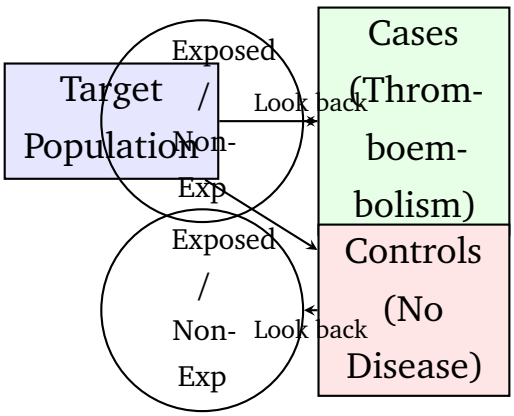
NEET PG Social & Preventive Medicine Sample Paper-9

Duration: 20 Minutes **Maximum Marks: 100**

Instructions

- This paper contains **25** Multiple Choice Questions.
- Each correct answer carries **+4** mark. Incorrect answer: **−1** marks. Only **one** correct option.
- Unattempted questions carry **0** marks.
- Use of mobile phones, smartwatches, or any electronic gadgets is strictly prohibited.

Q1. An investigator is studying the association between oral contraceptive use and the risk of developing thromboembolism. They select 200 women diagnosed with thromboembolism and 400 women of similar age without thromboembolism. They then look back at their medical records to determine past exposure to oral contraceptives. Which of the following diagrams correctly represents the core design logic of this study?



(A) Prospective Cohort Study

(B) Case-Control Study

(C) Randomized Controlled Trial

(D) Cross-sectional Analytical Survey

Q2. A newly introduced screening test for a low-prevalence non-communicable disease is evaluated in a community setting. If the cutoff value for a positive test is shifted to maximize the test's sensitivity, which of the following changes will inevitably occur regarding the screening performance?

(A) The Specificity increases, and the Positive Predictive Value increases

(B) The Specificity decreases, and the Positive Predictive Value decreases

(C) The Specificity decreases, and the Negative Predictive Value decreases

(D) The Specificity increases, and the False Positive Rate decreases

Q3. Under the National Tuberculosis Elimination Program (NTEP) diagnostic algorithm, a presumptive TB patient undergoes a molecular test (CBNAAT/Truenat) as the initial diagnostic tool. If the sample is found to be Mycobacterium tuberculosis positive but Rifampicin resistance is reported as "Indeterminate", what is the immediate next step recommended by the program guidelines?

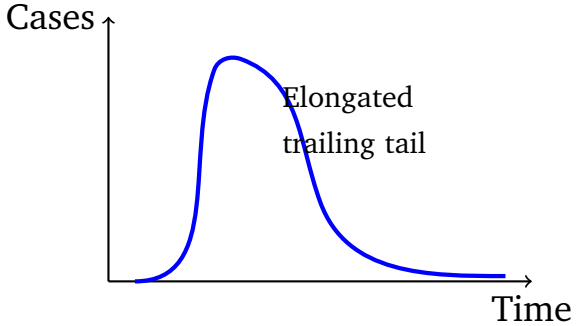
(A) Start standard Category I First-line DST regime immediately

(B) Repeat the molecular test using a fresh second specimen collected from the patient

(C) Refer the patient directly for a liquid culture and line probe assay (LPA) without further molecular testing

(D) Initiate a standard multi-drug resistant (MDR) TB regimen empirically

Q4. A state epidemiologist plots the distribution of incubation periods for an acute gastroenteritis outbreak following a community feast. The resulting curve exhibits a steep upward slope followed by a gradual, elongated downward trailing tail. Which type of epidemic curve is this, and what does it reveal about the exposure?



(A) Propagated epidemic curve; person-to-person transmission

(B) Continuous common source epidemic curve; ongoing contamination

(C) Point source common vehicle epidemic curve; single simultaneous exposure

(D) Cyclical trend curve; seasonal vector fluctuation

Q5. According to the current guidelines of the National Vector Borne Disease Control Programme (NVBDCDP) for elimination of Lymphatic Filariasis, the Mass Drug Administration (MDA) strategy in endemic districts employs which combination of therapeutic agents?

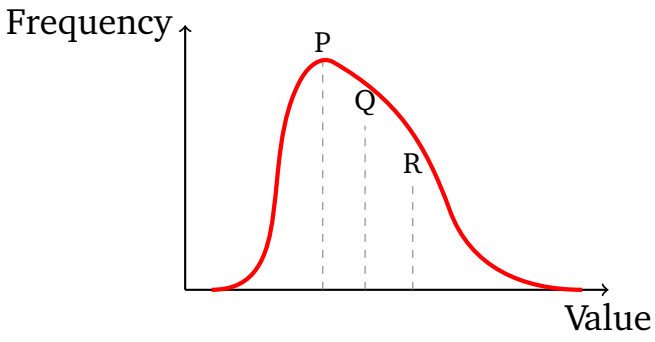
(A) Diethylcarbamazine (DEC) alone annually for 3 years

(B) Diethylcarbamazine (DEC) + Albendazole annually, or Triple Drug Therapy (Ivermectin + DEC + Albendazole) based on regional criteria

(C) Artesunate + Sulfadoxine-Pyrimethamine as a single observed dose

(D) Albendazole + Ivermectin twice a year for 5 consecutive years

Q6. The frequency distribution of serum cholesterol levels measured in a sample of healthy young adult males is found to be highly asymmetric. A statistician creates a frequency polygon shown below. Which of the following relationships correctly describes the central tendency metrics for this specific distribution?



(A) P is Mean, Q is Median, R is Mode

(B) P is Mode, Q is Median, R is Mean

(C) P is Median, Q is Mode, R is Mean

(D) P is Mean, Q is Mode, R is Median

Q7. During a routine inspection of an immunization clinic, a medical officer observes that the vaccine vial monitor (VVM) on a multi-dose vial of Oral Polio Vaccine (OPV) displays an inner square that is lighter than the outer circle, but has clearly started to darken compared to its initial pristine white state. The expiry date printed on the label has not passed. What is the correct clinical directive regarding this vaccine vial?

(A) Discard the vial immediately as it indicates definite thermal damage

(B) Send the vial back to the regional cold chain hub for potency re-testing

(C) Use the vaccine immediately, provided it has not passed its expiration date and other open-vial policy criteria are met

(D) Discard the vial only if the inner square matches or becomes darker than the outer circle

Q8. A multi-centric study is conducted across five states to evaluate whether the mean systemic reduction in HbA1c levels differs significantly among four distinct indigenous nutritional intervention modules. Assuming the data across all groups are normally distributed and possess equal variances, which statistical test is most appropriate to evaluate this hypothesis?

(A) Paired Student's t-test

(B) Chi-square test for independence

(C) One-way Analysis of Variance (ANOVA)

(D) Wilcoxon Signed-Rank test

Q9. The National Non-Communicable Disease (NCD) screening program mandates opportunistic screening of all individuals above 30 years of age at Ayushman Arogya Mandirs (Health and Wellness Centres) for three primary cancers. These specific target malignancies are:

(A) Lung Cancer, Colorectal Cancer, and Gastric Cancer

(B) Oral Cancer, Breast Cancer, and Cervical Cancer

(C) Ovarian Cancer, Prostate Cancer, and Esophageal Cancer

(D) Breast Cancer, Lung Cancer, and Oral Cancer

Q10. In an urban primary health center zone with a total population of 100,000, an epidemiological registry records 500 existing cases of a chronic autoimmune disorder on January 1, 2025. During the course of the year, 100 new cases are freshly diagnosed. A total of 40 patients with this condition die during 2025. What is the period prevalence of this disease per 1,000 population for the year 2025?

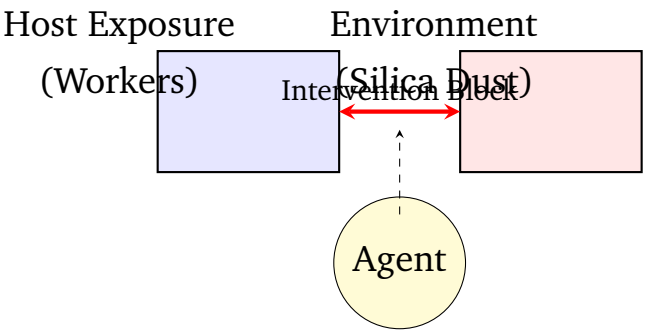
(A) 1.0 per 1,000 population

(B) 5.0 per 1,000 population

(C) 6.0 per 1,000 population

(D) 5.6 per 1,000 population

Q11. A public health intervention introduces a structural ventilation system in a cluster of factories to reduce workers' occupational exposure to silica dust. To measure the impact of this program, the team wants to visualize the shifting risk dynamics before and after intervention. The conceptual framework is illustrated below:



Which model of disease causation is this operational layout directly addressing?

(A) The Epidemiological Triad

(B) The Web of Causation

(C) The Wheel Model of Environment Interactions

(D) The Advanced Social-Ecological Framework

Q12. Under the Universal Immunization Programme (UIP) in India, the Rotavirus vaccine is administered to infants at which of the following chronological schedules and via which route?

(A) At 6 weeks, 10 weeks, and 14 weeks; 5 drops orally

(B) At Birth, 6 weeks, and 9 months; 0.5 mL intramuscularly

(C) At 6 weeks and 14 weeks; 2.5 mL subcutaneously

(D) At 9 months and 16-24 months; 1 mL orally

Q13. A diagnostic laboratory develops a new rapid molecular assay for detecting acute dengue infection. To validate it, they test 1,000 individuals whose definitive infection status is established using a gold-standard RT-PCR. The performance metrics are distributed in the standard 2×2 contingency grid below:

	RT-PCR Positive	**RT-PCR Negative**
New Test Positive	180 (True Pos)	40 (False Pos)
New Test Negative	20 (False Neg)	760 (True Neg)

Based on this cross-tabulation, what is the calculated sensitivity of this new rapid assay?

(A) 90%

(B) 81.8%

(C) 95%

(D) 76%

Q14. The National Programme for Climate Change and Human Health (NPCCHH) monitors health vulnerabilities associated with rising ambient temperatures. Which of the following syndromic clusters is identified as the primary target for early surveillance and capacity building at the district level under this program?

(A) Heat-related illnesses (Heat exhaustion, Heat stroke) and respiratory exacerbations due to surface ozone

(B) Water-borne helminthic infestations during winter seasons

(C) Dermatological vector-borne allergic reactions to cold waves

(D) Congenital malformations associated with solar eclipse radiation

Q15. A district medical officer calculates the infant mortality rate (IMR) for a region. Over a defined calendar year, there were 4,000 live births recorded in the district. The records indicate that 120 infants died before reaching 28 days of life, and 80 infants died between 28 days and 1 year of age. There were also 60 stillbirths recorded. What is the calculated Infant Mortality Rate (IMR) per 1,000 live births for this district?

(A) 30 per 1,000 live births

(B) 50 per 1,000 live births

(C) 65 per 1,000 live births

(D) 45 per 1,000 live births

Q16. An epidemiological team investigates an ongoing cholera outbreak in a coastal sub-district. They want to systematically assess the strength of association between drinking untreated well water and contracting clinical cholera. They calculate an Odds Ratio (OR) of 4.5 with a 95% Confidence Interval (CI) ranging from 2.8 to 6.4. How should this finding be accurately interpreted?

(A) The association is statistically significant, and individuals drinking untreated well water have 4.5 times higher odds of contracting cholera compared to those who do not

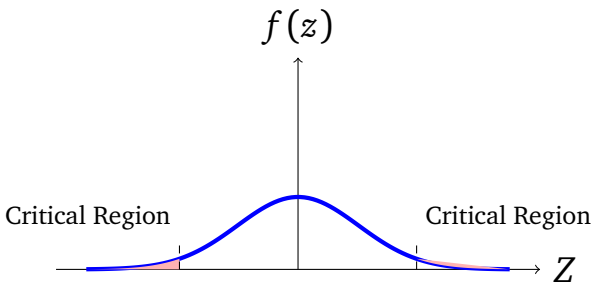
(B) The association is not statistically significant because the confidence interval does not include zero

(C) The association is inconclusive because the upper limit is more than double the lower limit of the interval

(D) Drinking untreated well water is protective against cholera, but the sample size is insufficient

Q17. A clinical trial compares the systolic blood pressure reductions achieved by a novel anti-hypertensive molecule against an active control drug. The clinical

team wants to visualize the mathematical distribution of probability for their sample mean under the null hypothesis, as represented below:



If the calculated p-value from their statistical analysis falls deep within the shaded critical region, which of the following operational conclusions must the clinical team draw?

(A) Retain the null hypothesis; there is no statistical difference between the two drugs

(B) Reject the null hypothesis; the observed difference is highly unlikely to have occurred by random chance alone

(C) Conclude that a Type I error has definitely been committed during data collection

(D) Accept that the alternative hypothesis is false and repeat the trial with a larger cohort

Q18. The National Nutritional Anemia Prophylaxis Programme operates under the structural umbrella of the Anemia Mukt Bharat (AMB) strategy. For pregnant women, the strategy mandates the daily prophylactic administration of Iron and Folic Acid (IFA) supplements containing which of the following precise elemental specifications?

(A) 100 mg elemental Iron + 500 μg Folic acid daily for 180 days during pregnancy, followed by 180 days postpartum

(B) 60 mg elemental Iron + 500 μg Folic acid daily for 180 days during pregnancy, followed by 180 days postpartum

(C) 30 mg elemental Iron + 250 μg Folic acid twice daily throughout the third trimester

(D) 100 mg elemental Iron + 5 mg Folic acid once weekly during the entire gestational cycle

Q19. A major target under the Sustainable Development Goals (SDG 3.1) is to reduce the global Maternal Mortality Ratio (MMR). Which of the following mathematical choices represents the correct denominator used for calculating the Maternal Mortality Ratio in India?

(A) Total number of women of reproductive age (15–49 years) in the mid-year population

(B) Total number of live births occurring in the same geographical area during the defined time period

(C) Total number of deliveries (both live births and stillbirths) in that year

(D) Total mid-year estimated population of the country

Q20. A multi-dose vial of Measles-Rubella (MR) vaccine is reconstituted with its specific diluent during an immunization session at an outreach sub-center. According to the standard operational protocols of the cold chain and open-vial policy in India, what is the maximum permissible timeframe within which this reconstituted vaccine must be used or discarded?

(A) Within 48 hours if maintained continuously between +2°C to +8°C

(B) Within 4 hours of reconstitution, or at the end of the immunization session, whichever is earlier

(C) Up to 28 days following reconstitution provided the VVM is intact

(D) Within 12 hours from the moment the vial septum was first punctured

Q21. A clinical trial evaluates a new vaccine for preventing a parasitic disease. Out of 1,000 vaccinated individuals, 10 develop the disease during follow-up. Out of 1,000 control individuals who received a placebo, 50 develop the disease during the same period. Based on these data, what is the Vaccine Efficacy (VE) of this new formulation?

(A) 20%

(B) 50%

(C) 80%

(D) 90%

Q22. The National AIDS Control Programme Phase V (NACP-V) targets the "95-95-95" global goals to end the epidemic as a public health threat. Which of the following options accurately reflects the middle "95" milestone within this strategic framework?

(A) 95% of all people living with HIV know their HIV status

(B) 95% of all people diagnosed with HIV infection receive sustained antiretroviral therapy (ART)

(C) 95% of all people receiving antiretroviral therapy achieve viral suppression

(D) 95% of high-risk behavior groups practice consistent barrier protection

Q23. A research team calculates the Body Mass Index (BMI) of 500 medical students. They wish to determine if a correlation exists between the students' BMI values (measured as a continuous variable in kg/m^2) and their average daily sleep duration (measured as continuous hours). Which of the following analytical indicators should be applied to measure the strength and direction of this linear relationship?

(A) Pearson correlation coefficient (r)

(B) Chi-square test statistic (χ^2)

(C) Odds Ratio (OR)

(D) Sensitivity index (d')

Q24. A community medicine specialist conducts an operational survey to evaluate the functionality of Primary Health Centres (PHCs) in a hilly tribal district. They want to check whether the staffing pattern and bed strength match the Indian Public Health Standards (IPHS) benchmarks. According to the IPHS guidelines, what is the minimum essential bed strength mandated for a standard Type B Primary Health Centre?

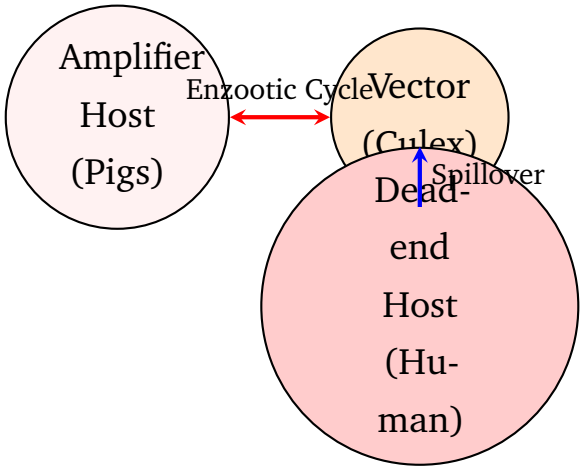
(A) 2 to 4 beds

(B) 4 to 6 beds

(C) 6 to 10 beds

(D) 20 to 30 beds

Q25. An epidemiological investigation assesses a cluster of acute neurological illness cases suspected to be Japanese Encephalitis in a rural block. To guide local vector control containment, the team maps out the ecological transmission cycle using the structural model below:



Based on this transmission framework, which vector control measure is most specific to break the amplification loop of this virus in this setting?

(A) Mass administration of DEC tablets to the human population

(B) Indoor Residual Spraying (IRS) combined with separation of pig enclosures from human dwellings

(C) Intermittent dry days in rice fields targeting Aedes aegypti breeding sites

(D) Implementation of standard active thermal fogging during afternoon hours around schools

Detailed Solutions

Q1.

Solution

Concept: The study design aims to evaluate an association by selecting individuals who have already developed the target condition (cases) and a comparable group without the disease (controls). The direction of inquiry proceeds retrospectively, investigating the frequency or levels of past exposure to a suspected risk factor within both cohorts to determine if an epidemiological association exists.

Solution:

(a) The investigator explicitly initiates the study by identifying 200 women diagnosed with the condition (thromboembolism), which satisfies the fundamental definition of establishing a diseased case group.

(b) Concurrently, 400 women of similar age without the condition are selected, forming the reference or control cohort essential for comparative risk evaluation.

(c) The investigative timeline moves backward throughout history ("look back at medical records") to assess exposure status to oral contraceptives. This retrospective directionality is the hallmark of a classic case-control architecture.

(d) The odds of exposure among cases are compared directly against the odds of exposure among controls. This provides an estimation of the relative risk via an Odds Ratio.

(e) Unlike cohort studies, the investigator does not follow healthy individuals forward in time to observe disease incidence, making prospective alternatives incorrect.

Final Answer: Case-Control Study

Answer: (B)

Go Back to Question 1

Q2.

Solution

Concept: Screening performance parameters are determined by the chosen diagnostic threshold value on a continuous spectrum. Shifting the cutoff line alters the mathematical classification criteria between healthy and diseased individuals, causing inverse changes between sensitivity and specificity, while heavily impacting the positive predictive value (PPV).

Solution:

(a) Sensitivity represents the ability of a screening test to correctly identify all true positive cases within the population. To maximize this capability, the cutoff value is lowered or shifted to capture almost all affected individuals.

(b) Shifting the threshold to ensure that fewer true cases are missed automatically causes a larger portion of healthy individuals to fall into the screen-positive zone, increasing the number of false positives.

(c) An increase in false positives directly reduces the specificity of the test, as specificity measures the capability to correctly rule out individuals who are free of the disease.

(d) Positive Predictive Value represents the probability that a person who screens positive truly has the disease. Because the number of false positives increases sharply while the overall disease prevalence remains low, the precision decreases.

(e) Consequently, maximizing sensitivity systematically compromises specificity and drives down the positive predictive value due to the heavier influx of false alarms.

Final Answer: The Specificity decreases, and the Positive Predictive Value decreases

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: The National Tuberculosis Elimination Program (NTEP) follows structured algorithmic rules when molecular tests return inconclusive resistance data. Ensuring prompt verification avoids false resistance labeling while preventing dangerous treatment delays for individuals infected with Mycobacterium tuberculosis.

Solution:

(a) When an initial CBNAAT or Truenat assay confirms the presence of Mycobacterium tuberculosis but yields an "Indeterminate" result for Rifampicin resistance, the diagnostic profile is incomplete.

(b) Under current program guidelines, an indeterminate drug-resistance result cannot be used to justify initiating an intensive second-line treatment regimen or an empirical standard first-line regimen.

(c) The mandatory immediate clinical action is to collect a fresh, second sputum specimen from the presumptive patient and repeat the molecular test to secure a definitive resistance status.

(d) If the repeat molecular test still yields an invalid or indeterminate result for drug resistance, the protocol mandates escalating the sample to a certified laboratory for liquid culture and Line Probe Assay.

(e) This systematic duplication step preserves resources, quickly corrects sample handling or technical processing errors, and ensures appropriate initial therapeutic choice.

Final Answer: Repeat the molecular test using a fresh second specimen collected from the patient

Answer: (B)

Go Back to Question 3

Q4.

Solution

Concept: Epidemic curves map the chronological distribution of onset times during an outbreak to clarify exposure dynamics. Point-source common vehicle outbreaks produce a distinct, predictable shape due to a synchronized, single-time exposure of individuals within a common incubation window.

Solution:

(a) The description highlights a steep upward vector that peaks rapidly, followed by a gradual, trailing downward tail. This pattern is characteristic of a point-source epidemic curve.

(b) The rapid upward rise signifies that a large cohort of individuals was exposed simultaneously to the infectious agent or toxin during a single event, such as a community feast.

(c) The distribution of cases over time reflects individual variations in the incubation period of the pathogen. Some individuals exhibit rapid onset, while others react more slowly.

(d) The elongated downward trailing tail represents those individuals with longer incubation lengths, or delayed consumption of contaminated leftovers, rather than secondary person-to-person spread.

(e) Propagated outbreaks, by contrast, display a series of progressively taller peaks reflecting multiple generations of transmission, which is absent here.

Final Answer: Point source common vehicle epidemic curve; single simultaneous exposure

Answer: (C)

Go Back to Question 4

Q5.

Solution

Concept: The National Vector Borne Disease Control Programme utilizes targeted chemoprophylaxis to interrupt the transmission of Lymphatic Filariasis. Mass Drug Administration strategies are adjusted regionally based on epidemiological data to achieve elimination goals.
Solution:

(a) Mass Drug Administration involves administering a single dose of antifilarial drugs to eligible populations in endemic areas once a year to clear microfilariae from the blood.

(b) The traditional programmatic standard relied on a two-drug combination consisting of Diethylcarbamazine along with Albendazole to target both the microfilariae and adult worms.

(c) To accelerate elimination, the program introduced an advanced Triple Drug Therapy (IDA) regimen that adds Ivermectin to Diethylcarbamazine and Albendazole in selected districts.

(d) This strategy is deployed according to defined regional criteria, with special focus on areas showing persistent transmission or failing to hit target microfilaria thresholds after routine rounds.

(e) Alternative options involving antimalarials, single mono-therapies, or multi-dose semi-annual cycles do not align with current national public health protocols.

Final Answer: Diethylcarbamazine (DEC) + Albendazole annually, or Triple Drug Therapy (Ivermectin + DEC + Albendazole) based on regional criteria

Answer: (B)

Go Back to Question 5

Q6.

Solution

Concept: The arrangement of central tendency indicators changes predictably in asymmetrical frequency distributions. In a positively skewed distribution, values trail off toward the higher end of the scale, separating the mode, median, and mean along the horizontal axis.

Solution:

(a) The provided frequency polygon displays a distinct positive skewness, characterized by a sharp peak on the left and a long tail extending toward the larger values on the right.

(b) The peak of the curve represents the value that occurs with the highest frequency, which defines the Mode. Therefore, point P indicates the Mode.

(c) The Mean is highly sensitive to extreme values. The long trailing tail on the right pulls the calculated average toward higher values, placing the Mean furthest to the right at point R.

(d) The Median represents the geometric center of the data set, splitting the total area under the curve into two equal halves. It consistently falls between the Mode and the Mean, corresponding to point Q.

(e) This regular spatial ordering establishes that Mode < Median < Mean in positively skewed data, aligning perfectly with the sequence P, Q, R.

Final Answer: P is Mode, Q is Median, R is Mean

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: Vaccine Vial Monitors are heat-sensitive indicators that provide a visual timeline of cumulative heat exposure. Recognizing the specific transition points within the indicator square is essential for determining when a vaccine remains safe and potent for clinical use.

Solution:

(a) The Vaccine Vial Monitor contains an inner square that darkens progressively when exposed to ambient heat over time. Its presentation is divided into four distinct operational phases.

(b) In the initial stages (Phases 1 and 2), the inner square remains noticeably lighter than the surrounding outer circle. This indicates that cumulative thermal exposure has not crossed the safety threshold.

(c) Although the inner square has begun to darken compared to its original state, the vaccine remains fully viable for administration as long as the square is lighter than the circle.

(d) The operational directive mandates that these vials should be prioritized for immediate use over pristine vials under the "earliest expiry, first out" management policy.

(e) Once the inner square matches the color of the outer circle (Phase 3) or becomes darker (Phase 4), the threshold has been crossed, and the vaccine must be discarded.

Final Answer: Use the vaccine immediately, provided it has not passed its expiration date and other open-vial policy criteria are met

Answer: (C)

Go Back to Question 7

Q8.

Solution

Concept: Selecting a statistical test depends on the type of data, the number of study groups, and whether parametric assumptions are met. Comparing continuous variables across three or more independent groups requires analyzing variance distributions to test the null hypothesis.

Solution:

(a) The study measures changes in HbA1c levels, which represents a continuous numerical variable suitable for parametric testing when normally distributed.

(b) The protocol evaluates four distinct indigenous nutritional intervention modules across independent cohorts, establishing four discrete experimental groups.

(c) The Student's t-test is limited to comparing a maximum of two groups. Using multiple t-tests to evaluate four groups increases the risk of Type I error.

(d) Analysis of Variance (ANOVA) evaluates variance between the groups relative to the variance within the groups, allowing a simultaneous comparison of multiple means.

(e) Since the data satisfy the parametric criteria of a normal distribution and equal variances across all four groups, one-way ANOVA is the correct statistical method.

Final Answer: One-way Analysis of Variance (ANOVA)

Answer: (C)

Go Back to Question 8

Q9.

Solution

Concept: The National Programme for Prevention and Control of Non-Communicable Diseases incorporates community-level opportunistic screening to detect high-burden malignancies early. The program targets specific cancers that are highly prevalent and amenable to early intervention at primary care facilities.

Solution:

(a) Ayushman Arogya Mandirs serve as primary care access points, offering opportunistic health screenings to individuals aged 30 and older to identify chronic conditions early.

(b) The national guidelines prioritize three specific cancers based on their public health burden and the availability of simple, cost-effective screening methods.

(c) Oral cancer screening relies on visual inspection of the oral cavity to identify precancerous lesions, which can be performed by trained primary healthcare workers.

(d) Breast cancer screening utilizes clinical breast examinations, while cervical cancer screening uses visual inspection with acetic acid (VIA) to identify high-risk individuals.

(e) These three conditions—oral, breast, and cervical cancers—constitute the primary oncology screening panel managed under this public health infrastructure.

Final Answer: Oral Cancer, Breast Cancer, and Cervical Cancer

Answer: (B)

Go Back to Question 9

Q10.

Solution

Concept: Period prevalence measures the total proportion of a population that exhibits a specific health condition at any point during a defined time window. It accounts for both pre-existing cases and newly diagnosed cases that emerge during that timeframe.

Solution:

(a) The calculation begins by determining the total number of individuals who had the disease during the year 2025. This includes both baseline cases and new cases.

(b) The registry notes 500 pre-existing cases on January 1, 2025. Over the next 12 months, an additional 100 individuals receive a diagnosis.

(c) Adding these figures yields a total of 600 individuals who had the disease at some point during the year (500 baseline + 100 new = 600 total cases).

(d) Period prevalence is calculated using the formula:

$$\text{Period Prevalence} = \left(\frac{\text{Total cases during the period}}{\text{Total risk population}}\right) \times 1,000$$

(e) Substituting the values gives:

$$\text{Period Prevalence} = \left(\frac{600}{100,000}\right) \times 1,000 = 6.0 \text{ per } 1,000 \text{ population}$$

Deaths occurring during the year do not reduce the count of individuals who lived with the condition during that period.

Final Answer: 6.0 per 1,000 population

Answer: (C)

Go Back to Question 10

Q11.

Solution

Concept: The multi-factorial nature of disease causation is traditionally evaluated through distinct epidemiological frameworks. When dealing with infectious, non-infectious, or environmental exposures, assessing how a specific intervention targets structural interactions between an agent, host, and external surroundings helps categorize the underlying disease paradigm.

Solution:

(a) The operational diagram directly focuses on three fundamental components: Host Exposure (represented by workers), Environment (represented by silica dust), and a specific biological or chemical factor (the structural Agent node).

(b) This layout depicts the classic interaction where a disease condition is caused by a hazardous agent interacting with a susceptible human host within a supportive external environment.

(c) By implementing a localized engineering control such as a structural ventilation mechanism, the intervention systematically introduces a block between the environment and the host.

(d) This targeted disruption breaks down the mandatory three-way relationship needed for exposure progression, aligning perfectly with the core principles of the traditional epidemiological triad model.

(e) Other options like the Web of Causation focus on interconnected sets of multiple risk factors without isolating a single triad loop, which makes them conceptually distinct from this specific diagnostic framework.

Final Answer: The Epidemiological Triad

Answer: (A)

Go Back to Question 11

Q12.

Solution

Concept: The Universal Immunization Programme (UIP) in India specifies precise administration timetables, accurate therapeutic dosing limits, and correct physiological entry sites for pediatric vaccines. This standardization ensures high levels of infant seroconversion while reducing adverse localized reactions.

Solution:

(a) Rotavirus is a primary viral pathogen responsible for severe, dehydrating diarrhea among infants and young children nationwide, highlighting the importance of preventative immunization strategy.

(b) Under current national immunization program mandates, protection is achieved by delivering an oral live-attenuated vaccine preparation to infants during early development milestones.

(c) The authorized schedule features three consecutive doses given at specific intervals: at 6 weeks, 10 weeks, and 14 weeks of age.

(d) This timing allows the vaccine to be co-administered with other essential national pediatric immunizations, including the Pentavalent and Oral Polio Vaccine series.

(e) The standard dosage is 5 drops delivered directly into the infant's mouth, making injectable alternatives or alternative timetables operationally incorrect under current national clinical guidelines.

Final Answer: At 6 weeks, 10 weeks, and 14 weeks; 5 drops orally

Answer: (A)

Go Back to Question 12

Q13.

Solution

Concept: Evaluating a novel diagnostic test requires computing intrinsic performance dimensions from a standardized 2×2 validation matrix. Sensitivity measures the true positive rate, representing the percentage of truly infected individuals who are correctly identified by the new diagnostic tool.

Solution:

(a) The validation table isolates individuals whose positive disease status has been confirmed by the absolute gold-standard diagnostic tool (RT-PCR Positive column).

(b) The total number of truly infected individuals in this target group corresponds to the vertical sum of the column: True Positives (180) + False Negatives (20) = 200.

(c) The sensitivity of a diagnostic test is calculated using the standard mathematical formula:

$$\text{Sensitivity} = \left(\frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}} \right) \times 100$$

(d) Substituting the exact quantities derived from the grid into the equation yields:

$$\text{Sensitivity} = \left(\frac{180}{180 + 20} \right) \times 100 = \left(\frac{180}{200} \right) \times 100 = 90\%$$

(e) This means the rapid molecular assay successfully identifies 90% of actual dengue cases, while failing to detect the remaining 10% as false negatives.

Final Answer: 90%

Answer: (A)

Go Back to Question 13

Q14.

Solution

Concept: The National Programme for Climate Change and Human Health (NPCCHH) coordinates public health infrastructure to manage rising ambient temperatures. Surveillance activities focus on early warning indicators and treating acute environmental illnesses at the district level.

Solution:

(a) Extreme environmental temperature spikes present immediate, life-threatening physiological stress, requiring organized public health surveillance to protect vulnerable communities.

(b) The foundational core of the NPCCHH operational framework focuses heavily on identifying, tracking, and treating acute heat-related illnesses, specifically heat exhaustion and heat stroke.

(c) Program guidelines mandate that local medical centers monitor daily emergency room presentations for these temperature-sensitive conditions during seasonal spikes.

(d) The program also tracks secondary climate-induced health risks, such as worsening chronic respiratory diseases caused by elevated ground-level ozone concentrations during heatwaves.

(e) Other options involving cold-weather vector issues or radiation-linked birth defects do not align with the primary strategic priorities established by this environmental health program.

Final Answer: Heat-related illnesses (Heat exhaustion, Heat stroke) and respiratory exacerbations due to surface ozone

Answer: (A)

Go Back to Question 14

Q15.

Solution

Concept: Vital statistics utilize specific mathematical ratios to monitor child survival trends across communities. The Infant Mortality Rate (IMR) measures the probability of a live-born child dying before completing their first year of life within a given calendar year.

Solution:

(a) Calculating the Infant Mortality Rate requires identifying all recorded deaths of live-born infants that occur between birth and up to 365 days of age.

(b) The dataset identifies two distinct components of infant mortality: 120 early neonatal deaths occurring before 28 days, plus 80 post-neonatal deaths occurring between 28 days and one year.

(c) Summing these components yields the total number of infant deaths within the period: $120 + 80 = 200$. Stillbirths are excluded from this calculation because they do not meet the definition of a live birth.

(d) The standard formula used to compute this indicator is structured as follows:

$$\text{IMR} = \left(\frac{\text{Total infant deaths under 1 year}}{\text{Total registered live births}} \right) \times 1,000$$

(e) Substituting the values into the equation gives:

$$\text{IMR} = \left(\frac{200}{4,000} \right) \times 1,000 = 50 \text{ per } 1,000 \text{ live births}$$

This confirms the final mortality index for the district.

Final Answer: 50 per 1,000 live births

Answer: (B)

Go Back to Question 15

Q16.

Solution

Concept: Evaluating an association in observational research depends on calculating an exact point estimate alongside its corresponding confidence interval. This boundary determines the precision of the finding and confirms whether the results are statistically significant.

Solution:

(a) The calculated point estimate is an Odds Ratio of 4.5. This indicates that individuals exposed to untreated well water show 4.5 times higher odds of contracting cholera than the unexposed comparison group.

(b) To assess statistical significance without relying solely on a p-value, researchers evaluate the accompanying 95% confidence interval, which spans from 2.8 to 6.4.

(c) The null value for an Odds Ratio—representing a complete absence of statistical association or relative difference between groups—is exactly 1.0.

(d) Because the interval (2.8 to 6.4) sits entirely above 1.0 and does not include this null threshold, the observed positive association is statistically significant at the 5% level.

(e) This configuration rules out random chance as a likely explanation for the difference, confirming that consuming untreated well water is a significant risk factor for cholera in this setting.

Final Answer: The association is statistically significant, and individuals drinking untreated well water have 4.5 times higher odds of contracting cholera compared to those who do not

Answer: (A)

Go Back to Question 16

Q17.

Solution

Concept: Hypothesis testing relies on mapping test statistics onto a probability distribution defined by the null hypothesis. The critical region represents the extreme tails of this distribution, where finding a sample value by random chance is highly improbable.

Solution:

(a) The null hypothesis assumes no real difference in blood pressure reduction between the novel drug molecule and the active control group, treating any variance as random sampling error.

(b) The shaded critical region on the curve represents the boundary for the alpha level, defining the probability threshold for rejecting the null hypothesis.

(c) When the statistical analysis produces a p-value that falls deep inside this critical boundary, it indicates that the observed data are highly incompatible with the null hypothesis.

(d) This mathematical position means the probability of obtaining such a difference by random variation alone is lower than the pre-specified significance threshold.

(e) The clinical team must therefore reject the null hypothesis, concluding that the new anti-hypertensive molecule demonstrates a statistically significant therapeutic difference compared to the control.

Final Answer: Reject the null hypothesis; the observed difference is highly unlikely to have occurred by random chance alone

Answer: (B)

Go Back to Question 17

Q18.

Solution

Concept: The Anemia Mukt Bharat (AMB) strategy outlines specific nutrient formulations and dosing schedules for target populations. These standardized prophylactic regimens are designed to control iron deficiency anemia during periods of high physiological demand.

Solution:

(a) Pregnancy significantly increases maternal blood volume and fetal development demands, substantially elevating the daily physiological requirement for iron and folic acid.

(b) To address this need, the national AMB strategy defines an explicit preventative regimen for all pregnant women, starting early in the second trimester after the first managing assessment.

(c) The standard formulation contains 60 mg of elemental Iron combined with 500 μg of Folic Acid, prepared as a single oral tablet.

(d) Guidelines mandate daily administration of this tablet for 180 consecutive days during pregnancy, followed by an additional 180 days during the postpartum lactation period.

(e) This continuous approach helps rebuild maternal iron stores, while the folic acid component prevents neural tube defects, distinguishing it from lower-dose or intermittent regimens.

Final Answer: 60 mg elemental Iron + 500 μg Folic acid daily for 180 days during pregnancy, followed by 180 days postpartum

Answer: (B)

Go Back to Question 18

Q19.

Solution

Concept: Maternal mortality indicators use specific mathematical standards to ensure accurate tracking and comparison across regions. Understanding the exact components of the denominator is essential for distinguishing a ratio from a rate in reproductive health statistics.
Solution:

(a) The Maternal Mortality Ratio (MMR) measures the obstetric risk associated with pregnancy, calculating maternal deaths relative to the total number of live births within a population.

(b) The standard formula used to compute this indicator is structured as follows:

$$\text{MMR} = \left(\frac{\text{Number of maternal deaths in a given period}}{\text{Total number of live births in the same period}} \right) \times 100,000$$

(c) Using the total number of registered live births as the denominator provides a reliable proxy for the total number of pregnancies, avoiding the tracking challenges associated with miscarriages or stillbirths.

(d) This specific choice of denominator classifies the index as a ratio rather than a true rate, since the denominator does not encompass the entire population at risk.

(e) In contrast, the Maternal Mortality Rate uses the total population of reproductive-aged women as its denominator, serving a distinct analytical purpose in public health monitoring.

Final Answer: Total number of live births occurring in the same geographical area during the defined time period

Answer: (B)

Go Back to Question 19

Q20.

Solution

Concept: Handling reconstituted live-attenuated vaccines requires strict adherence to cold chain protocols to preserve potency and avoid contamination. Program guidelines define strict time limits for using these vials once the dry pellet is mixed with its liquid diluent.

Solution:

(a) The Measles-Rubella (MR) vaccine is distributed as a freeze-dried powder that must be mixed with a specific sterile diluent immediately before clinical administration.

(b) Once reconstituted, live-attenuated viral particles become unstable and lose potency rapidly if exposed to ambient heat or light outside protective storage environments.

(c) Reconstituted vials are also highly susceptible to bacterial contamination if kept open for extended periods under field conditions at outreach immunization sites.

(d) National open-vial policy guidelines state that reconstituted MR vials must be used within 4 hours, or by the end of the immunization session, whichever comes first.

(e) Any remaining vaccine must be discarded after this 4-hour limit, even if the vaccine vial monitor indicates safety, separating it from stable liquid vaccines that allow multi-day use.

Final Answer: Within 4 hours of reconstitution, or at the end of the immunization session, whichever is earlier

Answer: (B)

Go Back to Question 20

Q21.

Solution

Concept: Vaccine Efficacy measures the proportionate reduction in disease attack rates among vaccinated cohorts compared to completely unvaccinated control populations. This metric quantifies the direct protective capabilities of an immunizing formulation under controlled clinical trial environments.

Solution:

(a) Calculating vaccine efficacy begins by establishing the primary incidence rates or disease attack rates within both independent study groups during the follow-up phase.

(b) The disease attack rate among the vaccinated group is calculated by dividing the number of infected individuals by the total number of vaccinated participants:

$$\text{AR}_{\text{vax}} = \frac{10}{1,000} = 0.01 \text{ or } 1\%$$

(c) Similarly, the baseline disease attack rate among the unvaccinated control group receiving the inert placebo substance is computed as:

$$\text{AR}_{\text{ctrl}} = \frac{50}{1,000} = 0.05 \text{ or } 5\%$$

(d) The standard mathematical equation used to establish overall Vaccine Efficacy is structured as follows:

$$\text{VE} = \left(\frac{\text{AR}_{\text{ctrl}} - \text{AR}_{\text{vax}}}{\text{AR}_{\text{ctrl}}} \right) \times 100$$

(e) Substituting the calculated incidence figures directly into this performance formula yields:

$$\text{VE} = \left(\frac{0.05 - 0.01}{0.05} \right) \times 100 = \left(\frac{0.04}{0.05} \right) \times 100 = 80\%$$

This confirms that the vaccine formulation reduces disease transmission by 80% relative to the placebo.

Final Answer: 80%

Answer: (C)

Go Back to Question 21

Q22.

Solution

Concept: The National AIDS Control Programme Phase V aligns national resources with international frameworks to eliminate HIV as a public health threat. The programmatic strategy establishes sequential milestones targeting diagnosis, treatment coverage, and viral suppression.

Solution:

(a) The programmatic framework relies on three separate targets designed to create an integrated path toward full suppression of the viral epidemic.

(b) The first milestone focuses entirely on testing outreach, requiring that 95% of all individuals living with HIV globally become aware of their true diagnostic status.

(c) The middle component shifts the focus toward medical intervention coverage, mandating that 95% of all individuals diagnosed with an HIV infection receive sustained antiretroviral therapy.

(d) The final pillar measures therapeutic success, setting a goal for 95% of all patients currently maintained on antiretroviral therapy to achieve complete viral suppression.

(e) This sequential combination ensures that the middle metric monitors the linkage of diagnosed patients to life-saving clinical regimens, making alternative therapeutic assertions incorrect.

Final Answer: 95% of all people diagnosed with HIV infection receive sustained antiretroviral therapy (ART)

Answer: (B)

Go Back to Question 22

Q23.

Solution

Concept: Selecting a statistical indicator depends on the mathematical nature of the study variables and the specific research objectives. Evaluating a potential linear relationship between two continuous numerical datasets requires computing a parametric coefficient to determine association dynamics.

Solution:

(a) The research team collects measurements for two separate clinical indicators: Body Mass Index and daily sleep duration.

(b) Body Mass Index is recorded as a continuous numerical variable (kg/m^2), and sleep duration is tracked using continuous hourly intervals.

(c) When both the independent and dependent variables are measured on a continuous scale, categorical testing methods like the Chi-square test are methodologically inappropriate.

(d) To assess the strength and directional orientation of a linear relationship between two continuous variables, investigators compute the Pearson correlation coefficient (r).

(e) This numerical index ranges from -1.0 to $+1.0$, where negative values reveal an inverse association and positive values confirm a parallel directional trend, satisfying the requirements of the study layout.

Final Answer: Pearson correlation coefficient (r)

Answer: (A)

Go Back to Question 23

Q24.

Solution

Concept: The Indian Public Health Standards establish strict operational requirements for healthcare facilities based on population density, geographical terrain, and caseloads. These standards define the mandatory infrastructure and bed availability for primary medical facilities.

Solution:

(a) Primary Health Centres are organized into specific operational categories based on delivery volumes to optimize resource allocation across rural communities.

(b) A Type A facility handles fewer than twenty deliveries per month, whereas a Type B facility is structurally and operationally equipped to manage twenty or more deliveries monthly.

(c) Because Type B centers handle higher obstetric volumes, they require expanded medical staffing patterns and increased inpatient bed capacity compared to smaller rural health points.

(d) According to official national guidelines, a standard Type B Primary Health Centre must maintain a minimum baseline capacity of 4 to 6 indoor patient beds.

(e) This specific structural footprint provides adequate capacity for short-term postpartum observation and basic medical monitoring, distinguishing it from larger community hospitals or smaller sub-centers.

Final Answer: 4 to 6 beds

Answer: (B)

Go Back to Question 24

Q25.

Solution

Concept: Controlling vector-borne pathogens requires targeting specific points within the ecological transmission cycle. Disrupting the virus amplification loop before spillover occurs prevents transmission to human populations, who act as dead-end hosts.

Solution:

(a) The transmission model illustrates that the Japanese Encephalitis virus is maintained in an enzootic cycle involving Culex mosquitoes and domestic pig amplifiers.

(b) Pigs serve as optimal reservoirs where the virus rapidly replicates, generating high levels of viremia that allow feeding mosquitoes to easily acquire and propagate the pathogen.

(c) Humans do not develop high enough viremia to infect feeding mosquitoes, acting as dead-end hosts in this ecological pathway.

(d) To break this cycle, vector control measures must target the primary amplification loop between the insect vectors and the reservoir animal hosts.

(e) Implementing Indoor Residual Spraying inside animal shelters, combined with physically separating pig pens from human dwellings, lowers vector density near human populations and reduces transmission.

Final Answer: Indoor Residual Spraying (IRS) combined with separation of pig enclosures from human dwellings

Answer: (B)

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Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	B	3	B	4	C	5	B
6	B	7	C	8	C	9	B	10	C
11	A	12	A	13	A	14	A	15	B
16	A	17	B	18	B	19	B	20	B
21	C	22	B	23	A	24	B	25	B