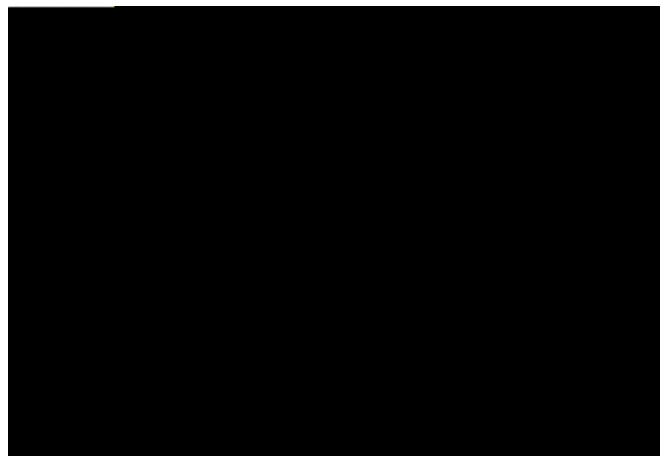
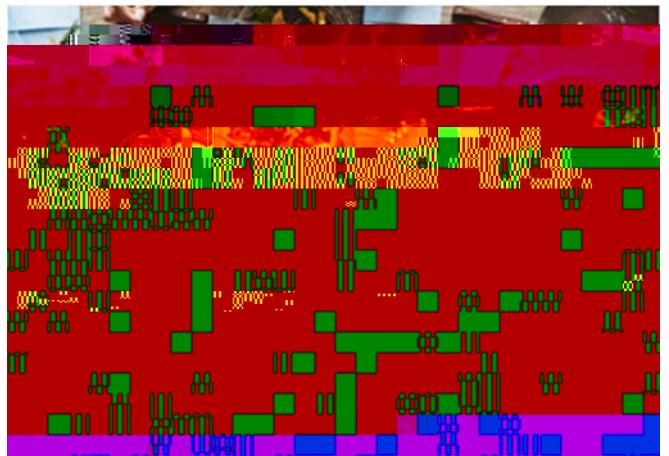


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+ R Q R X U V 3 U R M H F W



& R Q W H Q W V

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, Q W U R G X F W L R Q

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\$ S S O L F D W L R Q F K H F N O L V W

/ L V W R I 3 U R M H F W V

' H W D L O V R I 3 U R M H F W V

, QWURGXFWLRQ

%\$JU6F +RQV %6F +RQV DQG %92 +RQV VWX
 FRPSOHWH D FDQGLZULSWRMDHGWVHVOWDHWQRQKID
 GLVVHULDWLQV DUDQGJHWXSDHWYK VEHDG/ HEVWDDQI DFFHDFG
 7KLV ERRNOHW FRQWDLQV DOLVW RDVORDEHORI LQK
 FRPLQJ \HDU LW PD\ EH WKDW RWKHUWSXGRHMQHFWD
 VWURQJO\ DGYLVHG WR WDON WR SRVWHEQVH DO V
 \$FDGHPLF UHVHDUFK VWDII KDYH WKHLU RZQ ZHE
KWWSV UHVHDUFKHUV OLQFROQ DF Q]

\$LPV

'LVVHULDWLQV DUHQGLPHGXWQ ZUDHUGHDXUFK DQG V
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 WKH LQLWLD SURSRVDO UHYLHZ RWVOEWRQGQFWX
 H[SHULPHQWV DQDO\VLV RI UHVXOV\O DSQJCR YWLIGHL
 DVVHVVPHQW RI WKHILWWXGRHQVQG XDFEADUQIG HDSQHQG
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2EMHFVLYHV

\$W WKH FRPSOHWDLRQRI DDVWLXGHQW VKRXOG EH
 EUHDN GRZQ D SUREOHP LQWR NH\ TXHVWLR
 GHYHORS WKRQHWRXDIUMLVRHOULEK SURSRVDO
 UHDG DQG FULWLFDODVVHVV OLSHILFDWXU
 ZULWH D UHVHDUFK SURSRVDO
 SODQ DQG FRQGXFW DSSURSULDWH UHVHDU

(QUROPHQW

3OHDVH UHIHU WR WKH 8QLYHUVLW\ ZHEVLWH
KWWSV ZZZ OLQFROQ DF QJ VWXG\ VWXG\ SURJU

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<RX QHHG

(QJOLVK DV D ILUVWLQDQGRDXRHRQW\$QWRORQKR
/DQJXDJH SURILFLHQF\%
%LUWK FHWLIMFDHWUWUISHQVFSRSULHV RQO\\$
\$FDGHPLF WUDQVFULSWV RIILFLDOOFWSHLHWL
HGXFDWLRQ TXDOLILFDWLRQV HLWKISU FRPS
7KH QDPH RI WKH DUHD \RX UH DSSOR\JQJDQRG
D VWDWHPHQW RI UHVHDUFK LQWHUHVW

7R DSSO\ RQO KQHW\$R WR ZZ OLQFROQ DF Q] VWXG

6SHFLDO ,QRDWWHHU %DFKHORU GHJUHH VWXGLRQX
IURP /LQFROQ 8QLYHUVLWR\XWDRUMWWXGLQORQRTXAVUH
DQ DSSOLFDWLRQ IRUP SULRU WR UHJLVWUDWLRQ

/LVW RI 3URMHFWV

1R 3URMHFW 7LWOH

6XSHUYLVRU DQG HPDLC

\$FLG VRLOV DQG DOXPLQLX~~B~~ WLR[DRLW\ 1RYHO
OHJXPHV IRU KLJK FRXQWU\ -LP ORLU#OLQFROQ DF C

\$UH SLQH SODQWDWL RQV J3UHRHQ KRRV&HO BXVK
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([SORULQJ WKH HIIHFW RI %UD 00DT XHF KEHDQHJ] INQ V
PDGH IURP VLQJOH RULJLQ RDN DQG GLIIHUHQW
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7KH SURGXFWLYLW\KRJL6FWRWQWWO DQGRVSWI LRHGV E Q DV R
PRLVWXUH OLPLWHG QJGJ RDZFLQJ WRHLDOWR GSL+DLRQD CQ'D ZK
FORYHU KDV EHHQ \VSRDZQWDXW HV KJH JXHP HU VELXWW I DYLKVXW R
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WR LPSURYH GU\ODXQGV ISRDQ WXRUZH\\$H B GQ XAFRH UQH LV N
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E\ VRLO S+ QFRURH DWHM G LV RQDP DFLXGVWH GH DQSSCZKHUH V
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% L D V H V % L R G L Y H U V L W \ D Q G % L J G D W D

7 K H V W X G H Q W Z L O I O P S Q M A D V Q L F J D W I H E M F R R Q L R Y J H U K W I L V Q V L Q Q D
G D W D V H W V I U R P H P S Q H D U Q L P / H H Q / W D V O D Q R G Y V H I R I W W K H Q Z A R K U R O X G J K
W K D W E L R G L Y H U W L R V S H I R S E O H Q U H I R E I Y D Q S D V O R J W R H V H D U F K
R Y H U V H D V K D Y H D U W J X W \ G L W K D W C G H V V Z H P K S D R Y U H W W Q R V X W K K
7 R E H W W H U X / Q K G L H V U W W B Q G M X C W H Q V M R X Z J L K O V Q D K W H D O V S H V N Y H O
Q H Z D Q D O \ V H V I R U E W I R K S I H M H H U P V Q L V Q R Q Q H V D V Q D W O R I W H X V R Q
F R P S X W H U V L V Q H H S G U H D G F W Q F G H V I R V P B S S U H F L D W H G

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U\HJUDVV±ZKLWH FQXFIW WZDIUHGQ WIRUQ QP RI IQ JUDDQ LIQRJR W
GDLU\ IDUPV +RZH YHM R H SIQ B WWDHLQHIDQV IJ HOGXDFFLQLQJQ Q L
IDUP OHYHO LV \HW MDRU FEGHAR Q WLXQH DQE Q X QLHQYJH DQRF
SODQWDLQ LQ WKHD R YHHJW B VJH GKVLNDHU E QQ OMOK H W R W
SDVWXUH 'O KDV EH BQ HWKWD/ELQFLVRKQHGDBQE K HD VWW\ 5H

(IIHFW RI D IXQJD O E K R Q F R W Q Y H Z R R P S I R W E R U Q H S C
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6RLO ERUQH SDWKRHJDIQLVQD USHU RDQOLHQF LSWR DJULWFLXPOQW X:
ZLOO EH LQYHVWLRIID DVLEQJL DFKWML D E LOKOMA LSFUDROG K R A G RE
VRLO LQKDELWLQJ WXZQRJ X VR LVOR EFRUQQMDSRDMX KURJHZQKH D W
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VHHG FRDWLQJ RQ WKSHD W K R JHRLQDOLYQR KXQGX VM RV W
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RI WKH FRPSRXQG LRSQODQW W KSHU PSQJXHFWMHQ RH WDQHG DE VH
FRPSRXQG

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(IIHFW RI HDUO\ OLIH PLON IHHGLQJ RQ OLIH WL P
, Q WKLV UHVHDUFKG SIQRMZIEOMOJ WRKHS/DKQGDPMHN \LHOG
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UHVHDUFK ZLOO LQYJHKWW L D D W HD Q GRYIHOQV WL IOO G WRD WALKRH
KHLIHUV

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Email: [5DFKHDO%U\DQW#OLQFROQDFQ\]](mailto:5DFKHDO%U\DQW#OLQFROQDFQ])

(IIHFW RI VKHOO PDWHULD D Q G J H R RQHWU\ RI PL
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RI WKH WHDW FXSRVKHMO\ DRQ GP LVOKNH EUDQFH UP/L O D Q QLQJQ I O X
SHUIRUPDQFH D Q G WIKHRZRPLR UW HRG D QHW B QL W D H DHLQH
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HDFK ILWWHG ZL WIKQWLQH R HRW UGLH VHSRQI IRRUW QPFLH D Q
WKH FRPIRUW RI WKH FRZV

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Email: [2PDU\\$O0DUDVKGHK#OLQFROQDFQ\]](mailto:2PDU$O0DUDVKGHK#OLQFROQDFQ])

* U R Z L Q J K L J K Y D Q X G H P Z D K L H I D V R Q & D Q W H U E X U \ V R L O
\$ U D E O H I D U P L Q J V \ W W L H R P Q M D Q D Y H H P A S U K D D G / E J H R G S L Q F U H D V I
S U R G X F W L Y L W \ H D O Q Q G R J Y U H D U L L Q W K R Q D Q Q L X W W D V O U D / W H 7 J K K D V
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= H D O D Q G 7 R G D \ ¶ V V D H U F D M E R O W H U D Q X Q L Q H M Q R G D D P H V Q X L I W

/RZ 1 GDLU\ IDUP V\VWHPV

, Q R U G H U W R P D N H B Q R I Q] H U D H E G O X H F L L Q P J S H D Q Q I R V M I D B P L I Q Q
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Q L W U D W H O H D F K L Q H J D D Q V G H P U L N H Q R I Q R V X V W Z / B 5' D U K F D Q Y H H W V
E H H Q H V W D E O L V K H Q K M R H L I Q H Y F H W V L J F D P W L R Q Q J R I Q P L W L .
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1 6 \ V W H P V S U R I M H H F M Y I D Q Q J G / D E R U D W R U \ I Z K L W A K H E V N Q O V O
D Q G H [S H U W L V H I U R I P V I H D U F K =) \$ Q W H U U D D Q G & 5 9

Supervisor: Dr Racheal Bryant

Email: 5DFKHDO %U\DUQW#OLQFROQ DF QJ

1LWURJHQ F\FOLQJ LQ WHPSHUDWH UDLQIRUHVW

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IXQFWLRQDO XQGHU\WQ\ DQG QD RQFRV\ QLXW\UDWQ HWHQ\WU HRP H
KXPDQ DOWHUDWLRC\WFRV\ WIKPHL WL RWMDRE\OOLW\ WE DW\RI OHV
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UDLQIRUHV WWWRQRW\K W\RH, WOKDHQGR\& WRKYLQGDQ\ IS RW\K UDO
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XVH VRLOV FROOHF\W\H\GWI UDOPWID\WUXRGV\\$/LDH\BQGW\FO\W\ RD\W\H\W\J
XQGHUVWDQG WKHZ\H\H\Q DQW\W\RUQV/JKHLQS EDW\W\H\O\ D\QIGO\ L\W\ F\G
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ODERUDWRU\ FKDU\W\W\H\W\LPV\W\W\UR Q\H\G\W\RL\Q\J\ R\J\H\Q\ SUR

Supervisor: Dr Naomi Wells, Dr Charlotte Alster

Email: 1DRPL :HOOV#OLQFROQ DF QJ

1XPHULFDO VLPXODWLRQ RI ZDWHU WGDQVSRUW

, Q Y H V W L J D W L R Q R I I H Z U D H A Q H M W O I O V R D W L X Q U D H I Q H M G L D / Q R L V O R / L V H
F K D U D F W H U L] H Z Q W H L Q G Y D V G A R V I H E X R A Q G H R I V, W U D H O D W R S U R Y L
L P S O L F D W L R Q V W R Q Y Q H Y G I V F V R Q J D D M P H C G D Q R A X Q G D Q Q W B R U W
F D X V L Q J J U R X Q G Z D X M H W R S R Q Q X W H R Q W O' L Q R Y P D S G R H M H Q J R V Q
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7 K L V V W X G \ Z L O O W S D S N U H R D F Q X W R U V L F P D K O H D G W Z H V B I Q G D S S
P L J U D W L R Q L Q S K \ V L F D O O \ K H W H U R J H L Q H S R U K R / I L D Q Q H G V Y D

Supervisor: Dr Chamindu Deepagoda

Email: & K D P L Q G X ' H H D \$ D J R Q F R O Q D F Q I

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:LOG NLZLIUHQWL DIR QPDIQ W DIOHZ H H Q DQGX VDWLG D H G
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\$UEXVFODU P\FRU\P KDJUDHO D\QQLPLS R\\$UWWDQW JURXS RI W
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