



Faculty of Public Health

of the Royal Colleges of Physicians of the United Kingdom

Working to improve the public's health

PART A EXAMINATION FOR MEMBERSHIP OF THE FACULTY OF PUBLIC HEALTH

Of the Royal Colleges of Physicians of the United Kingdom

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**EXAMINATION QUESTIONS WITH KEY POINTS AND
EXAMINERS' COMMENTS**

N.B. Please note that these are key points, not model answers

Question 1

- a) What is meant by the term 'causality' in public health? (30% of marks)
- b) How does causality differ from the term 'association'? (20% of marks)
- c) What epidemiological criteria can be used to suggest evidence of a causal association? (50% of marks)

KEY POINTS

What do we mean by the term 'causality' in public health?

Causality is the 'relating of causes to the effects they produce'. (Last) (10%)

Causality in public health is important to identify modifiable and important exposures or risk factors for disease which will inform the development of prevention and control strategies. (10%)

Better answers may discuss multiple or component causes and interactions between causes and allude to causal models and diagrams. (10%)

Mention of necessary or sufficient and their distinction gains extra marks.

How does causality differ from the term 'association'?

Association is the statistical dependence of two variables. Candidates are expected to clarify that association implies statistical dependence. An association may be positive, if higher values for one variable is associated with higher values for the other, or negative, if higher values for one variable is associated with lower values for the other. (10%)

Causality may be refuted if an association is not present but the presence of an association does not imply a causal relationship between the variables. (10%)

Mention of discussion of bias, confounding and chance in relation to association vs. causation gained extra marks.

What epidemiological criteria can be used to suggest evidence of a causal relationship?

Evidence from epidemiological studies is inadequate to establish causality. There are frameworks which can be used to aid judgements as to whether an exposure or risk factor may be causal or not e.g. Bradford Hill's criteria/viewpoints. (10%)

Candidates are expected to clarify that judgement is required when applying the Bradford Hill framework.

Temporality is only necessary criterion for a causal relationship between exposure and outcome but the presence of temporality does not mean a relationship/association is causal. (10%)

Candidates may provide a list of other criteria with an explanation including strength of association, consistency of relationship, specificity of relationship, biological gradient, biological plausibility, coherence of evidence, experimental evidence and analogy. (20%)

Better answers may include a discussion on the limitations of formal criteria as aids for causal inference. (10%)

EXAMINERS' COMMENTS

This question was generally answered well, with good knowledge shown of the Bradford Hill criteria/viewpoints for assessing causation.

Strong candidates expressed the concepts behind causality clearly, with mention of concepts of necessary and sufficient causes in section (a). Few candidates explained the public health importance of identifying risk factors in developing population based strategies to improve health, or reduce disease.

In part (b) good candidates clearly specified that association implied a statistical relationship between two variables. In addition, many candidates correctly identified that an association may be due to chance, bias or confounding. Few candidates noted that causality would be refuted if no association between an exposure and a putative risk factor was shown.

In part (c) good candidates not only showed clear knowledge of the Bradford Hill criteria/viewpoints, they also stated that this framework was helpful in assessing causation, but definitive proof of causation was often a difficult judgement. Good candidates made clear the key importance of a cause preceding an outcome. Good candidates also noted limitations in the Bradford Hill approach, often referencing Rothman. Limitations most often noted were in regard to specificity, and biological plausibility. In addition some excellent candidates also described Koch's postulates."

Question 2

Write short notes on each of the following statistical techniques, explaining the purpose of each and giving an example of how they might be used in public health:

- a) A chi-square test for comparing two proportions (30% of marks)
- b) Non-parametric statistical procedures (30% of marks)
- c) Multiple regression analysis (40% of marks)

KEY POINTS

a) A chi-square test compares the proportions of an event between two samples. It tests the null hypothesis that the two samples come from populations where the underlying rate of the event is the same. It is valid when the numbers in the sample are sufficiently large (expected values greater than 5 in each cell). Details of the test statistic will gain extra marks.

Example:

Compare the proportions of smoking cessation following two different health education programmes. Any example would be acceptable provided that it is appropriate.

b) Non-parametric statistical procedures do not require any assumptions about the distribution of the values in the population from which the data are considered to be samples, thus are generally used when data are not normally distributed. When samples are large enough but not normally distributed transformation of the data (eg by log transformation) may enable parametric tests to be used. The most commonly used non-parametric procedures are those which are computed from the ranks of observations. An example would be the Mann-Whitney test which is used to test the null hypothesis that the measurements from the two samples come from the same population.

Example:

To compare the activities of daily living scale between two groups of elderly patients who were treated at home or in hospital as part of a clinical trial. Any example would be acceptable provided that it is appropriate.

c) Multiple regression analysis: This is a group of statistical techniques used for predicting an outcome variable from one or more predictor variables. In general MRA allows the influence of each predictor variable on the outcome to be assessed, with adjustment for all of the other predictors which might confound the relationship of primary interest. There are several different multiple regression techniques, each of which is appropriate for use with specific types of data. Expect, at least one example of which type of MRA to use with which type of data.

Example:

Children's results on cognitive testing can be predicted from factors such as birth weight, social class, parental smoking and type of schooling. Any example would be acceptable provided that it is appropriate.

EXAMINERS' COMMENTS

This question was generally well answered with some candidates giving very full and excellent answers to all three sections of the question.

For all three sections an example of the use of the three statistical techniques was required. Good candidates gave clear concrete examples of when each different technique is applicable and the

relevant type of data. Candidates who didn't give any examples immediately lost 30% out of the available 100% for this question.

For section (a) good candidates mentioned the null hypothesis under test, many gave the test statistic formula and the fact that the chi-square test deals with proportions but in the calculation the actual numbers are used.

In section (b) good candidates gave several examples of different types of non-parametric tests and the types of data they are used for in addition to the concrete example of a single test.

In section (c) several candidates interpreted multiple regression analysis as only multiple linear regression with the loss of relevant marks. Furthermore whilst it was helpful to mention simple regression (eg simple linear regression) as the basis for answering this question about multiple regression, candidates who spent a lot of time explaining simple regression in detail wasted valuable time which might have been better spent on explaining the several different types of multiple regression techniques.

Question 3

Following a celebration dinner attended by about 150 people, an outbreak of salmonellosis has occurred.

- a) Who are the at risk population and how might they be identified? (20% of marks)
- b) What type of analytical study would you wish to perform and what criteria would you wish to see fulfilled before you commence such a study? (30% of marks)
- c) List the categories of questions you would expect to see on any questionnaire used in an outbreak of this nature. (30% of marks)
- d) Indicate how data acquired from such an incident should be analysed. (20% of marks).

KEY POINTS

Most or all of the following points would be required for a pass:

- a) At risk population – all those who attended the function. Ideally they would be identified from a convenient register (e.g. guest lists and staffing rosters) but frequently asking attendees to identify other attendees may be required (“snowballing”). Providing contact phone number to establishment where the dinner took place for attendees to contact. Establishing a case definition—confirmed, probable and possible case. Case finding—by contacting laboratories, local health centres, A & E departments.
- b) Type of analytical study – retrospective cohort study would be usual. Other study designs might be accepted but a case would need to be made. Pilot questionnaire
Criteria – Preliminary enquires to test a plausible hypothesis. Adequate identification of at risk population. Adequate ascertainment of plausible exposures (particularly foods available).

A definition of the disease outcome would be required ie a case definition. This might be on a levels of ‘caseness’ in that there may be: (i) laboratory confirmed cases (ii) symptomatic cases (acceptable symptoms would need to be defined a priori so that specific questions could be asked in the questionnaire) (iii) not a case.

- c) Categories of questions:
 - Identify the subject (name, address, phone,GP)
 - Susceptibility factors (age, sex, intercurrent illness, medication, occupation)
 - Exposures (foods, drinks consumed)
 - Plausible other exposures which characteristically may be associated with illness (foreign travel, contact with other cases, animal contact, consumption of poultry etc.)
 - Clinical details about the illness (symptoms, date and time of onset, specimens submitted, complications, admission to hospital)
- d) Analysis – Descriptive—time, person, place as well as exposure to different variables. Food specific attack rates as well as any statistical significance to illness, 2x2 contingency tables;relative risks of consuming different food items. Epidemic curve. Background surveillance of salmonellosis

The following are additional points which might improve the answer to “good” or “excellent”:

- Use of media enquiries to identify risk population
- Recognition of difficulty of “universal exposure” (e.g. plated meal served to all guests; set meal) and value of data on amounts of food or drinks consumed.
- Open questions (what do you think caused your illness?) may be valuable.
- Techniques for handling confounding: Mantel Haenszel Test, logistic regression.
- Microbiological results of food and environmental samples –reviewed with epidemiological information.

EXAMINERS' COMMENTS

This was a straightforward question about investigation of a food poisoning outbreak. The question was generally well answered. As there were 4 parts, candidates who scored poorly in one part were able to achieve a pass if they did well in other parts of the question.

- The most appropriate study is a retrospective cohort study. Many candidates chose a case control study which could be used in certain circumstances but in general these circumstances were not explained.
- Very few candidates included the need to pilot the questionnaire
- List of category of questions to include in the questionnaire was generally well answered
- Only about half of the candidates considered the importance of early descriptive epidemiology to generate a hypothesis.
- Analysis revealed poor understanding of the calculation of food specific attack rates

Question 4

- a) Describe the development of a strategy for promoting healthy eating in people aged 65 and over in a defined population. (75% of marks)
- b) How would you implement and evaluate such a strategy? (25% of marks)

KEY POINTS

Most of the following and definitely those points marked with * should be included for a pass.

Development of strategy (75%)

- **Understanding of issues in defined population*** (e.g, hospital/community/long stay) and importance of maintaining adequate nutrition (defined) and prevention of nutritional deficiencies as well as reducing disease risk such as cardiovascular disease
- **Assessment of need** (from national or local data/survey) (ie assessment of adequacy of diet.
- **Vision of where to go ie what you want to achieve from strategy**
- **Evidence of effective interventions to improve*** – A relevant review and strategy is WHO (2004) Global strategy on diet, physical activity and health (includes parts relevant to the older population). Findings from international studies may not be applicable to chosen population e.g. if not insurance based health service. However successful interventions have been reported where individual feedback on diet, focus on high risk individuals, use of motivational group led model, emphasis on improving specific intakes – protein, vitamins and minerals. Few studies reviewing effect of wider policies on diet. *The lack of evidence may be true of many areas in public health where a strategy is proposed so it is important for candidates to highlight this.*
- **Setting targets/performance indicators***. These need to be relevant for and acceptable to the population chosen and based on consultation with local experts – nutritionists, dieticians, voluntary organisations, elderly and carers themselves. Examples may include evaluating intake against national or international standards before and after chosen intervention/strategy, diaries, meal planning and food waste in institutions (number of residential homes signing up to “healthy eating initiative.
- **Development of an action plan with key roles and responsibilities and timescales***
- **Other issues to be considered** – promotion via media, budget and cost issues, provide training to those delivering programme as necessary

Implementation and evaluation (25% of marks)

This Section should add value to the first section and not just repeat points made already.

- **Implementation through a multidisciplinary group***.
 - Overall lead, regular review, change if new evidence arises or unexpected harmful effects*
 - Understanding of possible barriers to implementation – e.g. may not be a high priority compared with other national/local targets or issues in the defined population
- **Evaluation** –
 - content of strategy against standards, evidence and good practice*
 - Acceptability by consulting/surveying target group (may be at variance from any initial consultation)
 - Change achieved by before and after survey/investigation
 - Lessons learned from the strategy
 - Final report

EXAMINERS' COMMENTS

This question was generally well answered although many candidates failed to define the target population.

- Many candidates did not define the stages in strategy development.
- In general, the health effects of poor nutrition in the elderly were not described
- There was little reference to the current literature
- Too often candidates suggested a list of possible interventions rather than focus on strategy development and implementation and evaluation.

Question 5

- a) For a geographically defined population, what information would you use in investigating inequalities (disparities) in health? (50% of marks)
- b) How could this information be used for the benefit of this population? (50% of marks)

KEY POINTS

- a) Identification of an appropriate geographically defined population e.g. country, region, local authority or health authority, primary care trust.
- b) Identification of appropriate measures of health from readily available data at local or small area level. This should include vital statistics, avoidable causes of death, admission or discharge data from hospitals, data on uptake of services by age and sex; morbidity data (e.g. infectious diseases, cancer registry data, data from primary care), and where possible linked to socio-economic classifiers.
- c) Health Profiles in England, Scotland and Wales could be mentioned as a good starting point for determining inequalities. In other countries only limited health data may be available on a small area basis. For instance, in Hong Kong, mortality data only are available at the small area (TPU) level, but often there is a mis-match between numerator data and denominator data, because they are collated by different government departments. Data on cancer incidence by small area are not routinely available. Hospital data covers a much wider area than TPUs; they are available on a district basis, but the problem is that these districts are not uniformly demarcated.
- d) Methods of measuring social status or disadvantage at the small area level - census variables used as a proxy for standard of living. Indicators of social disadvantage such as receipt of benefits, children at risk and in care, indices of social deprivation used in the context of the country involved. For example, in the UK indices of multiple deprivation (e.g. Jarman, Townsend, Carstairs etc) are based on combinations of age profile, educational status and housing status. Sources of data in Hong Kong are focussed around tertiary planning units (TPUs). Denominator data are limited to age, gender, educational level, income, housing type, occupation.
- e) Linkage of measures of social status or disadvantage at an area level to information about health at the level of the same geographical area requires coterminous or nested boundaries. For instance, census output areas or electoral districts often do not coincide with hospital catchment areas.
- f) Description of the way in which this information can be used to identify areas of unmet need, particular ill health, or under-utilisation of services, so that services can be targeted towards addressing inequalities in health using a multi-sectoral multi-agency collaborative approach.
- g) In many areas, routine data may be supplemented by locally collected data eg through local surveys. In some areas local authorities collect information on perceived health and social care needs using 'consumer panels'

The following additional points might improve the answer to 'good' or 'excellent':

- a) A good answer would elaborate on the quality of data available, the methodology for comparison at small area or other defining groupings, including the appropriate application of different indices of deprivation, and would refer critically to the literature.

- b) Advanced approaches such as the application of geographical information systems and record linkage might be discussed.
- c) Issues such as ecological fallacy (application of area-based measures to individuals) might be discussed.

EXAMINERS' COMMENTS

This question was generally well answered. Candidates often went in to long descriptions of the background of inequalities and some failed to answer the question set. In defining the geographic areas, some candidates actually named the PCT in which they were working which is generally not recommended..

Question 6

Write short notes on each of the following:

- a) The implications of casemix in measuring outcome (33% of marks)
- b) Population projections and their limitations (33% of marks)
- c) Death certification and registration in a named country (33% of marks)

KEY POINTS

a) The implications of casemix in measuring outcome

- Casemix is important in any comparisons of outcome as it is a important determinant of this.
- Quality of hospital data: comparisons need to be adjusted for this.
- Methods used include standardisation for age, sex, and birthweight, clinical scoring systems e.g. coma scales, CRIB score, cancer staging, healthcare related groups (HRGs).
- Casemix measures themselves may be subject to bias.
- May be impossible to adjust for all factors in casemix or indeed know the extent to which they do influence outcome.
- May be subject to manipulation and 'gaming' in hospital providers where coding is used to maximise income
- If casemix is not taken into account in outcomes, clinicians may be more reluctant to take on complex cases especially where results of interventions are made publically available.

b) Population projections and their limitations

Calculated by: Measurement of population at a given point in time;
Applying mortality rates over a given period;
Projection of immigration and emigration. E.g. net migration.
Birth rate projections.

Limitations: Only as good as assumptions and estimates made;
Accuracy likely to decrease further projection made into future;
May be less reliable for small areas.
Illegal migrant population always an unknown, sometimes big problem in certain cities.
Future fertility assumptions are always less robust than future mortality assumptions - therefore greater uncertainty around future births and child populations than for older age groups.
Variant projections take account of possible high and low scenarios for different components of demographic change.
Not very sensitive to local conditions such as the development of new housing estates or new towns

c) Death certification and registration

- Legal requirement therefore nearly all deaths recorded.
- Information given by doctor e.g. cause of death.
- Information given by informant (usually close relative) e.g. occupation of deceased.
- Information given by doctor subject to clinical judgement and may be less reliable for deaths in the elderly.
- Information from informant may be inaccurate and subject to bias.
- In England deaths should be registered within 5 days. The medical certificate of cause of death is taken to the register office where registration takes place

- In some cases the registrar will determine the need to involve the coroner, and in certain causes of death the police are likely to be involved at an early stage. In Scotland where there are no coroners, the procurator fiscal supervises any further investigation required.
- Post mortems may be carried out in certain circumstances and provide much greater accuracy for the death certification process. These may be carried out with the permission of relatives, but in certain circumstances (such as sudden or violent death) these may be required by the coroner or other relevant law officer.
- In Hong Kong a similar death certification system exists; requiring the doctor to fill in data and sign death certificate. It provides information on underlying cause of death and associated conditions; length of illness is not required on death certificates; death within 24 hrs of hospitalization, without known medical history or record of chronic illness / established diagnosis, requires autopsy followed by coroner's inquest; occupation refers to last job before death and is of limited use in linking death to occupational cause.

EXAMINERS' COMMENTS

This was a three part question in which it should have been possible to score high marks. The first section on case mix was answered very poorly; some candidates indicated that it was a research tool without any indication of its implications in the delivery and monitoring of healthcare. The question on population projections should have been straightforward with a surprising number of candidates demonstrating confusion between population projections and estimates. The final part on death certification and registration was also poorly answered with many candidates failing to describe the certification process (by a doctor or law officer) and also being unclear about the registration processes. Timescales such as the requirement in which to register the death were often given incorrectly.

Question 7

- a) Write short notes on the ways in which parental attributes and behaviour can influence (positively and negatively) the health of children in a named country. (50% of marks)
- b) Describe the types of action which can be taken to overcome adverse influences. (50% of marks)

KEY POINTS

Most or all of the following would be required for a pass:

Influences

- Antenatal parental behaviour (folic acid, smoking, good nutrition, alcohol)
- Maternal nutrition and maternal smoking, educational attainment of the mother and health of the child. Breast feeding, bonding, care of sick children, self esteem and confidence building in the child.
- Biological parents – genetic endowment
- Role models for smoking, alcohol consumption and drug-taking.
- Health effects of physical, emotional and sexual abuse.
- Health disbenefits of over-involvement in child progress e.g. stress from high expectations,
- Parental conflict and its adverse effects on the child. Parents who have been poor school achievers and association with truancy (and substance misuse) in children. Family break-up and criminal activity in children.

Types of Action

- Family level: guidance on parenting provided during the antenatal period and throughout the pre-school years of children.
- Community level - action to strengthen the family - pupil/parent partnerships in schools, parents support networks, community mothers' support groups, variety of community developments which strengthen parental responsibility in relation to children's health and welfare.
- Neighbourhood level: the concepts of healthy living centres, healthy neighbourhoods, social exclusion, social capital have parenting as an important way to address health improvement and at community level.
- National policy and legislation, for instance drugs and crime.
- Non governmental agencies – national or international eg. UNICEF

The following are additional points that might improve the answer to "good" or "excellent":

- Discussion of links between child health, parenting skills, health and social inequalities.

- Physical health (bronchitis, early death, obesity etc) and mental health difficulties. Adverse childhood events: Alcohol and drug misuse, domestic violence, parental mental illness, emotional and sexual abuse.
- Emotional literacy.
- Safety – adequate supervision of internet access
- Interventions e.g. resilience training
- Social marketing.

EXAMINERS' COMMENTS

Most candidates included the basic key points. Few managed to include any of the “additional points”. Although both parts of the question carried equal marks, candidates generally appeared reluctant to devote equal time to both parts. In most cases none thought about the structure of the answer.

The use of simple structures, (e.g preconception, antenatal, postnatal, childhood) would have helped candidates to cover the subject more thoroughly and achieve higher marks.

Question 8

Write short notes on each of the following, commenting on their implications for public health:

- a) the clinical iceberg (33% of marks)
- b) non-verbal communication (33% of marks)
- c) stigma (33% of marks)

KEY POINTS

a) the clinical iceberg

A term used to indicate that the true incidence/prevalence of disease in a population may be grossly unrepresented by number/rate/pattern of patients presenting with symptoms to a clinician. This is sometimes displayed as a diagram of an iceberg triangle for e.g. CHD or mental illness showing 'below line' morbidity; population at risk; healthy state.

Use population based studies to assess 'iceberg' phenomenon (Give examples, e.g. depression, diabetes)

b) non verbal communication

Studies of communication, particularly within families, have shown that much information can be exchanged between individuals without use of (speech or written) language. Information exchanged provides important signals about affect or rapport; degree of involvement, listening and emotion associated with particular social interaction. Alternative term is body language. Signals may include smiles, frown, raised eyebrows, gestures, postures, pattern of spacing, and gaze. Also applies to other situations eg. committees, foreign negotiations, appearances on television; medical consultations.

Visual loss or blindness limits ability to receive and respond to non-verbal signals.

Mixed messages may be communicated eg where non verbal and verbal signals are inconsistent. In clinical practice, often observed in communications about certain illnesses (eg terminal).

In research - non verbal communication may introduce (observer/interviewer) bias into findings of sociological or epidemiological studies.

May have implications for public health interventions which are operator dependent eg health trainers

c) stigma

Illness usually brings with it a social recognition that once labelled/or confirmed as sick by a professional the person concerned requires sympathy, care and absolution from normal functions.

However, social response to illness also affected by stigmatisation

Stigmatisation is a term used to indicate that a particular illness is perceived to produce an undesirable difference from normal.

Person believes themselves, and is believed by others, to be tarnished, inferior, not quite human; or threatening, as a result of having a particular condition.

Beliefs of the person about their illness and the reactions of those who interact with them, forces the person and their close associates to reconstruct his/her identity.

Number of stages involved in readjustment: Why me? Who am I now? What can I now do? Who can I relate to socially? (Goffmann)

Extreme cases can lead to complete social isolation of individual and associated family members (felt and enacted stigma).

Examples are: facial disfigurement; physical disability; HIV; mental illness. (Also examples of non stigmatising illnesses).

EXAMINERS' COMMENTS

Many candidates failed to demonstrate an understanding of the key principles of all three parts of this question. Many included considerable irrelevant information, while some appeared to have no relevant knowledge of one of the three parts of the question. A legible, structured and focused approach to presenting the information would have improved many candidates' marks.

Question 9

“The resolution calls on the health sector to upscale actions in adaptation projects to limit the impacts of climate change on health; to raise global awareness of the impacts of health from climate change at national and international levels; and to boost political attention and action.” (extract from Sixty-first World Health Assembly, Resolution WHA.61.19, May 2008.)

Describe, in a geographical region of your choosing, how you, as a public health specialist, would seek to implement this resolution.

KEY POINTS

In order to pass, a candidate needs to demonstrate awareness of the main health impacts of Climate Change, which include;

- Flooding, windstorms (cyclones) and their direct impact on populations
- Water-borne disease
- Vector-borne diseases
- Health impact of temperature rises
- Air pollution
- Population migration and its impacts on health

The emphasis which candidates place on different aspects is likely to vary depending on the region they choose to consider. Climate change is being felt most in coastal areas, continental masses, in the tropics, and in low-lying, densely populated regions.

Candidates should demonstrate awareness of the impact of how people live, on climate change, and the link between greenhouse gas emissions and the following:

Energy production and usage

Industrial manufacture

Transport systems, especially those dependent on fossil-fuels and private vehicles

Agriculture- land use, and fertilisation

Waste processing

The health benefits of action to adapt to, or mitigate climate change include:

Better health through more active modes of travel, such as cycling and walking

Improved diet through consumption of less highly processed, energy dense foods

Improved diet through reduced meat consumption

Improved air quality as fossil-fuelled transport is reduced

Fewer road casualties

Healthcare systems in developed and developing countries have a significant impact on greenhouse gas production. Public health, as a key part of such systems, can bring about beneficial change in any of the following areas;

- Energy usage
- Procurement policies, especially of food, medicine and single-use items
- Water consumption and conservation
- Waste, its reduction and disposal
- Design, location and delivery of health care
- Travel patterns of staff, patients and visitors
- Integration of healthcare and related services

EXAMINERS' COMMENTS

Generally, candidates showed a reasonable knowledge of the adverse health effects of climate change, and recognition of the way impact will vary according to geography and resilience of specific

populations. Their ability to turn this into a credible action plan was more variable. Without exception, candidates could have made more of the fact that many actions to combat climate change will also benefit health (the 'co-health benefits'.)

The isolated, exceptional answer also looked forward to the changing international policy background, which will present opportunities for the enlightened public health practitioner to seize, wherever he or she operates.

Question 10

Organisational change occurs frequently in health services. Drawing on management theory, suggest an organisational strategy for dealing with such change in a healthcare setting of your choice.

KEY POINTS

1. Description of the current state of affairs in the chosen healthcare setting; the strategy for change should reflect whether a large organisation or a small one is selected.
2. Describe why there is a need to change, including the drivers for change. Management theories/models include use of SWOT analysis.
3. Describe how complexity, interdependence and fragmentation in the chosen healthcare setting can be understood. This should cover power relationships, identification of key players, stakeholder analysis, the interaction between work structures and systems, procedures and people, and influencing skills for achieving change. Management theories/models include Weisbord's Six-Box Organisational Model, 7S Model, PESTELI, Five Whys, Content, Context and Process Model, Soft Systems Methodology, Process modelling, Process flow, Influence diagram, and Theory of Constraints.
4. Describe who and what can change. Management theories/models include use of Force field analysis, Sources and potency of forces, Readiness and capability, Commitment, enrolment and compliance, Organisation-level change interventions, Total Quality Management, Business Process Reengineering, Group-level change interventions, Parallel learning structures, Self-managed teams, Individual-level change interventions, Innovation research, and securing individual behaviour change.
5. The strategy needs to involve all people and their representatives involved in the change.
6. Formulate a vision of what the new world could look like as early as possible and promote this. There needs to be frequent, timely, repeated, and accurate communication with all stakeholders during the change process about all significant change proposals and actions.
7. Describe how change can happen. Blocking, stress and conflict need to be identified and managed. Management theories/models include use of organisational development, organisational learning and the learning organisation, action research, and project management.
8. Create task forces for tackling particular problems and securing specific projects.
9. Explain and consult about the proposals to enable them to prepare to change.
10. Monitor and evaluate its effects.

EXAMINERS' COMMENTS

The examiners expected to see the answers covering a real example of change. The better answers did this since they contained actual experiences to which candidates could apply their theoretical management theory. Some candidates focused too much on management theory without conveying a sense of the practical and necessary stages in the management of change. At times the disgorgement of theory had only a loose connection with the task in hand. This approach did not instil confidence that the candidate would be a competent member of a team involved in change management. The best answers recognised that the concerns of staff involved in change are paramount and exemplified ways of discerning these and responding to them in a win-win way. This question was relatively straightforward and many candidates answered it to a good standard.

Paper IIA

You are a Director of Public Health with responsibility for an area in which uptake of measles, mumps & rubella (MMR) vaccination is 80%. The following paper is brought to your attention:

Lamden KH, Gemmell I. General practice factors and MMR vaccine uptake: structure, process and demography. *J. Pub. Health* 2008; **30**:251-257.

1. Write a critical appraisal of the paper. (40% of marks)
2. The authors state that *the MMR uptake was strongly correlated with the IMD domain of barriers to housing and services (Figure 4)*. Suggest an alternative method of statistical analysis which would be less influenced by the skewed distributions of MMR uptake and IMD score in Figure 4. (10% of marks)
3. The authors suggest that *qualitative methods... may be required to examine practice systems in more detail*. You wish to conduct such qualitative research in your area to identify the components of a 'strategic approach' to MMR prevention. Outline the methods that might be used and the key issues that you might wish to address. (20% of marks)
4. Write a brief article (500 words) for inclusion in your annual newsletter to local immunisation teams. The article should summarise what you consider to be the key findings of the JPH paper and suggest how these findings might be used to improve the uptake of MMR vaccination locally. (30% of marks)

KEY POINTS

1. Critical appraisal

This should demonstrate a systematic approach which covers the following areas:

- Is there a clear rationale for the study.
- Has the strongest study design, appropriate to the research question, been used.
- Were the sources of information appropriate.
- How were general practice factors (practice structure, deprivation, ethnicity, process measures) measured; was measurement of these factors subjective or objective. Was measurement valid and reliable. Could measurement of any of these factors have been subject to error or have led to biased results.
- For example, the use of practice level deprivation scores are only a crude proxy for the socioeconomic status of individual patients registered with the practice (non-differential measurement error).
- Comment on the questionnaire response rate.
- How was MMR uptake measured; was measurement subjective or objective. Was the method of measuring MMR uptake valid and reliable. Could measurement of MMR uptake have been subject to error or have led to biased results.
- Were the statistical methods of analysis appropriate

- Were the number of participating practices sufficient to minimise the play of chance
 - How are the results of the demographic and structural analysis presented and what is the main result
 - How are the results of the questionnaire analysis presented and what is the main result
 - Although there was a strong association between having a strategy for MMR and MMR uptake, this is a hypothesis generating finding and does not prove causality because having a strategy was self reported and data are cross-sectional. An RCT would be required to determine if having a strategy for MMR increases MMR uptake.
 - There were multiple hypothesis tests so the two observed associations could have arisen by chance (type I error).
 - How precise are the results (confidence intervals)
 - Were all important outcomes considered so the results can be applied to a local situation
 - How strong are the associations. Are the results of clinical or public health significance.
 - Are the results generalisable beyond the study population.
 - Did the study have ethical approval. Who sponsored the study. Were there any conflicts of interest.
2. Spearman's rank correlation coefficient would be more appropriate than the Pearson correlation coefficient used by the authors. The inverse correlation shown in Figure 4 may have been unduly influenced by outlying observations for both the "MMR uptake" and "barriers to housing and services score" variables.
3. Outline of methods used for qualitative research:
- Use of semi-structured interviews conducted in the form of a guided conversation, with use of a loose interview schedule or prompt-guide to ensure specific questions relevant to the research enquiry.
 - Mention of new areas of interest emerging during the data collection phase possibly being incorporated into later interviews.
 - Maximum variation sampling - types of experiences included being influenced by any or all of the following: the literature, observations, discussion with experts, focus groups, pilot work and early interviews. The inclusion of as broad a range of relevant people as possible. Use of snowballing.
 - Analysis based on assigning labels (or codes) to sections of data from the interviews which are then incrementally grouped into organised categories that reflect the emerging themes. The analysis proceeds as interviews are being conducted to assist the incorporation of emergent themes into the later interviews.

Key issues:

- Leadership, team work, information, use of protocols, proactive/ outreach for defaulters, monitoring and review, training
- Consideration of local geography and access to services
- Strategy and objectives for MMR vaccination, why were some strategies successful and how was this achieved?
- Are the findings transferable to other contexts?

4. Article in local newsletter to immunisation teams

Using suitable language the article should demonstrate:

- Recognition of the local situation
- Summary of the findings of the Journal of Public Health paper
- Suggestions as to how these findings might be used to try and improve MMR uptake within the primary health care/immunisation teams' localities.

EXAMINERS' COMMENTS

This question allowed candidates to gain credit across several domains: critical appraisal, statistical methods, qualitative research, and communication skills. The results were disappointing, especially for Q3, the question on Qualitative Research, and there were few really good candidates with consistently good answers across the entire paper.

Q1. Too many candidates simply repeated information given in the *J. Pub. Health* paper and/or gave information not actually asked for, such as suggestions as to how the investigation presented in the paper should have been carried out. This often resulted in several pages of writing with very little to award marks for. The paper was a straightforward one on a topical issue, yet relatively few candidates succeeded in covering sufficient of the key points to pass this section.

Q2. This question was easy to pass well and easy to fail badly. A lack of basic statistical knowledge was apparent in the answers given by many of the candidates. The question actually informed candidates that the data was skewed; thus a non-parametric test was implied. The non-parametric equivalent of Pearson's for paired data is Spearman's rank correlation. Transformation of the ranks to a normal distribution is an alternative approach.

Q3. Papers making use of qualitative methods of analysis are increasingly seen in the medical (and other) literature. This subject was also covered in a series of articles in the BMJ last autumn. It was therefore disappointing that few candidates appeared to have much knowledge of the subject and few were able to list many (sometimes any) key issues which they might want such research to address. Examiners were looking for three elements to the answer. What to ask: especially leadership, who's responsible, can they commit resources, do they deal with 'non-attenders actively (go to them) or passively (invite them again); how/who to sample: extremes; analysis: how to turn anarchic 'free text' into coded and categorised information.

Q4. Many brief articles written for newsletters were couched in patronising terms inappropriate for professional people. Although the key findings of the paper might have been summarised, suggestions as to how the findings might be used to improve MMR uptake locally were poorly demonstrated and often were little more than re-stating the need to develop a local strategy. The problem may have been candidates leaving themselves insufficient time to tackle this question, which is a pity as up to 30% of the total marks were available for good answers.

The examiners considered it essential that the report should start with a bar chart of local vaccination rates by Practice. This was done by no candidate, not even those who mentioned feedback or audit. IMD scores and any other explanatory environmental factors are of little relevance to Practitioners - the Primary Care team usually know a great deal more about the socioeconomic circumstances of their patients than any IMD score would tell them (and probably more than is on a census form). The newsletter might have touched on this through discussions of supportive performance management of PC teams, offering help to those with challenging populations.

Paper IIB

You are a public health consultant/specialist responsible for the health of a population in Area A, an area with poor health and deprivation indicators compared to the rest of the country. Your Director of Public Health/Chief Medical Officer has requested that you submit a report on the health gap between Area A and the rest of the country.

Q1: List four key demographic, behavioural, health or disease parameters that you will include in your report (10% of marks)

Tables 1 and 2 compare the average life expectancy in males and females at birth respectively (in years) between Area A and the rest of the country.

Table 1: Life expectancy at birth – Males

	1995–97	1996–98	1997–99	1998–00	1999–01	2000–02	2001–03	2002–04	2003–05	2004–06
Rest of the country	74.6	74.8	75.1	75.4	75.7	76.0	76.2	76.5	76.9	77.3
Area A	72.7	72.9	73.1	73.4	73.7	74.1	74.2	74.6	74.9	75.3

Table 2: Life expectancy at birth – Females

	1995–97	1996–98	1997–99	1998–00	1999–01	2000–02	2001–03	2002–04	2003–05	2004–06
Rest of the country	79.6	79.7	79.8	80.0	80.2	80.4	80.7	80.7	80.9	81.1
Area A	78.2	78.3	78.4	78.5	78.7	78.9	79.2	79.2	79.4	79.6

Q2: What do you understand by the term life expectancy at birth? Why is the life expectancy for males at birth lower than females? Estimate the absolute and relative gap in life expectancy **for males only** between Area A and the rest of the country for each of the periods 1995-97 and 2004-06 (20% of marks)

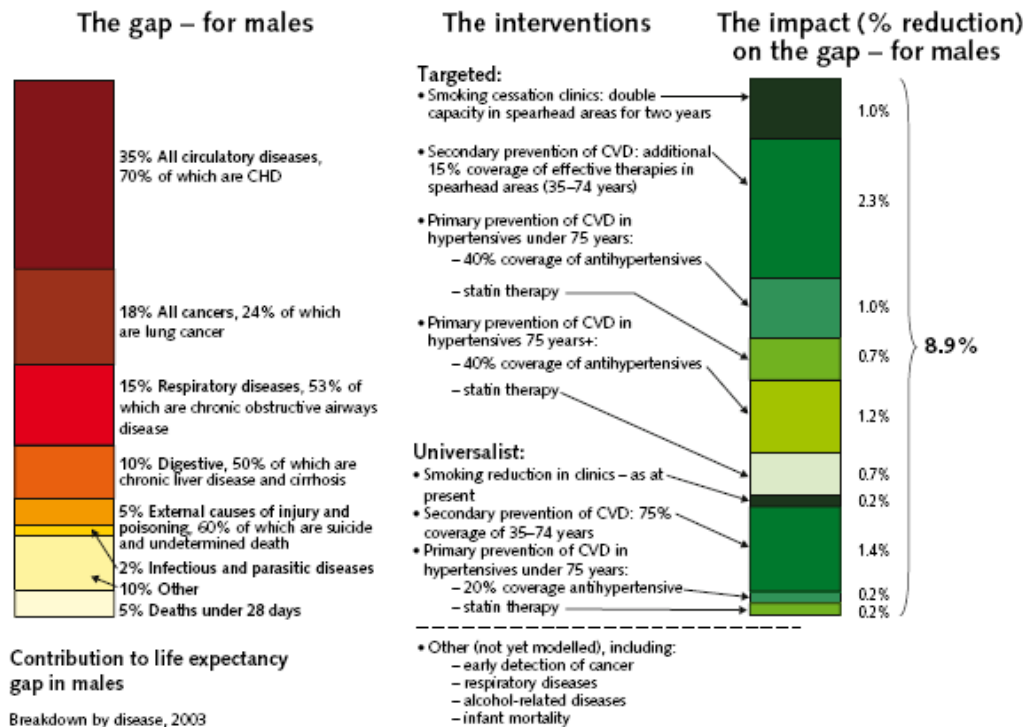
Q3: What do you understand about relative gap? What is the added advantage of measuring relative gap in life expectancy over absolute gap? (10% of marks)

Q4: Calculate a measure for the change in the relative gap between Area A and the rest of the country from the period 1995-7 to the period 2004-6 **for males only** and comment on your findings (10% of marks)

Q5: Given that the life expectancy at birth in the rest of the country is projected to rise to 79 years for males in 2009-11, what should be the life expectancy for males in Area A in 2009-11 to achieve a target reduction of 10% in the relative gap from the 1995-97 baseline? (20% of marks)

Q6: Figure 1 shows data from a recent national policy document illustrating the major causes that contribute to life expectancy gaps in males and the scope for reducing these by various interventions. Assuming that these data apply to Area A, write a briefing paper of up to 500 words for your Director of Public Health/ Chief Medical Officer demonstrating how the target of a reduction of 10% in the relative gap for life expectancy in males between 1995-97 and 2009-11 could be achieved in Area A. (30% of marks)

Figure 1: Major causes responsible for gap in life expectancy in males and various interventions that can reduce it



KEY POINTS

Q1. Essential points

Any four of the following would be needed

1. Life expectancy from birth (in years) in both males and females
2. Infant mortality rates
3. Under-18 conception rates
4. Cancer mortality rates
5. Circulatory disease rates
6. Child road causality accident rates
7. Smoking prevalence
8. Perinatal mortality rate (number of stillbirths & deaths in first week of life/1000 births)

Q2. Essential points

Life expectancy at birth = average number of years to be lived by a group of people born in the same year

Women live longer than men. Males have higher death rates (accidents & cardiovascular diseases)

The absolute gap = $RB - RA$

RA = indicator value for disadvantaged group (group A)

RB = indicator value for reference group (group B)

The relative gap = $[(RB - RA) / RB] \times 100$

Additional points

Assumptions for life expectancy- the mortality at each age remains constant in the future

Other causes for male higher death rates - violence when young and cancer rates (especially lung cancer) in later life.

Smoking - key factor responsible for the difference

Absolute gap in 1995-97 = 1.9 years and in 2004-06 = 2.0 years

Relative gap in 1995-97 = 2.55% and in 2004-06 = 2.59%

Increase in both absolute and relative gaps in life expectancy between 1995-97 and 2004-06 in area A

Q3. Essential points

Relative gap measures how unequal is the health experience between groups

Additional points

Both are important to assess progress on inequalities

The absolute gap measures the impact in absolute terms

Use examples such as cancer deaths to illustrate the difference between absolute and relative gap

Q4. Essential points

Percentage difference in relative gap is an appropriate measure

The relative gap in male life expectancy between Area A and the rest of the country has widened

Additional points

The difference = $[(R_c - R_b) / R_b] \times 100$

R_c = Relative gap in the current period

R_b = Relative gap in baseline period

Percentage difference in the relative gap = 1.57%

The relative gap in male life expectancy between Area A and the rest of the country has widened by 1.57%

Q5. Essential points

The relative gap in 1995-97 is the baseline. A 10% reduction would mean a 10% reduction in the relative gap from this baseline.

Life expectancy can be estimated if we know the relative gap and life expectancy in the reference population

Additional points

The relative gap in 1995-97 was 2.55%. A 10% reduction would mean a relative gap of 2.295%.

If relative gap (RG) = $[(R_B - R_A) / R_B] \times 100$ where $R_B = 79$ years and $RG = 2.295\%$

Then $RG/100 = (R_B - R_A) / R_B$

$$(RG/100) \times RB = RB - RA$$

$$RA + [(RG/100) \times RB] = RB$$

$$RA = RB - [(RG/100) \times RB] = 77.2 \text{ years.}$$

The life expectancy for males in area A needs to be 77.2 years in 2009-11

Q6. Essential points

- The paper should state its objective i.e. to seek board support in agreeing priorities to tackle life expectancy gap in males
- It should highlight the absolute and relative gap in life expectancy in males between their area and the rest of country
- It should highlight that the relative gap has increased over the last 10 years
- It should propose a reasonable inequality target
- It should present an analysis of the causes of life expectancy gaps in males
- It should make recommendations to the board and propose interventions which are likely to reduce the gap

Additional points

Able to explain absolute and relative gap in lay terms

Explains the estimate and underlying assumptions in lay terms

Presents causes of life expectancy gaps in males with examples using key references

Able to suggest which interventions are most likely to give highest return in achieving local area target for reducing relative gap in male life expectancy

Presents logical sequence within the text

EXAMINERS' COMMENTS

Q1 and Q2 were both answered satisfactorily by nearly all of the candidates.

Q3 was answered satisfactorily by a majority of candidates, who demonstrated an adequate understanding of the concept of proportionality.

Q4 was answered less well, with some candidates not grasping that this question was about comparing the relative difference between two percentages. Some candidates lost marks for treating this as a ratio of the two relative gaps. Also, candidates lost marks by either making careless arithmetical errors or by not calculating differences to enough decimal places.

Q5 was answered either very well or very badly. Most of those who understood what was being asked were able to do the relatively simple arithmetic involved in deriving the correct answer and achieved most or all of the marks for this question. In contrast, those who didn't scored low or very low marks.

In Q6, most candidates could present an analysis of the causes of life expectancy gap and propose actions to reduce this. This is unsurprising given that the data were supplied in the question. Higher-scoring candidates included an accurate comparison of life expectancy for Area A and the rest of the country and/or a discussion about the extent to which the data applied to Area A and/or a discussion on the pros and cons of a targeted versus a universalist approach.