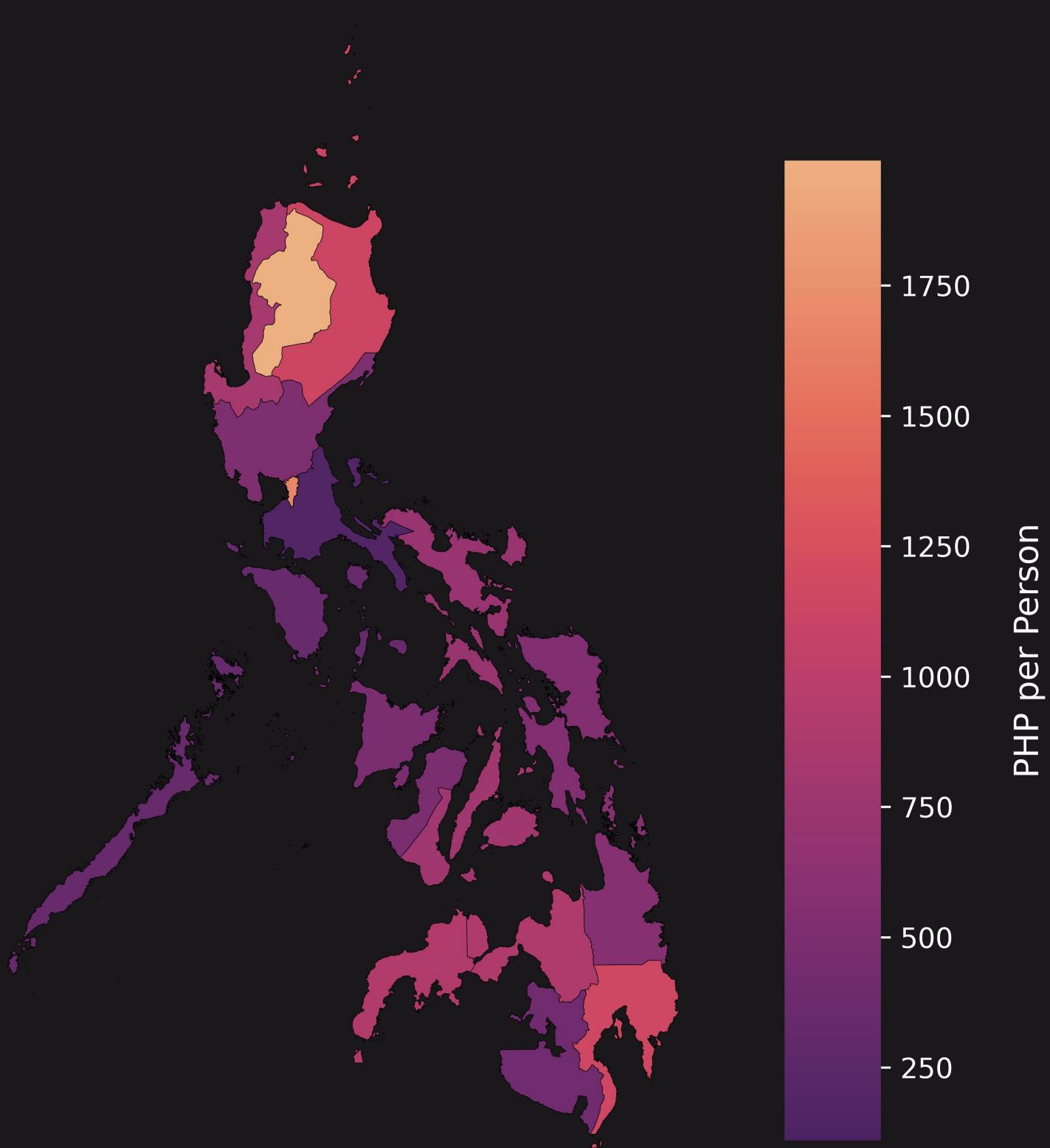
DOH - Pesos per Person (2021)



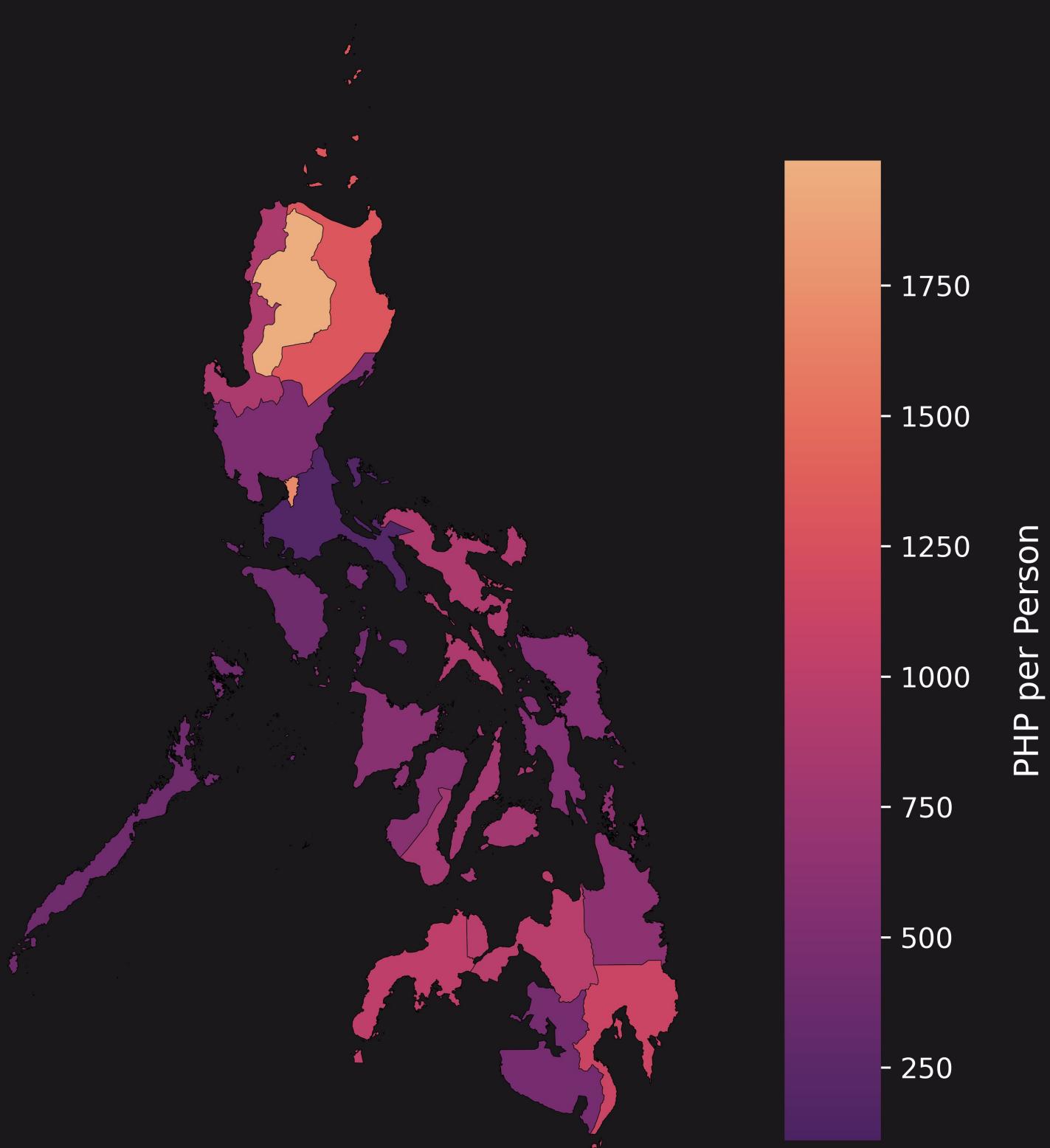
DOH - Pesos per Person (2022)



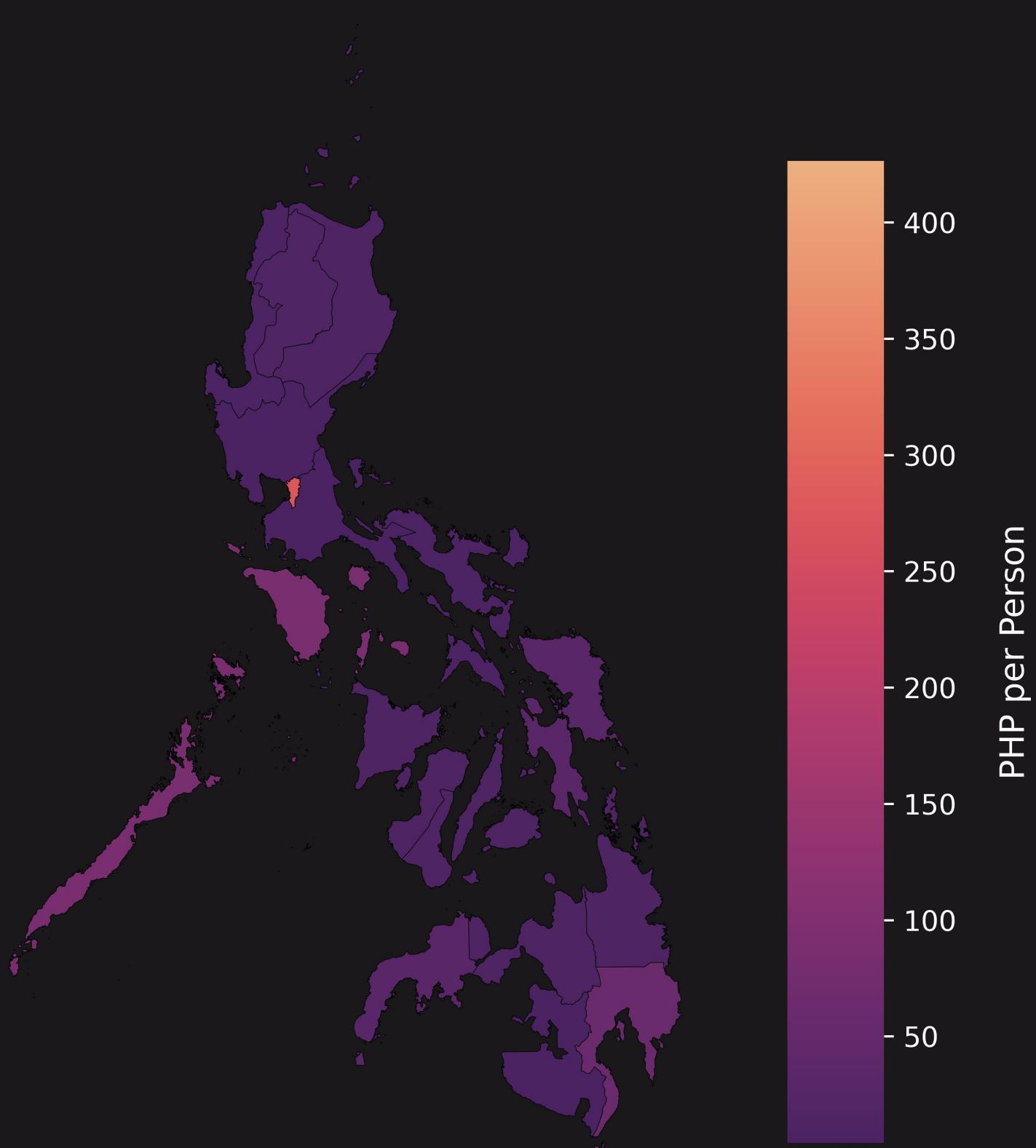
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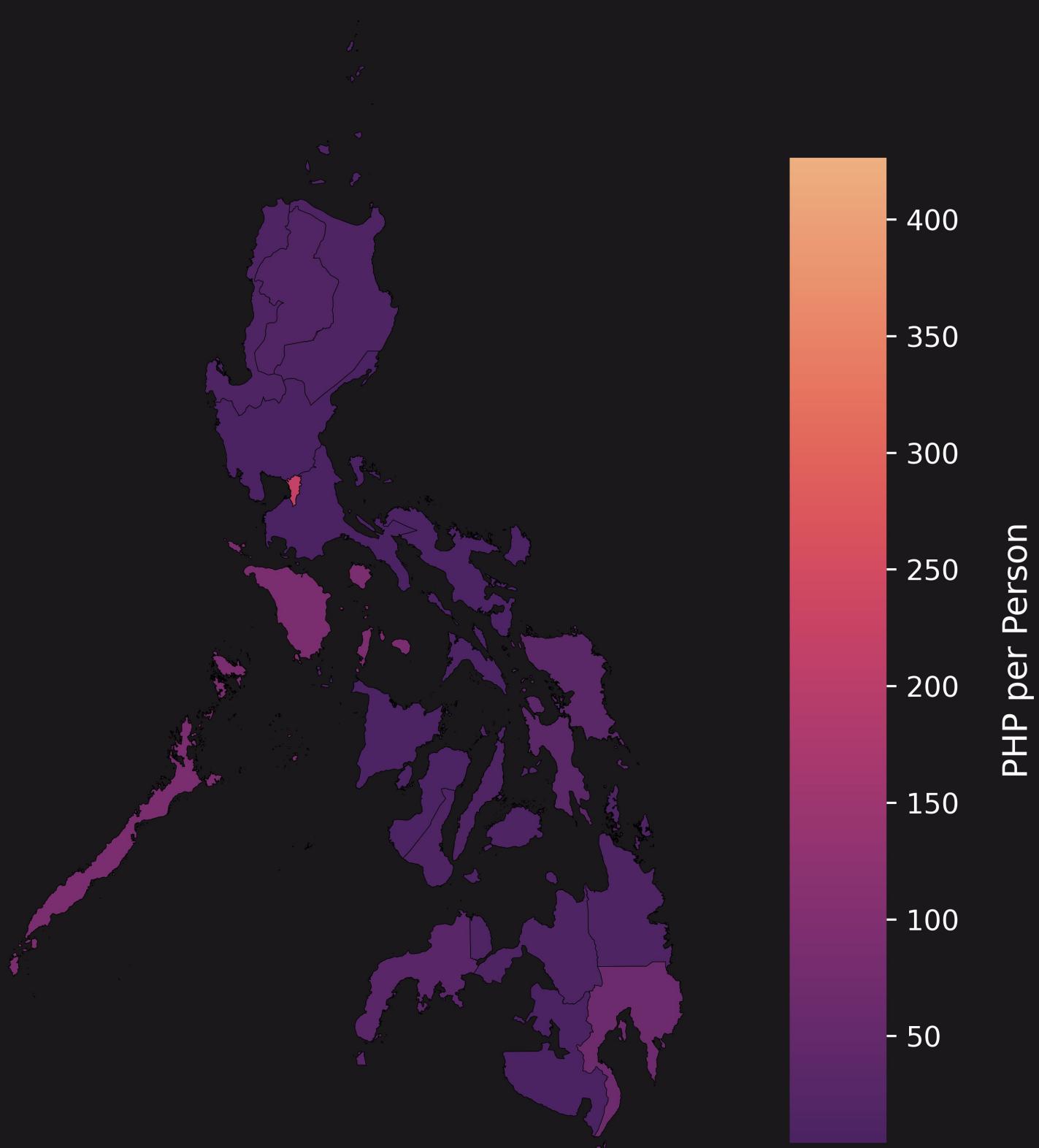
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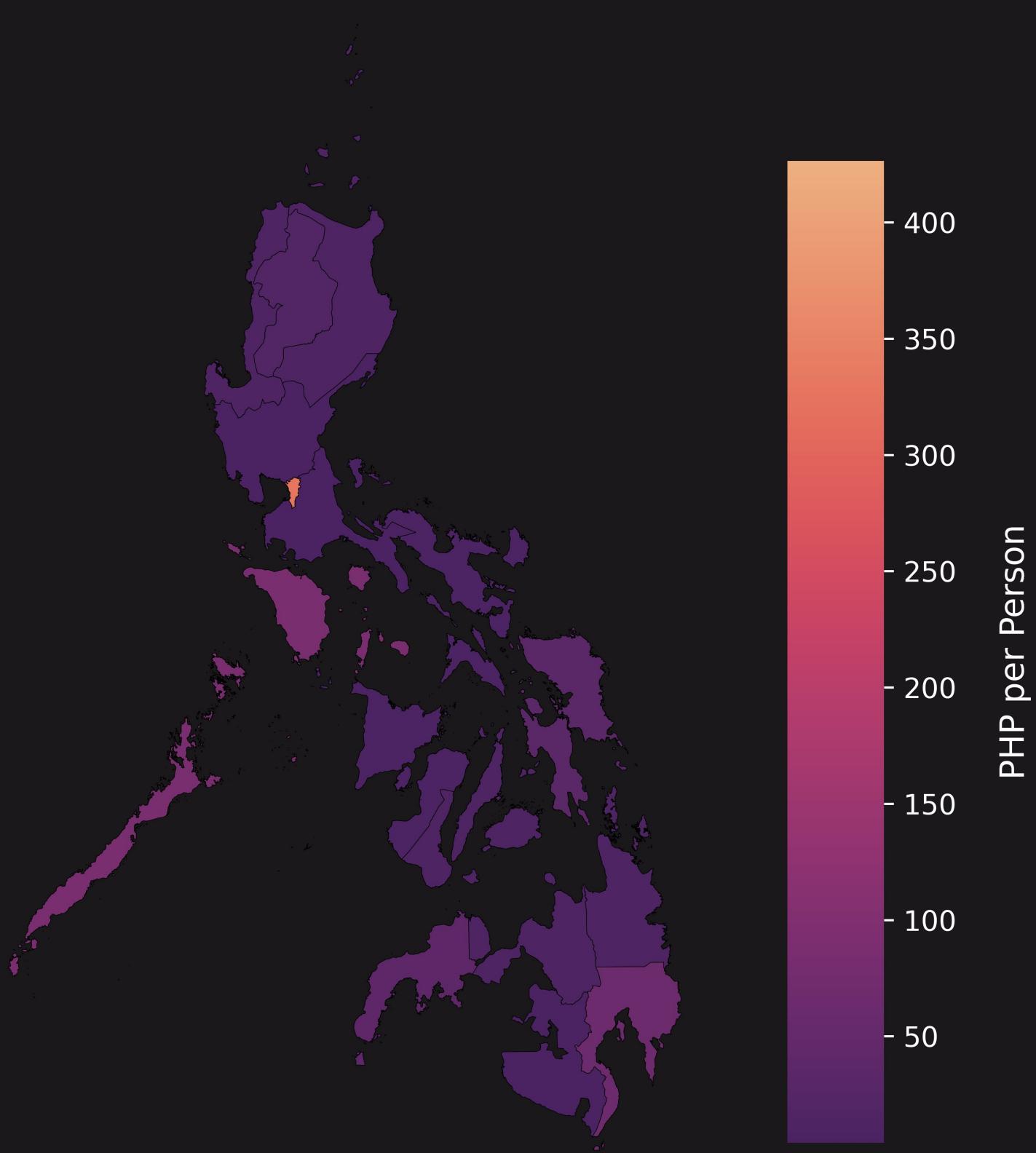
DOJ - Pesos per Person (2020)



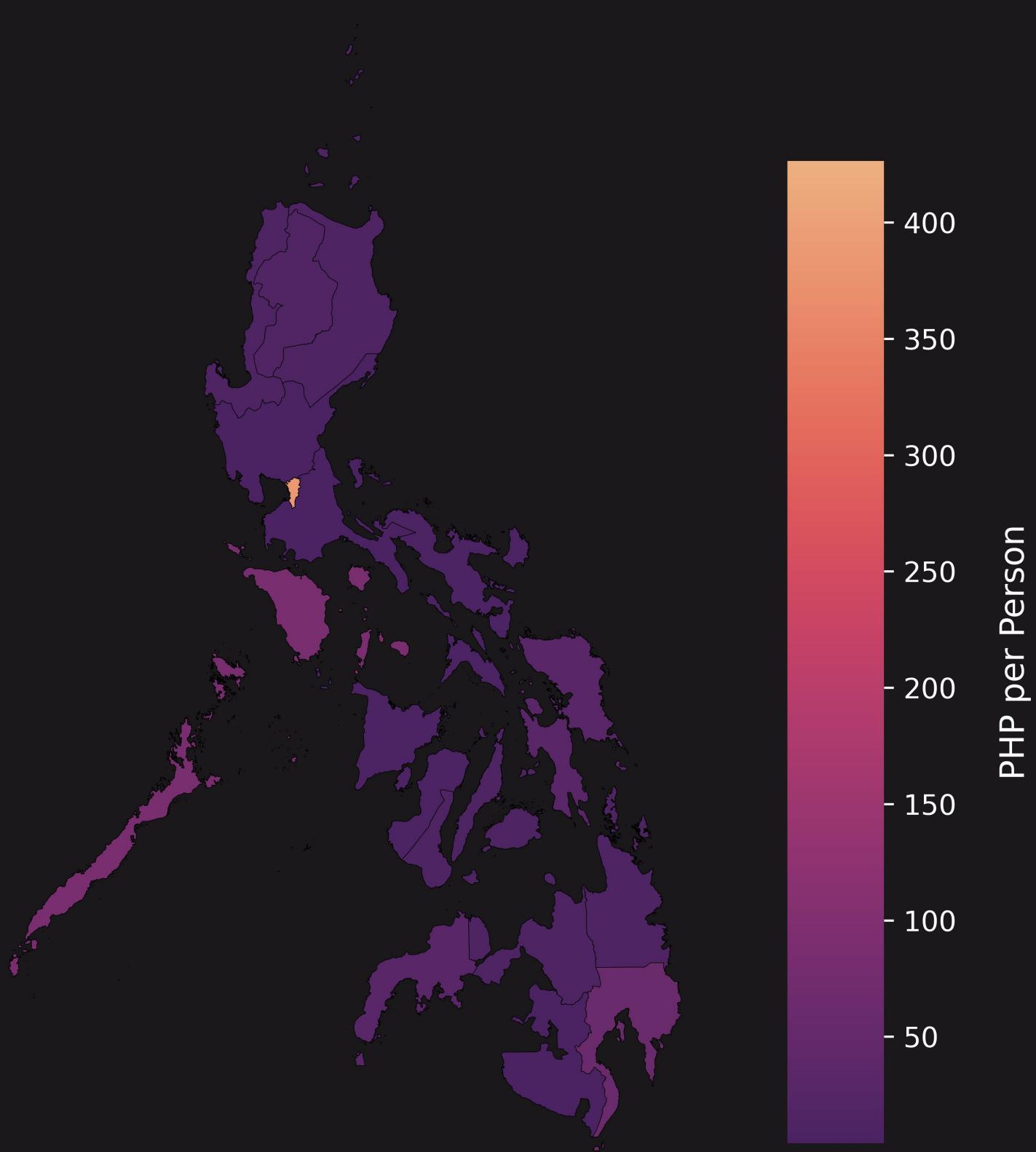
DOJ - Pesos per Person (2021)



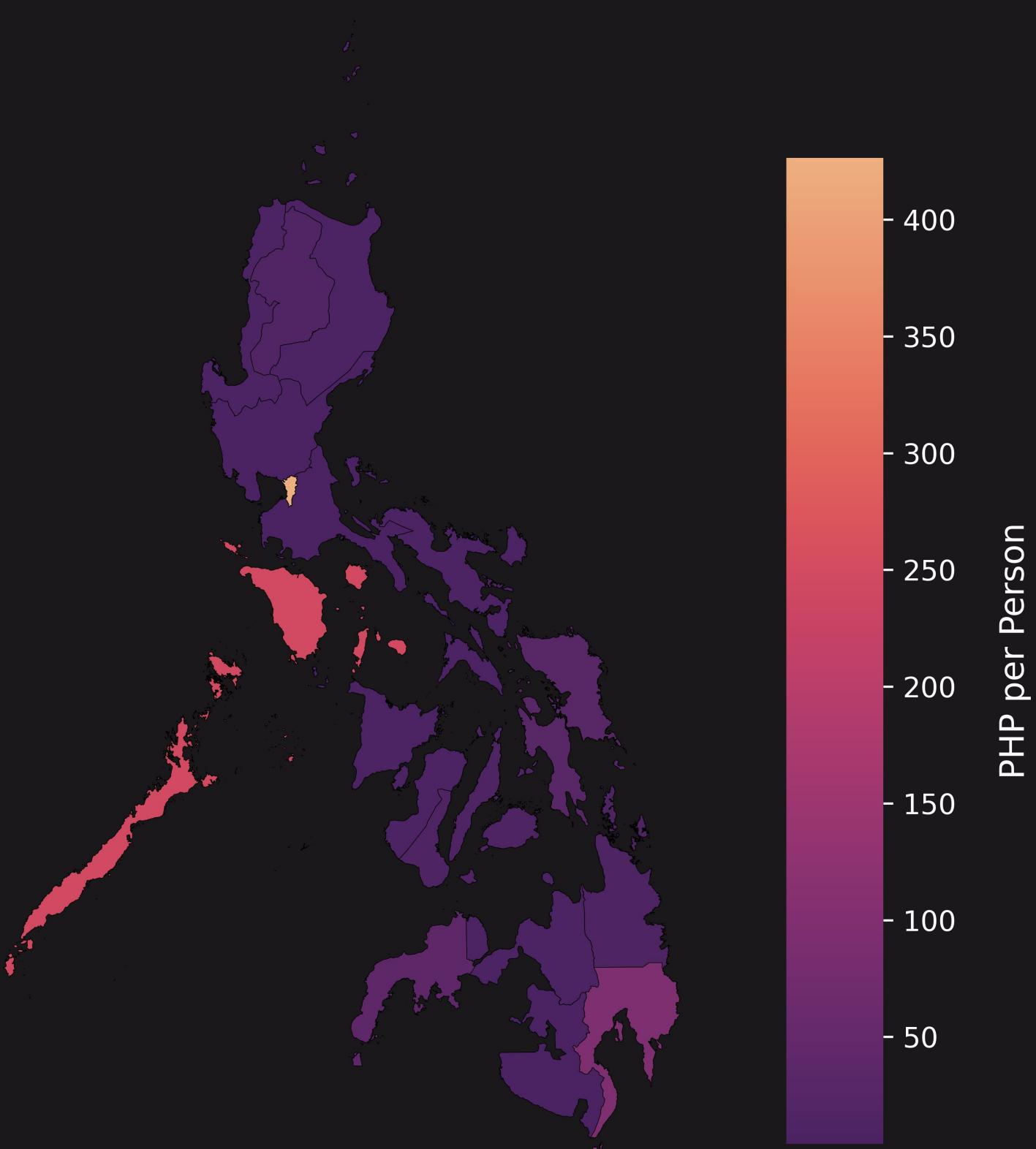
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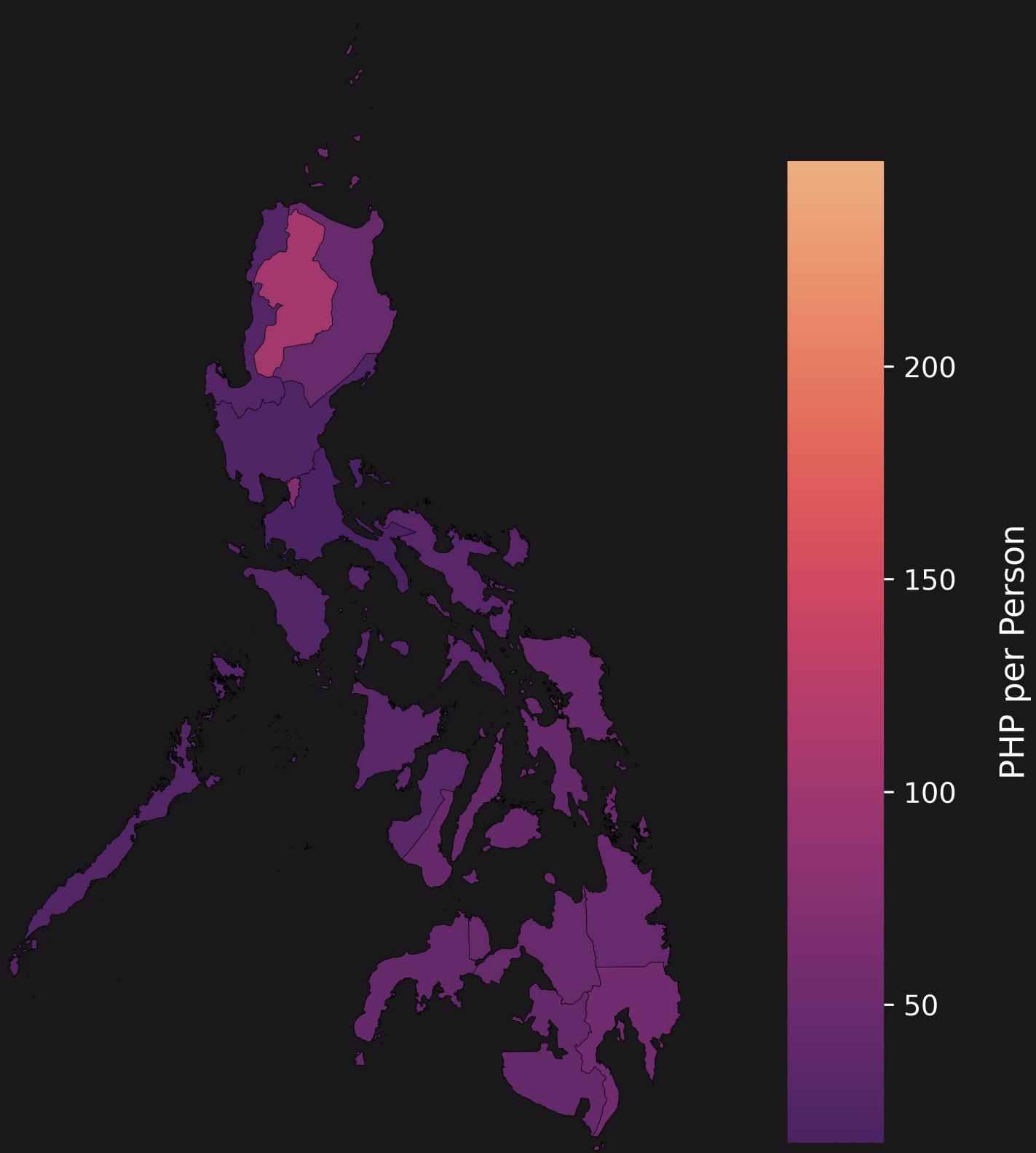
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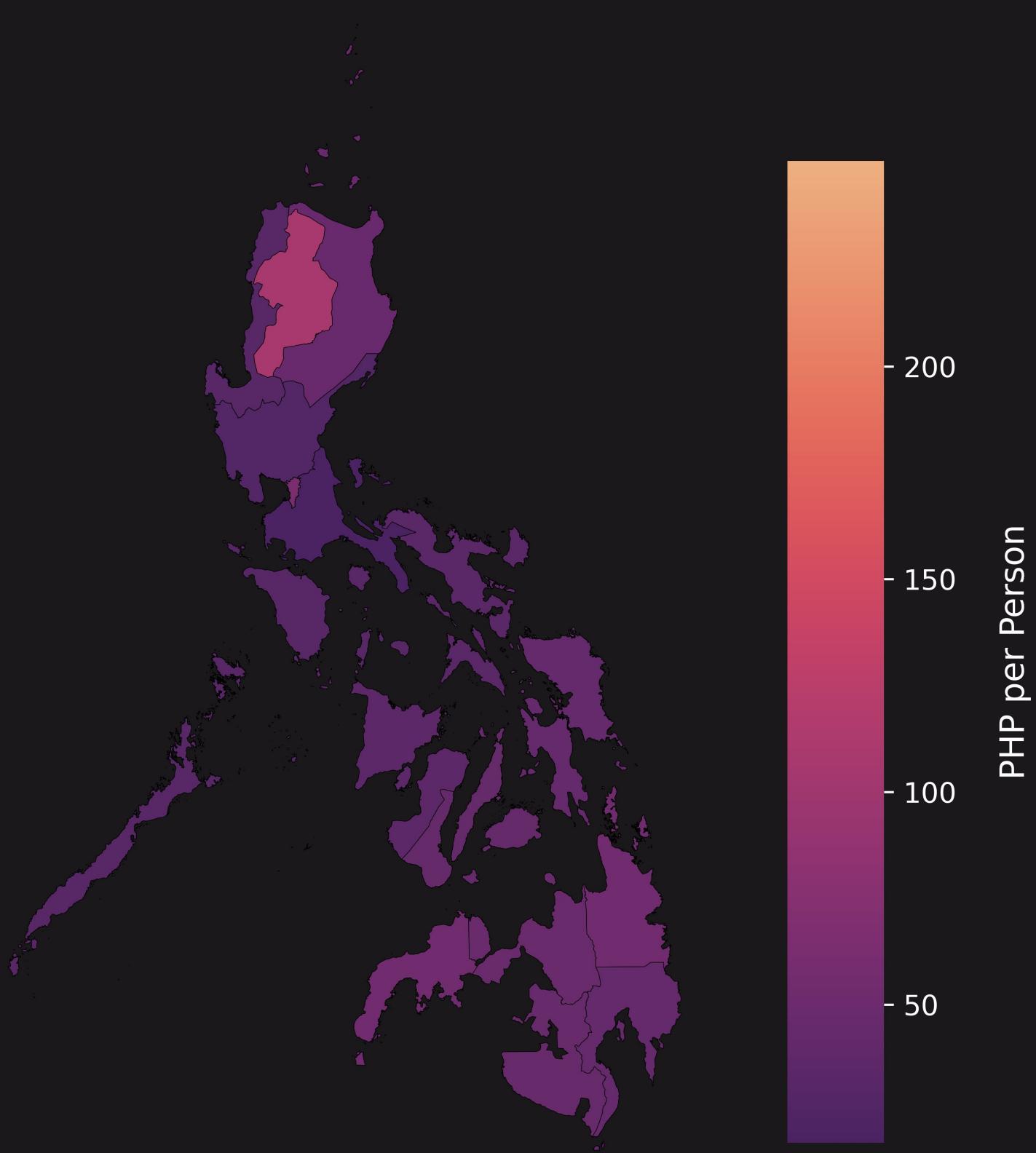
DOJ - Pesos per Person (2024)



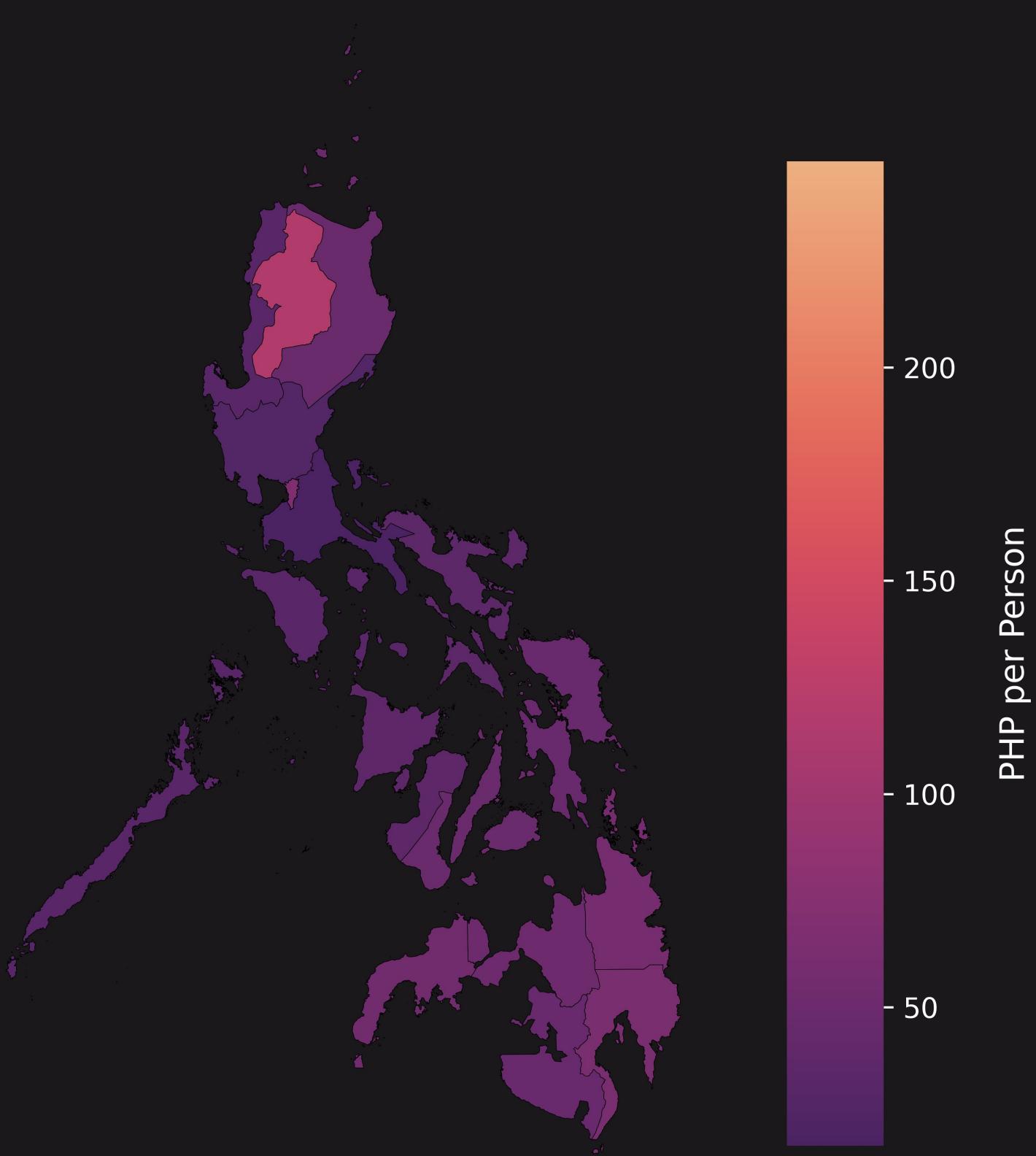
DOLE - Pesos per Person (2020)



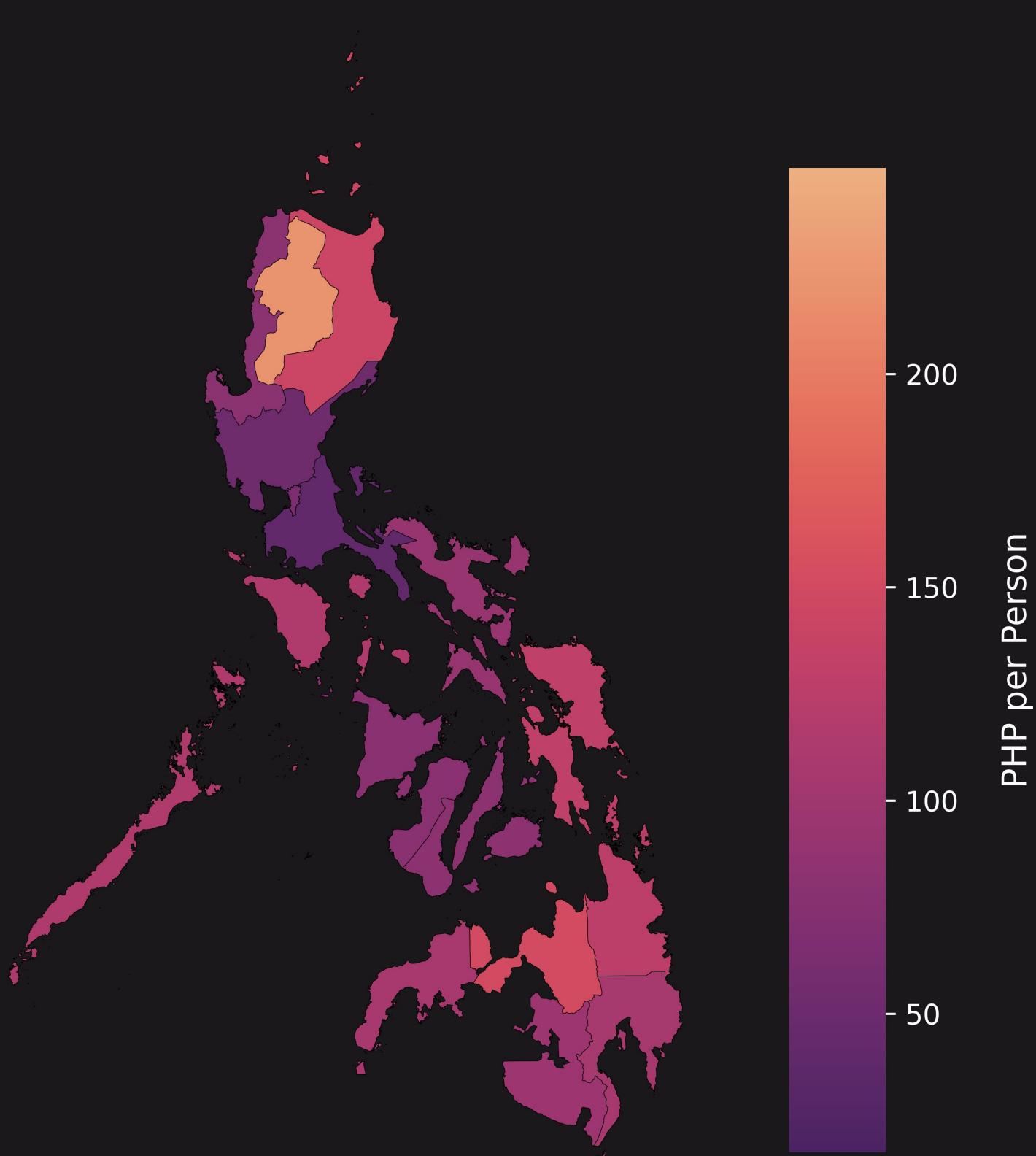
DOLE - Pesos per Person (2021)



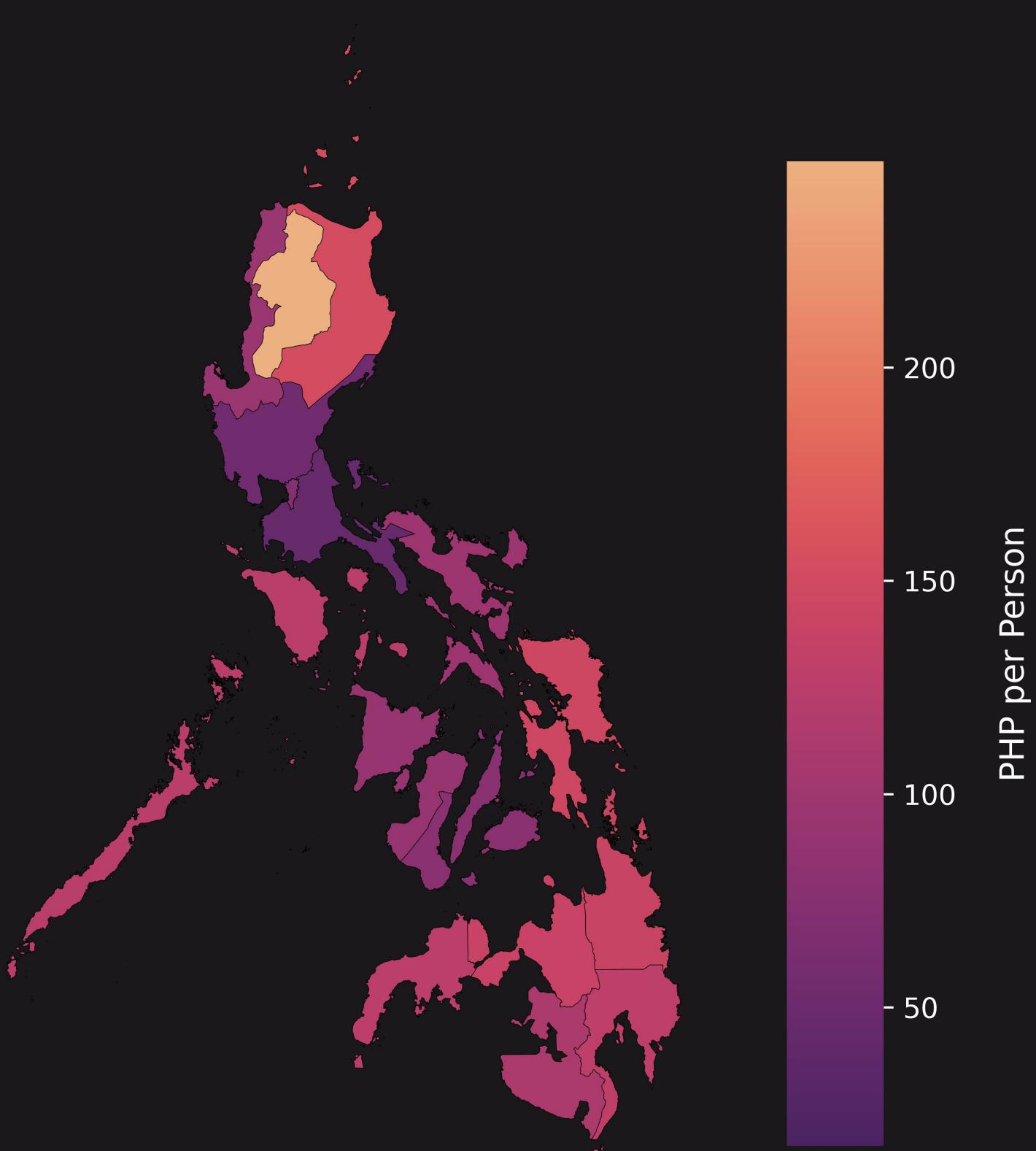
DOLE - Pesos per Person (2022)



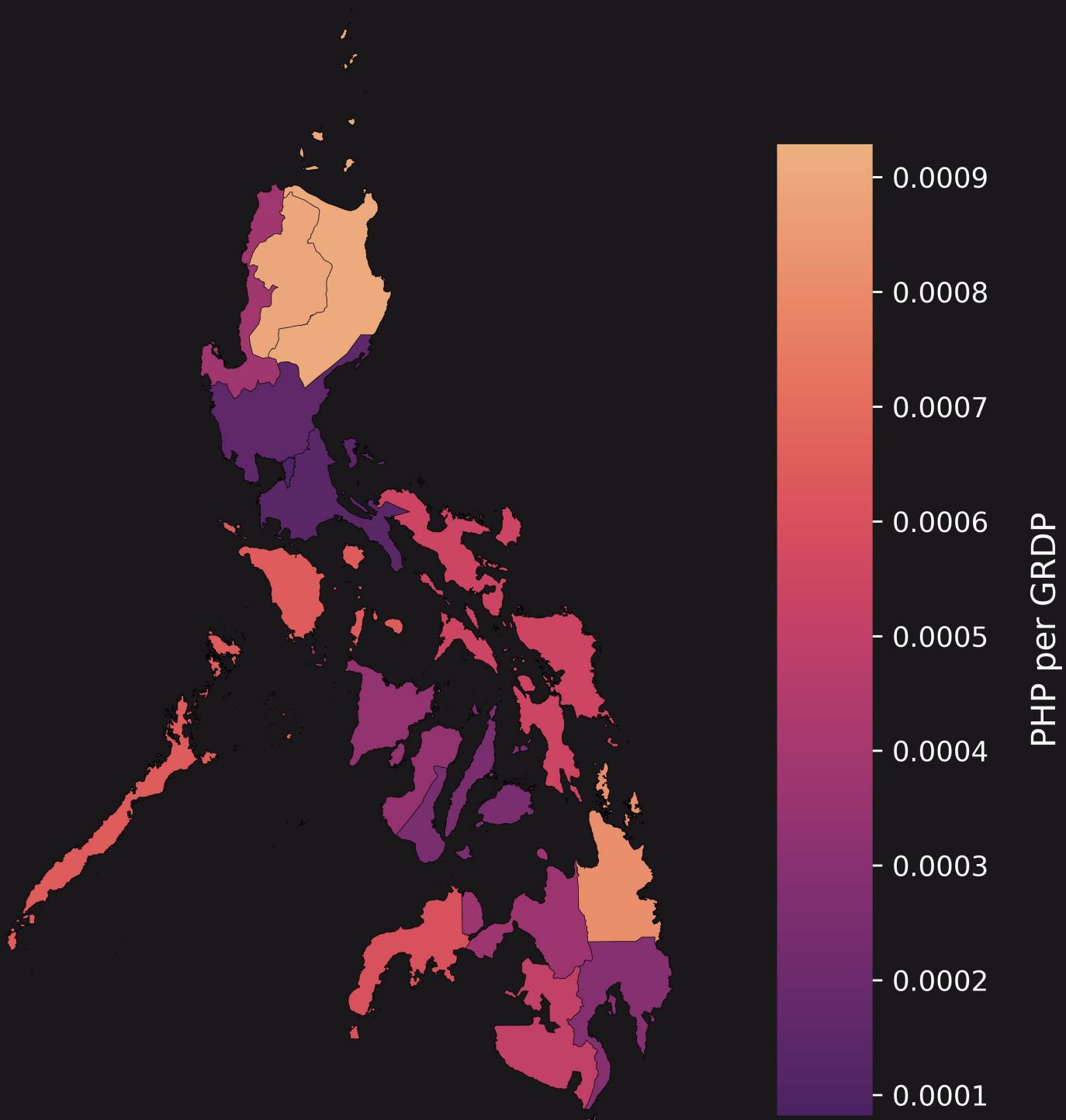
DOLE - Pesos per Person (2023)



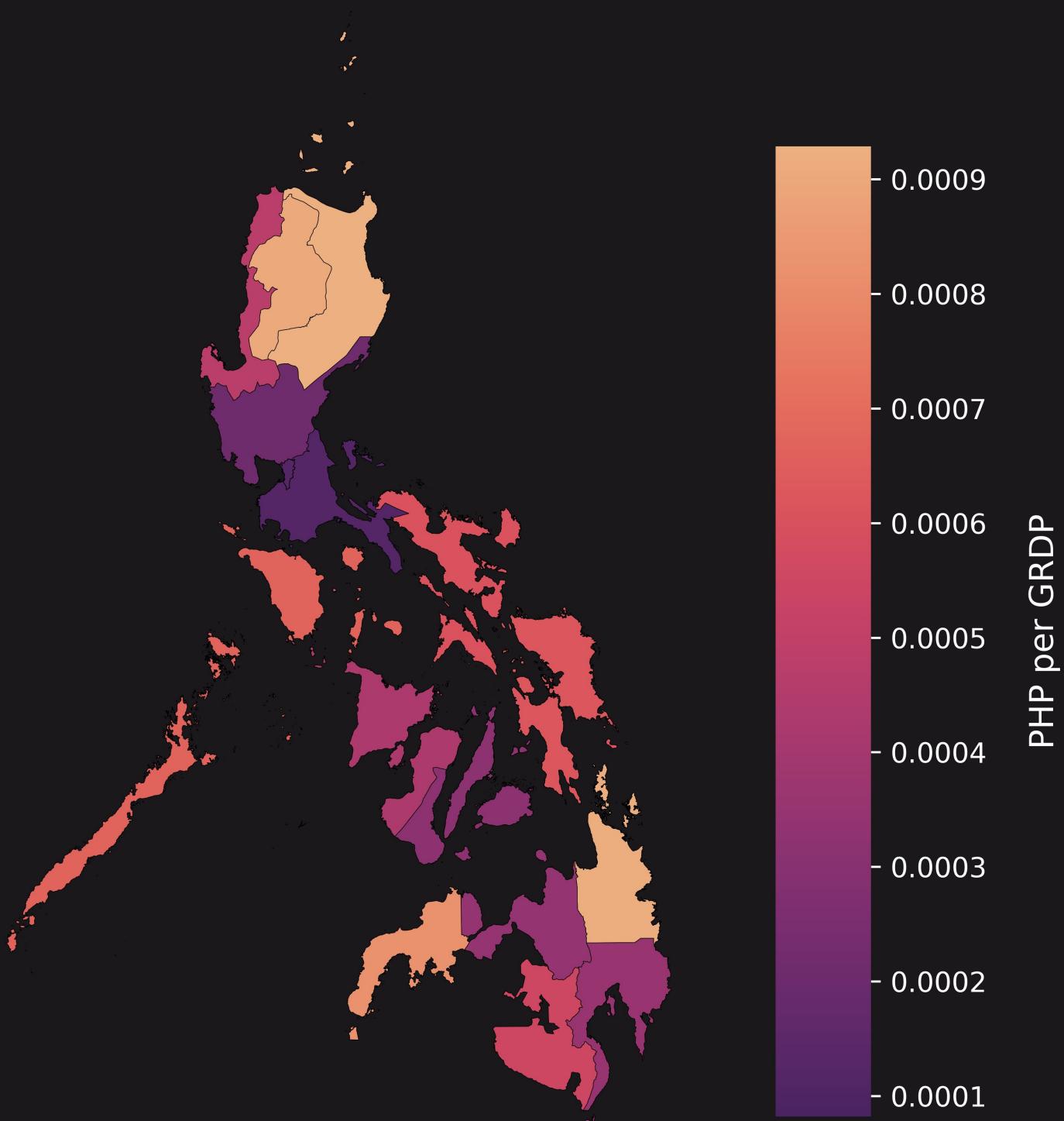
DOLE - Pesos per Person (2024)



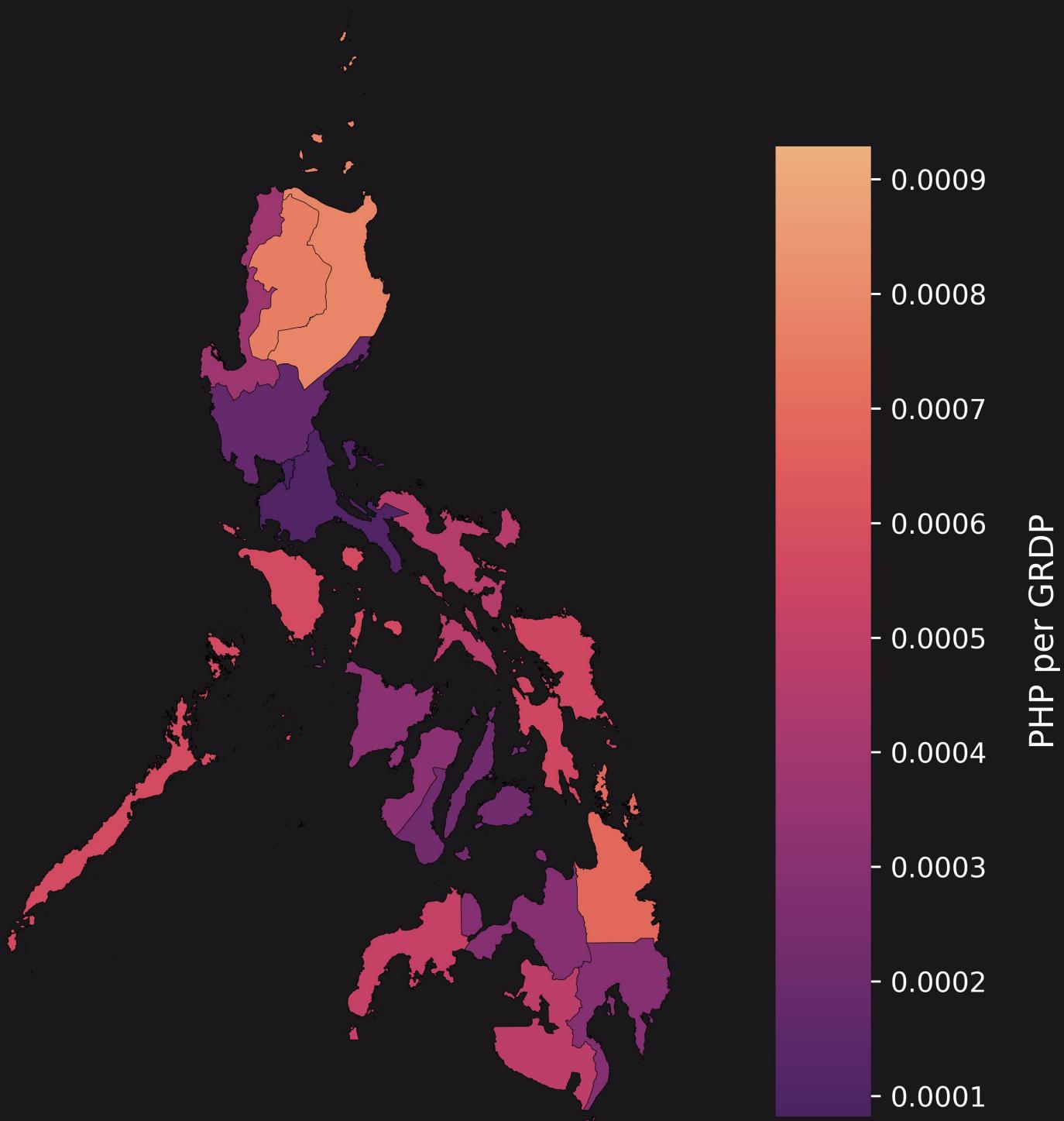
DOST - Budget Allocation (PHP) per GRDP (2020)



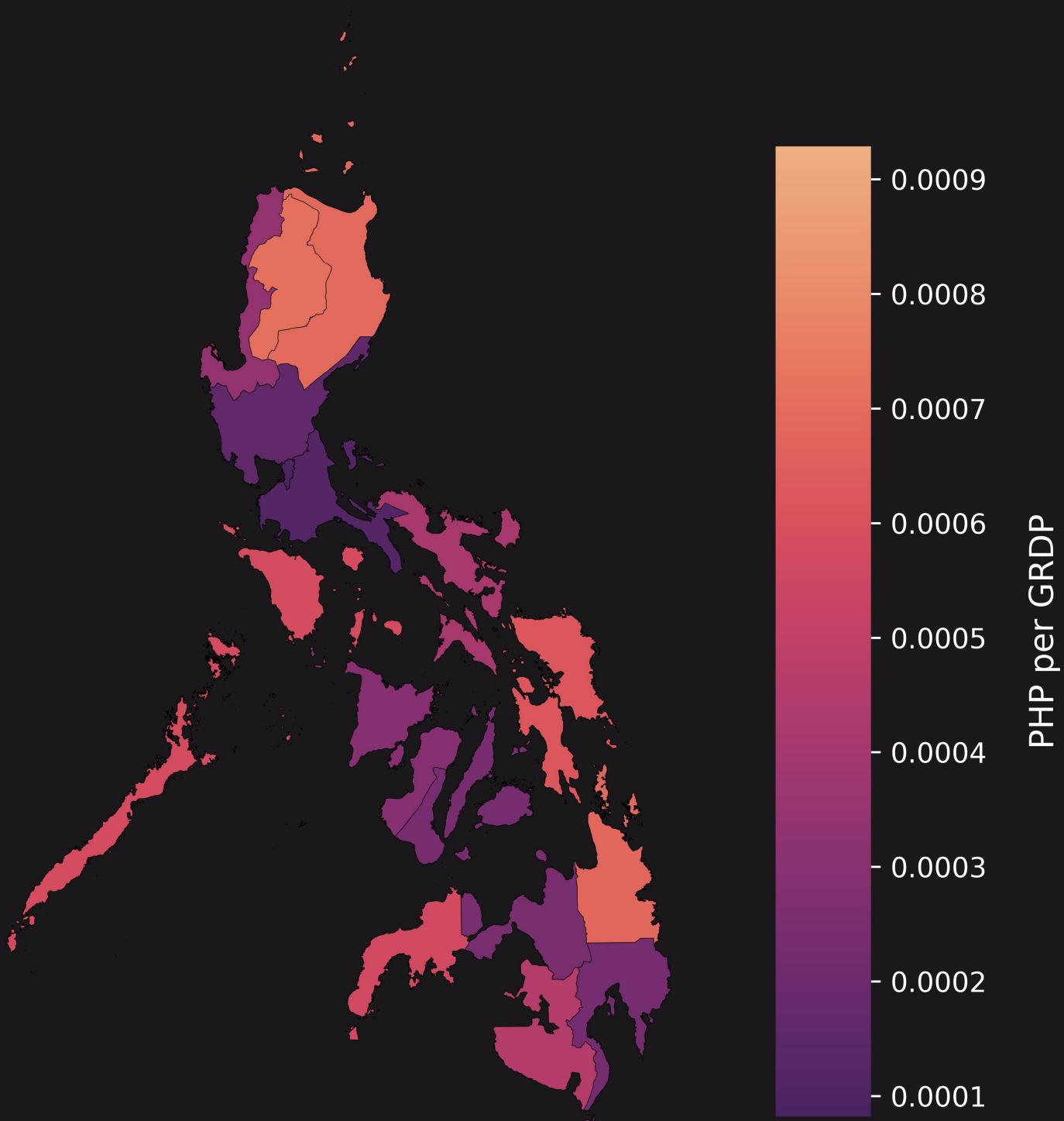
DOST - Budget Allocation (PHP) per GRDP (2021)



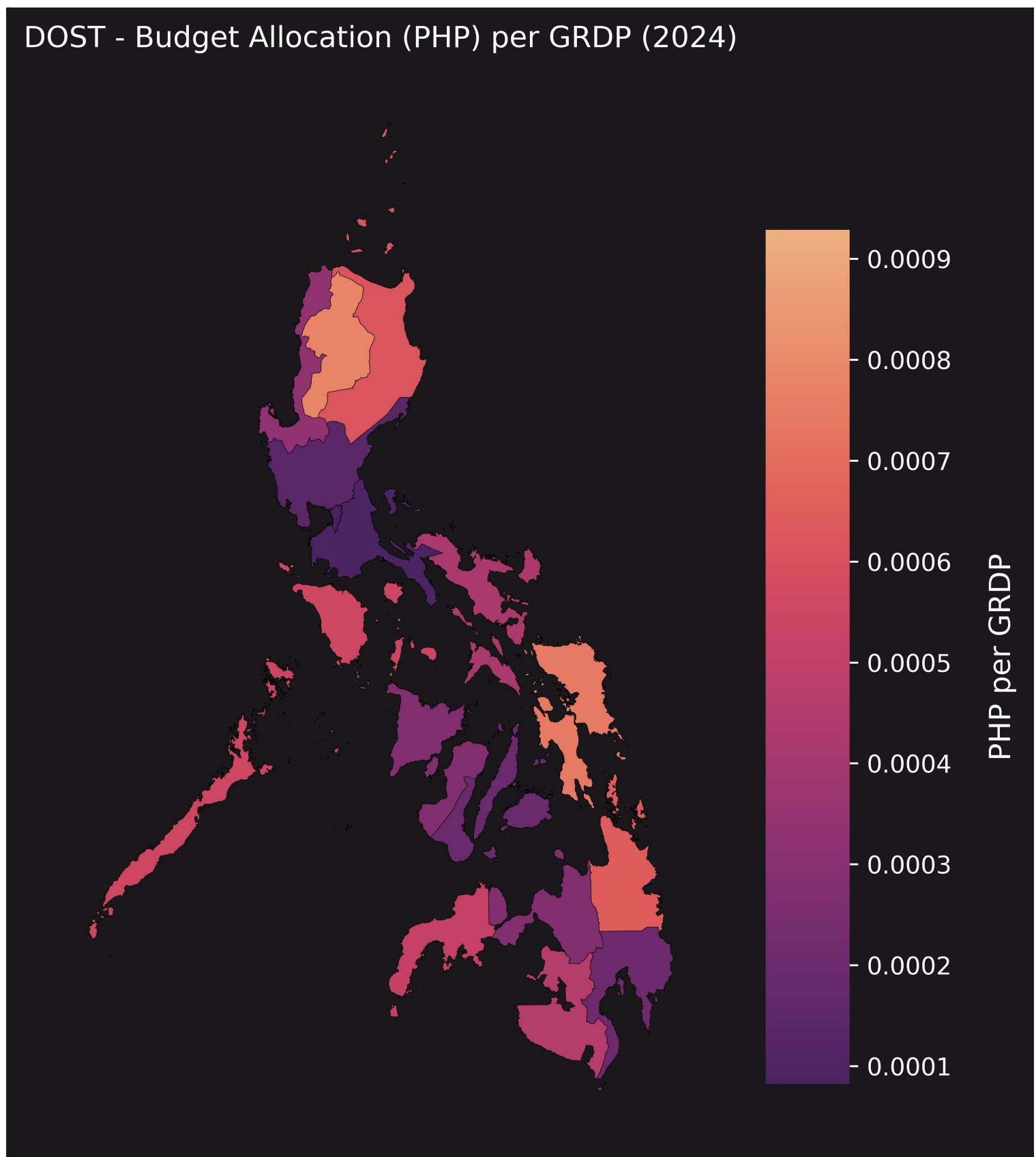
DOST - Budget Allocation (PHP) per GRDP (2022)



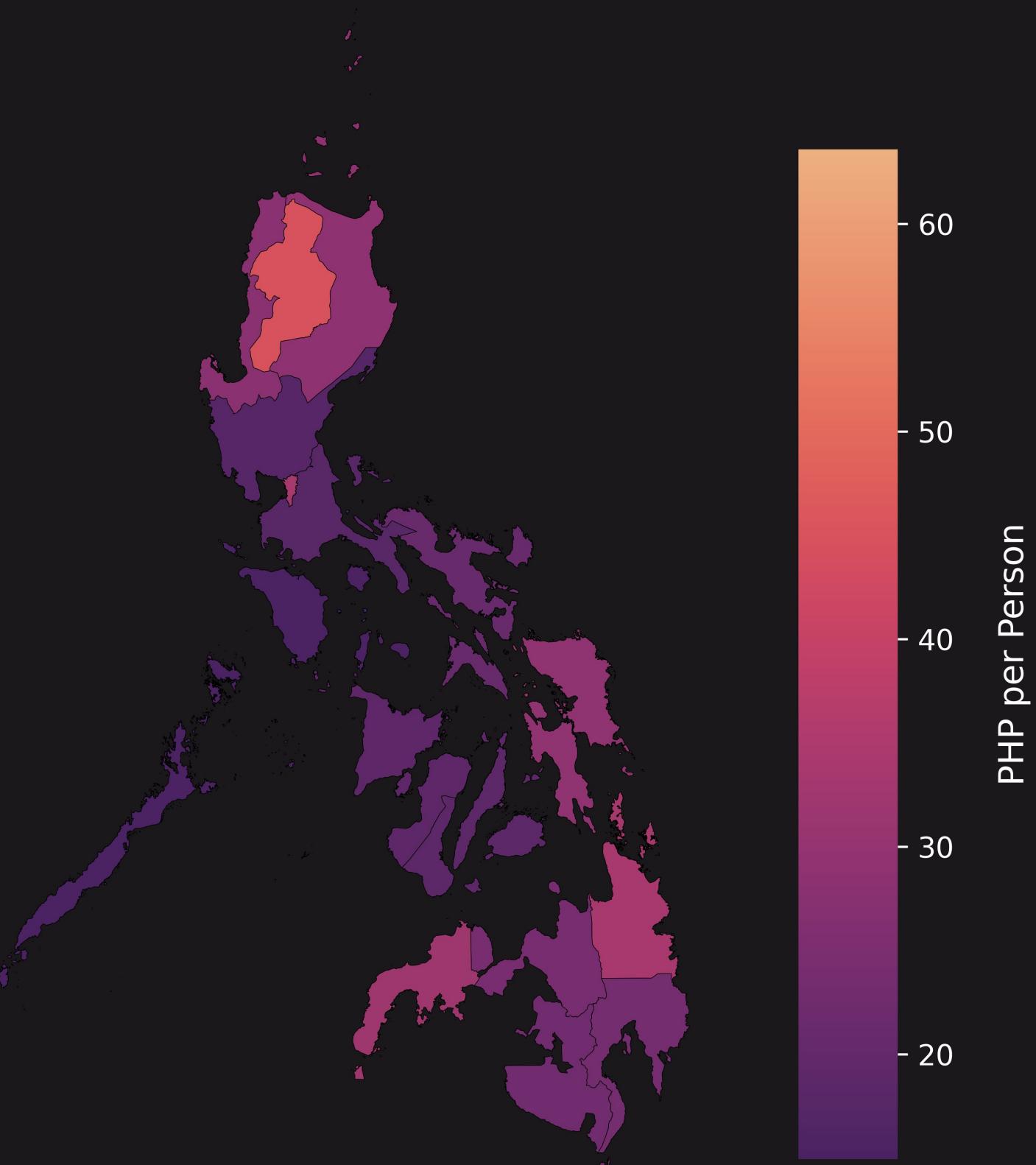
DOST - Budget Allocation (PHP) per GRDP (2023)



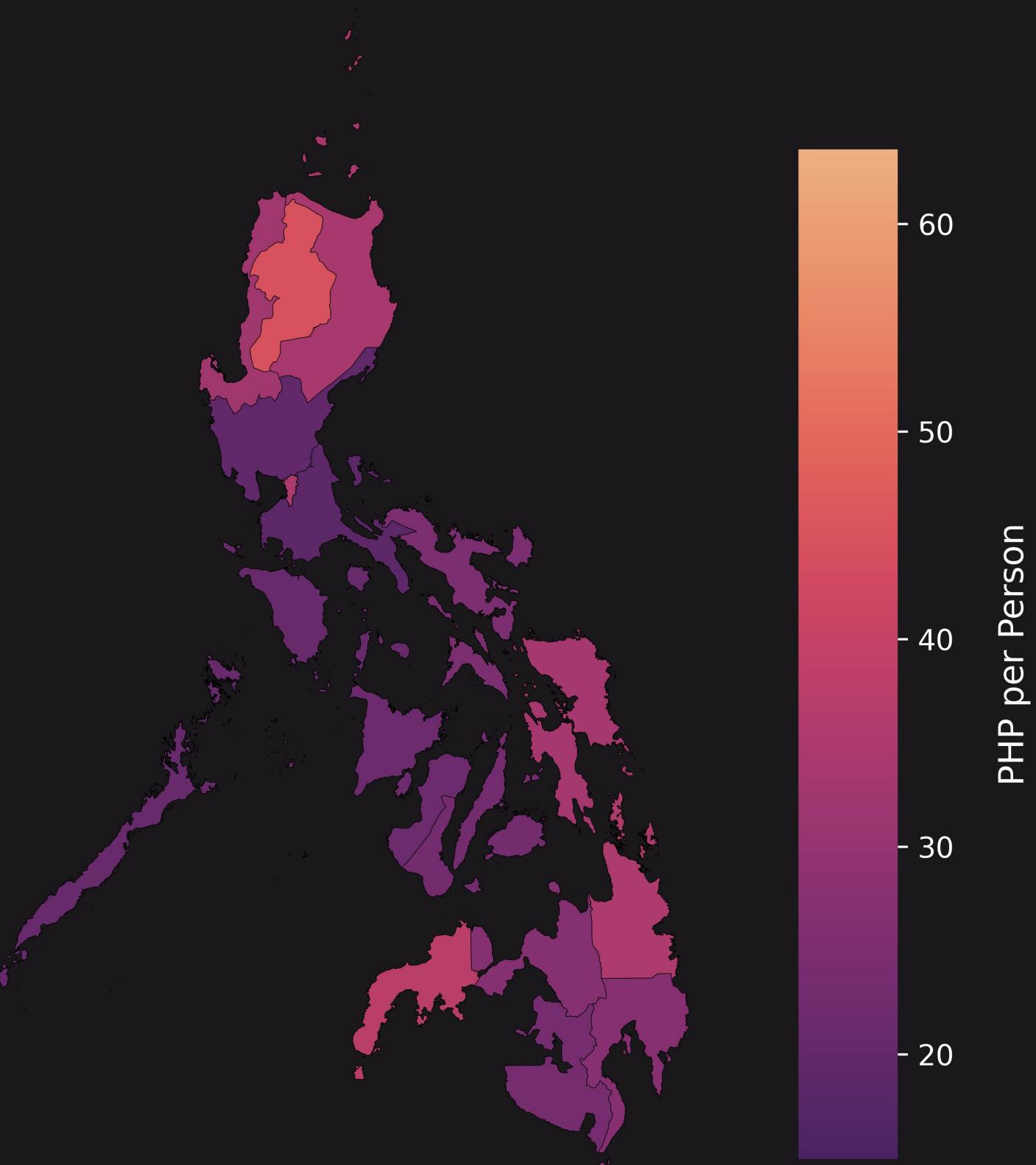
DOST - Budget Allocation (PHP) per GRDP (2024)



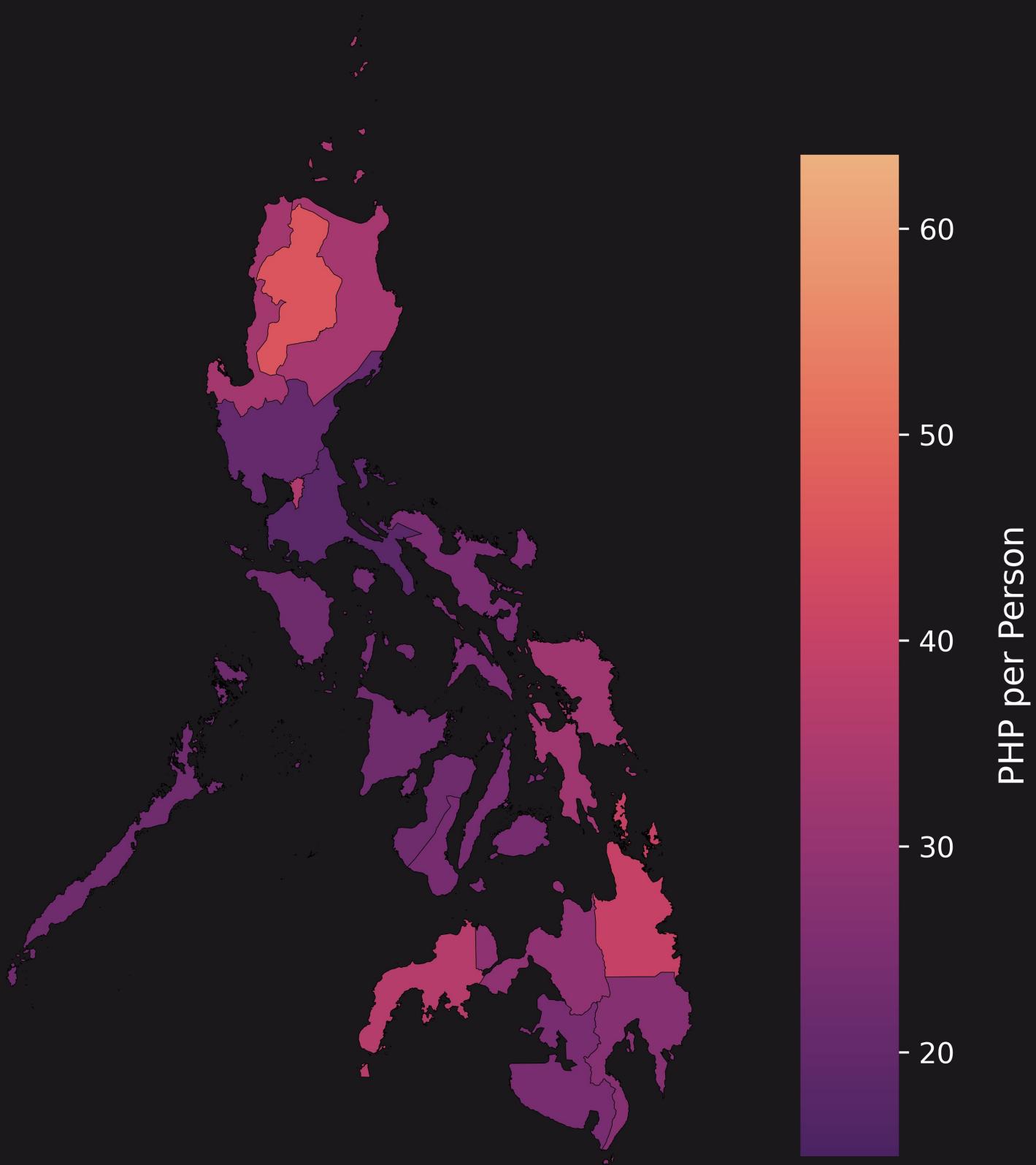
DOTr - Pesos per Person (2020)



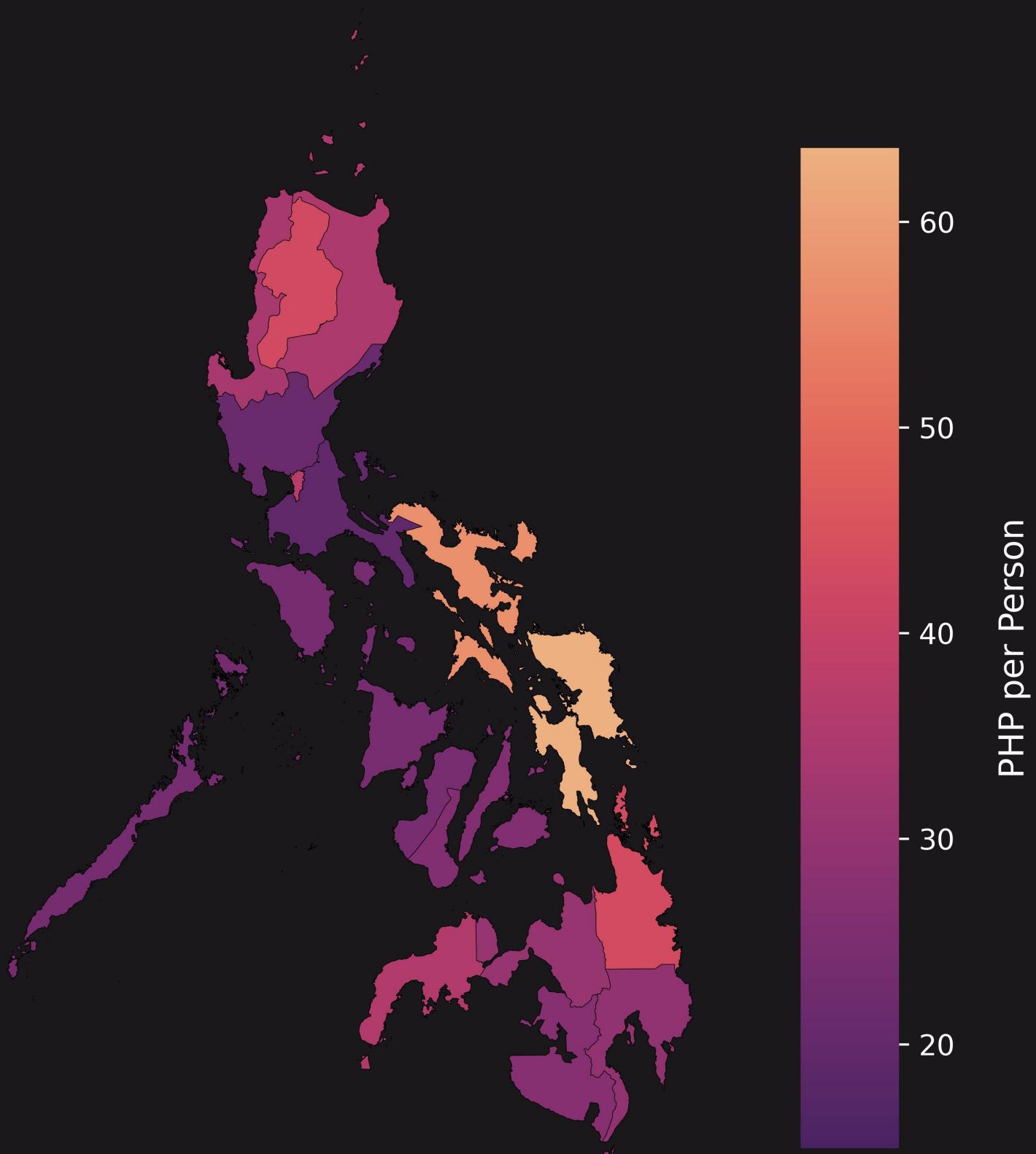
DOTr - Pesos per Person (2021)



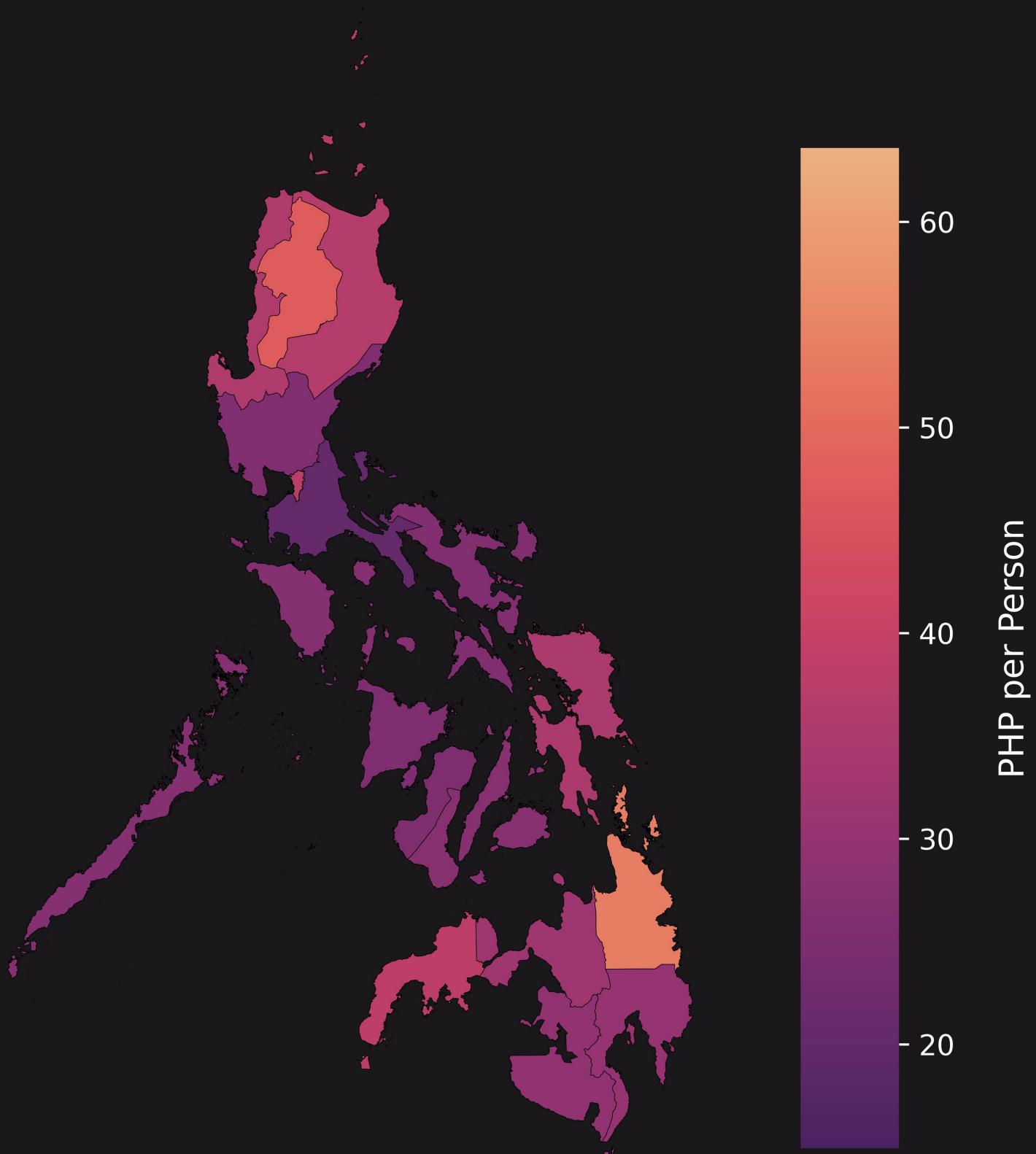
DOTr - Pesos per Person (2022)



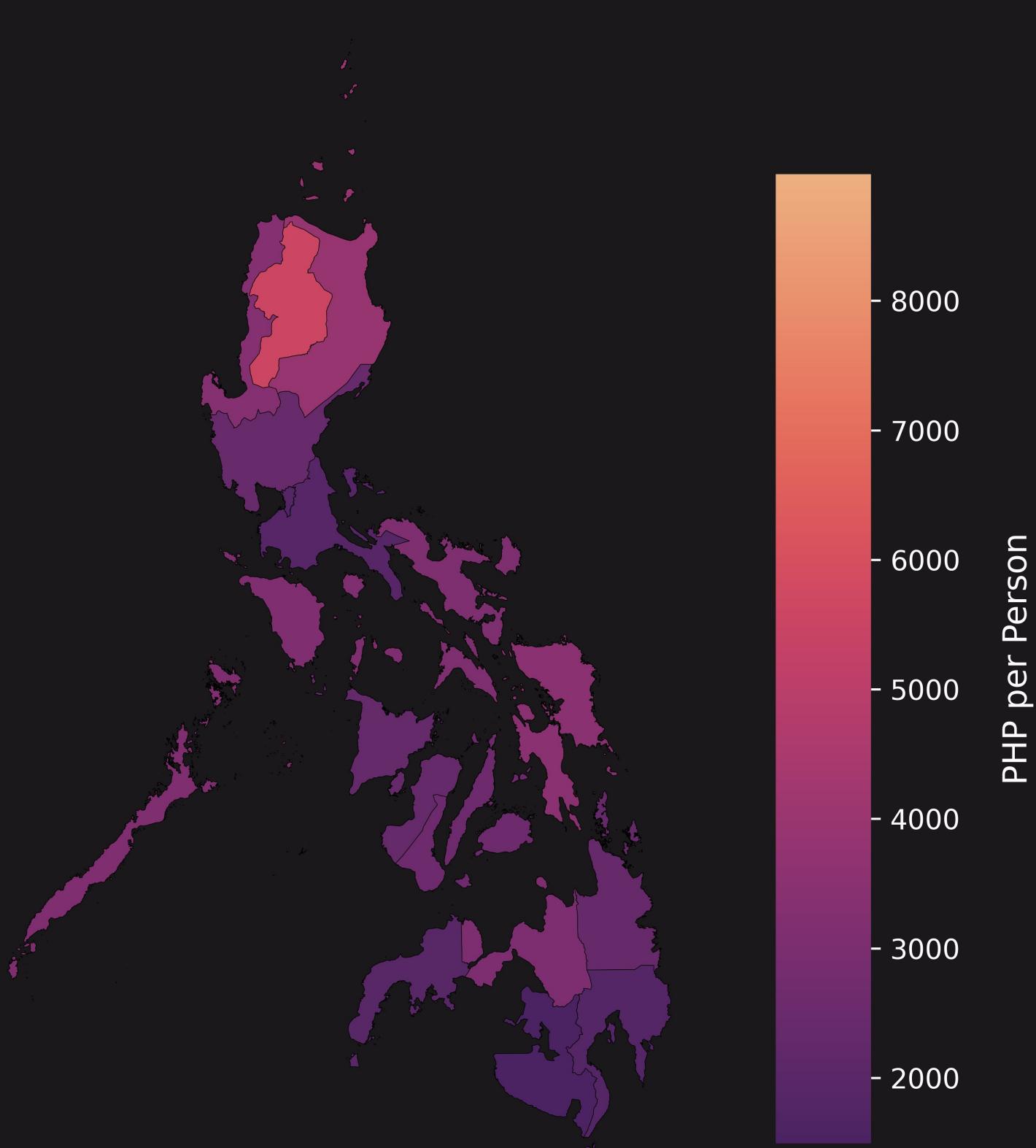
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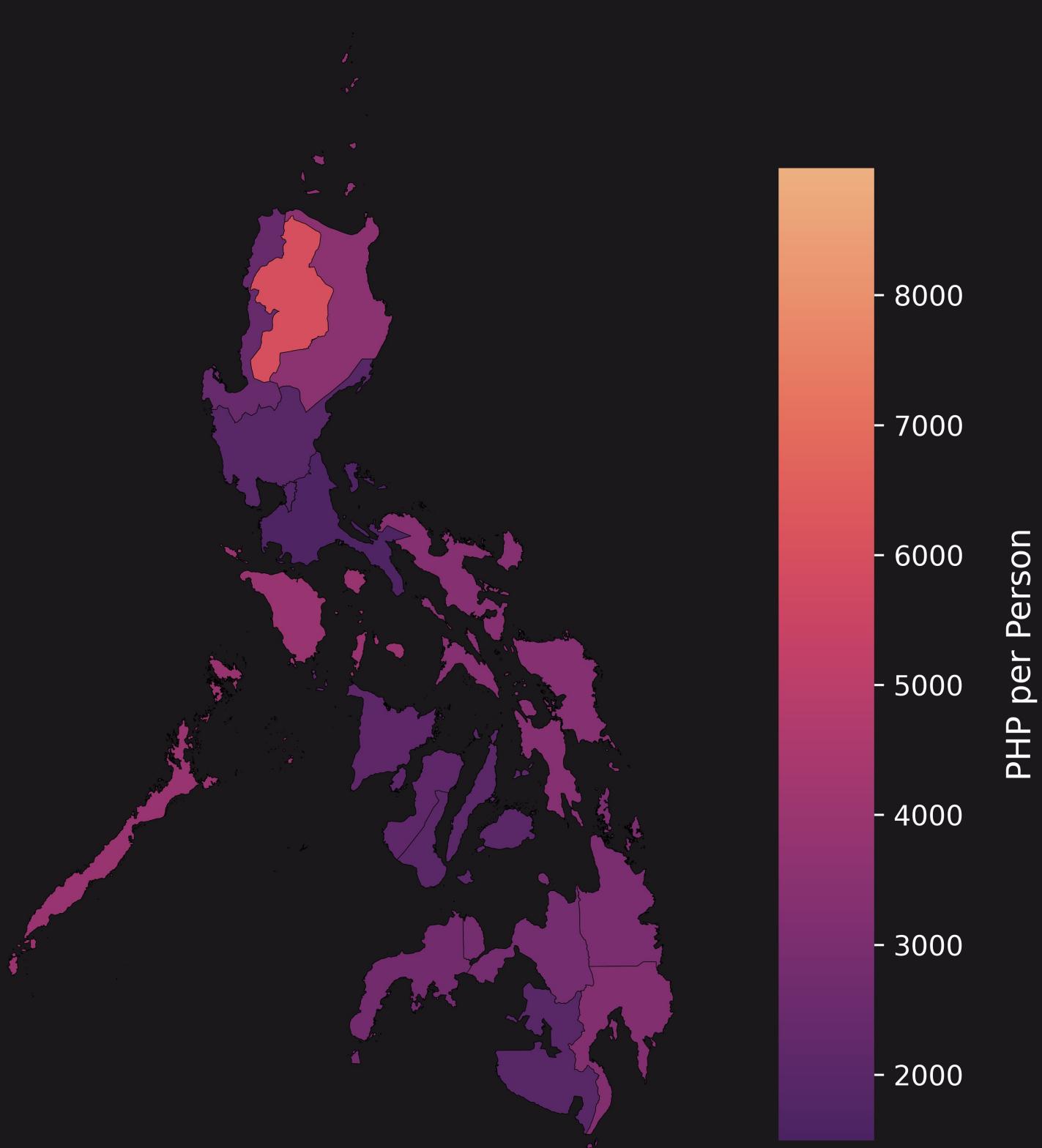
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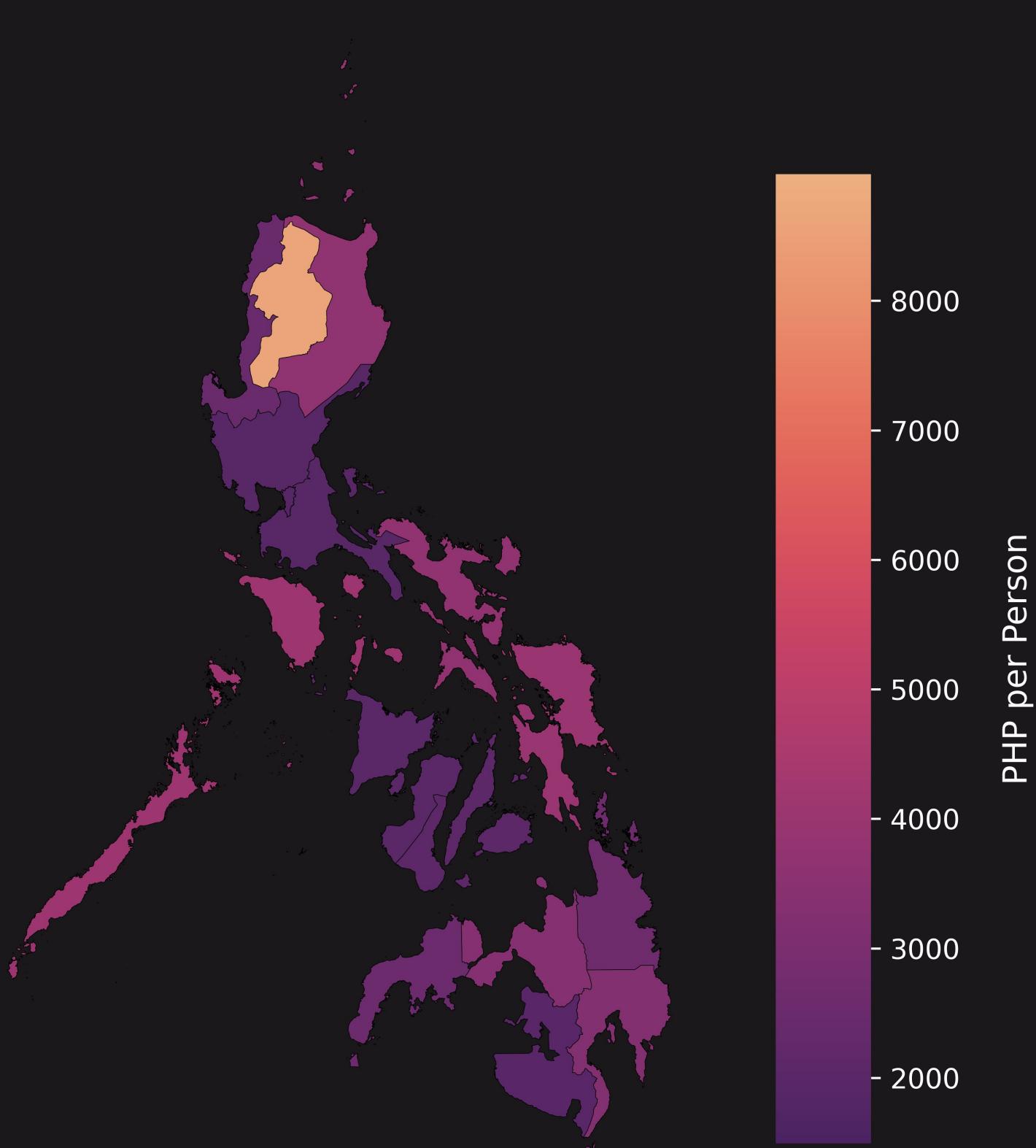
DPWH - Pesos per Person (2024)



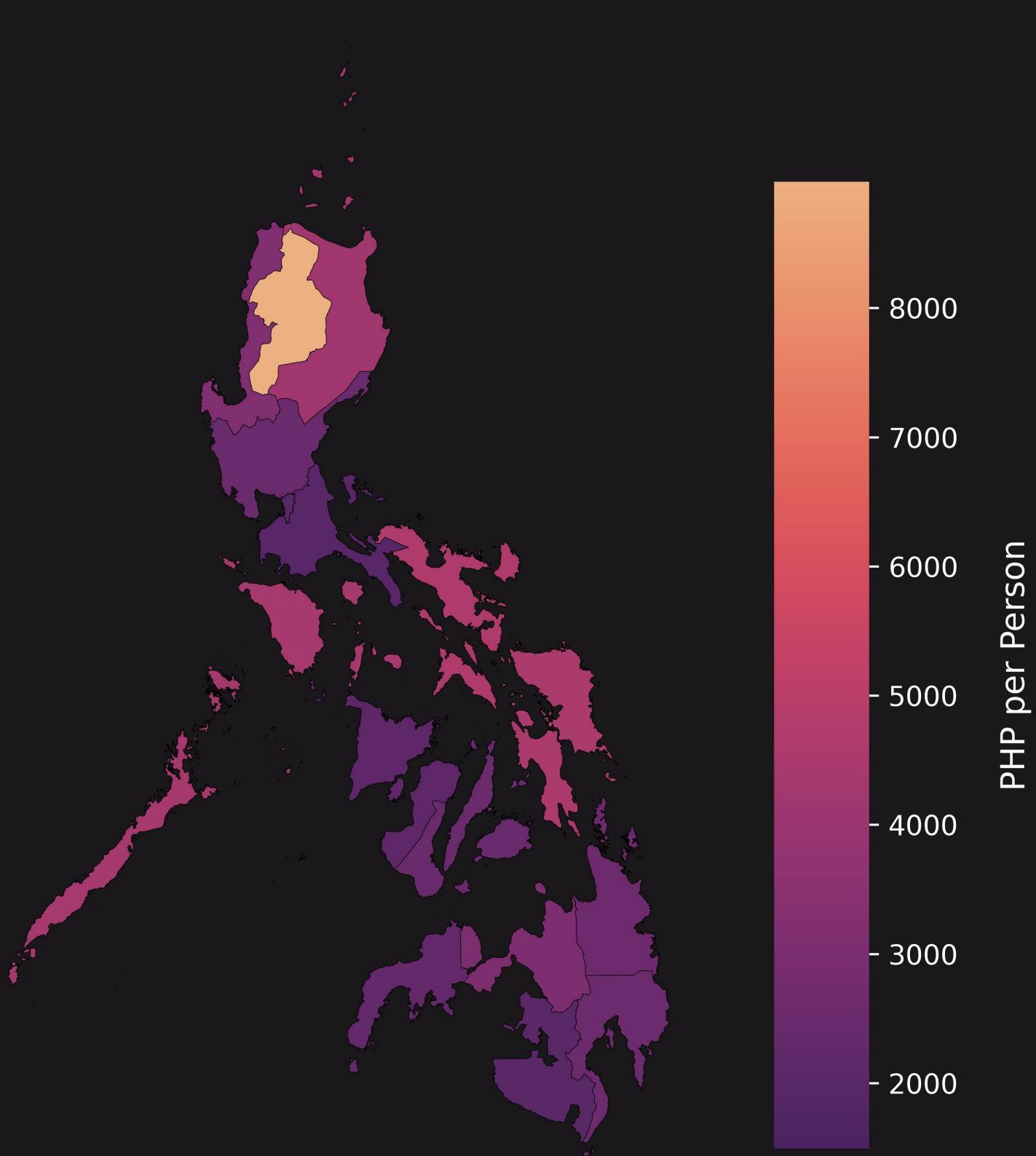
DPWH - Pesos per Person (2020)



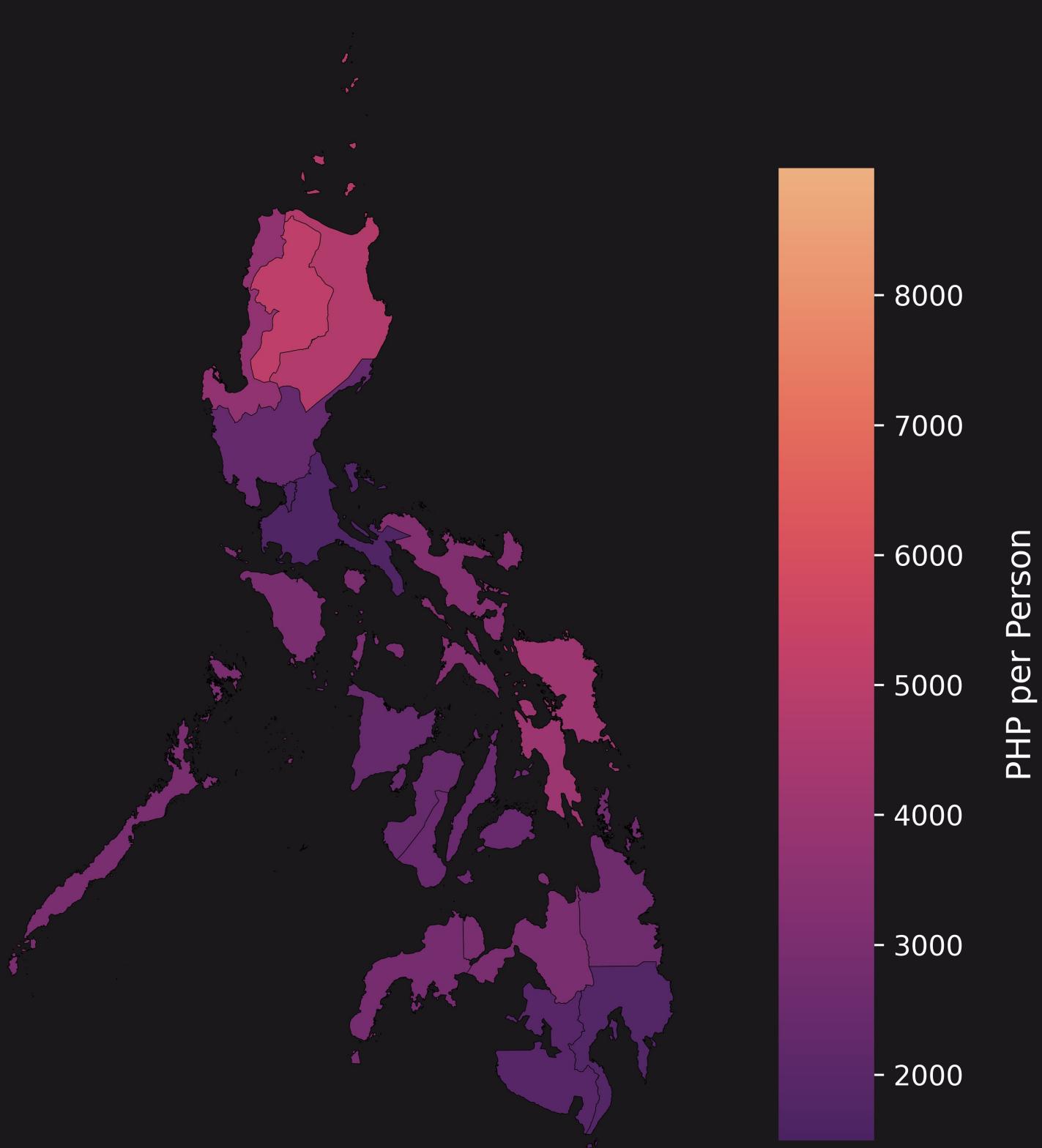
DPWH - Pesos per Person (2021)



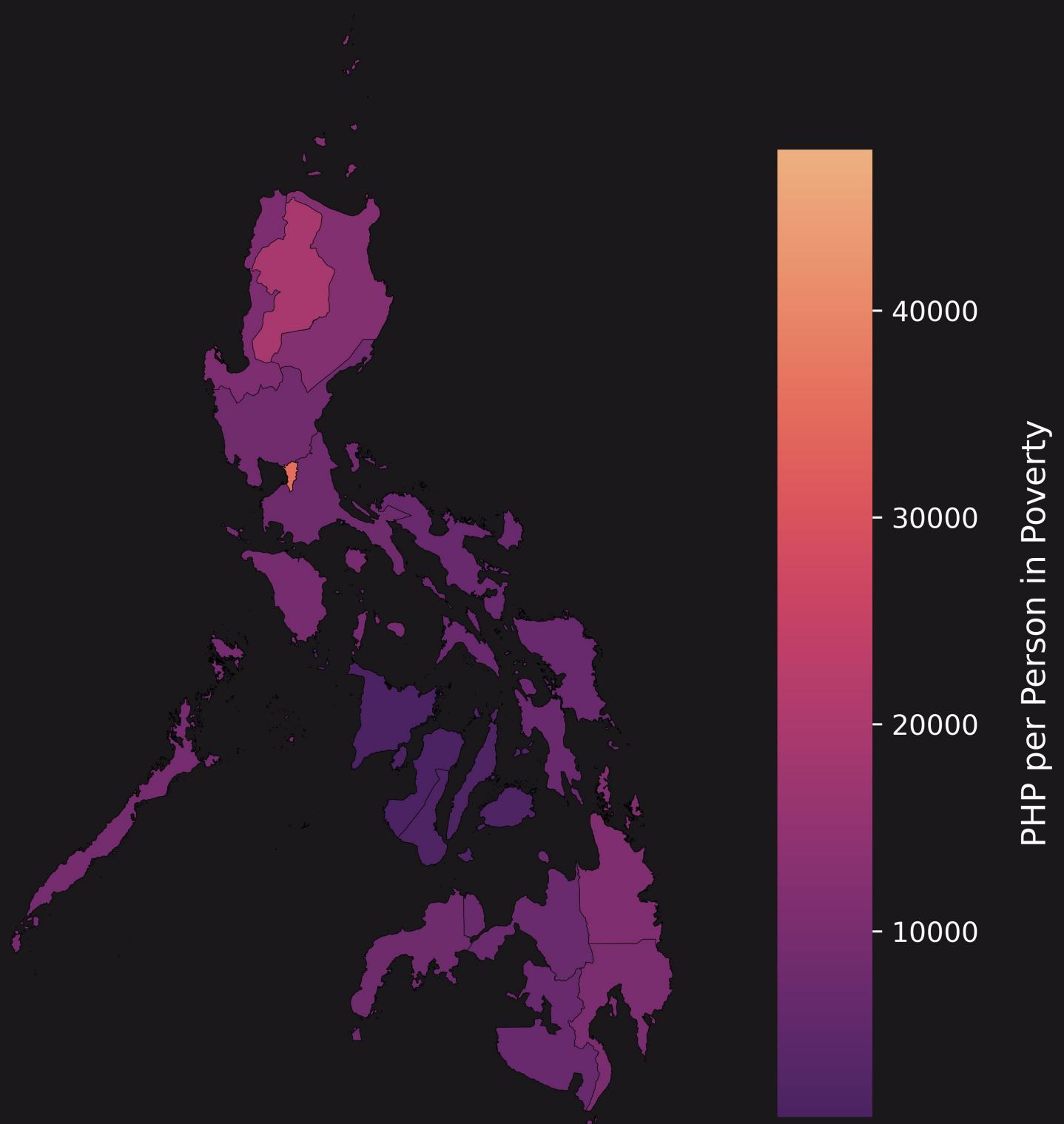
DPWH - Pesos per Person (2022)



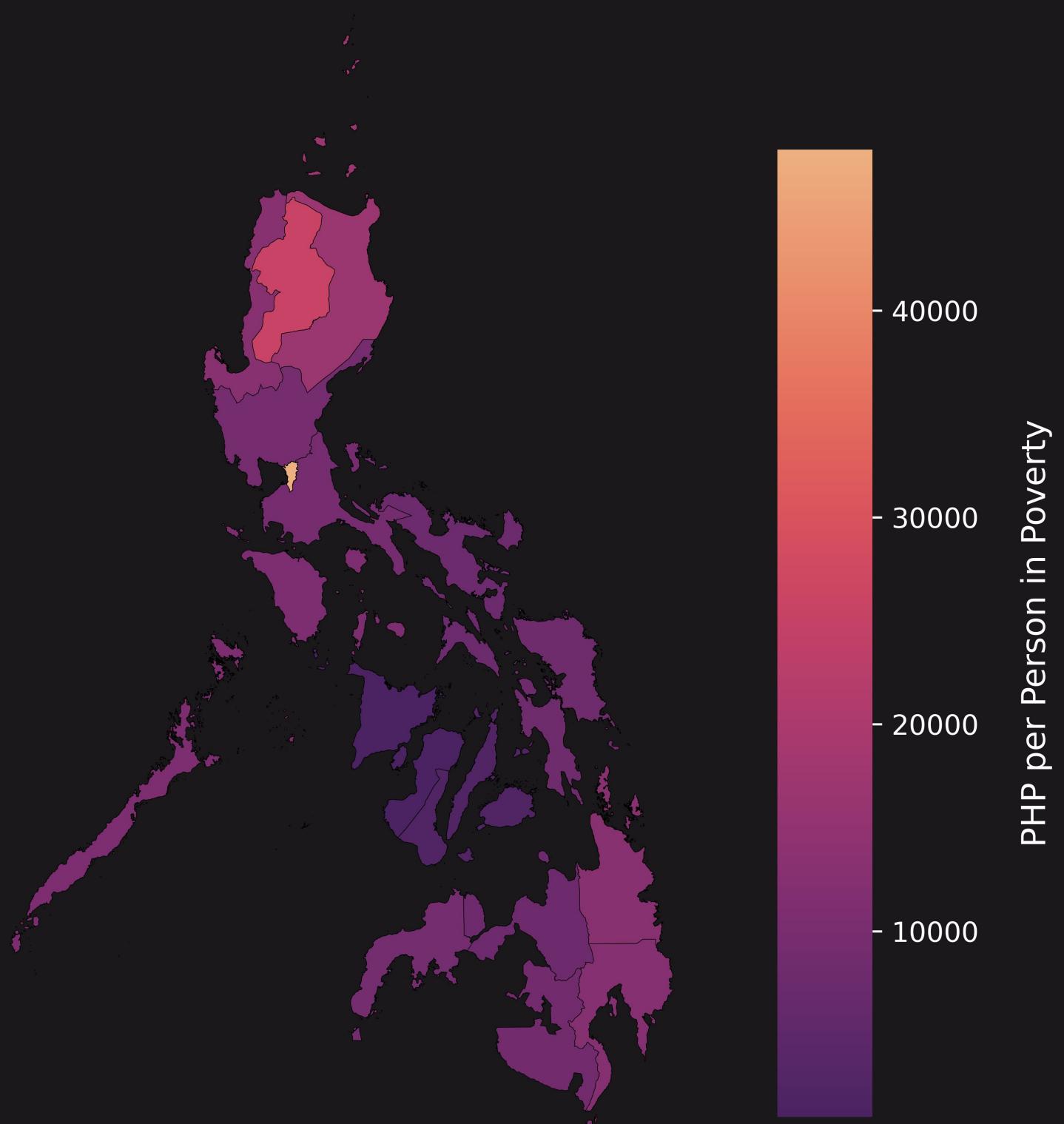
DPWH - Pesos per Person (2023)



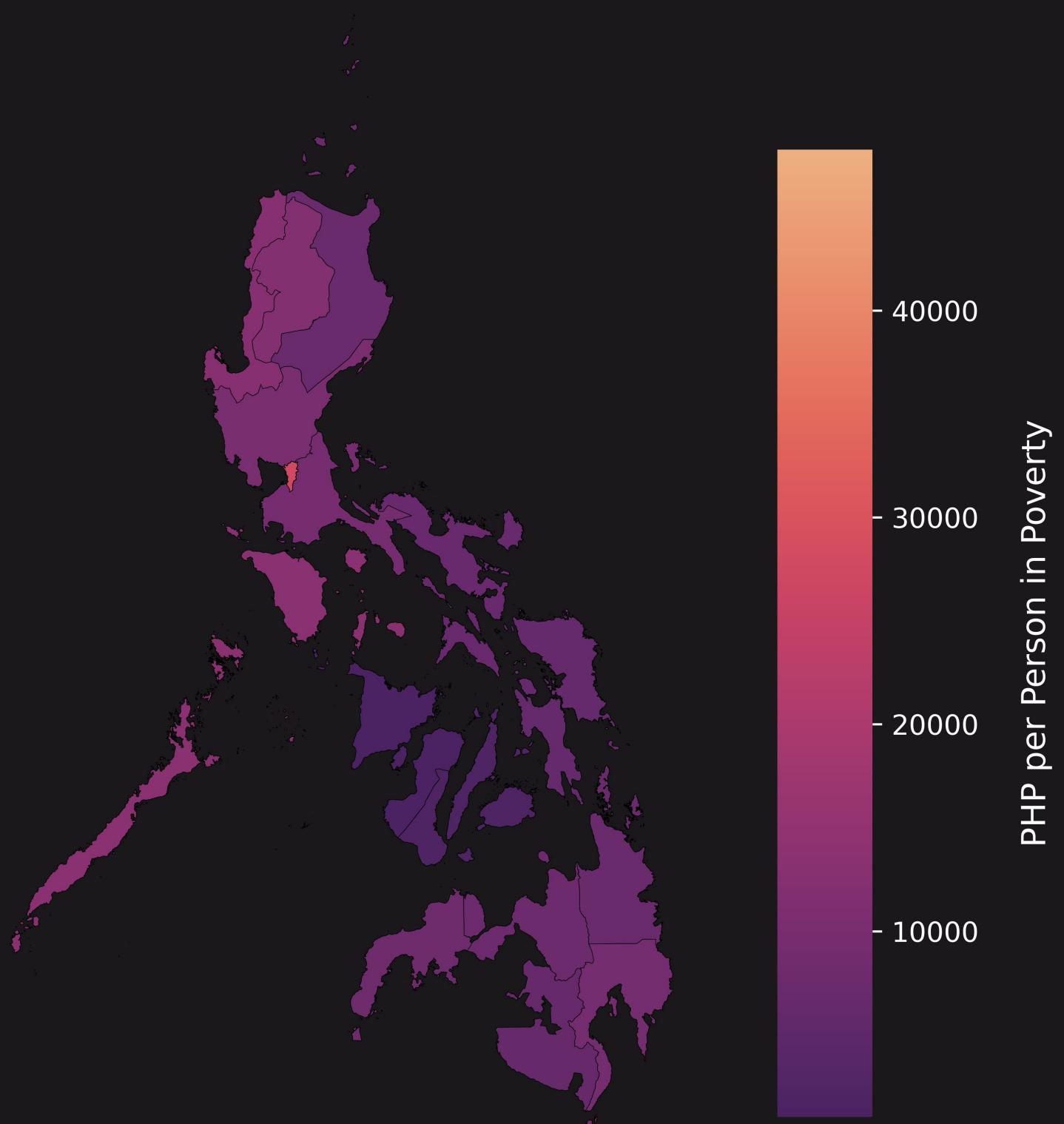
DSWD - Pesos per Person in Poverty (2023)



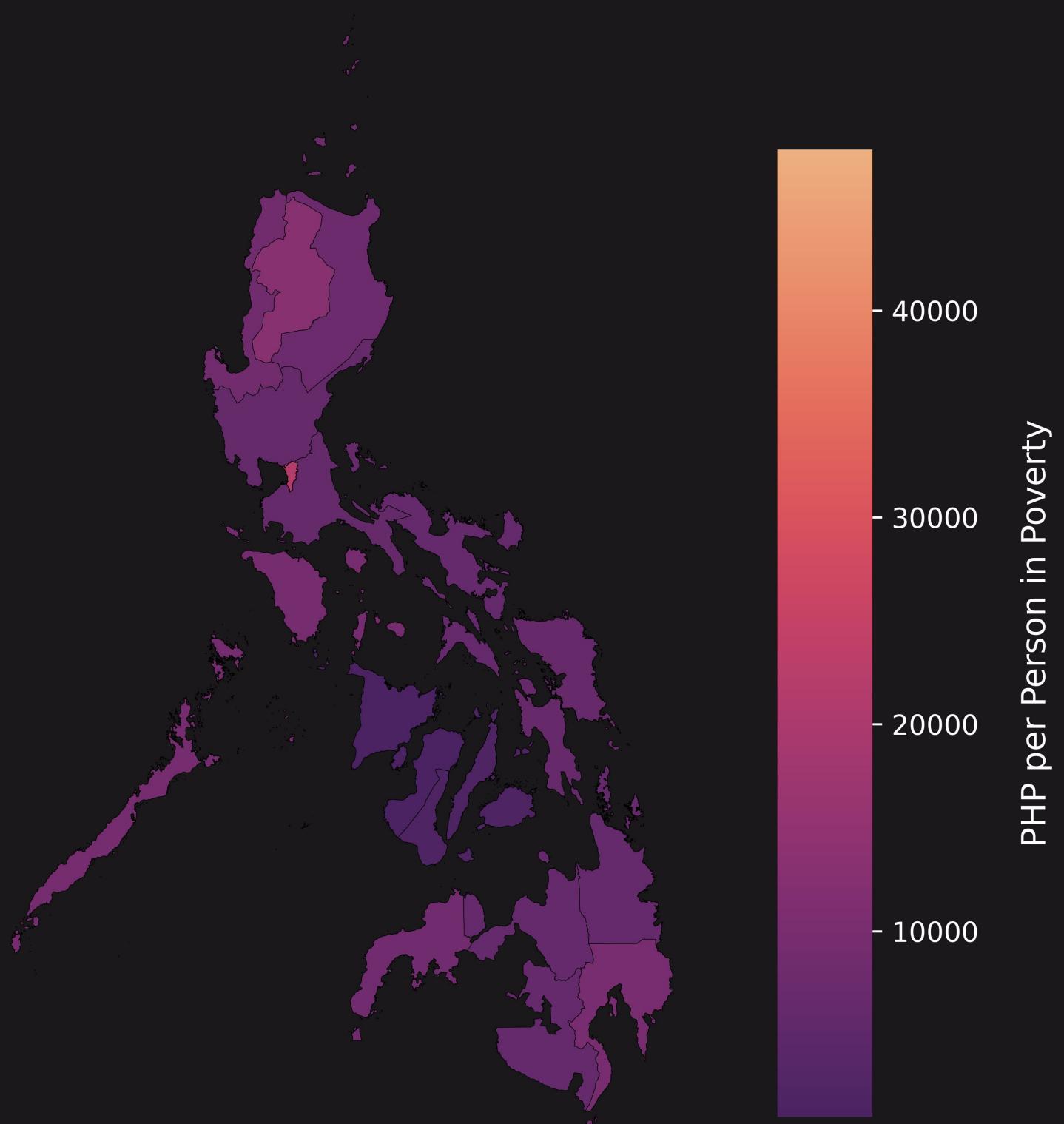
DSWD - Pesos per Person in Poverty (2024)



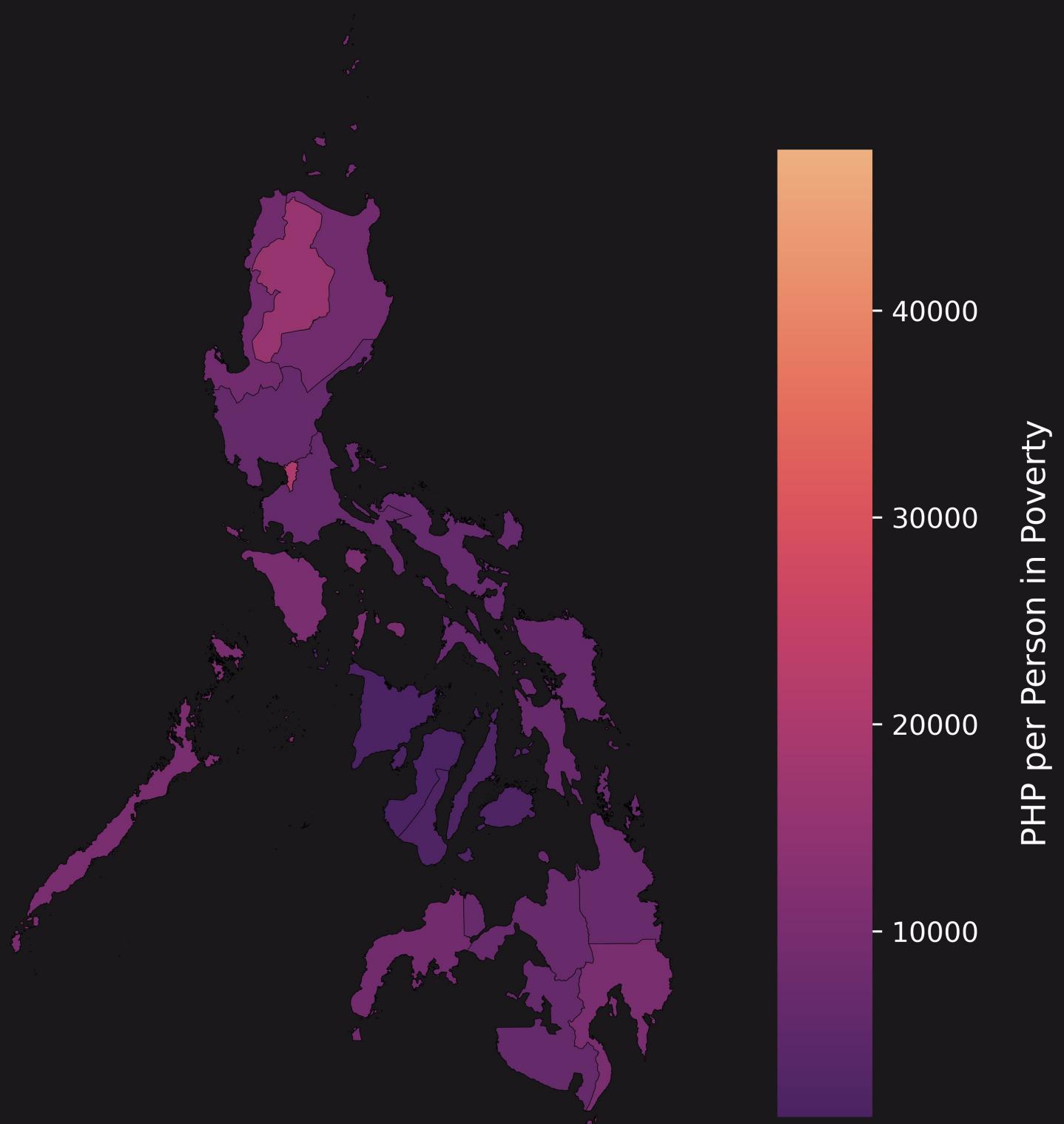
DSWD - Pesos per Person in Poverty (2020)



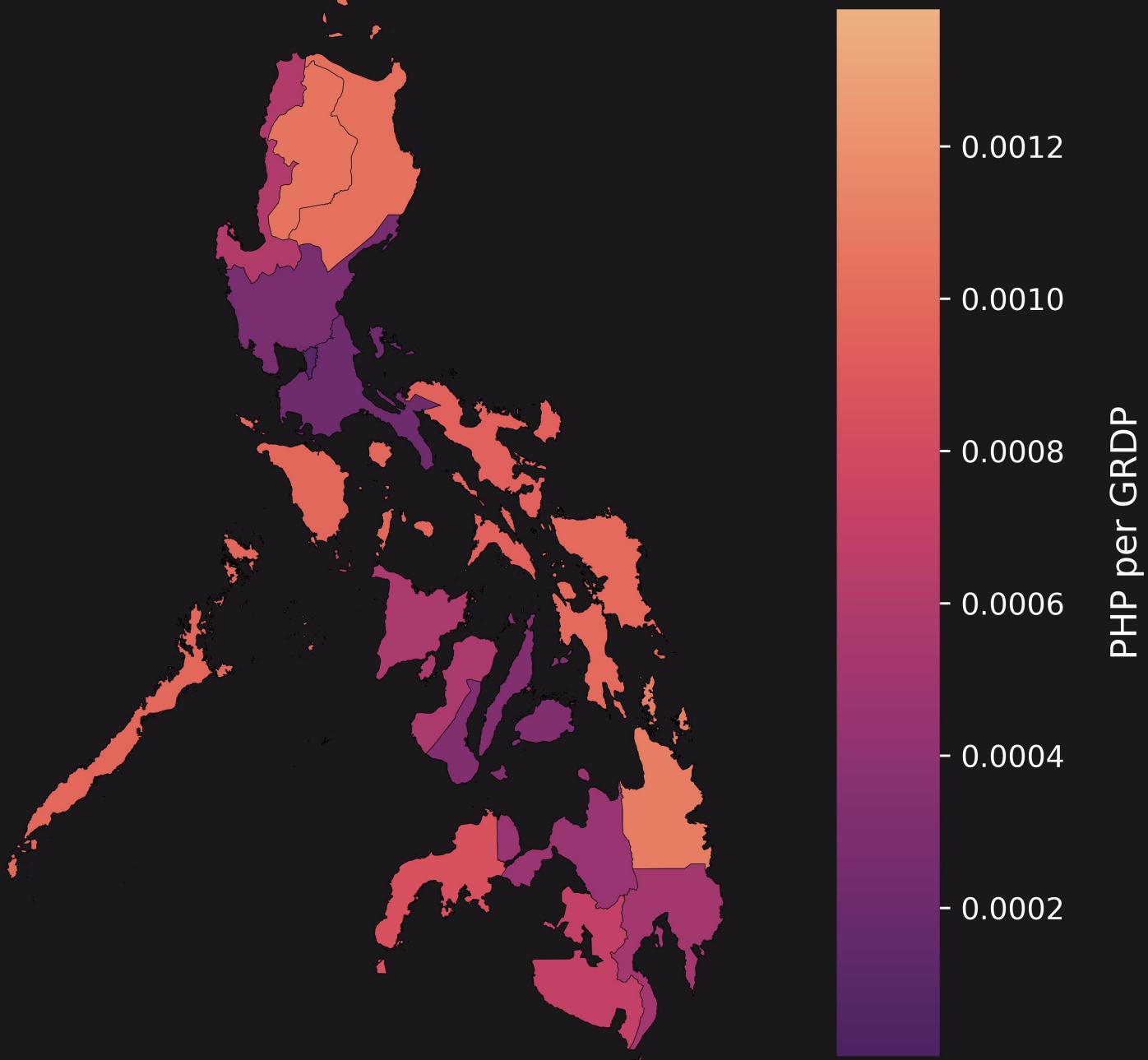
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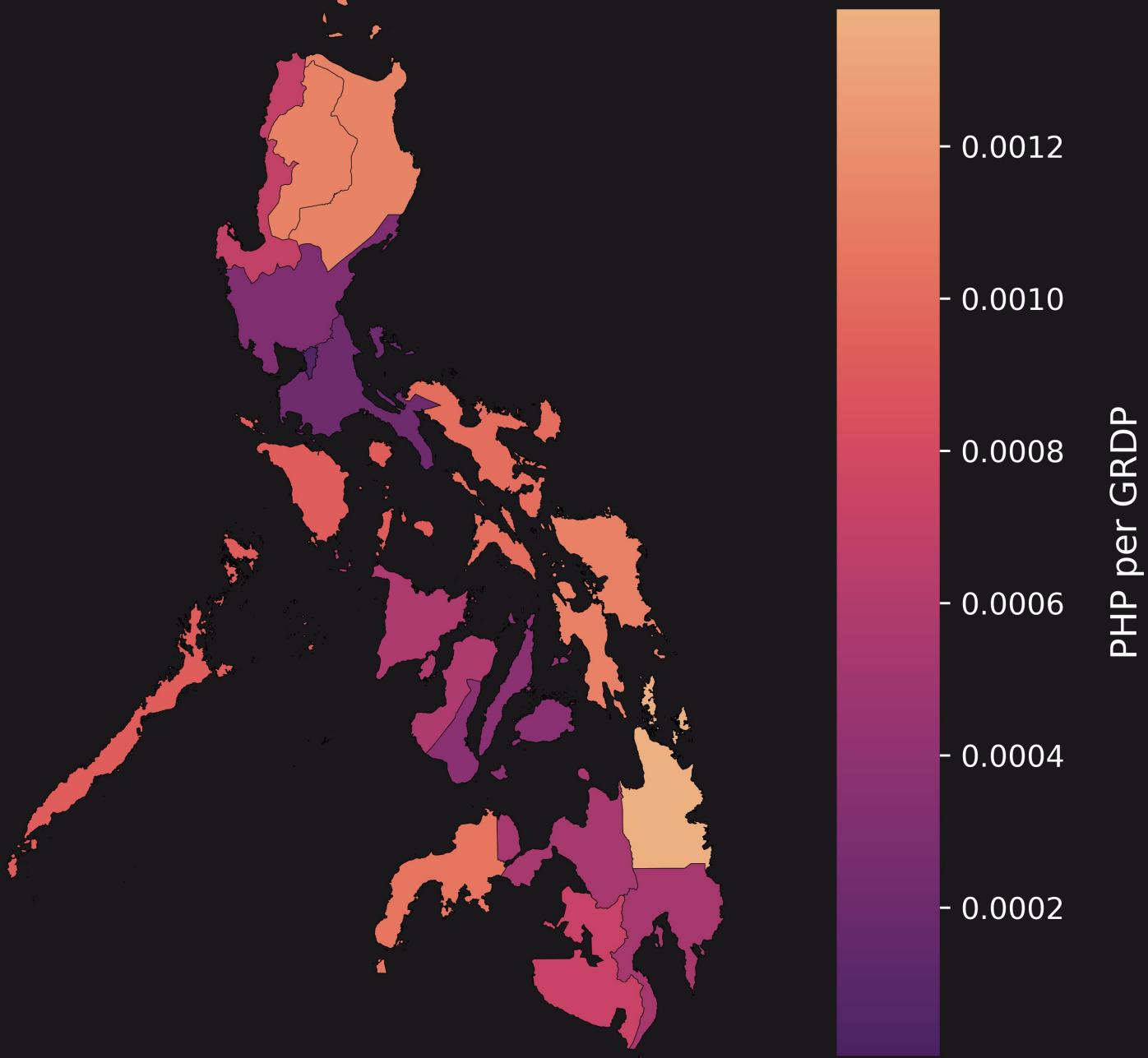
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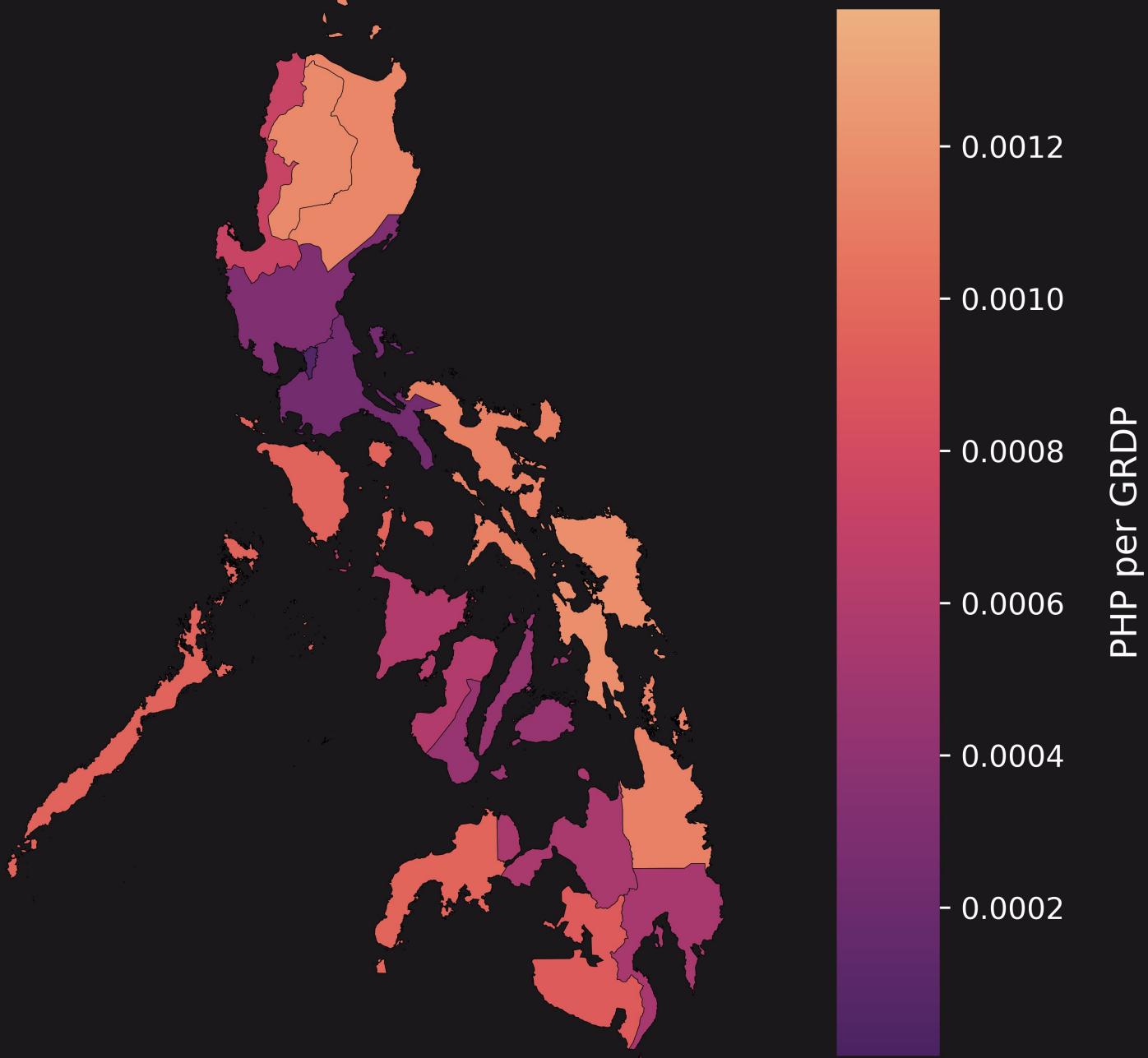
DTI - Budget Allocation (PHP) per GRDP (2020)



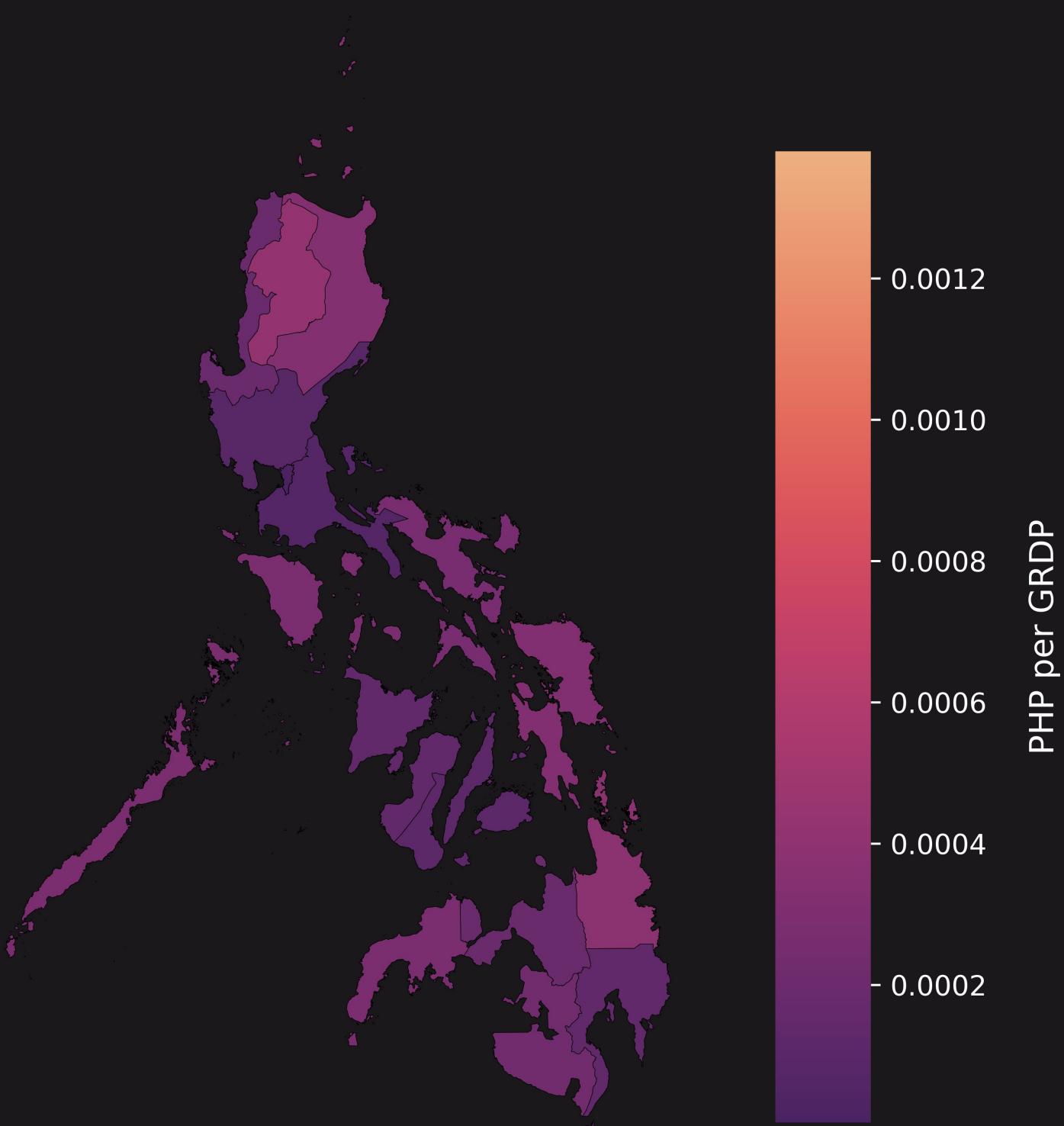
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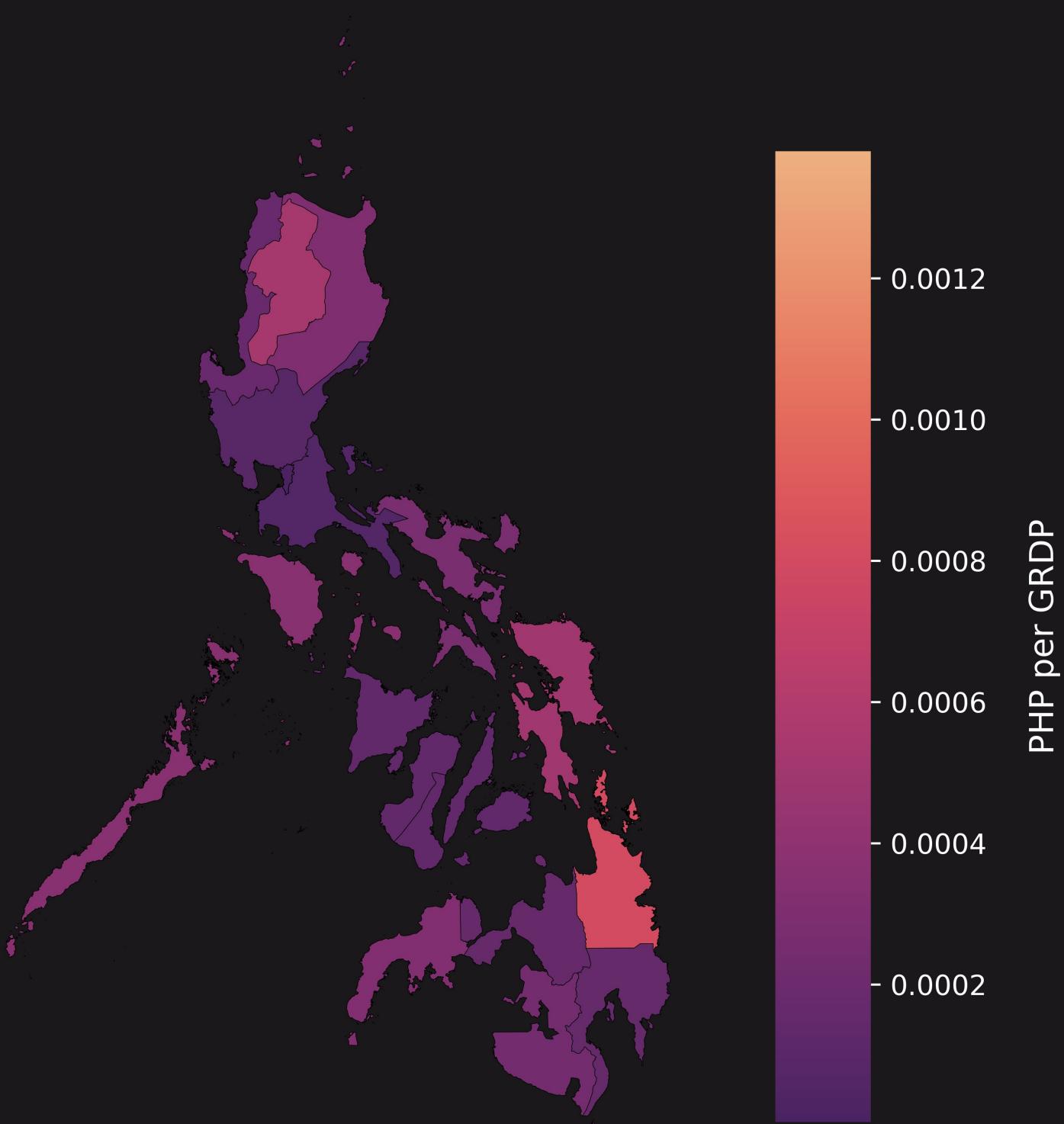
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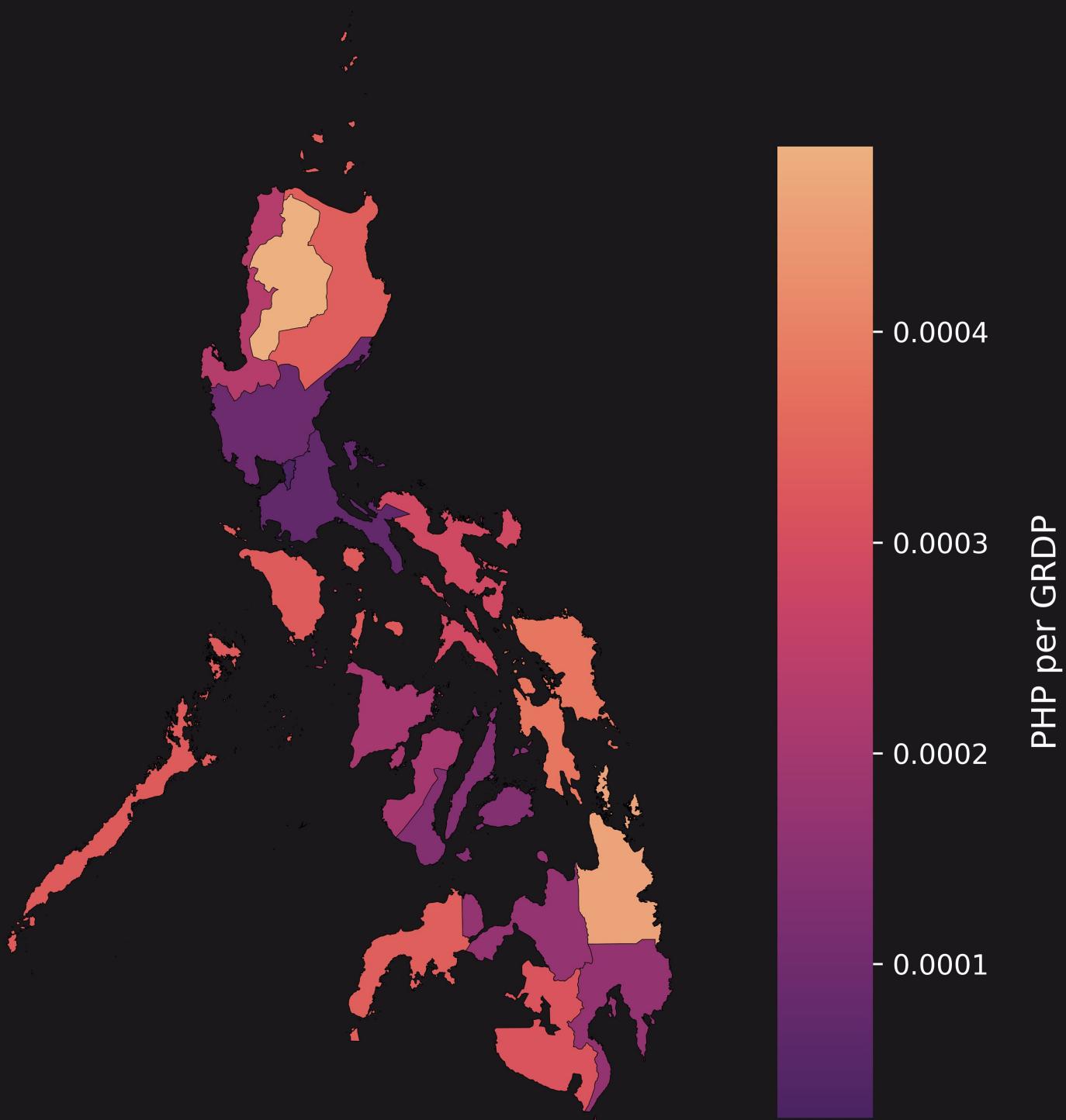
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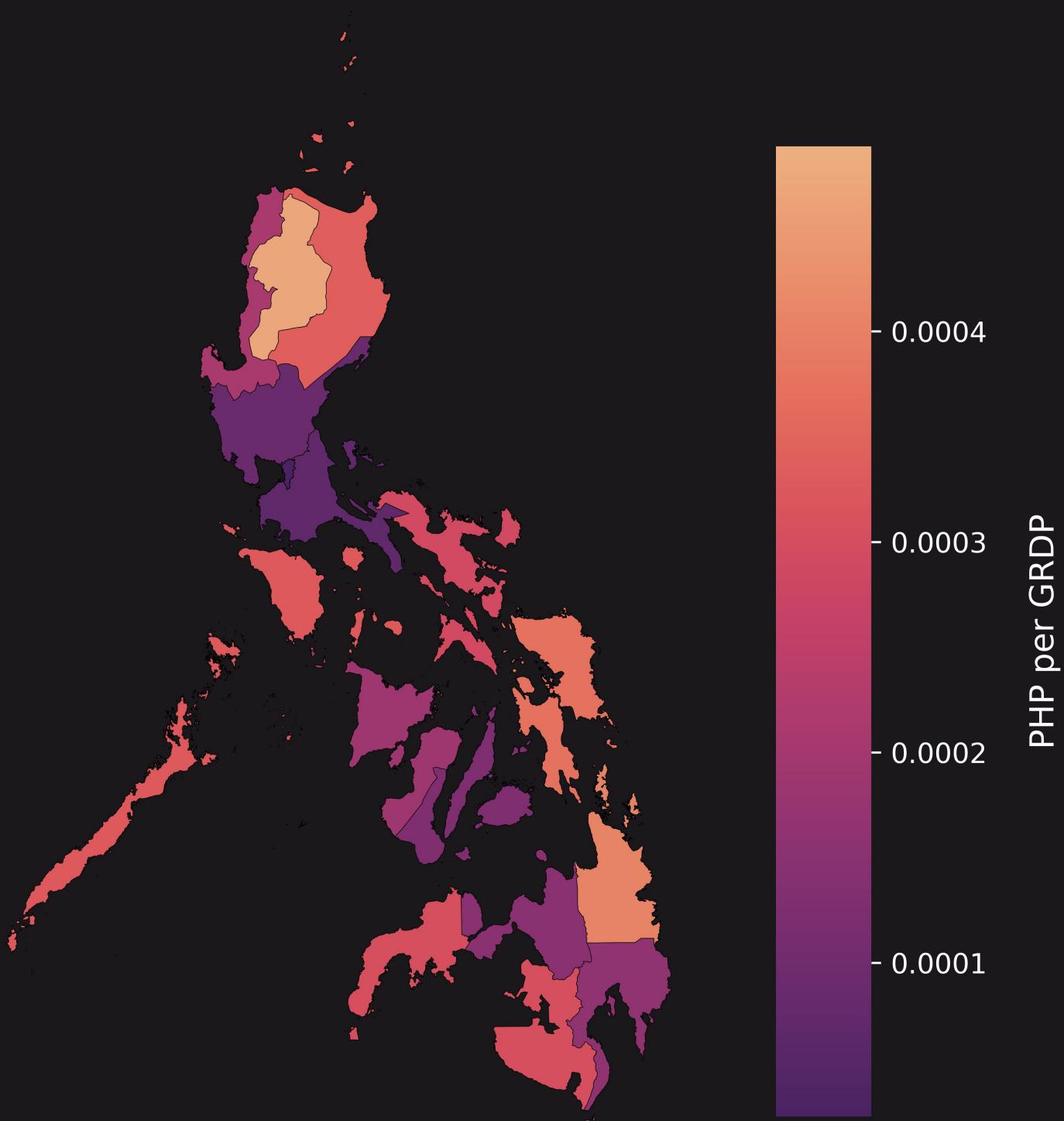
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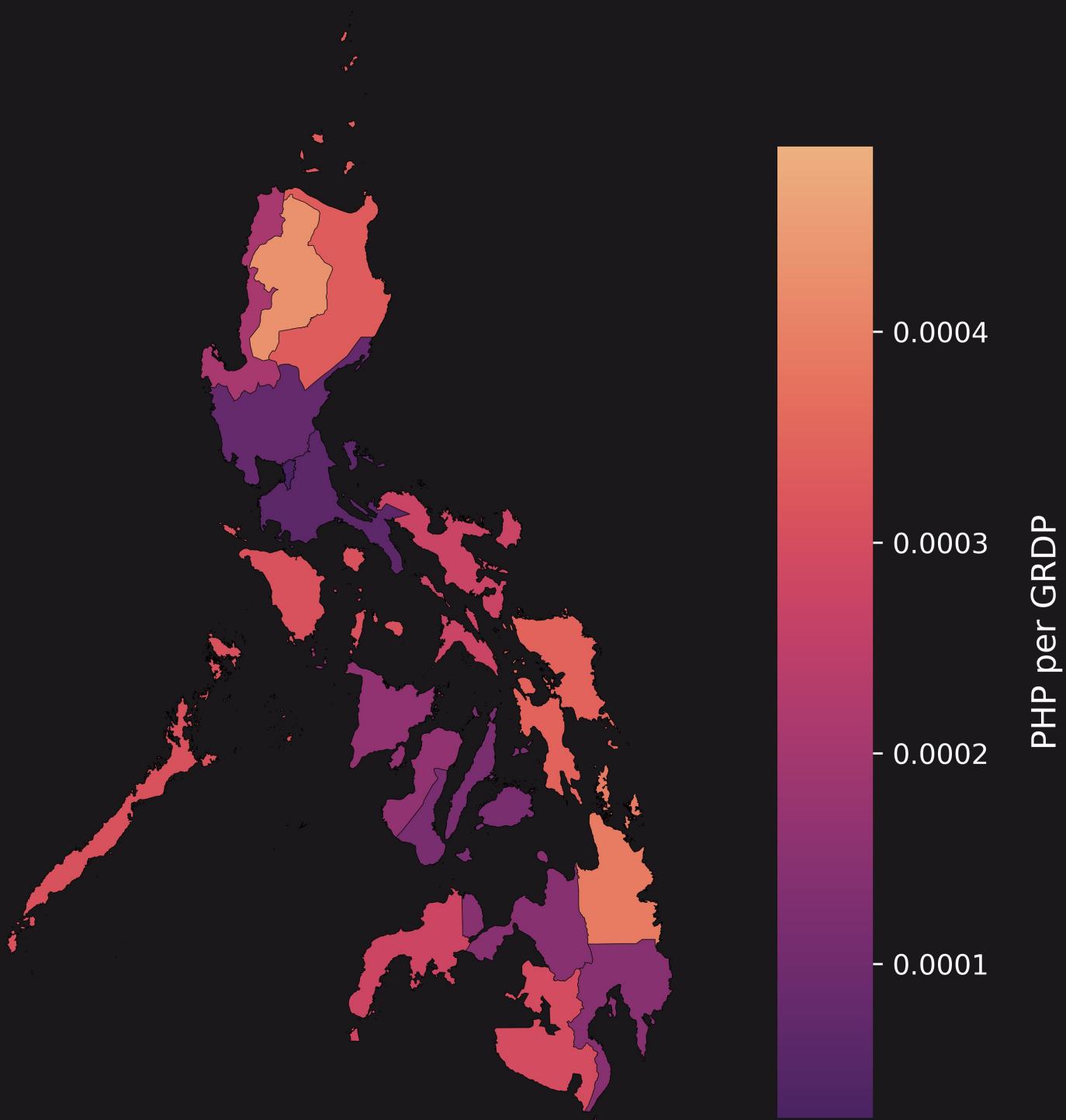
NEDA - Budget Allocation (PHP) per GRDP (2020)



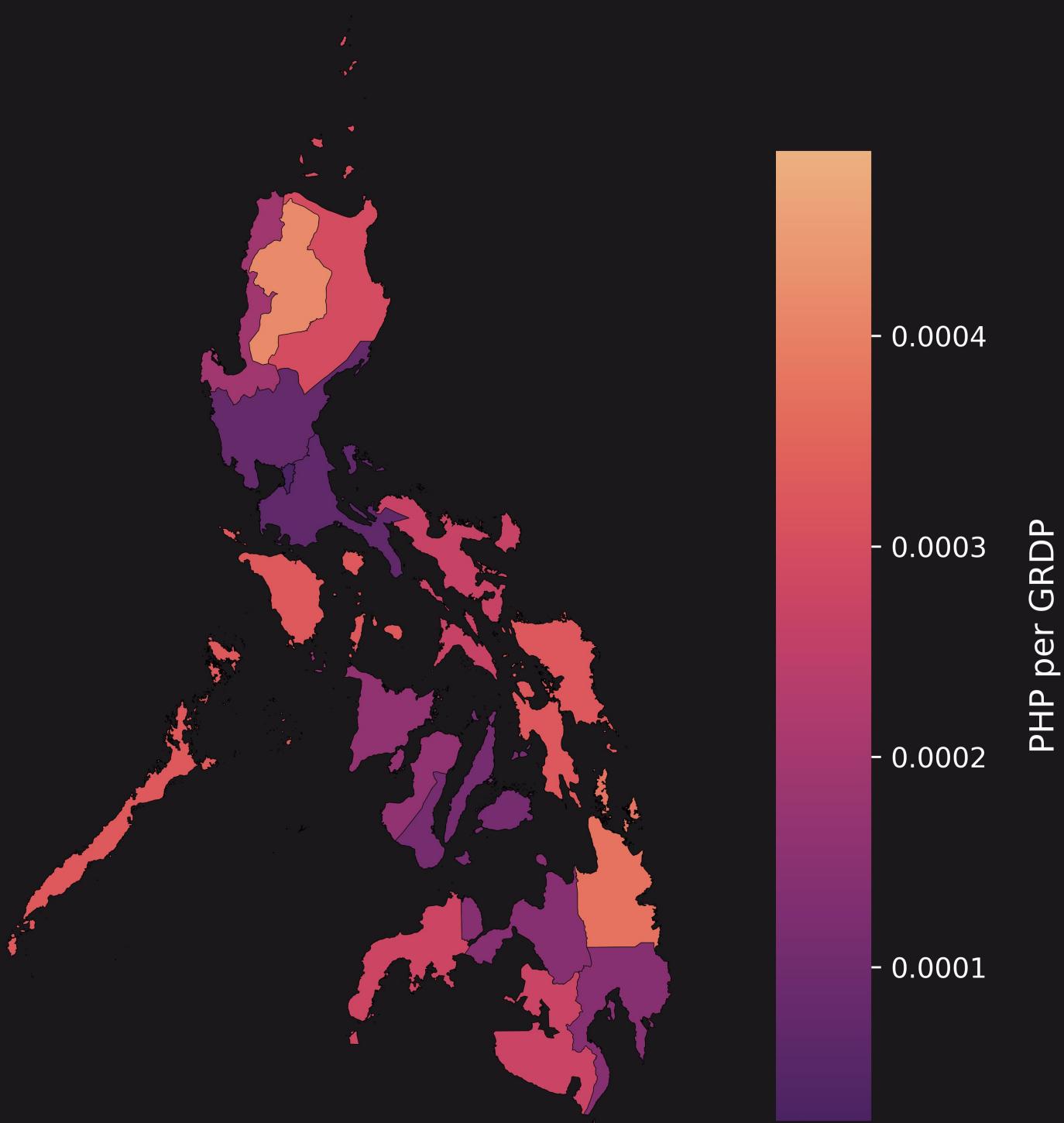
NEDA - Budget Allocation (PHP) per GRDP (2021)



NEDA - Budget Allocation (PHP) per GRDP (2022)



NEDA - Budget Allocation (PHP) per GRDP (2023)



NEDA - Budget Allocation (PHP) per GRDP (2024)

