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Hematological, Biochemical, and Lipid Profile Characteristics and Correlational Analysis among Elderly Participants in a Community-Based Population Study

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Abstract

Population aging increases the importance of routine laboratory assessment for identifying subclinical hematological and metabolic abnormalities among older adults. This study evaluated the hematological, biochemical, renal, and lipid profiles of community-dwelling older adults in Manila and examined selected correlations among clinically relevant laboratory parameters. A cross-sectional descriptive-correlational design was employed among 206 participants aged 60 years and above who were recruited from different districts of Manila. Venous blood samples were analyzed for hemoglobin, hematocrit, platelet count, red blood cell indices, fasting blood glucose, glycated hemoglobin, lipid parameters, blood urea nitrogen, creatinine, and uric acid. Descriptive statistics and Pearson product-moment correlation analysis were used. Most participants had normal hemoglobin, platelet, red blood cell index, fasting blood glucose, glycated hemoglobin, blood urea nitrogen, and creatinine levels. However, low hemoglobin and hematocrit values were observed in 19.9% and 26.2% of participants, respectively. Lipid abnormalities were prominent, with elevated total cholesterol in 54.9%, elevated triglycerides and very-low-density lipoprotein in 31.6%, low high-density lipoprotein in 32.0%, and elevated low-density lipoprotein in 17.0%. Elevated uric acid was found in 21.4% of participants. Hemoglobin was strongly correlated with hematocrit, while fasting blood glucose showed a weak but significant positive correlation with glycated hemoglobin. The findings indicate that generally preserved hematological and renal profiles may coexist with substantial lipid, glycemic, and uric acid abnormalities. Routine community-based laboratory screening may support early detection and targeted preventive interventions among older adults.

Keywords: *older adults; hematological profile; biochemical markers; lipid profile; renal function; community health screening*

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1. Introduction

Population aging has become a major demographic and public health concern worldwide. Improvements in health care, nutrition, sanitation, and disease prevention have contributed to longer life expectancy and a growing proportion of older adults in many countries. The World Health Organization (2025) projected that the global population aged 60 years and above would increase substantially over the coming decades, creating greater demand for health services capable of addressing age-related physiological and metabolic changes. Although aging is not inherently a disease condition, advancing age is frequently accompanied by alterations in hematological, biochemical, renal, and lipid parameters that may increase vulnerability to chronic illness, functional decline, and adverse health outcomes. Population aging also creates systems-level pressures by increasing long-term-care demand and strengthening the need for analytics-informed workforce and health-service planning (Atento, Quinto, & Espelita, 2025).

The aging process is associated with gradual changes in physiological regulation, organ function, and metabolic homeostasis. These changes may remain clinically silent during their early stages and may not be readily detected through physical examination alone. Routine laboratory assessment is therefore important in identifying subclinical abnormalities, monitoring disease risk, and supporting preventive health interventions among older adults. Community-based laboratory screening is particularly relevant because it can identify individuals who may

appear generally healthy but already demonstrate biochemical or hematological patterns requiring further clinical assessment.

In the Philippines, the proportion of older adults has continued to increase as a result of improved access to health care and longer life expectancy. This demographic transition has implications for national and local health systems because older adults commonly experience multiple health risks, including cardiovascular disease, diabetes, anemia, renal dysfunction, and metabolic disorders. Access to routine laboratory assessment, however, remains uneven, particularly among older adults living in densely populated urban communities.

Hematological parameters provide essential information regarding oxygen transport, red blood cell production, blood cell morphology, and hemostatic function. Hemoglobin and hematocrit measurements are commonly used to assess anemia and oxygen-carrying capacity, while red blood cell indices such as mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, and red cell distribution width help characterize the size, hemoglobin content, and variability of erythrocytes. Platelet count is likewise relevant in assessing hemostatic capacity and identifying possible abnormalities associated with bleeding or thrombotic risk (McPherson & Pincus, 2017).

Age-related hematological changes may be influenced by nutritional deficiencies, chronic inflammation, renal impairment, bone marrow alterations, medication use, and underlying chronic diseases. Anemia among older adults is particularly important because it has been associated with fatigue, reduced physical functioning, cognitive impairment, increased frailty, and poorer health outcomes. Nevertheless, hematological abnormalities may remain unrecognized when older adults do not undergo routine laboratory testing. Evaluating these parameters at the community level may therefore provide useful evidence regarding the prevalence and distribution of hematological abnormalities among older populations.

Biochemical measures are equally important in assessing metabolic health. Fasting blood glucose and glycated hemoglobin are routinely used to evaluate short-term and longer-term glycemic regulation. Glycated hemoglobin reflects average blood glucose levels over the preceding two to three months and is widely used in the screening and monitoring of diabetes mellitus (American Diabetes Association, 2020). Because glucose regulation may become less efficient with advancing age, older adults may experience impaired fasting glucose or elevated glycated hemoglobin even in the absence of previously diagnosed diabetes.

Lipid parameters, including total cholesterol, triglycerides, high-density lipoprotein, low-density lipoprotein, and very-low-density lipoprotein, are important indicators of cardiovascular and metabolic risk. Dyslipidemia may contribute to atherosclerosis and the development of cardiovascular disease, particularly when elevated total cholesterol, triglycerides, and low-density lipoprotein coexist with reduced high-density lipoprotein levels. Clinical guidelines therefore recognize lipid assessment as an important component of cardiovascular risk evaluation and preventive health management (Grundy et al., 2019; National Cholesterol Education Program, 2002).

Renal function parameters also require attention among older adults because kidney function may gradually decline with age. Blood urea nitrogen and serum creatinine are commonly used as indicators of renal filtration and metabolic waste clearance. Uric acid is another relevant biochemical marker because elevated levels may be associated with gout, renal dysfunction, metabolic abnormalities, and increased cardiovascular risk. Although abnormal renal markers may indicate clinically significant disease, modest alterations may also reflect age-related physiological change, medication use, diet, hydration status, or coexisting health conditions.

The interpretation of laboratory findings among older adults should not be limited to isolated parameters. Relationships among hematological and biochemical indicators may provide additional insight into physiological regulation and metabolic health. For example, hemoglobin and hematocrit are expected to exhibit a strong positive relationship because both reflect red blood cell mass and oxygen-carrying capacity. Fasting blood glucose and glycated hemoglobin may also be related because they represent complementary indicators of glycemic status. Similarly, correlations among lipid parameters may help describe patterns of lipid metabolism and cardiovascular risk within an older population.

Despite the clinical importance of these laboratory indicators and the increasing number of older adults in the Philippines, integrated evidence concerning the hematological, biochemical, renal, and lipid profiles of community-dwelling older adults remains limited. Many available reports focus on diagnosed disease groups, hospital-based patients, or individual laboratory measures rather than examining several laboratory domains within the same

community population. Moreover, relatively little is known about the relationships among selected laboratory parameters among older adults residing in urban Philippine communities.

This study aimed to evaluate the hematological, biochemical, renal, and lipid profile characteristics of elderly participants in a community-based population study in Manila. Specifically, it sought to describe the participants' hemoglobin, hematocrit, platelet count, red blood cell indices, fasting blood glucose, glycated hemoglobin, lipid profile, blood urea nitrogen, serum creatinine, and uric acid levels and to determine the correlations among selected clinically relevant laboratory parameters.

2. Review of Related Literature

2.1 Hematological Changes and Anemia among Older Adults

Hematological assessment is an important component of health evaluation among older adults because aging may alter red blood cell production, oxygen transport, and bone marrow function. Hemoglobin and hematocrit are commonly used to identify anemia and assess the capacity of circulating blood to transport oxygen. Red blood cell indices, including mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, and red cell distribution width, provide additional information regarding erythrocyte size, hemoglobin content, and morphological variability (McPherson & Pincus, 2017).

Anemia is relatively common among older populations, although its prevalence differs across settings and participant characteristics. Guralnik et al. (2004) reported that anemia among older adults may be associated with nutritional deficiencies, chronic kidney disease, inflammatory conditions, and unexplained age-related mechanisms. The condition is clinically important because reduced hemoglobin concentration has been associated with fatigue, diminished physical capacity, impaired cognitive functioning, frailty, and poorer overall health outcomes. The World Health Organization (2011) likewise identified hemoglobin concentration as a principal indicator for diagnosing anemia and assessing its severity.

Red blood cell indices assist in identifying possible causes of anemia. Low mean corpuscular volume may suggest microcytic anemia related to iron deficiency or chronic disease, while elevated mean corpuscular volume may indicate deficiencies in vitamin B12 or folate, medication effects, or bone marrow abnormalities. Red cell distribution width may increase when circulating erythrocytes vary markedly in size and may provide additional information when interpreted together with hemoglobin and other red blood cell measures (Bain & Leach, 2025; McPherson & Pincus, 2017).

Platelet count is also relevant in older adults because both thrombocytopenia and thrombocytosis may reflect underlying clinical conditions. Platelet abnormalities may be associated with inflammation, nutritional deficiency, medication use, malignancy, infection, or bone marrow dysfunction. Routine hematological screening can therefore identify abnormalities that may not yet be evident through symptoms or physical examination alone.

2.2 Glycemic Regulation and Metabolic Health in Aging

Advancing age is frequently accompanied by changes in glucose metabolism, insulin sensitivity, body composition, physical activity, and pancreatic function. These changes may increase the likelihood of impaired fasting glucose, hyperglycemia, and diabetes mellitus among older adults. The American Diabetes Association (2020) recognizes fasting blood glucose and glycated hemoglobin as important indicators for screening, diagnosis, and monitoring of glycemic status.

Fasting blood glucose reflects circulating glucose at a particular point in time following a prescribed fasting period. Although useful for identifying current glycemic abnormalities, fasting glucose may be affected by recent dietary intake, stress, medication use, acute illness, and compliance with fasting instructions. Glycated hemoglobin, in contrast, reflects average glucose exposure over approximately two to three months and is therefore useful in evaluating longer-term glycemic regulation (American Diabetes Association, 2020).

The interpretation of glucose-related measures among older adults requires attention to clinical context. Some individuals may have normal fasting glucose but elevated glycated hemoglobin, while others may exhibit isolated fasting hyperglycemia. These differences may result from variability in diet, medication, glucose tolerance, red blood cell turnover, or chronic disease status. Consequently, the combined use of fasting glucose and glycated hemoglobin may provide a more comprehensive picture of metabolic health than either measure alone.

Population-based nutritional and health reports in the Philippines have indicated that metabolic disorders and chronic noncommunicable diseases remain important concerns among older adults (Department of Science and Technology–Food and Nutrition Research Institute [DOST-FNRI], 2024). The growth of the older population may further increase the burden of diabetes and related complications. Community-level laboratory screening can therefore support early identification of individuals with possible glycemic abnormalities who may require further evaluation, lifestyle modification, or clinical management.

2.3 Lipid Abnormalities and Cardiovascular Risk

Lipid assessment is central to the evaluation of cardiovascular and metabolic risk. Commonly measured parameters include total cholesterol, triglycerides, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, and very-low-density lipoprotein cholesterol. These indicators provide information regarding lipid transport and the potential development of atherosclerotic cardiovascular disease.

Elevated low-density lipoprotein cholesterol is widely regarded as an important contributor to atherosclerosis because cholesterol-rich particles may accumulate in arterial walls. Elevated total cholesterol and triglycerides may also indicate increased cardiovascular or metabolic risk, particularly when accompanied by reduced high-density lipoprotein cholesterol. High-density lipoprotein is generally considered protective because it participates in reverse cholesterol transport, although its clinical significance must be interpreted together with the overall lipid pattern and other risk factors (Grundy et al., 2019).

The National Cholesterol Education Program (2002) emphasized the importance of lipid screening and risk-based interpretation in the prevention and management of cardiovascular disease. More recent clinical guidelines have continued to prioritize low-density lipoprotein reduction, lifestyle modification, and comprehensive cardiovascular risk assessment rather than evaluating lipid values in isolation (Grundy et al., 2019).

Older adults may be particularly vulnerable to dyslipidemia because of age-related metabolic changes, reduced physical activity, dietary patterns, obesity, medication use, and coexisting conditions such as diabetes and hypertension. Nevertheless, lipid abnormalities may remain undetected when individuals do not undergo routine laboratory evaluation. Community-based screening can therefore help identify older adults with elevated cholesterol, triglycerides, or low-density lipoprotein and those with low high-density lipoprotein levels.

Philippine health and nutrition reports have documented a continuing burden of diet-related noncommunicable diseases and cardiometabolic risk factors among adults and older populations (DOST-FNRI, 2024). These conditions reinforce the need for preventive laboratory assessment and health education at the community level.

2.4 Renal Function and Uric Acid among Older Adults

Renal function may gradually decline with advancing age because of structural and physiological changes in the kidneys. Reductions in renal blood flow, nephron function, and glomerular filtration may affect the elimination of metabolic waste products and the regulation of fluid and electrolyte balance. Blood urea nitrogen and serum creatinine are commonly used as biochemical indicators of renal function, although both measures may be influenced by factors other than kidney disease.

Blood urea nitrogen can vary according to protein intake, hydration status, liver function, gastrointestinal bleeding, medication use, and renal clearance. Serum creatinine is influenced by muscle mass, nutritional status, age, sex, and physical activity. Because older adults may have reduced muscle mass, apparently normal creatinine concentrations do not always exclude impaired renal function. Laboratory findings should therefore be interpreted together with clinical assessment and, where available, estimates of glomerular filtration.

Uric acid is another relevant biochemical indicator among older adults. Hyperuricemia may result from increased uric acid production, reduced renal excretion, dietary factors, medication use, or underlying metabolic conditions. Elevated uric acid has traditionally been associated with gout, but it has also been examined in relation to renal dysfunction, hypertension, metabolic syndrome, and cardiovascular risk (Richette & Bardin, 2010).

Age-related changes in kidney function may contribute to reduced uric acid clearance. However, elevated uric acid does not necessarily indicate symptomatic gout, and its clinical significance depends on the participant's health status, medications, diet, and associated conditions. Routine measurement of blood urea nitrogen, creatinine, and uric acid may provide useful baseline information, particularly in older adults with diabetes, hypertension, cardiovascular disease, or a history of renal problems.

2.5 Synthesis and Research Gaps

The reviewed literature indicates that aging may be accompanied by clinically important changes in hematological, glycemic, lipid, and renal parameters. Hemoglobin, hematocrit, red blood cell indices, and platelet count provide information regarding anemia, erythrocyte morphology, and hemostatic function (Bain & Leach, 2025; McPherson & Pincus, 2017; World Health Organization, 2011). Fasting blood glucose and glycated hemoglobin offer complementary measures of short-term and longer-term glycemic regulation (American Diabetes Association, 2020). Lipid parameters are central to cardiovascular risk assessment, while blood urea nitrogen, creatinine, and uric acid assist in evaluating renal and metabolic health (Grundy et al., 2019; National Cholesterol Education Program, 2002; Richette & Bardin, 2010).

Viewed through an integrated health-analytics lens, combining hematological, glycemic, lipid, and renal indicators may strengthen decision quality by preventing the fragmented interpretation of clinically related data (Atento, Quinto, Espelita, & Castaneda, 2025).

Despite this established clinical relevance, several gaps remain. Much of the available literature examines individual disease conditions, hospitalized patients, or single laboratory domains. Fewer studies provide an integrated description of hematological, glycemic, lipid, and renal profiles within the same community-dwelling older population. Philippine evidence is also more frequently presented through national health statistics and nutrition surveys than through detailed community-based laboratory studies (DOST-FNRI, 2024).

There is likewise limited local evidence concerning the relationships among selected laboratory indicators, including hemoglobin and hematocrit, fasting blood glucose and glycated hemoglobin, and components of the lipid profile. The present study addresses these gaps by examining multiple laboratory domains among older adults residing in Manila and by assessing selected correlations among clinically related parameters. Its findings may provide baseline evidence for community screening, preventive health planning, and future investigations involving older Filipino populations.

3. Methodology

3.1 Research Design and Setting

The study employed a cross-sectional descriptive-correlational design to characterize the hematological, biochemical, renal, and lipid profiles of community-dwelling older adults and to examine selected relationships among clinically relevant laboratory parameters. The study was conducted in selected communities across the six districts of the City of Manila, Philippines. The communities represented varied urban and socioeconomic settings within the city.

3.2 Study Participants

The participants were 206 adults aged 60 years and above who had resided in Manila for at least six months and completed the required laboratory examinations. Individuals were eligible if they were capable of providing informed consent.

Participants were excluded if they had an acute infection at the time of data collection, had received a blood transfusion within the preceding three months, had a known hematological disorder under active treatment, had severe cognitive impairment that prevented reliable participation, or declined to provide informed consent.

3.3 Sampling Technique

Participants were recruited through a multistage community-based approach. Districts and participating communities were first identified, after which eligible older adults were recruited from the selected sites. Convenience recruitment was used when necessary because of accessibility and logistical limitations.

Although participants were drawn from communities across Manila, the final sample was not obtained through complete probability sampling. The findings should therefore be interpreted as descriptive of the participants included in the study rather than as fully representative estimates for all older adults in Manila.

3.4 Data Collection Instrument

Data collection consisted of a structured questionnaire and a laboratory examination. The questionnaire obtained demographic and socioeconomic information, including age, sex, marital status, educational attainment,

employment status, dietary profile, and relevant medical history. Trained researchers administered the questionnaire through face-to-face interviews.

3.5 Blood Collection and Laboratory Analysis

Venous blood samples were collected from each participant by trained medical laboratory personnel using standard aseptic venipuncture procedures. Approximately 5–10 mL of blood was obtained from each participant.

Samples intended for hematological analysis were collected in lavender-top tubes containing ethylenediaminetetraacetic acid as an anticoagulant. Samples for biochemical analysis were placed in red-top plain tubes, allowed to clot at room temperature, and centrifuged to separate the serum. The serum samples were processed within three hours of collection following established laboratory procedures.

Hematological parameters were measured using an automated hematology analyzer. These included hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, red cell distribution width, and platelet count.

Biochemical analysis included fasting blood glucose and glycated hemoglobin to assess glycemic status. Renal and metabolic indicators included blood urea nitrogen, serum creatinine, and uric acid. The lipid profile consisted of total cholesterol, triglycerides, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, and very-low-density lipoprotein cholesterol. Biochemical and lipid parameters were determined using an automated clinical chemistry analyzer.

Laboratory results were categorized as low, normal, or high according to the reference intervals used by the performing laboratory. Sample processing and analysis followed the laboratory's established protocols and quality-control procedures.

Evidence from adjacent laboratory settings further demonstrates that pre-analytical choices and protocol control can materially influence the reliability and interpretability of downstream diagnostic results (Morcilla et al., 2025).

3.6 Statistical Analysis

The data were encoded, verified, and analyzed using IBM SPSS Statistics, version 26. Frequencies and percentages were used to summarize categorical demographic and laboratory classifications, while means and standard deviations were used for continuous laboratory measurements.

Pearson product-moment correlation analysis was conducted to examine selected relationships between hemoglobin and hematocrit, fasting blood glucose and glycated hemoglobin, and low-density lipoprotein cholesterol and total cholesterol. Correlation coefficients were interpreted according to the direction and magnitude of the association. Statistical significance was established at a two-tailed p value of less than .05.

3.7 Ethical Considerations

The study was conducted in accordance with accepted ethical standards for research involving human participants. Ethical approval was obtained from the Centro Escolar University–Manila Ethics Review Board (CEU–Manila ERB) before the commencement of data collection. Written informed consent was secured from all participants. Participation was voluntary, confidentiality was maintained, and participants were informed of their right to withdraw from the study at any time without penalty. No invasive procedure beyond standard venous blood collection was performed.

4. Results and Discussion

4.1 Participant Characteristics

The study included 206 community-dwelling adults aged 60 years and above. Of the total participants, 102 (49.5%) were female and 53 (25.7%) were male. Sex was not indicated for 51 participants (24.8%). The substantial proportion of participants without recorded sex should be considered when interpreting sex-specific findings. A detailed age distribution and other demographic characteristics were unavailable for the reported analysis.

4.2 Hematological Profile

Table 1 presents the hematological characteristics of the participants. Most had laboratory values within the reference ranges used by the performing laboratory. Normal hemoglobin levels were recorded in 150 participants (72.8%), while 41 (19.9%) had low hemoglobin and 14 (6.8%) had elevated hemoglobin. One participant had no determined hemoglobin classification.

Normal hematocrit values were found in 144 participants (69.9%). Low and very low hematocrit values were recorded in 53 (25.7%) and one participant (0.5%), respectively, while eight participants (3.9%) had elevated hematocrit. Mean hematocrit was higher among male participants (0.4213 ± 0.0436) than among female participants (0.3859 ± 0.0330); however, no inferential comparison of these means was conducted.

Most participants also had normal platelet counts and red blood cell indices. Normal platelet counts were observed in 185 participants (89.8%), while thrombocytopenia and thrombocytosis were recorded in 1.9% and 8.3%, respectively. Normal mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, and red cell distribution width were found in 89.8%, 87.4%, 98.1%, and 98.1% of participants, respectively.

Table 1. *Hematological Profile of the Participants (N = 206)*

Parameter	Classification	n	%
Hemoglobin	Normal	150	72.8
	Low	41	19.9
	High	14	6.8
	Not determined	1	0.5
Hematocrit	Normal	144	69.9
	Low	53	25.7
	Very low	1	0.5
	High	8	3.9
Platelet count	Normal	185	89.8
	Low	4	1.9
	High	17	8.3
Mean corpuscular volume	Normal	185	89.8
	Low	16	7.8
	High	5	2.4
Mean corpuscular hemoglobin	Normal	180	87.4
	Low	25	12.1
	High	1	0.5
Mean corpuscular hemoglobin concentration	Normal	202	98.1
	Low	4	1.9
Red cell distribution width	Normal	202	98.1
	Low	1	0.5
	High	3	1.5

Note. Classifications were based on the reference intervals used by the performing laboratory.

The predominance of normal red blood cell indices suggests generally preserved erythrocyte morphology among most participants. Nevertheless, the proportions with low hemoglobin, low hematocrit, low mean corpuscular volume, and low mean corpuscular hemoglobin indicate that a clinically relevant subgroup may have anemia or an evolving deficiency-related condition. Laboratory measures such as ferritin, serum iron, vitamin B12, folate, inflammatory markers, and renal function would be necessary to determine the underlying causes.

4.3 Glycemic and Lipid Profiles

Most participants had fasting blood glucose and glycated hemoglobin levels within the laboratory reference ranges. Normal fasting blood glucose was recorded in 156 participants (75.7%), while 39 (18.9%) had elevated values and 11 (5.3%) had low values. The mean fasting blood glucose level was 101.64 ± 41.25 mg/dL.

Glycated hemoglobin was normal in 185 participants (89.8%), elevated in 17 (8.3%), and low in four (1.9%). The mean glycated hemoglobin concentration was 5.55% ± 0.82%. The difference between the proportions with elevated fasting glucose and elevated glycated hemoglobin suggests that an isolated fasting measurement and a longer-term indicator of glucose regulation did not classify all participants similarly.

The lipid profile showed more extensive abnormalities. More than half of the participants had elevated total cholesterol, while approximately one-third had elevated triglycerides and very-low-density lipoprotein cholesterol. Low high-density lipoprotein cholesterol was observed in 32.0%, and elevated low-density lipoprotein cholesterol was found in 17.0%.

Table 2. *Glycemic and Lipid Profiles of the Participants (N = 206)*

Parameter	Classification	n	%	Mean ± SD
Fasting blood glucose	Normal	156	75.7	101.64 ± 41.25 mg/dL
	Low	11	5.3	
	High	39	18.9	
Glycated hemoglobin	Normal	185	89.8	5.55 ± 0.82%
	Low	4	1.9	
	High	17	8.3	
Total cholesterol	Normal	93	45.1	205.59 ± 47.97 mg/dL
	High	113	54.9	
Triglycerides	Normal	141	68.4	1.56 ± 0.99 mmol/L
	High	65	31.6	
Very-low-density lipoprotein	Normal	141	68.4	0.71 ± 0.45 mmol/L
	High	65	31.6	
High-density lipoprotein	Normal	137	66.5	1.29 ± 0.45 mmol/L
	Low	66	32.0	
	High	3	1.5	
Low-density lipoprotein	Normal	152	73.8	3.33 ± 1.05 mmol/L
	Low	19	9.2	
	High	35	17.0	

Note. Laboratory classifications were based on the reference intervals used by the performing laboratory. Measurements are presented in the units used by the performing laboratory.

The lipid findings indicate that dyslipidemia was more prominent than sustained glycemic abnormality in the study population. Elevated total cholesterol, elevated triglycerides, low high-density lipoprotein, and elevated low-density lipoprotein are clinically relevant because they may occur together with other cardiovascular risk factors such as hypertension, diabetes, obesity, physical inactivity, smoking, and advancing age.

4.4 Renal Function and Uric Acid

Blood urea nitrogen and serum creatinine were within the reference ranges for most participants. Normal blood urea nitrogen was found in 191 participants (92.7%), while 13 (6.3%) had elevated levels. Serum creatinine was normal in 184 participants (89.3%), elevated in 16 (7.8%), and low in six (2.9%).

Uric acid demonstrated greater variability. Although 130 participants (63.1%) had normal uric acid levels, 44 (21.4%) had elevated values and 32 (15.5%) had low values.

Table 3. *Renal Function and Uric Acid Profile of the Participants (N = 206)*

Parameter	Classification	n	%	Mean ± SD
Blood urea nitrogen	Normal	191	92.7	4.87 ± 1.52 mmol/L
	Low	2	1.0	
	High	13	6.3	
Serum creatinine	Normal	184	89.3	78.02 ± 20.92 µmol/L
	Low	6	2.9	
	High	16	7.8	
Uric acid	Normal	130	63.1	274.43 ± 114.51 µmol/L
	Low	32	15.5	
	High	44	21.4	

The findings suggest relatively preserved renal biochemical measures in most participants. However, normal serum creatinine alone should not be interpreted as definitive evidence of normal kidney function among older adults because reduced muscle mass may result in deceptively low or normal creatinine levels. Estimated glomerular filtration rate, urine albumin, medication history, hydration status, and comorbid conditions would provide a more complete renal assessment.

The proportion with elevated uric acid is clinically relevant because hyperuricemia may be associated with reduced renal excretion, diet, medication use, gout, hypertension, and metabolic abnormalities. However, elevated uric acid should not be interpreted as evidence of symptomatic gout without corresponding clinical assessment.

4.5 Correlations among Selected Laboratory Parameters

Pearson correlation analysis was used to examine three selected pairs of laboratory measures. Hemoglobin and hematocrit demonstrated a very strong positive relationship, $r = .985$, $p < .001$. Fasting blood glucose and glycated hemoglobin had a weak but statistically significant positive relationship, $r = .292$, $p < .001$. Low-density lipoprotein cholesterol and total cholesterol were not significantly correlated, $r = .046$, $p = .402$.

Table 4. *Correlations among Selected Laboratory Parameters*

Variables	r	p	Interpretation
Hemoglobin and hematocrit	.985	< .001	Very strong positive, significant
Fasting blood glucose and glycated hemoglobin	.292	< .001	Weak positive, significant
Low-density lipoprotein and total cholesterol	.046	.402	Negligible, not significant

The strong relationship between hemoglobin and hematocrit was expected because both measures reflect related aspects of circulating red blood cell mass. The weaker association between fasting blood glucose and glycated hemoglobin indicates that a single fasting glucose measurement corresponded only partially with longer-term glycemic exposure.

The reported absence of a significant relationship between low-density lipoprotein and total cholesterol should be interpreted cautiously. Because low-density lipoprotein contributes substantially to total cholesterol, the reported coefficient is unexpected and warrants verification through reanalysis of the original data, including variable coding, units, and missing-value treatment.

4.6 Discussion

The study depicts a mixed clinical profile in which generally preserved hematological and renal parameters coexist with notable anemia-related, lipid, glycemic, and uric acid abnormalities. This pattern supports the value of multidomain laboratory assessment because normal findings in one physiological system do not exclude clinically relevant abnormalities in another.

Approximately one-fifth of the participants had low hemoglobin, while slightly more than one-fourth had low or very low hematocrit. These findings indicate that anemia-related abnormalities remain relevant among community-dwelling older adults. Anemia in later life may result from nutritional deficiencies, chronic inflammation, renal disease, occult blood loss, medication use, bone marrow disorders, or unexplained mechanisms associated with aging (Guralnik et al., 2004). The predominantly normal mean corpuscular volume and mean corpuscular hemoglobin concentration suggest that severe morphological abnormalities were not widespread. However, low mean corpuscular hemoglobin in 12.1% and low mean corpuscular volume in 7.8% may be compatible with iron-restricted erythropoiesis or microcytic patterns in a smaller subgroup (Bain & Leach, 2025; McPherson & Pincus, 2017).

The very strong correlation between hemoglobin and hematocrit is physiologically coherent because both indicators are related to red blood cell mass and oxygen-carrying capacity. The finding supports the internal consistency of these two measurements, although each retains distinct clinical uses. The higher mean hematocrit among male participants is also consistent with expected biological differences, but the absence of a reported significance test and the large amount of missing sex information prevent stronger conclusions.

Most participants had normal platelet counts and red blood cell indices. This finding suggests that major platelet and erythrocyte abnormalities were not common in the sample. Nevertheless, the presence of thrombocytosis in 8.3% warrants clinical attention because elevated platelet counts can accompany infection, inflammation, iron deficiency, malignancy, or other underlying conditions. These results should be interpreted as screening findings rather than diagnostic classifications.

The glycemic results showed that elevated fasting glucose was more frequent than elevated glycated hemoglobin. Fasting blood glucose reflects glucose concentration at a particular time, whereas glycated hemoglobin

reflects average exposure over a longer period. Their weak positive correlation may therefore reflect biological variation, recent dietary intake, acute stress, medication use, fasting compliance, or differences in red blood cell turnover (American Diabetes Association, 2020). Participants with discordant findings may require repeat testing and clinical assessment before being classified as having impaired glucose regulation or diabetes.

Lipid abnormalities constituted the most prominent metabolic finding. More than half of the participants had elevated total cholesterol, approximately one-third had elevated triglycerides and very-low-density lipoprotein, and nearly one-third had low high-density lipoprotein. These patterns indicate a potentially substantial cardiovascular risk burden. Contemporary lipid management emphasizes comprehensive risk assessment rather than interpretation of a single lipid measure, particularly among older adults who may have multiple comorbidities and competing clinical risks (Grundy et al., 2019).

Although only 17.0% had elevated low-density lipoprotein, its lack of correlation with total cholesterol is inconsistent with the expected relationship between the two measurements. This result may have arisen from data coding, calculation, unit conversion, missing values, or analytical error. The result therefore warrants verification before it is used to support a substantive clinical conclusion.

Blood urea nitrogen and creatinine were normal for most participants, suggesting no widespread biochemical evidence of severe renal dysfunction. However, these measures are limited when used alone. Serum creatinine may remain within a conventional reference range despite reduced filtration among older adults with low muscle mass. Future studies should include estimated glomerular filtration rate and urinary albumin measures to improve the assessment of renal status.

Elevated uric acid was observed in more than one-fifth of the participants. Hyperuricemia may reflect reduced renal excretion, medication use, dietary patterns, alcohol intake, metabolic syndrome, or other chronic conditions. Although it is associated with gout, elevated uric acid alone does not establish a diagnosis of gout or indicate the need for pharmacological treatment without clinical evaluation (Richette & Bardin, 2010).

The study has several limitations. Its cross-sectional design precludes causal inference, and the use of community-based convenience recruitment limits the generalizability of the findings. The absence of a detailed age distribution and the large proportion of participants with unreported sex restrict subgroup analysis. Information on comorbidities, medication use, physical activity, dietary intake, smoking, alcohol use, and body composition was not incorporated into the reported analyses. Moreover, renal status was assessed without estimated glomerular filtration rate or urinary albumin, and the lipid correlation result requires verification. These limitations should be considered when interpreting the findings.

Overall, the findings support routine and integrated laboratory screening among older adults, particularly for anemia-related abnormalities, dyslipidemia, impaired glycemic regulation, and hyperuricemia. Community-based screening should be linked to confirmatory testing, clinical referral, nutrition counseling, medication review, cardiovascular risk assessment, and longitudinal follow-up rather than being treated as an isolated diagnostic activity.

5. Conclusions, Recommendations, and Implications

5.1 Conclusions

The study found that most community-dwelling older adults included in the sample had hematological and renal laboratory values within the reference ranges used by the performing laboratory. Normal hemoglobin, hematocrit, platelet count, red blood cell indices, blood urea nitrogen, and serum creatinine values predominated, suggesting generally preserved hematological and renal biochemical profiles among most participants.

Despite this overall pattern, clinically relevant abnormalities were present in several subgroups. Low hemoglobin and low hematocrit were observed in a substantial proportion of participants, indicating the presence of possible anemia-related conditions that require further clinical evaluation. A smaller proportion also demonstrated low mean corpuscular volume and low mean corpuscular hemoglobin, which may be consistent with microcytic or deficiency-related patterns but cannot establish a specific diagnosis without additional tests.

Most participants had normal fasting blood glucose and glycated hemoglobin levels. However, elevated fasting blood glucose was more common than elevated glycated hemoglobin, indicating that short-term and longer-

term measures of glycemic status did not classify all participants in the same manner. The weak but significant correlation between the two measures confirms that they are related but not interchangeable.

Lipid abnormalities were the most prominent biochemical findings. Elevated total cholesterol affected more than half of the participants, while elevated triglycerides, elevated very-low-density lipoprotein cholesterol, and low high-density lipoprotein cholesterol were also relatively common. These findings indicate a meaningful burden of dyslipidemia and potential cardiovascular risk among the participants.

Renal function indicators were within normal limits for most participants, although elevated serum creatinine and blood urea nitrogen were observed in a smaller subgroup. Elevated uric acid was present in more than one-fifth of the participants, suggesting the need for further evaluation of possible metabolic, renal, dietary, or medication-related factors.

Hemoglobin and hematocrit demonstrated a very strong positive correlation, consistent with their physiological relationship. Fasting blood glucose and glycated hemoglobin exhibited a weak but statistically significant positive correlation. The reported absence of a significant correlation between low-density lipoprotein and total cholesterol is inconsistent with the expected relationship between these lipid measures and should therefore be interpreted cautiously.

Overall, the study demonstrates that apparently stable hematological and renal findings may coexist with lipid, glycemic, uric acid, and anemia-related abnormalities among older adults. Integrated laboratory assessment may therefore provide a more complete basis for identifying health risks than reliance on isolated clinical indicators.

5.2 Recommendations

Community health programs serving older adults should incorporate periodic laboratory screening for hematological, glycemic, lipid, renal, and metabolic abnormalities. Screening should be linked to clinical assessment, appropriate referral, confirmatory testing, and follow-up rather than being treated as a stand-alone activity.

Participants with low hemoglobin, low hematocrit, or abnormal red blood cell indices should undergo further evaluation to identify possible nutritional deficiencies, chronic inflammation, renal disease, occult blood loss, medication effects, or other underlying conditions. Additional tests may include serum ferritin, iron studies, vitamin B12, folate, reticulocyte count, and inflammatory markers, depending on clinical indications.

Older adults with elevated fasting blood glucose or glycated hemoglobin should be referred for repeat testing and medical evaluation. Lifestyle counseling on diet, physical activity, weight management, and medication adherence should be provided where appropriate. Discordant fasting glucose and glycated hemoglobin findings should not be interpreted as definitive evidence of diabetes without confirmatory assessment.

The high prevalence of lipid abnormalities supports the inclusion of cardiovascular risk assessment in community-based senior health programs. Older adults with elevated total cholesterol, triglycerides, or low-density lipoprotein, or with low high-density lipoprotein, should receive individualized counseling and clinical evaluation based on their overall cardiovascular risk profile, comorbidities, functional status, and current medications.

Participants with elevated uric acid should be assessed for symptoms of gout, renal impairment, dietary risk factors, alcohol consumption, medication use, and related metabolic conditions. Treatment decisions should be based on clinical evaluation rather than on serum uric acid concentration alone.

Future studies should include a more complete demographic and clinical profile, particularly age distribution, sex, comorbidities, medication use, dietary patterns, physical activity, body mass index, smoking status, alcohol use, and previous diagnoses. These variables would allow a more detailed analysis of factors associated with laboratory abnormalities.

Subsequent research should employ probability-based sampling where feasible and include larger samples from different cities or regions to improve generalizability. Longitudinal designs may also be used to determine how laboratory profiles change over time and whether specific abnormalities predict subsequent health outcomes.

Future reanalysis should examine the reported correlation between low-density lipoprotein and total cholesterol using the original dataset, with attention to variable coding, units of measurement, missing values, formulas, and statistical output.

5.3 Implications of the Study

Practical and Clinical Implications

The findings underscore the value of multidomain laboratory assessment among older adults. A person may have normal renal indicators or blood cell indices while simultaneously exhibiting dyslipidemia, hyperglycemia, hyperuricemia, or low hemoglobin. Community health practitioners should therefore avoid relying on a single laboratory domain when assessing the health risks of older adults.

The study also highlights the importance of connecting laboratory screening with clinical decision-making. Abnormal findings should initiate appropriate counseling, repeat testing, physician referral, and continuing monitoring. This is particularly important for conditions that may remain asymptomatic during their early stages.

Laboratory indicators are most clinically useful when interpreted together with patient history, symptoms, and lived context, consistent with patient-centered analytics that treat narrative evidence as a complement rather than a substitute for quantitative measures (Atento, Quinto, Espelita, & San Juan, 2025).

Community and Institutional Implications

Local government units, barangay health centers, senior citizen programs, and higher education institutions may use the findings as baseline evidence when designing health-screening activities for older adults. Programs may prioritize anemia detection, lipid assessment, glycemic monitoring, renal evaluation, and health education based on the observed patterns.

Comparable Philippine community-health research has emphasized that preventive programs should align local risk profiles, health education, and enabling supports at the barangay level (Temporada et al., 2025).

The involvement of academic institutions in community-based laboratory screening may also strengthen service-learning, public health surveillance, and university–community partnerships. Such initiatives should be supported by clear referral pathways, data-protection procedures, laboratory quality assurance, and ethical oversight.

Within health professions education, data-informed leadership and quality assurance have been identified as necessary for coordinating institutional resources, clinical training capacity, and service quality (Bermido et al., 2025).

Policy Implications

The findings support policies that promote accessible preventive laboratory services for older adults, particularly in densely populated urban communities. Health programs for senior citizens may benefit from integrating routine laboratory monitoring with existing primary-care, nutrition, cardiovascular-risk, and chronic-disease services.

However, community screening policies should recognize that laboratory reference ranges and single measurements do not independently establish clinical diagnoses. Screening programs must therefore include confirmatory procedures, professional interpretation, and mechanisms for continuing care.

Research Implications

The study contributes local evidence on the simultaneous distribution of hematological, glycemic, lipid, renal, and uric acid parameters among older adults in Manila. It also identifies methodological priorities for future work, including improved demographic documentation, probability-based sampling, the inclusion of behavioral and clinical covariates, and the use of longitudinal follow-up.

Future research should examine which demographic, nutritional, behavioral, and clinical factors are associated with abnormal laboratory profiles. Multivariable analysis may provide a more comprehensive understanding of the predictors of anemia, dyslipidemia, impaired glycemic regulation, renal abnormalities, and hyperuricemia among older Filipino adults.

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