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Research Article

Evaluation of Mean Square Errors in Simple Moving Average versus Exponential Smoothing Method and Assessment of Time as Predictor in Forecasting Myocardial Infarction Cases in the Philippines

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ABSTRACT

This study aimed to identify the best forecasting model and evaluate if time (in months and years) is a predictor for Myocardial Infarction cases in the Philippines. The research design was quantitative research, specifically descriptive study design. Secondary data on monthly reported cases of myocardial infarction for the past five years (November 2018-November 2023) from Google Trends was utilized. Microsoft Excel and SPSS were the software used to obtain results. Simple Moving Average (SMA) and Exponential Smoothing Method (ESM) were the forecasting techniques used in this study. At the same time, Mean, Standard Deviation, Analysis of Variance, and Independent sample t-test were the statistical tools utilized for both descriptive and inferential analyses. Results revealed that the mean level of cases reported for the past five years was 54. Also, according to SMA and ESM, the forecasted cases for the next succeeding month (December 2023) were 66 and 61, respectively. Results also showed that the Mean Squared Error (MSE) value of SMA is lower than ESM, making SMA a better forecasting method. Moreover, there was a significant difference between the reported cases when grouped according to year, with Year 5 having the highest number of cases and Year 1 having the lowest. Further, there was no significant difference between the SMA and ESM forecasted cases. Furthermore, time (year and month) significantly predicted the number of myocardial infarction cases reported in the Philippines.

Keywords: *Descriptive research design, Exponential smoothing method, Mean square error, Myocardial infarction, Philippines, Simple moving average*

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Introduction

Myocardial Infarction (MI) is the irreversible necrosis of heart muscle. A common cause for infarction is deprivation of myocardial oxygen supply because of interruption of blood flow in ≥1 coronary arteries due to plaque rupture, erosion, fissure, or coronary dissection (Anderson et al., 2022). It is one of the leading causes of death in the developed world. The prevalence of the disease approaches 3 million people worldwide, with more than 1 million deaths in the United States annually (Mechanic et al., 2023). In 2021, around 23,000 people in Sweden suffered from myocardial infarction, corresponding to about 298 people per 100,000 inhabitants. In 2021, the incidence increased by 3 percent. The uncertainty that characterizes the data for 2020 as a result of the pandemic means that the change should be interpreted cautiously. Around 4,700 people died in myocardial infarction in 2021, corresponding to 59 deceased per 100,000 inhabitants (Engdahl & Ziegel, 2022). In the Asia Pacific Region, MI accounts for around 3 million deaths a year, being one of the major causes of death and disability. Additionally, it is associated with significant health, social, and nonfinancial costs because of the persistent disabilities suffered by many survivors (WHO, 2022). Through the presented magnitude of the problem, it is necessary to forecast the succeeding cases for the involved organizations, such as healthcare sectors, to prepare for the resources and specific approach in diagnosing, managing, and treating individuals with such noncommunicable diseases.

Time series is a collection of observations made at regular time intervals, and its analysis refers to problems in correlations among successive observations (Ivanovski et al., 2018). This has historically been a critical area of academic research—forming an integral part of applications in topics such as climate modeling, biological sciences, and medicine, as well as commercial decision-making in retail and finance, to name a few (Lim & Zohren, 2021) Forecasting the number of incidences of medical cases is essential in planning institutional health program strategies to draft interventions and allocate resources. The utilization of advancements in computing and the use of massive health data creates possibilities for the generation of tools in a recommender system (Quioc et al., 2022)

The Simple Moving Average method used actual data from the previous period to generate forecasting scores in the future. This method is characterized by the requirement for historical data for a certain period in forecasting the upcoming demand. The longer the period of historical data used, the more visible the smoothing effect in the forecast, resulting in a smoother moving average (Puspitasari et al., 2022).

In the study of Gultom et al., 2023, titled: "Shares Price Forecasting Using Simple Moving Average Method and Web Scrapping," the Simple Moving Average Method is defined as the method that can predict (forecast) share prices by calculating the moving average of the share price history. Historical share prices can be obtained in real time using the Web Scrapper technique, making the results quicker and more accurate. In their study, the level of accuracy of forecasting can be calculated using the Mean Absolute Percent Error (MAPE) method. As a result, the program could run successfully and display the value of forecasting and the level of accuracy for all the data tested in LQ45. Besides, forecasting with a value of N = 5 has the highest level of accuracy, reaching 97,6 %, while the lowest one uses the value of N = 30, which is 95,0 %.

On the other hand, the study made by Rustiana et al. (2020), titled: "Comparison of Rainfall Forecasting in Simple Moving Average (SMA) and Weighted Moving Average (WMA) Methods (Case Study at Village of Gampong Blang Bintang, Big Aceh District-Sumatera-Indonesia," predicted rainfall in 2018 and 2019 with the Simple Moving Average (SMA) method and the Weighted Moving Average (WMA) method. Based on 2004-2018 data, the dry season occurs in February to October, and the rainy season occurs in November to January. The level of validation of forecasters in 2018, according to each of the SMA and the WMA methods, was 43.43% and 40.69%, respectively. Both methods are low and reasonable or acceptable (Rusdiana et al., 2020).

Exponential Smoothing Methods are a family of forecasting models. They use weighted averages of past observations to forecast new values. The idea is to give more importance to recent values in the series. Thus, as observations get older in time, the importance of these values gets exponentially smaller (Franco, 2022)

In this study made by Yonar et al. (2020), titled: "Modeling and Forecasting for the Number of Cases of the COVID-19 Pandemic with the Curve Estimation Models, the Box-Jenkins and Exponential Smoothing Methods, the data is modeled via some curve estimation models to estimate the number of positive COVID-19 cases. Then, the forecasts of the COVID-19 positive cases are made by using the Box-Jenkins and Brown and Holt linear exponential smoothing methods, which are the linear exponential smoothing methods. Results showed that Japan (Holt Model), Germany (ARIMA (1,4.0)), and France (ARIMA (0,1,3)) provide statistically significant but not clinically qualified results in this data set. UK (Holt Model), Canada (Holt Model), Italy (Holt Model), and Turkey (ARIMA (1,4,0)), and the results are more reliable. They are specified for the particular model used in this case, Turkey.

On the other hand, the study made by Syafwan et al., 2021, titled: "Forecasting Unemployment in North Sumatra Using Double Exponential Smoothing Method," predicted the unemployment in the province of North Sumatra in 2020 using the Double Exponential Smoothing (DES) method. The accuracy method in this research uses MAD to count the number of errors, MSE to evaluate forecasting methods, and MAPE to calculate the percentage of errors. The results of this research in the form of forecasting the number of unemployment in North Sumatra in 2020 is 381459 people in the value of alpha 0.6 with a MAD value of 77402.12, MSE value of 12524690448.31, and MAPE value of 16.35%.

Furthermore, the study made by Nirmala et al. (2021), titled: "Sales Forecasting by Using Exponential Smoothing Method and Trend Method to Optimize Product Sales in PT. Zamrud Bumi Indonesia During the Covid-19 Pandemic", analyzed the sales pattern of Power Bumi products during the covid19 pandemic and compared the forecasting method that can produce the minor error value in forecasting sales of Power Bumi products PT. Zamrud Bumi Indonesia. This study used exponential smoothing and the least square trend model. Calculate the error rate using MAD, MSE, and MAPE. The results show that the exponential smoothing alpha 0.9 method has the most minor error value compared to other forecasting methods. In forecasting product sales, the MAD value is 130.329, MSE is 28251.23, and MAPE is 22.00%, with a forecast of 627.628 boxes.

The purpose of the study was to forecast the number of Myocardial Infarction cases in the Philippines for the next succeeding month. Further, it aimed to identify the best forecasting model, Simple Moving Average or Exponential Smoothing Method, via mean squared error assessment. Moreover, this study aimed to evaluate if there is a significant difference between the number of Myocardial Infarction cases in the Philippines when grouped according to years (Year 1 to Year 5). Also, this study assessed whether there was a significant difference between the forecasted values of the Simple Moving Average and Exponential Smoothing Method. Lastly, this study should evaluate the time (month and year) as a significant predictor for the number of Myocardial Infarction cases in the Philippines.

This study aimed to identify the best forecasting model and evaluate if time (in months and years) is a predictor for Myocardial Infarction cases in the Philippines. Specifically, this study aimed to answer the following questions:

1. What is the mean value of Myocardial Infarction cases in the Philippines for the past five years (November 2018-November 2023)?
2. What is the forecasted number of Myocardial Infarction cases in the Philippines for December 2023, according to:
   i. Simple Moving Average
   ii. Exponential Smoothing Method
3. What are the mean squared error values of the Myocardial Infarction cases in the Philippines for the past five years (November 2018-November 2023), according to:
   i. Simple Moving Average
   ii. Exponential Smoothing Method
4. Is there a significant difference between the number of cases when grouped according to:

i. Year 1 (November 2018-October 2019)
ii. Year 2 (November 2019-October 2020)
iii. Year 3 (November 2020-October 2021)
iv. Year 4 (November 2021- October 2022)
v. Year 5 (November 2022- October 2023)

5. Is there a significant difference between the Simple Moving Average and Exponential Smoothing Method regarding the forecasted value of cases? 6. Is time (month and year) a significant predictor for the number of Myocardial Infarction cases in the Philippines?

This study benefits the Department of Health since the researcher wanted to forecast Myocardial infarction cases in the Philippines using data from the past five years. In this way, the department will prepare necessary actions and establish clear mandates in addressing problems and helping patients manage such noncommunicable diseases. It is also beneficial for the Department of Science and Technology to emphasize myocardial infarction as a health issue and focus on establishing research. Its monthly cases and the forecasted data will make this department prioritize and mobilize more studies for its tests, diagnoses, monitoring, treatments, and management. Furthermore, this benefits future researchers as it helps them understand how to evaluate forecasting techniques using time series methods to choose the best model for a particular data set.

This study dealt with myocardial infarction of all types. It focused only on the five-year data (November 2018-November 2023) for Myocardial Infarction cases reported in the Philippines. The data extracted from https://trends.google.com/ presents monthly reports of the said noncommunicable disease. Microsoft Excel was the software of choice for the computation and graphical presentation of values. Simple Moving Average and Exponential Smoothing Methods, both forecasting techniques, were utilized in this study to identify the best forecasting model by comparing their Mean Square Error values. Furthermore, this study only forecasted the next succeeding month, December 2023.

Methods

Research Design

This study utilized quantitative research, specifically descriptive study design. Quantitative research involves analyzing and gathering numerical data to uncover trends, calculate averages, evaluate relationships, and derive overarching insights. It is used in various fields, including the natural and social sciences. Quantitative data analysis employed statistical techniques for processing and interpreting numeric data (Fleetwood, 2023). On the other hand, descriptive study design is an exploratory research method. It enables researchers to precisely and methodically describe a population, circumstance, or phenomenon. It describes the characteristics of the group, situation, or phenomenon being studied (Heath, 2023).

Sources of Data

This study used secondary data regarding Myocardial Infarction monthly reported cases for the past five years (November 2018- November 2023). Google Trends (https://trends.google.com), an online data exploration tool, was the source of such a dataset. The data downloaded was in an MS Excel file reflecting the month and year and the corresponding number of MI cases in the Philippines.

Data Gathering Instrument

The researcher utilized Google Trends (https://trends.google.com/), an online data exploration tool, to extract data on Myocardial Infarction cases in the Philippines Myocardial Infarction and specified cases in the Philippines and indicated cases for the past five years. After setting the necessary details of the dataset of interest, the researcher downloaded the file in MS Excel.

The Procedure of the Study

EXCEL

Simple Moving Average

From the data given, perform three-period moving average, click data, click data analysis, select moving average, [input range: highlight the values of interest, interval: 3, output range: select the cell you wanted the moving average to appear, click chart output, click ok].

Mean Error (ME)

Make a new column for errors, reflecting the difference between the actual and predicted values. Get the average of the error.

Mean Squared Error (MSE)

Make another column, then solve for the squared error. This is simply the squared value of the error computed. Get the average of the squared error. MSE is the average sum of the square difference between the actual and predicted values, so it measures how closely the fitted line is to the data points to find the model that produces the smallest MSE. In other words, a model with the smallest MSE value will have the best prediction.

Graph Presentation

Provide a line graph to compare actual versus forecasted Myocardial Infarction cases for the past five years using a Simple Moving Average.

Exponential Smoothing Method

This method used a weighted average of the past time series as the forecast. In other words, the older the data, the less priority or weight is given. So, new data will be more relevant and assigned more weight. Here, we are using a smoothing parameter, usually denoted by alpha, to determine the weight of the observations.

For the process, click data, click data analysis, select exponential smoothing, [input range: highlight the values of interest, damping factor: 0.8 (1.0 minus 0.2 [alpha value]), output range: select the cell you wanted exponential smoothing result to appear, click chart output, click ok].

Mean Error (ME)

Make a new column for errors, reflecting the difference between the actual and predicted values. Get the average of the error.

Mean Squared Error (MSE)

Make another column, then solve for the squared error. This is simply the squared value of the error computed. Get the average of the squared error. MSE is the average sum of the square difference between the actual and predicted values, so it measures how closely the fitted line is to the data points to find the model that produces the smallest MSE. In other words, a model with the smallest MSE value will have the best prediction.

Graph Presentation

Provide a line graph to compare actual versus forecasted Myocardial Infarction cases for the past five years using the Exponential Smoothing Method.

SPSS

The researcher used IBM SPSS 26 to test normality descriptive and inferential statistical tools. The researcher assessed the Kolmogorov-Smirnov and Shapiro-Wilk values for the normality test. However, the researcher assessed the mean and standard deviation values for descriptive statistics. On the other hand, the researcher evaluated the results of the variance analysis, independent sample t-test, and simple regression analysis for inferential statistics.

Statistical Treatment

Simple Moving Average- calculated by taking the arithmetic mean of a given set of values over a specified period. In this study, the number of cases of Myocardial Infarction for the past five years (November 2018-November 2023) is added together and then divided by the number of cases in the set (Fernando, 2023).

Exponential Smoothing Method- This estimation process is proven by studying cases that depend on time or change with time (Tekindal, 2020).

Mean- the average- is the sum of values in a sample divided by the number of values in your sample (Hurley & Tenny, 2023).

Standard Deviation- is a statistic that measures the dispersion of a dataset relative to its mean and is calculated as the square root of the variance. The standard deviation is calculated as the square root of variance by determining each data point's Deviation relative to the mean (Hargrave, 2023).

Analysis of Variance- used for three or more data groups to gain information about the relationship between the dependent and independent variables (Kenton, 2023).

Independent Sample t-test - a strategy used to test whether the obscure populace means for two groups on a specific variable are equivalent (Rani, 2022).

Simple linear regression - creates a predictive model using one independent variable and one dependent variable. In a regression analysis, the independent variable may also be referred to as the predictor variable, while the dependent variable may be referred to as the criterion or outcome variable. The regression analysis builds on the simple correlational analysis, moving from a measure of relationship to one with predictive abilities (NU, 2023).

Result and Discussion

Table 1 shows the descriptive statistics data for Myocardial Infarction. The mean of the "CASES" variable is 54.0000. This is the sum of all the values divided by the number of cases, which is 60. It represents the central tendency of the data. The standard Deviation is 8.27903. It measures the variation or dispersion in the "CASES" variable. A higher standard deviation indicates more variability in the data.

Table 1. Descriptive Statistics Data for Myocardial Infarction

	N	Mean	Std. Deviation
Cases	60	54.0000	8.27903

Table 2 shows the forecasted number of Myocardial Infarction cases in December 2023 using the Simple Moving Average and Exponential Smoothing Method. A Simple Moving Average is a forecasting method that calculates the average of a specified number of past data points. In this case, it has been applied to predict the number of cases for December 2023.

The forecasted value is 66 cases, indicating that, according to the Simple Moving Average method, it is expected that there will be 66 cases in December 2023. The Exponential Smoothing Method is a time-series forecasting technique that gives more weight to recent observations. It is a method that adapts to changes in the data pattern. The forecasted value using the Exponential Smoothing Method is 61 cases. This suggests that, based on this method, the expected number of cases for December 2023 is 61.

Table 2. The forecasted number of Myocardial Infarction cases in December 2023

Forecasting Methods	**Forecasted cases (December 2023)**
Simple Moving Average	66 cases
Exponential Smoothing Method	61 cases

Table 3 shows the mean squared error values of the Simple Moving Average and Exponential Smoothing Method. The MSE for the Simple Moving Average is 56.04731. The MSE for the Exponential Smoothing Method is 57.33194. With a lower MSE of 56.04731, the Simple Moving Average method, on average, has smaller squared differences between its predicted and actual values compared to the Exponential Smoothing Method. The Exponential Smoothing Method has a slightly higher MSE of 57.33194, indicating slightly larger squared differences between predicted and actual values. The interpretation of MSE values provides insights into the relative performance of the two forecasting methods, with the Simple Moving Average method having a slightly lower MSE than the Exponential Smoothing Method.

Table 3. The Mean Squared Error values of the Simple Moving Average and Exponential Smoothing Method

Forecasting Methods	**Mean Squared Errors (MSE)**
Simple Moving Average	56.04731
Exponential Smoothing Method	57.33194

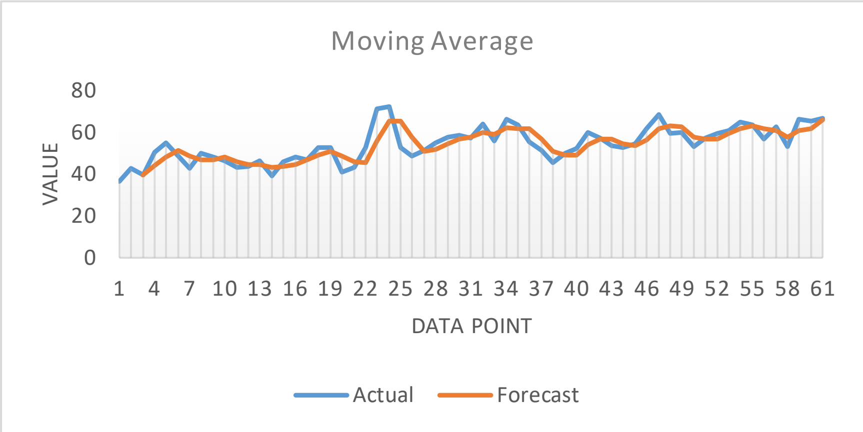

Figure 1. Actual Number of Cases Versus Forecasted Number of Cases Using Simple Moving Average

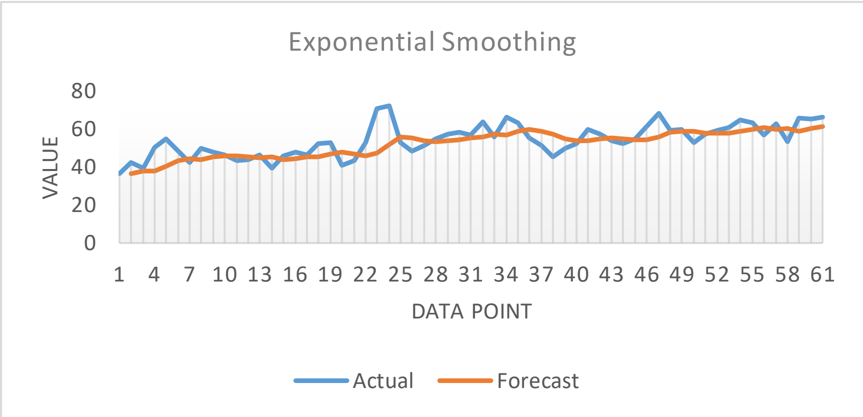

Figure 2. Actual Number of Cases Versus Forecasted Number of Cases Using Exponential Smoothing Method

Table 4A shows the ANOVA table. The "Between Groups" section assesses the variability between different groups in the data. The high F-statistic (8.788) and very low p-value (0.000) suggest significant differences between at least two groups. The "Within Groups" section assesses the variability within each group. The Mean Square value of 44.858 within groups measures the average variability within each group. In summary, based on this ANOVA result, there is evidence of significant differences between groups.

Table 4A. ANOVA table

CASES	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1576.833	4	394.208	8.788	0.000
Within Groups	2467.167	55	44.858		
Total	4044.000	59			

Table 4B shows the multiple comparison procedure using Tukey's Honestly Significant Difference (HSD) method. The Tukey HSD method compares the means between different levels of the variable "YEAR." The table provides mean differences between each pair of

"YEAR" levels, standard errors, and significance levels. The significance level (Sig.) indicates whether the mean difference between each pair of "YEAR" levels is statistically significant.

Based on specific pairwise comparisons, Year 1 compared to Year 2 has a mean difference of -5.41667, with a nonsignificant p-value (0.289). Year 1, compared with Year 3, has a mean difference of -11.58333, and the p-value is significant (0.001). Year 1, compared to Year 4, has a mean difference of -10.00000, and the p-value is significant (0.005). Year 1, compared to Year 5, has a mean difference of -14.66667, and the p-value is highly significant (0.000). Year 2, compared to Year 3, has a mean difference of -6.16667, and the p-value is highly significant (0.175). Year 2, compared to Year 4, has a mean difference of -4.58333, and the p-value is highly significant (0.457). Year 2, compared to Year 5, has a mean difference of -9.25000, and the p-value is highly significant (0.011). Year 3, compared to Year 4, has a mean difference of 1.58333, and the p-value is highly significant (0.978). Year 3, compared to Year 5, has a mean difference of - 3.08333, and the p-value is highly significant (0.791). Year 4, compared to Year 5, has a mean difference of -4.66667, and the p-value is highly significant (0.438).

Table 4B. The Multiple Comparison Procedure using Tukey's Honestly Significant Difference (HSD) method

					95% Confidence Interval	
YEAR	YEAR	Mean Difference	Std. Error	Sig.	Lower Bound	Upper Bound
1.00	2.00	-5.41667	2.73428	.289	-13.1282	2.2949
	3.00	-11.58333*	2.73428	.001	-19.2949	-3.8718
	4.00	-10.00000*	2.73428	.005	-17.7116	-2.2884
	5.00	-14.66667*	2.73428	.000	-22.3782	-6.9551
2.00	1.00	5.41667	2.73428	.289	-2.2949	13.1282
	3.00	-6.16667	2.73428	.175	-13.8782	1.5449
	4.00	-4.58333	2.73428	.457	-12.2949	3.1282
	5.00	-9.25000*	2.73428	.011	-16.9616	-1.5384
3.00	1.00	11.58333*	2.73428	.001	3.8718	19.2949
	2.00	6.16667	2.73428	.175	-1.5449	13.8782
	4.00	1.58333	2.73428	.978	-6.1282	9.2949
	5.00	-3.08333	2.73428	.791	-10.7949	4.6282
4.00	1.00	10.00000*	2.73428	.005	2.2884	17.7116
	2.00	4.58333	2.73428	.457	-3.1282	12.2949
	3.00	-1.58333	2.73428	.978	-9.2949	6.1282
	5.00	-4.66667	2.73428	.438	-12.3782	3.0449
5.00	1.00	14.66667*	2.73428	.000	6.9551	22.3782
	2.00	9.25000*	2.73428	.011	1.5384	16.9616
	3.00	3.08333	2.73428	.791	-4.6282	10.7949
	4.00	4.66667	2.73428	.438	-3.0449	12.3782

Table 5A shows the descriptive statistics of forecasted values by Simple Moving Average and Exponential Smoothing Methods. The Simple Moving Average and Exponential Smoothing Method forecasting techniques group the data. The Simple Moving Average group has 58 observations with a mean forecasted value of approximately 53.9293 and a standard deviation 6.76611. The Exponential Smoothing Method group has 59 observations with a mean forecasted value of approximately 52.0637 and a standard deviation 6.68547.

The mean forecasted value represents the average value predicted by each forecasting technique. The Simple Moving Average technique, on average, predicts higher values (53.9293) compared to the Exponential Smoothing Method (52.0637).

Standard Deviation reflects the degree of variability or spread in the forecasted values within each group. A higher standard deviation indicates more variability in the forecasted values. In this case, both groups have relatively similar standard deviations, suggesting comparable variability in their forecasted values.

Table 5A. Descriptive Statistics of Forecasted Values by Simple Moving Average and Exponential Smoothing Method

Group Statistics	FORECASTING TECHNIQUES	N	Mean	Std. Deviation
FORECASTED_VALUES	SIMPLE MOVING AVERAGE	58	53.9293	6.76611
	EXPONENTIAL SMOOTHING METHOD	59	52.0637	6.68547

Table 5B shows equality variances between the Simple Moving Average and Exponential Smoothing Method. Levene's test assesses whether the variances of the two groups being compared are statistically equal. A nonsignificant p-value (in this case, .985) suggests no evidence to reject the null hypothesis of equal variances. Therefore, based on this test, the assumption of equal variances is met. The test compares the means of the two groups (assumes equal variances). The t-statistic is 1.500, and the associated p-value is .136. The nonsignificant p-value suggests insufficient evidence to reject the null hypothesis of equal means. The results are similar to the assumed case of equal variances, with a nonsignificant p-value and a confidence interval that includes zero. Both t-tests, with and without the assumption of equal variances, yield nonsignificant p-values (.136). In conclusion, based on these tests, there is no significant difference in the means of forecasted values between the two groups, and Levene's test supports the assumption of equal variances.

Table 5B. Equality Variances between Simple Moving Average and Exponential Smoothing Method

		Levene's Test		t-test				
		F	Sig.	t	df	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
FORECASTED VALUES	**Equal variances assumed**	**.000**	**.985**	**1.500**	**115**	**.136**	**-.59774**	**4.32893**
	Equal variances not assumed			**1.500**	**114.902**	**.136**	**-.59802**	**4.32921**

Table 6A shows the correlation matrix between the year and number of Myocardial Infarction cases. The Pearson correlation coefficient measures the strength and direction of a linear relationship between two variables. In both cases, the correlation coefficient is 0.584. A positive value indicates a positive linear relationship, and the magnitude (0.584) suggests a moderate strength of association. The very low p-values (0.000) suggest that the observed correlation coefficients are statistically significant.

Table 6A. Correlation Matrix Between Year and Number of Myocardial Infarction Cases

		CASES	YEAR
Pearson Correlation	CASES	1.000	0.584
	YEAR	0.584	1.000
Sig. (1-tailed)	CASES		0.000
	YEAR	0.000	

Table 6B shows the Model summary/model fit. The R Square (coefficient of determination) is 0.341, indicating that approximately 34.1% of the variability in the dependent variable is explained by the independent variable(s) included in the model. The Adjusted R Square considers the number of predictors in the model and provides a more conservative estimate of the model fit. In this case, it is 0.330.

The correlation coefficient (R) 0.584 suggests a moderate positive correlation between the predictor(s) and the dependent variable. The low p-value (0.000) indicates that adding the predictor(s) significantly improves the model fit. Based on this output, the regression model is a good fit, explaining a substantial amount of variability in the dependent variable, and the addition of predictor(s) significantly contributes to this explanation.

Table 6B. Table of Model Fit

Model	R	R Square	Adjusted R Square	Change Statistics		
				R Square Change		Sig. F Change
1	.584[a]	.341	.330	.341		.000

Table 6C shows the coefficients in Regression Analysis. The unstandardized coefficient (B) for the variable YEAR is 3.392. This represents the change in the dependent variable for a one-unit change in the predictor variable (YEAR). The standardized coefficient (Beta) is 0.584. In this case, a one-unit change in the standardized predictor (YEAR) corresponds to a 0.584 standard deviation change in the dependent variable.

The p-value (Sig.) associated with YEAR is 0.000, indicating that the coefficient is statistically significant. The coefficient for YEAR (3.392) indicates that, on average, the dependent variable increases by 3.392 units for each one-unit increase in the predictor variable YEAR. The standardized coefficient (Beta) of 0.584 suggests that YEAR is a significant predictor, and a one-unit change in YEAR corresponds to a 0.584 standard deviation change in the dependent variable. The coefficient for YEAR and the intercept are statistically significant, as indicated by their low p-values. In conclusion, based on this output, the variable YEAR is a statistically significant predictor of the dependent variable, and the intercept term is also statistically significant.

Table 6C. Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients		95.0% Confidence Interval for B	
		B	Std. Error	Beta	Sig.	Lower Bound	Upper Bound
1	(Constant)	43.825	2.052		.000	39.718	47.932
	YEAR	3.392	.619	.584	.000	2.153	4.630

Conclusion

Forecasted cases for the next succeeding month are an essential indicator that health departments in the Philippines should establish action for its subsidence. It has been presented that the Simple Moving Average is a better forecasting technique than the Exponential Smoothing Method in projecting a possible number of cases in the next succeeding month using mean square error. However, another test for error evaluation can be utilized for forecasting technique assessment. In addition, there has been a drastic increase in recorded cases of MI from Year 2 to Year 3, and this year, the World Health Organization (WHO) declared COVID-19, the disease caused by the SARS-CoV-2, a pandemic. According to the study of Randjelovic et al., 2023, there is a strong association between the cumulative incidence of out-of-hospital cardiac arrest (OHCA) and COVID-19 disease. Furthermore, they observed that the 60% increase in OHCA in 2020 compared to the same period in 2019 paralleled the time course of the COVID-19 outbreak. A sedentary lifestyle is possible since people stayed longer at home due to the lockdown. It could lead to abnormal Body Mass Index (BMI) status, thus leading to an increased risk of cardiovascular disease such as MI. Among all identified years, Year 5 had the highest number of cases. This indicates that people under such a year practice a lifestyle that could increase the risk of obtaining MI. Furthermore, this study suggested that time is a predictor of several cases. However, researchers could explore other predictors that could significantly affect the several cases to obtain more comprehensive results.

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